Comprehensive Care Project Written Report Guideline

Student: Airel Harte #2332

I. Patient Identification (No names of the patient needed for privacy)

1. Age: 64
2. Sex: Female
3. Race and/or Ethnicity: Hispanic
4. Marital Status: Widow
5. Occupation: Housewife

II. Chief Concern

1. Three years since last dental hygiene cleaning
2. Evaluation of fractured teeth and root tip

III. Medical History

1. Past Medical History (include last physical examination)
    a. Last physical exam was 3 years ago
    b. Abdominal hernia repair surgery 5 years ago

2. Past medication or drug use
    a. Past medication
        - Patient was given pain medication after the abdominal hernia repair. However, she does not remember the name of the medication. Pain medication was only taken for a few days.

3. BMI (Body Mass Index) – Obtain information, height and weight, asking the patient (no measurement will be taken on patient)
    a. Height: 5'2
    5'2 → 157.48cm → 1.57m
    Square of height: (1.57 x 1.57) m^2 = 2.46m^2
    b. Weight: 189 lbs.
    189 lbs → 85.729kg

BMI = kg/ m^2 BMI = 85.729kg/ 2.46 m^2 BMI = 34.8 kg/ m^2

The patient's BMI is 34.8 kg/ m^2 which falls within the range of obesity (25.0 kg/ m^2 - < 30.0 kg/ m^2). There is a strong correlation between obesity and periodontal disease as inflammation from obesity can increase a person's predisposition to periodontal tissue destruction. In addition, obesity can put the patient at risk for developing other health concerns such as diabetes, cardiovascular disease, and many others.

4. Family History:
    a. The patient's husband was previously diagnosed with having high blood pressure and high cholesterol. Unfortunately, he passed away from a heart attack a year ago.
    b. The patient's mother was previously diagnosed with type II diabetes. Per patient, her mother passed away from old age four years ago.

5. General
    a. Patient is allergic to penicillin.

6. Hospitalizations
    a. The patient was hospitalized twice over 20 years ago when she gave birth to her two daughters. Their birth was via vaginal delivery and there were no complications that occurred to the patient or her newborns. Her daughters were born within two years of each other.
    b. 5 years ago, the patient was hospitalized when she underwent surgery for an abdominal hernia repair. General anesthesia was used during the procedure and sutures were placed to close the incision site. Post operative medication was prescribed to soothe the pain however, the patient did not remember the name of the pain medication prescribed and stated that she only took the medication for a few days (less than a week).

7. Review of Systems
    a. Neurological:
        - In some cases, hypertension can present with neurological conditions such as hemorrhagic strokes or hypertensive encephalopathy. This can affect the oral cavity by causing inflammation that, with the presence of plaque biofilm, may progress to loss of periodontal support.
        - Hypothyroidism has potential to cause neurological irregularities. Oral manifestations include dysgeusia, macroglossia, poor periodontal health, and delayed wound healing.
    b. Psychological:
        - The patient's BMI of 34.8 kg/ m^2 places her in the range of obesity. This can be associated with depression, anxiety, patterns of behavior, and way of thinking. Obesity can cause gingival inflammation that can then lead to bone loss and tooth loss.
    c. Functional:
        - Clenching and grinding have resulted in maxillary and mandibular attrition of anterior teeth as well as fractures on tooth # 16 and #31. With the presence of plaque biofilm, excessive forces can speed up the rate of periodontal destruction.
    d. Respiratory: N/A
    e. Cardiovascular: The patient was diagnosed with hypertension which is a condition that causes the blood vessels to tighten and become narrow. To compensate, a greater workload is thus required from the heart and blood vessels. This can lead to other health problems such as heart attack and stroke if the condition is not monitored and controlled. This can affect the oral

cavity by causing inflammation that, with the presence of plaque biofilm, may progress to loss of periodontal support. In addition, it is important to consider hypertension medications that can have adverse reactions within the oral cavity.

f. Dermatological: N/A
g. Gastrointestinal: N/A
h. Sexual: N/A
i. Hematological: N/A
j. Endocrine
    - Hypothyroidism
k. Immunological: N/A

8. Current Medication (Implication and Dental concerns)
    a. **Levothyroxine 50mg**
    Directions: Taken 1x every morning
    Pharmacologic Category Thyroid Product
    Local Anesthetic/Vasoconstrictor Precautions
    No precautions with vasoconstrictor are necessary if patient is well controlled with levothyroxine
    Effects on Dental Treatment No significant effects or complications reported
    Effects on Bleeding No information available to require special precautions
    Adverse Reactions
    Cardiovascular: increased blood pressure
    Central nervous system: fatigue, heat intolerance
    Mechanism of Action Levothyroxine (T4) is a synthetic form of thyroxine, an endogenous hormone secreted by the thyroid gland. T4 is converted to its active metabolite, L-triiodothyronine (T3). Thyroid hormones (T4 and T3) then bind to thyroid receptor proteins in the cell nucleus and exert metabolic effects through control of DNA transcription and protein synthesis; involved in normal metabolism, growth, and development; promotes gluconeogenesis, increases utilization and mobilization of glycogen stores, and stimulates protein synthesis, increases basal metabolic rate.

    b. **Metoprolol** 50mg
    Directions: Taken 1x every morning
    Pharmacologic Category Antianginal Agent; Antihypertensive; Beta-Blocker, Beta-1 Selective
    Use
    Hypertension: Management of hypertension. **Note:** Beta-blockers are **not** recommended as first-line therapy (ACC/AHA [Whelton 2017]).
    Local Anesthetic/Vasoconstrictor Precautions
    No information available to require special precautions
    Effects on Dental Treatment Metoprolol is a cardioselective beta-blocker. Local anesthetic with vasoconstrictor can be safely used in patients medicated with metoprolol. Nonselective beta-blockers (ie, propranolol, nadolol) enhance the pressor response to epinephrine, resulting in hypertension and bradycardia; this has not been reported for metoprolol. Many nonsteroidal anti-inflammatory drugs, such as ibuprofen and indomethacin, can reduce the

hypotensive effect of beta-blockers after 3 or more weeks of therapy with the NSAID. Shortterm NSAID use (ie, 3 days) requires no special precautions in patients taking beta-blockers.
Effects on Bleeding No information available to require special precautions
Adverse Reactions Frequency not always defined.
Central nervous system: fatigue (1% to 10%)
Mechanism of Action Selective inhibitor of beta1-adrenergic receptors; competitively blocks beta1-receptors, with little or no effect on beta2-receptors at oral doses <100 mg (in adults); does not exhibit any membrane stabilizing or intrinsic sympathomimetic activity

c. **HydroCHLOROthiazide** 25mg
Directions: Taken 1x day every morning
Pharmacologic Category Antihypertensive; Diuretic, Thiazide
Local Anesthetic/Vasoconstrictor Precautions
No information available to require special precautions
Effects on Dental Treatment Key adverse event(s) related to dental treatment: Hypotension; Patients may experience orthostatic hypotension as they stand up after treatment; especially if lying in dental chair for extended periods of time. Use caution with sudden changes in position during and after dental treatment.
Effects on Bleeding No information available to require special precautions
Adverse Reactions
N/A
Mechanism of Action Inhibits sodium reabsorption in the distal tubules causing increased excretion of sodium and water as well as potassium and hydrogen ions

d. **Ramipril** 20mg
Directions: Taken 1x day every morning
Pharmacologic Category Angiotensin-Converting Enzyme (ACE) Inhibitor; Antihypertensive
Local Anesthetic/Vasoconstrictor Precautions
No information available to require special precautions
Effects on Dental Treatment Key adverse event(s) related to dental treatment: Patients may experience orthostatic hypotension as they stand up after treatment; especially if lying in dental chair for extended periods of time. Use caution with sudden changes in position during and after dental treatment. An angiotensin-converting enzyme (ACE) Inhibitor cough is a dry, hacking, nonproductive cough that can potentially interfere with longer dental procedures if patient has this side effect.
Effects on Bleeding No information available to require special precautions
Adverse Reactions
Central nervous system: fatigue (2%)
Mechanism of Action Ramipril is an ACE inhibitor which prevents the formation of angiotensin II from angiotensin I and exhibits pharmacologic effects that are similar to captopril. Ramipril must undergo enzymatic saponification by esterases in the liver to its biologically active metabolite, ramiprilat. The pharmacodynamic effects of ramipril result from the high-

affinity, competitive, reversible binding of ramiprilat to angiotensin-converting enzyme, thus preventing the formation of the potent vasoconstrictor angiotensin II. This isomerized enzyme-inhibitor complex has a slow rate of dissociation, which results in high potency and a long duration of action; a CNS mechanism may also be involved in the hypotensive effect as angiotensin II increases adrenergic outflow from CNS; vasoactive kallikreins may be decreased in conversion to active hormones by ACE inhibitors, thus reducing blood pressure

e. **Potassium Chloride** 8mg
Directions: Take 1x day with meal
Pharmacologic Category Electrolyte Supplement, Oral; Electrolyte Supplement, Parenteral
Local Anesthetic/Vasoconstrictor Precautions
No information available to require special precautions
Effects on Dental Treatment No significant effects or complications reported
Effects on Bleeding No information available to require special precautions
Adverse Reactions
N/A
Mechanism of Action Potassium is the major cation of intracellular fluid and is essential for the conduction of nerve impulses in heart, brain, and skeletal muscle; contraction of cardiac, skeletal and smooth muscles; maintenance of normal renal function, acid-base balance, carbohydrate metabolism, and gastric secretion

***Adverse reactions of all medications are listed only as they pertain to patient.**

9. Baseline Vital Signs
    a. BP: 138/88 mm Hg
    b. P: 64 bpm
    c. R: 18 bpm
    d. T: 96.5°
    e. SpO2: 96%

10. ASA status **with rationale**
    a. ASA II
    b. Rationale:
        - Blood pressure reading of 138/88 mm Hg indicates the patient is stage I hypertensive.
        - Patient is allergic to Penicillin.
        - Patient's current medications include Levothyroxine, Metoprolol, Hydrochlorothiazide, and Ramipril which are taken to control hypertension and hypothyroidism. These conditions are considered controlled conditions without substantive functional limitations.

- BMI of 34.8 falls within (30<BMI<40) of the obesity range.

IV. Clinical Examination (Pre-Treatment)

*This data MUST be obtained at first appointment or before any other step

1. Extra-and-Intra Oral Examination

   *Include, set of 12, pre-treatment photos

   - Extra Oral Examination and Findings
     - Eyes, hands, face, anterior auricular lymph nodes, posterior auricular lymph nodes, occipital lymph nodes, scalp, ears, parotid gland, submandibular lymph nodes, submental lymph nodes, sternocleidomastoid, supraclavicular lymph nodes, thyroid gland, and larynx/trachea are all WNL.
     - TMJ assessments and oral habits
       - Muscle palpation: WNL
       - Mandibular movement: Deflection to the right side upon opening
       - Joint function/sound: Asymptomatic popping on the left side
       - Excursive movements (lateral and protrusion/retrusion):
         - Lateral (Right side): 8mm, WNL
         - Lateral (Left side): 8mm, WNL
         - Protrusion: 7mm, WNL
       - Tooth mobility: Class I: #18
       - Tooth Structures:
         - Clinical evidence of clenching and grinding due to worn tooth enamel on cusps of mandibular premolars and molars, attrition on mandibular anterior teeth, fractured teeth #16 and #31, and class I mobility of tooth #18.
       - Radiographic signs:
         - Generalized widening of PDL
         - Radiographic evidence of attrition on mandibular anterior teeth
         - Secondary trauma from occlusion: When the adaptive capacity of the periodontium have been reduced by previous bone loss or systemic disorders.
         - Generalized horizontal bone loss
         - Localized vertical bone loss between #9/#10, #13/14, #14/#15, #18/#19
         - Cratered bone defect between #19/21
         - Missing #1, #3, #4, #17, #20, #32
         - Mesial drift #18/#19 due to missing #20
         - Visible radiographic evidence of generalized subgingival calculus
         - Crown-to-Root Ratio:
           - Generalized 1:2
           - Localized 1:1 on #8, #14, #15, #23-26

        - Presence of oral habits:
            - Clenching and grinding

- Intra Oral Examination and Findings
    - Lips, cheeks, and pharynx are WNL.
    - Tooth Arch Discrepancies
        - Maximum Opening: 47mm
        - Overbite: N/A
        - Underbite: N/A
        - Overjet: 1mm
        - Open bite:
            - space of #3, #4, #13, and #20
            - open contact between #14/#19, #15/#18 due to mesial drift of #18 and #19 as a result of missing #20.
        - Crossbite: N/A
        - Facial profile: Mesognathic
    - Occlusal Classification
        - Right Canine: Class III
        - Right Molar: Unidentifiable due to missing #3
        - Left Canine: Class II
        - Left Molar: Class I
    - Gingival description:
        - Maxillary Free Gingiva: pink, soft, smooth, rolled borders
        - Maxillary Attached Gingiva: pink, edematous, glossy with loss of stippling
        - Mandibular Free Gingiva: pink, soft, rolled borders
        - Mandibular Attached Gingiva: pink, edematous, glossy
        - Generalized loss of interdental papilla
    - Visible supragingival calculus on the facial and lingual surfaces of mandibular anterior teeth
    - MGI: N/A
    - Plaque Index: 55.7%
    - Probing Depth: Generalized 2-3mm pockets with localized 4-7mm pockets
    - BOP: 17%
    - Recession: Generalized 2-3mm of recession with localized 1 and 4mm
    - CAL: Generalized 3-4mm with localized 5-7mm
    - Furcation: Class II on Lingual aspect of #18, #19 and Buccal aspect of #30, #31.

- Identification of findings on hard tissues:
    - Attrition on the maxillary anterior teeth and the maxillary first premolars
    - Attrition on the mandibular anterior teeth
    - Worn enamel cusps on mandibular premolars and molars

    - Abfraction: #5, #11-13, #21, #28
    - Visible cavitation on the mesial surface of #11 and exposed root tip of #13
    - Retained root tip #13
    - Fractures present on the mesiolingual surface of #16 and the lingual surface of #31

- Possible cultural/ethnic influencing factor(s):
    - The patient acknowledged chewing Canels gum on a regular basis. Canel's gum is a Mexican gum made with sugar and other artificial flavors.
    - Diet high in carbohydrates (i.e., rice, pasta, bread) puts the patient at high risk of caries.
    - Level of education is limited due to cultural upbringing. Patient's knowledge in dental care is limited.

Before Treatment

Right (Buccal) view

Anterior view

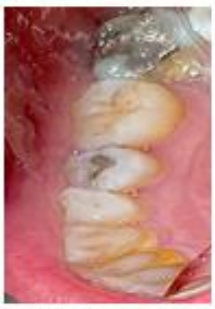
Left (Buccal) view

Palatal view

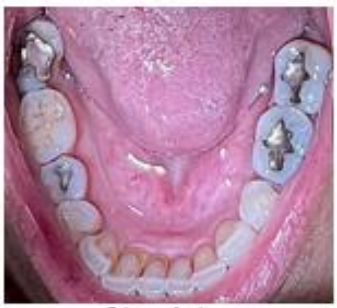
Right (Palatal) view

Palatal view

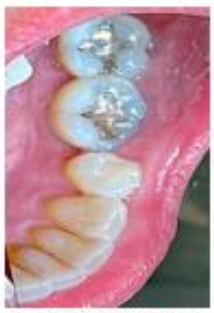
Left (Palatal) view



Right (Lingual) view



Lingual view



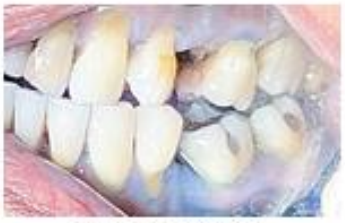
Left (Lingual) view

Lingual view

Before Treatment

Right (Buccal) view

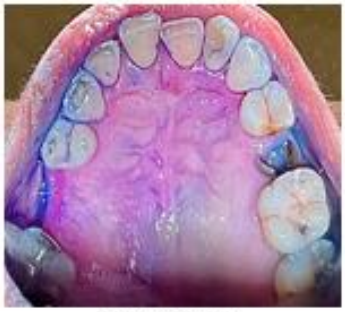
Anterior view



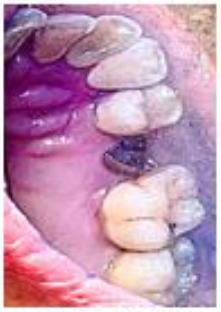
Left (Buccal) view

Palatal view

Right (Palatal) view

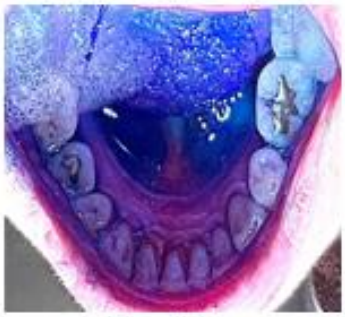


Palatal view



Left (Palatal) view

Right (Lingual) view



Lingual view

Left (Lingual) view

Lingual view

2. Plaque (Baseline Date, PI) include 2-3 pictures of disclosing
   *Provide copy of Plaque Index

West Los Angeles College
Health Science Division
Department of Dental Hygiene
Process Evaluation Form

Student Name/Number: Ariel Harte
Date: 10/24/22
Instructor: Velasco
Attempt: Feedback (1st) 2nd 3rd

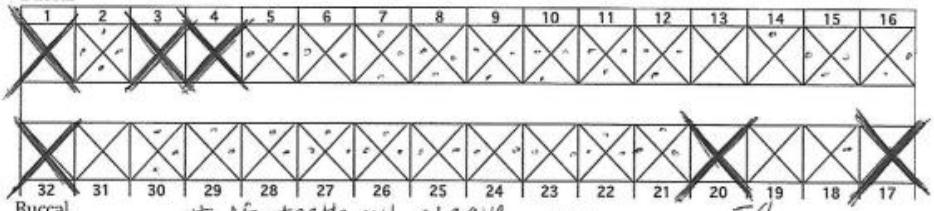
PLAQUE INDEX

Process Evaluation	Pass	No Pass	Notes
- PE form ready / Student name, date, and attempt filled in			
- Discusses rationale, benefit, and outcome of disclosing and plaque index for patient			
- Prepares all necessary armamentarium			
- Neatly discloses patient's teeth			
- Identifies plaque on similar teeth surfaces as instructor			
- Calculates plaque index identified by student and instructor correctly - Student's calculation is within 10% difference of instructor's			
- Demonstrates professional behavior and uses dental terminology - Demonstrates professional patient management			
- ***Maintains infection control throughout entire evaluation			

*** = *Indicates critical criteria. If competency is not met, student will receive a summary evaluation grade of "0".*

STUDENT FINDINGS

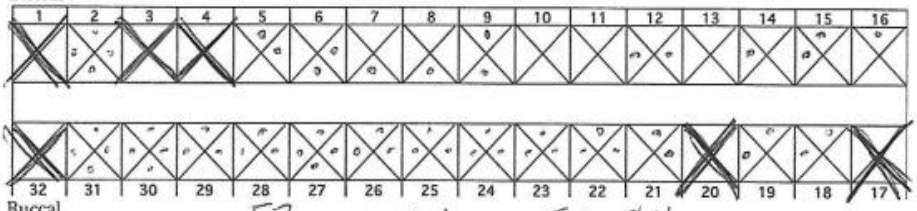
Buccal



Buccal

Show your calculation here: # of teeth w/ plaque / # of teeth x 4 x 100 = 58/104 x 100 = 55.7%

Buccal



Buccal

Show your calculation here: 57/104 x 100% = 54.8%

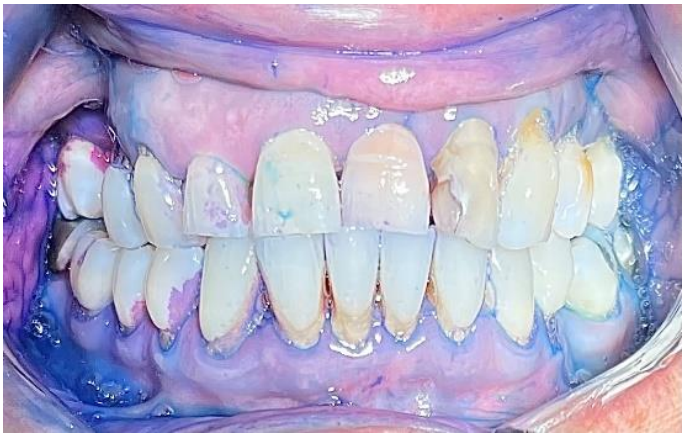
4	3	2	1	0
Student demonstrated correct sequence and proper technique without guidance.	Student demonstrated 1-2 minor errors and required minimal guidance.	Student demonstrated 3 minor errors, required guidance but corrected with verbal feedback.	Student required constant guidance, demonstrated 4 errors, difficulty completing task.	Student required constant guidance, unable to complete task. Student made more than 4 errors or ONE critical error.

Velasco
Instructor Signature

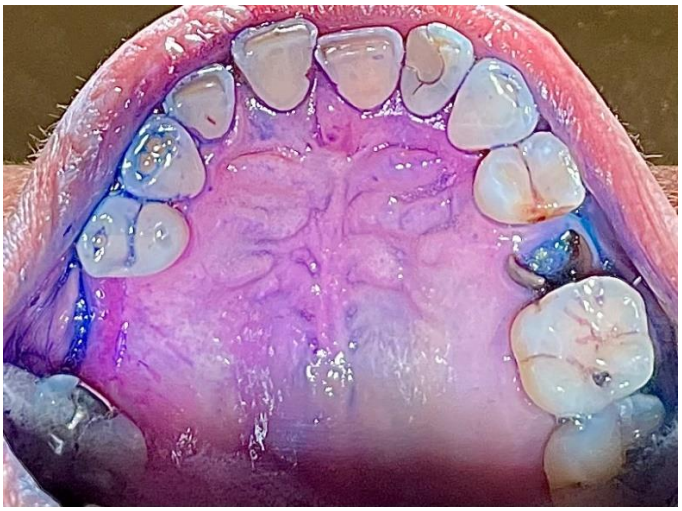
4.0
Grade

Plaque Index -2021

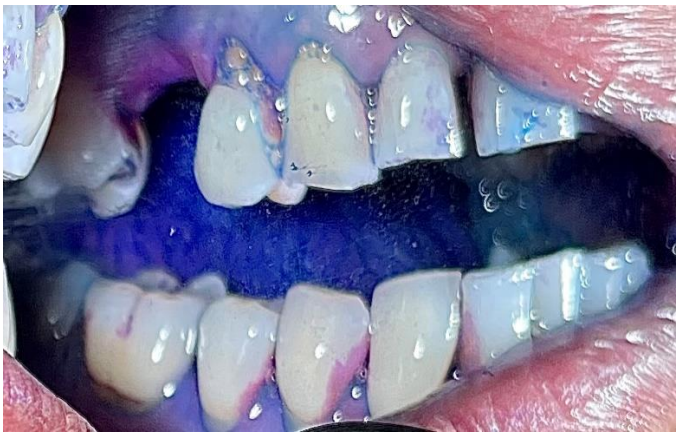
*Include 2 – 3 photos of disclosed plaque



Anterior View



Palatal View



Right (Buccal) View

Calculation: $$\text{Plaque Index} = \frac{\text{\# of teeth surfaces recorded with plaque}}{\text{\# of teeth x 4}} \times 100$$

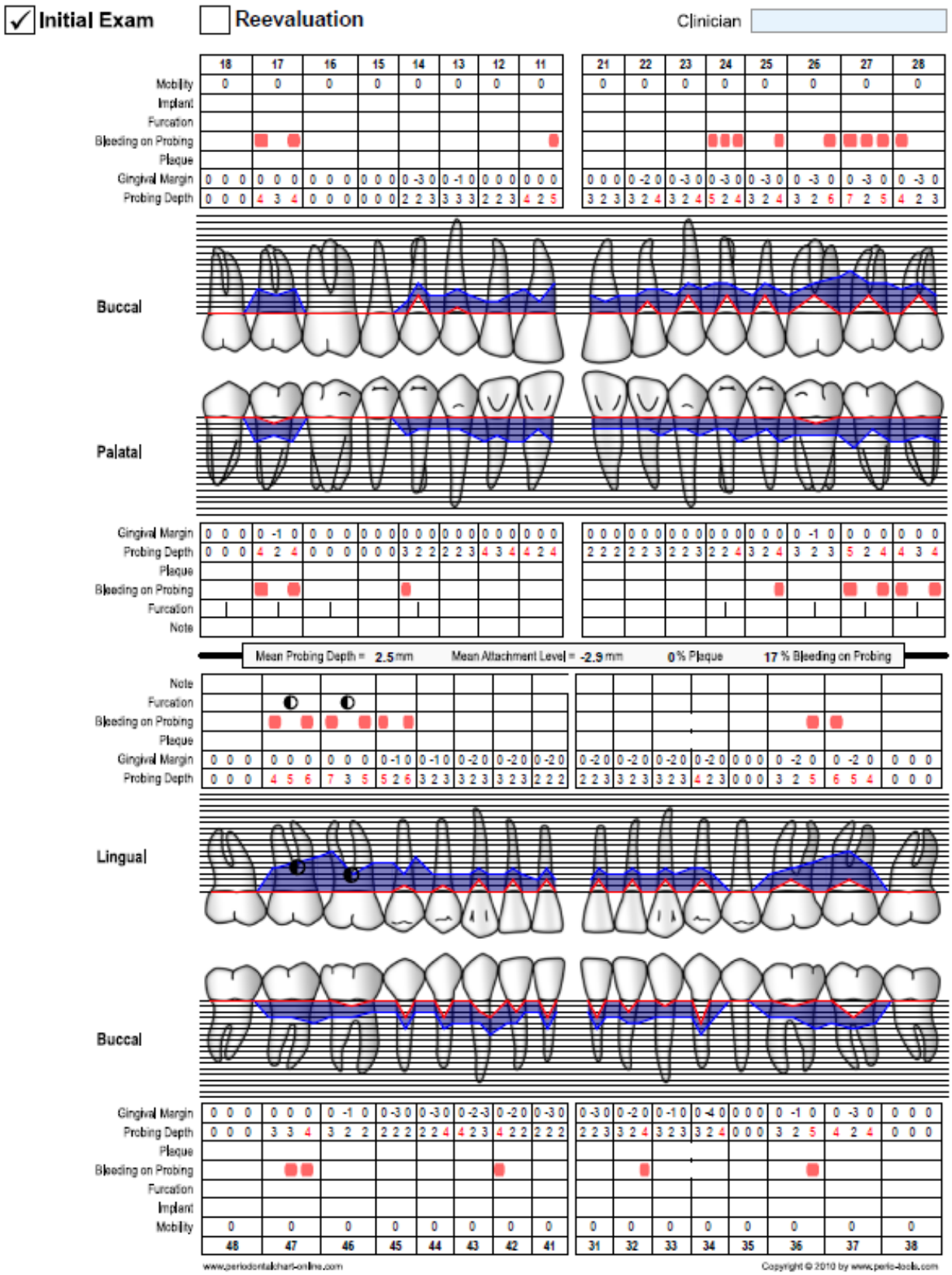
$$\text{Plaque Index} = \frac{58}{104} \times 100$$

Plaque Index = 55.7%

The plaque index calculation (seen above) demonstrates the amount of plaque formation on the surfaces of the patient's teeth. Undisturbed plaque on teeth produces acids that can begin to infect the surrounding tissues leading to inflammation that causes gingivitis. If left untreated, gingivitis may progressively worsen to periodontal disease. In addition, undisturbed plaque acids lead to an increased risk of caries that destroy enamel and, without treatment, slowly penetrate the dentin before infecting the pulp.

The patient presents with generalized plaque accumulation with a plaque index score of 55.7%. This serves as a demonstration to show the patient and clinician areas within the oral cavity that require more oral hygiene attention both in the dental chair as well as with oral home care. Modified home care routines were demonstrated and new dental aids were recommended (discussed in detail in the oral hygiene evaluation section).

3. Periodontal Assessment (Must be graded) & Radiographic Interpretation
   *Include copy of periodontal probing



Probing depth:

- Generalized pocket measurements of 2-3mm
- localized 4mm pockets:
  - #2 DB, MB, ML, DL
  - #7 DL, ML
  - #8DB, ML, DL
  - #10 DB
  - #11 DB
  - #12 DB, DL
  - #13 DB, DL
  - #15 DL
  - #16 MB, DL, ML
  - #18 DL, DB, MB
  - #19 DL
  - #21 DB, ML
  - #23 DF
  - #26 DF
  - #27 DF
  - #28 MB
  - #31 MB, DL
- Localized 5mm pockets
  - #8 MF
  - #12 MF
  - #15 DB, ML
  - #18 L
  - #19 DB
  - #29 DL
  - #30 ML
  - #31 L
- Localized 6mm pockets
  - #14 DB
  - #18 ML
  - #29 ML
  - #31 ML
- Localized 7mm pockets
  - #15 MB
  - #30 DL

*Provide copy of the graded Periodontal Evaluation PE

West Los Angeles College
Department of Dental Hygiene
Process Grading Form
Periodontal Evaluation

Student Name Ariel Harte
Date 11/19/21
Instructor Chambers

CCP Case

Grade: 3.0

Clinical Assessment	**Pass**	**No Pass**	**Notes**
Discusses the patient's periodontal history	✓		3yrs ago SRP
**Assesses attachment loss; recession, probing, furcation, mobility, mucogingival involvement	✓		6 and discrepancy post molar.
**Assesses disease activity; MBI, BOP's, tissue description (marginal and attached gingival, alveolar mucosa)	✓		Retained root tip - Furcation
Identifies all local contributory factors (anatomic and traumatic factors)	✓		Mesial drift, missing teeth, clenching & grinding
Identifies all host response factors and systemic risk factors	✓		gBP, Hypothyroid

Interpret radiographs	**Pass**	**No Pass**	**Notes**
Correlates radiographic findings with clinical findings	✓		Horizontal w/ Extensive Vertical
Identifies the type and extent of bone loss	✓		
Identifies and correlates furcation invasion areas	✓		Generalized widening PDL
Determines crown to root ratio	✓		
Identifies the periodontal ligament and correlates to clinical findings	✓		Generalized 1:2 w/ mf. Horizontal 1:1 Ant. 8, 11, 16
Correlates bone appearance with disease activity	✓		
Notes and discusses pathology or other radiographic findings	✓		

Dental Hygiene Diagnosis and Treatment Plan	**Pass**	**No Pass**	**Notes**
Assesses an appropriates periodontal diagnosis and AAP classification of Stages with Rationales.	✓		Generalized Stage III
Determines an appropriates treatment plan	✓		
Identifies the need for consultations or referrals	✓		
Determines an appropriates Supportive Periodontal Therapy interval	✓		4 SRPs Perio Eval Next
Discusses the treatment prognosis	✓		
Uses appropriate professional terminology	✓		
Manages patient care and complete assessment in a timely manner	✓		Tx dependent on Compliance
**Communicates with patient regarding periodontal status	✓		

** These asterisks indicate critical criteria. When asterisk criteria are not performed correctly, summary evaluation grade will be "0".

Summary Evaluation

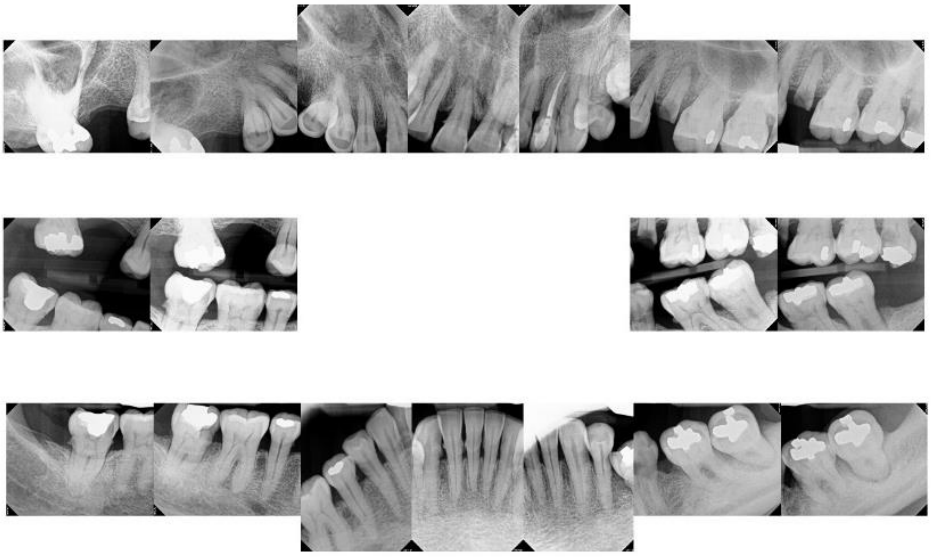
4	3	2	1	0
Student demonstrated correct sequence and proper technique without guidance.	**Student demonstrated 1-2 minor errors and required minimal guidance.**	**Student demonstrated 3 minor errors required guidance but corrected with verbal feedback**	**Student required constant guidance, demonstrated 4 errors, difficulty completing task**	**Student required constant guidance, unable to complete task. Student made more than 4 errors or ONE critical error.**

Faculty Signature: Chambers

Form #14 Periodontal Evaluation - Rev. 2019

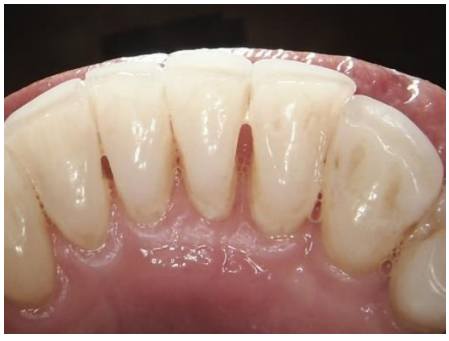
Periodontal Evaluation:

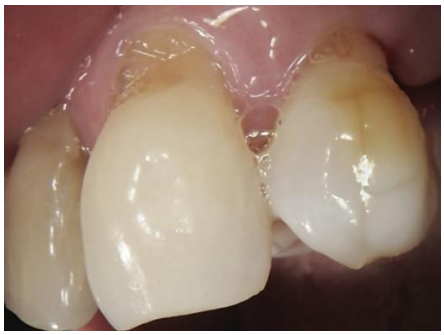
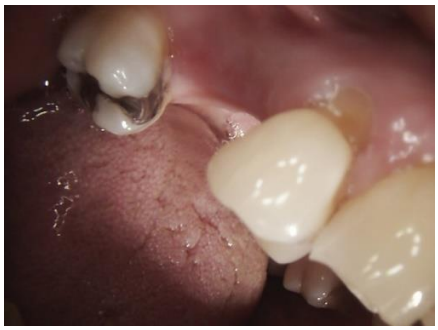
- Clinical Assessment
    - Periodontal History: Patients last dental hygiene appointment was three years ago. Full mouth scaling and root planing were performed during that appointment.
    - CAL: Generalized 3-4mm with localized 5-7mm
    - Probing Depth: Generalized 2-3mm with localized 4-7mm
    - Furcation: Class II on Lingual aspect of #18, #19 and Buccal aspect of #30, #31.
    - Mobility: Class I #18
    - Mucogingival Involvement: N/A
    - BOP: 17%
    - Tissue Description:
        - Maxillary Free Gingiva: Pink, soft, smooth, rolled borders
        - Maxillary Attached Gingiva: pink, edematous, glossy with loss of stippling
        - Mandibular Free Gingiva: pink, soft, smooth, rolled borders
        - Mandibular Attached Gingiva: pink, edematous, glossy
- Radiographic Interpretation (pulp cavity, alveolar bone, lamina dura, alveolar crest, pdl space, etc.)
    - Correlates radiographic findings with clinical findings:
      Clinical evidence → Radiographic evidence
        - Recession → loss of supporting structures/bone loss
        - Occlusal forces → widening of PDL
        - Open embrasure spaces → bone loss
        - Probing depths → bone loss and furcation involvement
        - Missing teeth → mesial drift
    - Identifies the type and extent of bone loss: Generalized horizontal bone loss with localized vertical bone loss
    - Identifies and corelates furcation invasion areas: Furcation: Class II on Lingual aspect of #18, #19 and Buccal aspect of #30, #31.
    - Determines crown-to-root ratio: Generalized 1:2 with localized 1:1 on #8, #14, #15 and mandibular anterior teeth
    - Identifies the periodontal ligament and correlates to clinical findings: Generalized widening of PDL correlates with maxillary and mandibular attrition on the anterior teeth as well as fractured teeth #16 and #31.
    - Correlates bone appearance with disease activity: Generalized areas with active disease are visible clinically and radiographically due to shadowy/less dense appearance of bone in interproximal spaces.
    - Notes and discusses pathology or other radiographic findings: No pathology noted



- Dental Hygiene Diagnosis and Treatment Plan
    - Assesses an appropriate periodontal diagnosis and AAP classification of Stages with Rationales: Generalized Stage III with Localized Stage IV
    - Determines an appropriate treatment plan: 4 Quads SRP with Anesthesia and periodontal re-eval 4-6 weeks later
    - Identifies the need for consultations or referrals
    - Determines an appropriates supportive periodontal therapy interval
    - Discusses the treatment prognosis: Fair depending patient compliance

4. Three (3) Intra-oral photos, **using intra-oral camera**, depicting specific areas of concern (ie: abfraction, severe recession, visible furcation, craze/fracture, etc.).
   These are NOT part of, or in place of, the general pre and post treatment photographs.
   *Provide information and rationale for concern

Intra-oral photos	**Rationale for concern**
 Post treatment photo	1. This photo was taken two weeks after scaling the lower right quadrant and almost 4 weeks after scaling the lower left quadrant. It is evident that plaque has begun to reaccumulate during the previous weeks and that OHI recommendations should be reinforced. 2. The patient has generalized recession that is clinically prominent on the mandibular anterior teeth. Recession facilitates the accumulation of plaque if good oral hygiene is not maintained, and proper use of interdental aids are not applied. Without proper home care the remaining supporting tissue will continue to destruct, and the function of the remaining dentition may become compromised.

	1. The patient clenches and grinds her teeth which is putting a substantial amount of pressure on the teeth causing attrition and, as pictured, abfraction. If left untreated, the abfraction will continue to grow larger and put the tooth at risk for caries formation, infection, or tooth loss. 2. To treat the abfraction, the patient may consider visiting the DDS to have composite resin material placed over the area and have a nightguard made to protect the teeth from further wear.
	1. Missing teeth #3 and #4 were extracted due to caries approximately 5 years ago with no intent to restore the missing teeth. The adjacent teeth can become affected by drifting into the space, becoming loose, and/or affecting the bite. The bone is also affected and at risk for resorbing since there is no longer a tooth in its place to receive the stimulation that is required to maintain a healthy supporting bone structure. 2. The patient can visit the DDS to discuss restoration options which may include removable prosthesis, a bridge, or implant(s).

V. Dental History and Caries Examination

1. History of dental exam, treatment, and hygiene visits
    a. Last dental exam: 3 years ago
    b. Last dental x-rays: BW's taken 3 years ago
        Patient does not recall date of last FMX
    c. Last dental cleaning: Scaling and Root Planing approximately 3 years ago.
        - Patient did not maintain routine maintenance appointments after scaling and root planning.
    d. Restorations: #2 MOL Amalgam, #10 MFL Composite, #14 O Amalgam, #15 O Amalgam, #16 O Amalgam, #18 OB Amalgam, #19 OB Amalgam, #29 O Amalgam, #31 OB Amalgam were done within the last 5-7 years. Patient could not state an approximate date.
    e. Extractions:
        - Teeth #1, 17, and #32 were extracted 32 years ago due to severe decay.
        - Tooth #20 was extracted 11 years ago due to severe decay.
        - Teeth #3 and #4 were extracted 5 years ago due to severe decay.
        - Tooth #16 was extracted 2 months ago due to lingual fracture.
        - Root tip of tooth #13 was extracted two months ago.
    f. Root Canal: #10 was treated with endodontic therapy approximately 5 years ago.
2. Present Status
        - Patient presents with generalized plaque and calculus on supragingival and subgingival areas, generalized horizontal bone loss with localized

vertical bone loss, generalized probing depths of 2-3mm with localized 4-7mm pockets, generalized 2-3mm of recession, generalized 3-4mm of CAL with localized 5-7mm, furcation involvement class II on lingual aspect of tooth #18 and #19, and buccal aspect of #30 and #31. Patient also presents with mobility class I on tooth #18.

3. Existing caries and quality of restorations (type and location), Caries Index (DMFS – Decay, Missing, and Filled Surfaces)
    - Dental Exam:
        - Possible carious lesion/fractures present:
            - #11 M Class III caries
            - #13 root tip
            - #16 ML fracture
            - #31 L fracture
        - Metallic restorations:
            - #2 MOL Amalgam
                - Good Condition/Acceptable
            - #14 O Amalgam
                - Good Condition/Acceptable
            - #15 O Amalgam
                - Good Condition/Acceptable
            - #16 O Amalgam
                - Fractures and needs referral to DDS
            - #18 OB Amalgam
                - Good Condition/Acceptable
            - #19 OB Amalgam
                - Good Condition/Acceptable
            - #29 O Amalgam
                - Good Condition/Acceptable
            - #31 OB Amalgam
                - Tooth has mesiolingual fracture and needs referral to DDS
        - Synthetic (composite) restorations:
            - #10 MFL Composite
                - The margins of the restoration are not flush with the natural tooth. It is not aesthetically pleasing and it appears discolored in comparison with the natural tooth.
        - Inlays: N/A
        - Onlays: N/A
        - PFM's: N/A
        - Bridge(s): N/A
        - Dental Implant(s): N/A
        - Other treatment:
            - #10 RCT

Caries Index (DMFS) (Obtained during initial screening/assessment appointment)

- D – 2 teeth with clinically visible caries

- M – 3 missing teeth (extracted) due to severe decay
  (third molars not included)
- F – 9 teeth with amalgam or composite fillings

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
X	F	M	M						F	D		D	F	F	F
X	F		F									M	F	F	X
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

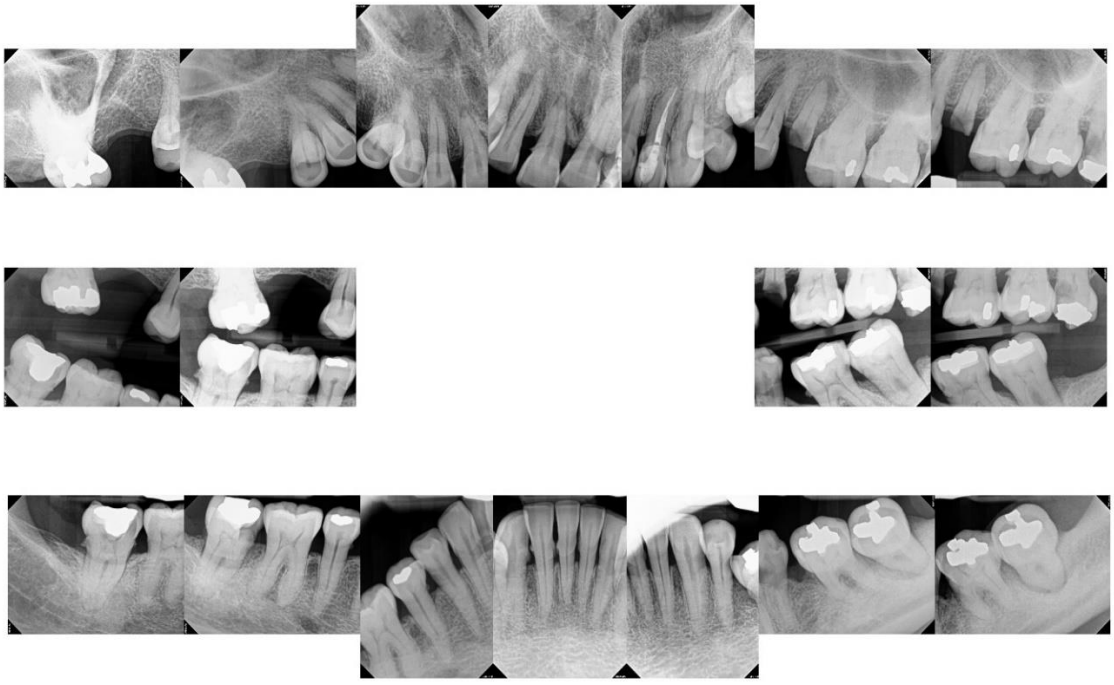
*After scaling the upper left quadrant and lower left quadrant, the patient visited the dentist for extraction of the retained root tip of #13 and extraction of fractured tooth #16. Post treatment DMFS is seen below.

Caries Index (DMFS) (Post extractions of tooth #13 and #16)

- D – 1 tooth with clinically visible caries
- M – 4 missing teeth (extracted) due to severe decay)
  (third molars not included)
- F – 8 teeth with amalgam or composite fillings

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
X	F	M	M						F	D		M	F	F	X
X	F		F									M	F	F	X
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

4. Evaluation of radiographs for caries and restorative needs
   *Provide a <u>clear</u> image, or attach a digital copy, of diagnostic FMX



- Missing teeth #3, #4, and #13 should be restored to prevent alignment issues, added stress on occlusion, further bone loss, and to prevent adjacent teeth moving into these spaces. Patient should discuss replacement options with DDS.
- The root tip of #13 that is seen radiographically has already been extracted.
- There is existing caries on the mesial surface of tooth #11. This should be treated as soon as possible to prevent further penetration into the dentin and risk of infection.
- There is radiographic evidence of maxillary and mandibular attrition on anterior teeth. A nightguard is suggested to prevent further grinding and enamel wear.

VI. Oral Hygiene Evaluation (Pre-Treatment)

*Be specific, descriptive, and informative, include rationale where applicable

1. Patient's skill level
    a. Poor
2. Patient's knowledge and awareness of dental and periodontal diseases
    a. Patient was not aware of proper brushing and flossing techniques.
    b. Patient was not aware of interdental aids like proxabrushes and end tuft tooth brushes.
3. Objectives developed during OHI (based on patient's needs and current dental status)
    a. Modified bass technique 2x day
    b. C-Shaped flossing 1x day
    c. Use Tepe proxy brushes for embrasure spaces
    d. Use End-tuft tooth brush for distal surfaces of most posterior teeth
    e. Receive 5% Fluoride Varnish at each re-care maintenance appointment every 3 months
    f. Substitute Canels Gum for Sugar Free Xylitol or Ice Breakers
    g. Referral to DDS to address root tip, fractured teeth, and caries
4. Oral Hygiene Instruction (Process grading)
   *Provide copy of the graded OHI PE

West Los Angeles College
Department of Dental Hygiene
Process Grading Form

Student Name Airel Harte
Date 11/08/22
Instructor Chambers

Oral Hygiene Instruction - Caries Risk Assessment (CAMBRA) assessment **Grade:** 3.0

Preparation	Pass	No Pass
Explains the benefits of oral hygiene instruction and caries risk assessment to patient	Cw	
Establishes appropriate patient/operator positioning — Pt need to be at eye level		
Uses verbal and nonverbal communication skills to establish patient/provider relationship	Cw	

Assessment	Pass	No Pass
Assesses the patient's current oral hygiene status and caries risk by interview, clinical observation and assessment form.	Cw	
Uses saliva test if available	Cw	
Disclose and determine the Plaque Index if applicable. It allows the patient to self-evaluate.	Cw	
Asks the patient to demonstrate brushing, flossing, and other oral care techniques	Cw	
Assesses patient's oral structure, occlusion, tissue contour, types of the embrasure and manual dexterity	Cw	
Determines dental knowledge of the patient	Cw	

Interpretation and Plan	Pass	No Pass
Interprets appropriate risk level using a risk assessment form — High (caries)	Cw	
Customizes the oral health care plan based on the patient's needs and status	Cw	
Selects appropriate preventive aids and products for the risk level (Include options for antimicrobials, fluoride, xylitol, sealants, and frequency of radiographs and dental hygiene services) — Modified Brushing technique + flossing, IP brushes, End Tuft TB, good mouthing habits, FL mouthrinse	Cw	

Implement and Instruction	Pass	No Pass
Discusses disease concepts and engages patient	Cw	
Discusses goal and technique to improve oral hygiene status and caries risk status	Cw	
Demonstrates appropriate tooth brushing method, flossing method, Interproximal cleaning method, and other preventive homecare agents	Cw	
Demonstrates by using the tell-show-do approach	Cw	
Allows patient to give feedbacks and evaluates the patient's ability to perform recommended instruction	Cw	
Professionalism	**Pass**	**No Pass**
Provides instruction and demonstration in a caring manner	Cw	
Manages patient care and provides service in a timely manner within 15 minutes.	Cw	
Documents patient's oral hygiene status and specific OHI instruction given to patient in patient's record.	Cw	
**Appropriate protective wear and infection control throughout the process.	Cw	

** These asterisks indicate critical criteria. When asterisk criteria are not performed correctly, summary evaluation grade will "0".

Summary Evaluation

4	3	2	1	0
Sudent demonstrated correct sequence and proper technique without guidance.	**The student demonstrated 1-2 minor errors and required minimal guidance.**	**Student demonstrated 3 minor errors required guidance but corrected with verbal feedback**	**Student required constant guidance, demonstrated 4 errors, difficulty completing the task**	**Student required constant guidance, unable to complete task. Student-made more than 4 errors or ONE critical error.**

Recommended night guard.

Form #13 Oral Hygiene Instruction CAMBRA 2021

CARIES RISK ASSESSMENT FORM – CHILDREN AGE 6 AND OVER/ADULTS

Date: 11/08/22 **Assessment Date:** 11/08/22 **Is this (please circle) baseline or recall**

Please use this form with your patient and explain their caries risk. Give the filled out form to the patient as reference.

NOTE: Any one YES in Column 1 signifies likely "High Risk" and an indication for bacteria tests	YES = CIRCLE 1	2	3	Comments:
1. Risk Factors (Biological Predisposing Factors)				
(a) Has active dental decay in the past year	YES			
(b) Frequent (> 3 times/day) between-meal snacks		YES		# times/day: 2 Types: Apple / Banana
(c) Drinks sports beverages NO		YES		# times/day:
(d) Recreational drug/tobacco/alcohol use NO		YES		
(e) Saliva-Reducing factors (medications/radiation/systemic)		YES		
(f) Child or adolescent has special health care needs NO		YES		
(g) Orthodontic appliances NO		YES		
2. Protective Factors				
(a) Home/work/school in fluoridated community buys Sparkletts			YES	Zip Code: 90028
(b) Fluoride toothpaste at least 2x daily Colgate			YES	# times/day: 4x day
(c) Fluoride mouthrinse (0.05% NaF) daily			YES	2x day
(d) 5000 ppm F fluoride toothpaste daily			YES	
(e) Fluoride varnish in last 6 months NO			YES	3 years since last Hy Sp
(f) Chlorhexidine prescribed/used one week each month during the last 6 months NO, 3yr ago			YES	
(g) Xylitol gum/lozenges 4x daily last 6 months NO			YES	
(h) Calcium and phosphate paste during last 6 months NO			YES	
3. Disease Indicators - Clinical Examination				
(a) Visible cavities or radiographic penetration of the dentin	YES			
(b) Radiographic proximal enamel lesions (not in dentin)	YES			
(c) White spots on smooth surfaces Yes	YES			
(d) Restoration in the last 3 years 2 fills ~~UR~~ UL	YES			
(e) Plaque is obvious on the teeth and/or gums bleed easily		YES		
(f) Visually inadequate saliva flow NO		YES		
(g) Exposed roots NO		YES		
(h) Deep pits and fissures Yes		YES		
(i) New remineralization since last visit (List teeth):			YES	Teeth:

Overall Caries Risk (circle): **HIGH** **MODERATE** **LOW**

EXTREME RISK=HIGH RISK + SEVERE SALIVARY GLAND HYPOFUNCTION

Bacteria/Saliva Test Results: MS: LB: Flow Rate: ml/min: Date:

Self-management goals:

1. Modified bass technique
2. Fluoride products
3. Tepe interdental brushes

Since Last Visit:

New Cavitation: (Y) N

New White Spot Lesions: (Y) N

Dental Pain: Y (N)

Referral Needs: Extract #13 root tip, #11 MFL Caries, #16 L fractur #31 ML Fracture

(Updated: 8/19/14)UCLA

VII. Nutritional Analysis

1. Three-day dietary analysis

Thursday

FOOD | EXERCISE | BIOMETRIC | NOTE

Kellogg's, Special K Cereal, Original	1.5	cup, whole pieces	180.18	kcal
Milk, Whole	1.5	cup	223.26	kcal
Turkey Sandwich, with Mayo	1	sandwich	449.44	kcal
Spanish Rice, Mexican Rice, without Meat	1	cup	183.15	kcal
Pinto Beans, Cooked from Dried	1	cup, whole pieces	244.53	kcal
General Walking, Light	30	minutes	-90	kcal

Friday

FOOD | EXERCISE | BIOMETRIC | NOTE

Milk shakes, thick vanilla	10	fl oz	318.08	kcal
Chili, Chile, Relleno with Cheese, Fried	2	each - chili	434.91	kcal
Pinto Beans, Cooked from Dried	1.5	cup, whole pieces	366.79	kcal
Spaghetti Noodles, White, Cooked in Salted Water	1.5	cup	331.8	kcal
Ground Beef, Onion and Chili, Pima Indian	1	cup	364.96	kcal
Mixed Vegetables, Broccoli, Cauliflower and Carrots	1	cup, cut pieces	43.4	kcal
General Walking, Light	30	minutes	-90	kcal

Saturday

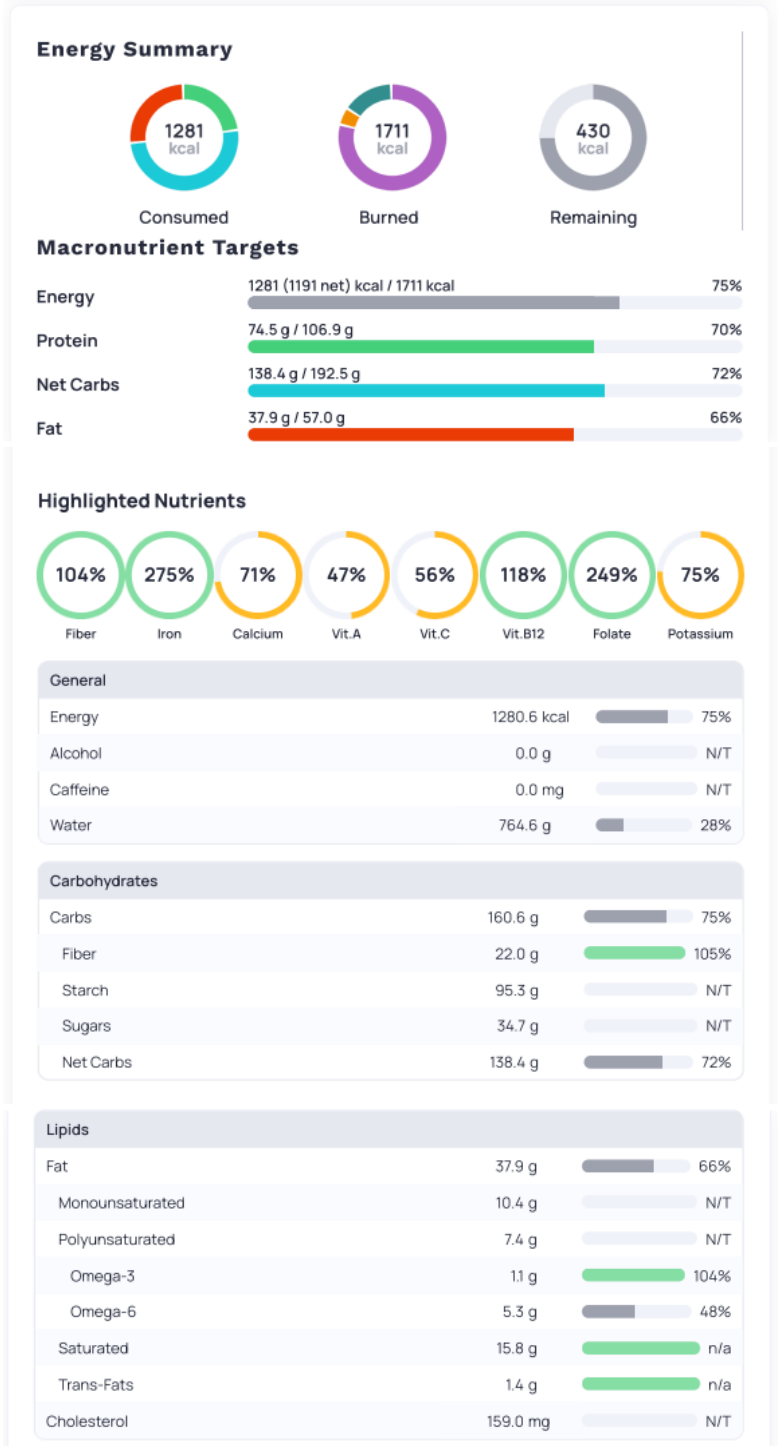
FOOD | EXERCISE | BIOMETRIC | NOTE

Weight	189	lbs		
Yogurt, Greek, nonfat, strawberry, Chobani	1	× 5.30 oz	120	kcal
Bananas, Raw	1	large - 8" to 8 7/8" long	121.04	kcal
Eggs, Cooked	1	medium	68.2	kcal
Pinto Beans, Cooked from Dried	1	cup, whole pieces	244.53	kcal
Chicken Breast, Skinless	1	small	181.65	kcal
Spanish Rice, Mexican Rice, without Meat	1	cup	183.15	kcal
Mixed Vegetables, Broccoli, Cauliflower and Carrots	1	cup, cut pieces	43.4	kcal
General Walking, Light	30	minutes	-90	kcal

2. Special needs of nutrition (Pregnancy or special diet etc.)
    a. No special needs reported

3. Complete analysis of carbohydrate intake

Thursday



Energy Summary

Consumed	Burned	Remaining
1281 kcal	1711 kcal	430 kcal

Macronutrient Targets

Energy	1281 (1191 net) kcal / 1711 kcal	75%
Protein	74.5 g / 106.9 g	70%
Net Carbs	138.4 g / 192.5 g	72%
Fat	37.9 g / 57.0 g	66%

Highlighted Nutrients

Fiber	Iron	Calcium	Vit.A	Vit.C	Vit.B12	Folate	Potassium
104%	275%	71%	47%	56%	118%	249%	75%

General		
Energy	1280.6 kcal	75%
Alcohol	0.0 g	N/T
Caffeine	0.0 mg	N/T
Water	764.6 g	28%

Carbohydrates		
Carbs	160.6 g	75%
Fiber	22.0 g	105%
Starch	95.3 g	N/T
Sugars	34.7 g	N/T
Net Carbs	138.4 g	72%

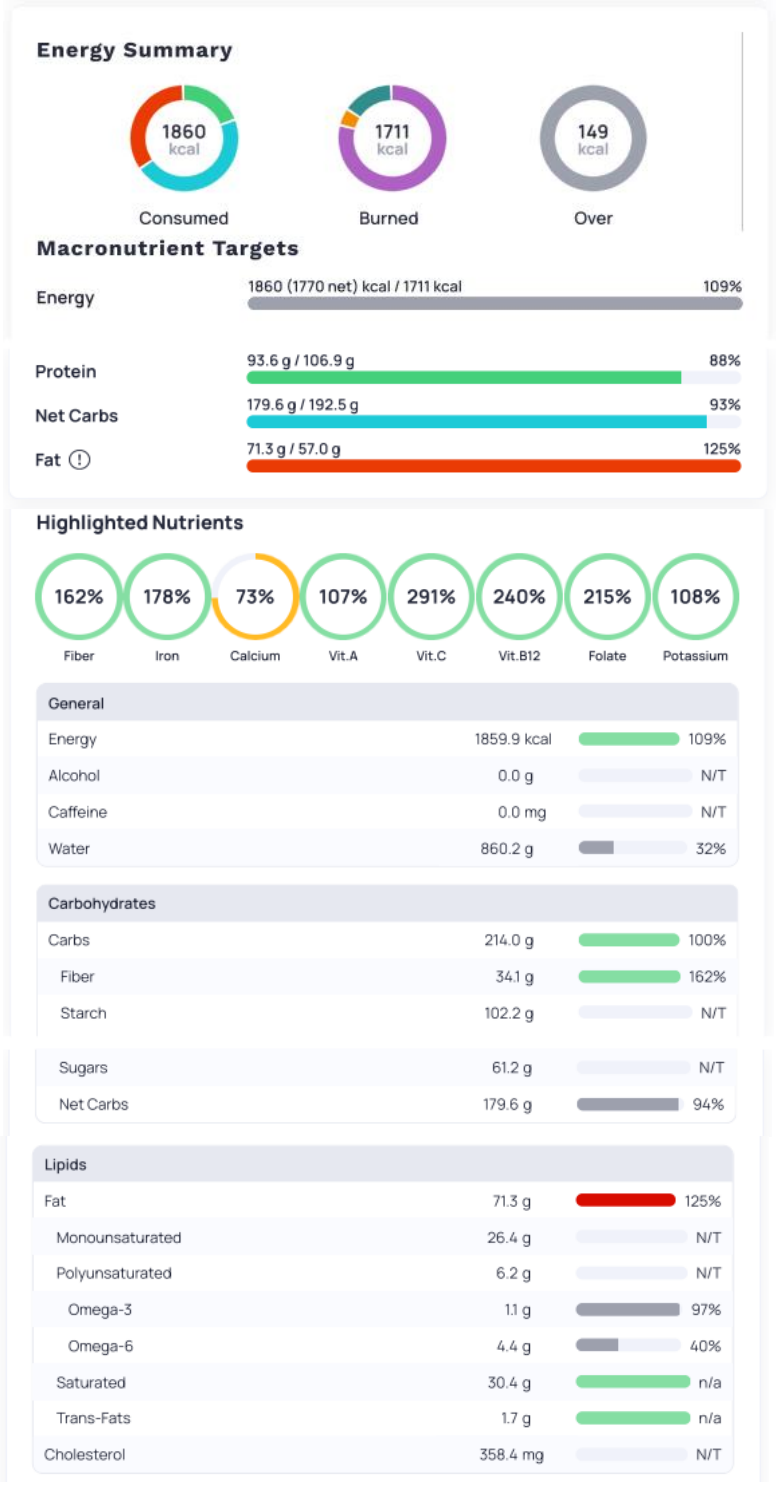
Lipids		
Fat	37.9 g	66%
Monounsaturated	10.4 g	N/T
Polyunsaturated	7.4 g	N/T
Omega-3	1.1 g	104%
Omega-6	5.3 g	48%
Saturated	15.8 g	n/a
Trans-Fats	1.4 g	n/a
Cholesterol	159.0 mg	N/T

Protein		
Protein	74.5 g	70%
Cystine	0.9 g	106%
Histidine	2.0 g	168%
Isoleucine	3.5 g	213%
Leucine	6.0 g	166%
Lysine	4.9 g	151%
Methionine	1.6 g	200%
Phenylalanine	3.6 g	253%
Threonine	2.9 g	172%
Tryptophan	1.0 g	224%
Tyrosine	2.6 g	187%
Valine	3.9 g	192%

Vitamins		
B1 (Thiamine)	2.3 mg	208%
B2 (Riboflavin)	1.6 mg	141%
B3 (Niacin)	16.0 mg	114%
B5 (Pantothenic Acid)	3.9 mg	78%
B6 (Pyridoxine)	1.8 mg	117%
B12 (Cobalamin)	2.8 µg	119%
Folate	997.4 µg	249%
Vitamin A	332.9 µg	48%
Vitamin C	42.4 mg	57%
Vitamin D	292.5 IU	49%
Vitamin E	5.7 mg	38%
Vitamin K	28.2 µg	31%

Minerals		
Calcium	857.4 mg	71%
Copper	0.8 mg	92%
Iron	22.0 mg	275%
Magnesium	211.2 mg	66%
Manganese	2.2 mg	125%
Phosphorus	1062.5 mg	152%
Potassium	1955.5 mg	75%
Selenium	101.0 µg	184%
Sodium	1399.5 mg	93%
Zinc	7.3 mg	91%

Friday

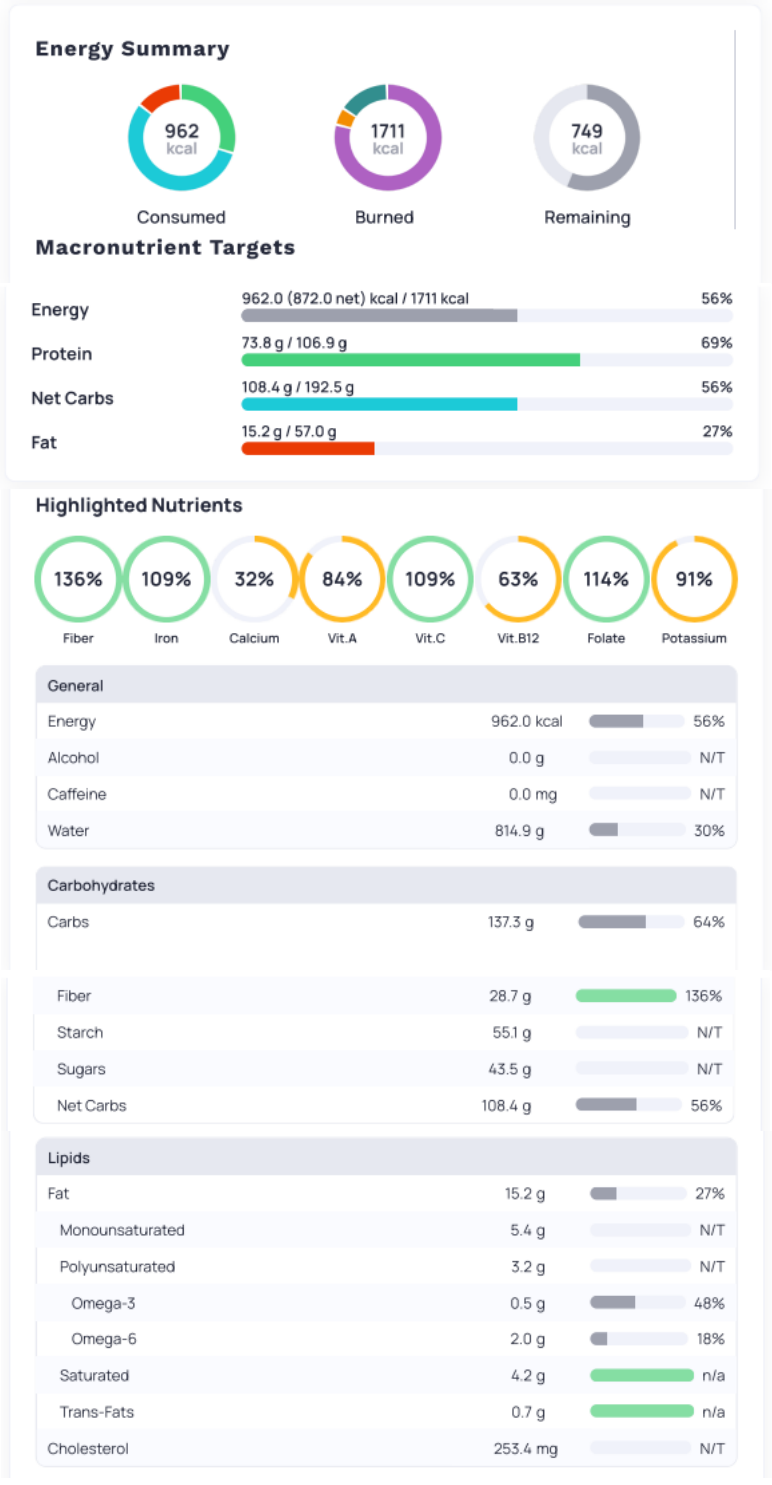

Energy Summary
1860 kcal
Consumed
1711 kcal
Burned
149 kcal
Over
Macronutrient Targets
Energy
1860 (1770 net) kcal / 1711 kcal
109%
Protein
93.6 g / 106.9 g
88%
Net Carbs
179.6 g / 192.5 g
93%
Fat
71.3 g / 57.0 g
125%
Highlighted Nutrients
162% Fiber
178% Iron
73% Calcium
107% Vit.A
291% Vit.C
240% Vit.B12
215% Folate
108% Potassium
General
Energy 1859.9 kcal 109%
Alcohol 0.0 g N/T
Caffeine 0.0 mg N/T
Water 860.2 g 32%
Carbohydrates
Carbs 214.0 g 100%
Fiber 34.1 g 162%
Starch 102.2 g N/T
Sugars 61.2 g N/T
Net Carbs 179.6 g 94%
Lipids
Fat 71.3 g 125%
Monounsaturated 26.4 g N/T
Polyunsaturated 6.2 g N/T
Omega-3 1.1 g 97%
Omega-6 4.4 g 40%
Saturated 30.4 g n/a
Trans-Fats 1.7 g n/a
Cholesterol 358.4 mg N/T

Protein		
Protein	93.6 g	88%
Cystine	1.2 g	144%
Histidine	2.6 g	217%
Isoleucine	4.4 g	272%
Leucine	7.6 g	212%
Lysine	6.1 g	188%
Methionine	1.9 g	229%
Phenylalanine	4.5 g	317%
Threonine	3.9 g	225%
Tryptophan	1.2 g	286%
Tyrosine	3.0 g	210%
Valine	5.0 g	245%

Vitamins		
B1 (Thiamine)	1.6 mg	143%
B2 (Riboflavin)	1.8 mg	165%
B3 (Niacin)	11.9 mg	85%
B5 (Pantothenic Acid)	3.4 mg	68%
B6 (Pyridoxine)	1.7 mg	115%
B12 (Cobalamin)	5.8 µg	240%
Folate	861.2 µg	215%
Vitamin A	753.0 µg	108%
Vitamin C	218.9 mg	292%
Vitamin D	219.9 IU	37%
Vitamin E	5.7 mg	38%
Vitamin K	86.7 µg	96%

Minerals		
Calcium	882.7 mg	74%
Copper	1.3 mg	148%
Iron	14.3 mg	178%
Magnesium	286.2 mg	89%
Manganese	2.6 mg	142%
Phosphorus	1369.5 mg	196%
Potassium	2830.1 mg	109%
Selenium	130.0 µg	236%
Sodium	1220.8 mg	81%
Zinc	13.9 mg	173%

Saturday



Energy Summary

962 kcal — Consumed
1711 kcal — Burned
749 kcal — Remaining

Macronutrient Targets

Energy	962.0 (872.0 net) kcal / 1711 kcal	56%
Protein	73.8 g / 106.9 g	69%
Net Carbs	108.4 g / 192.5 g	56%
Fat	15.2 g / 57.0 g	27%

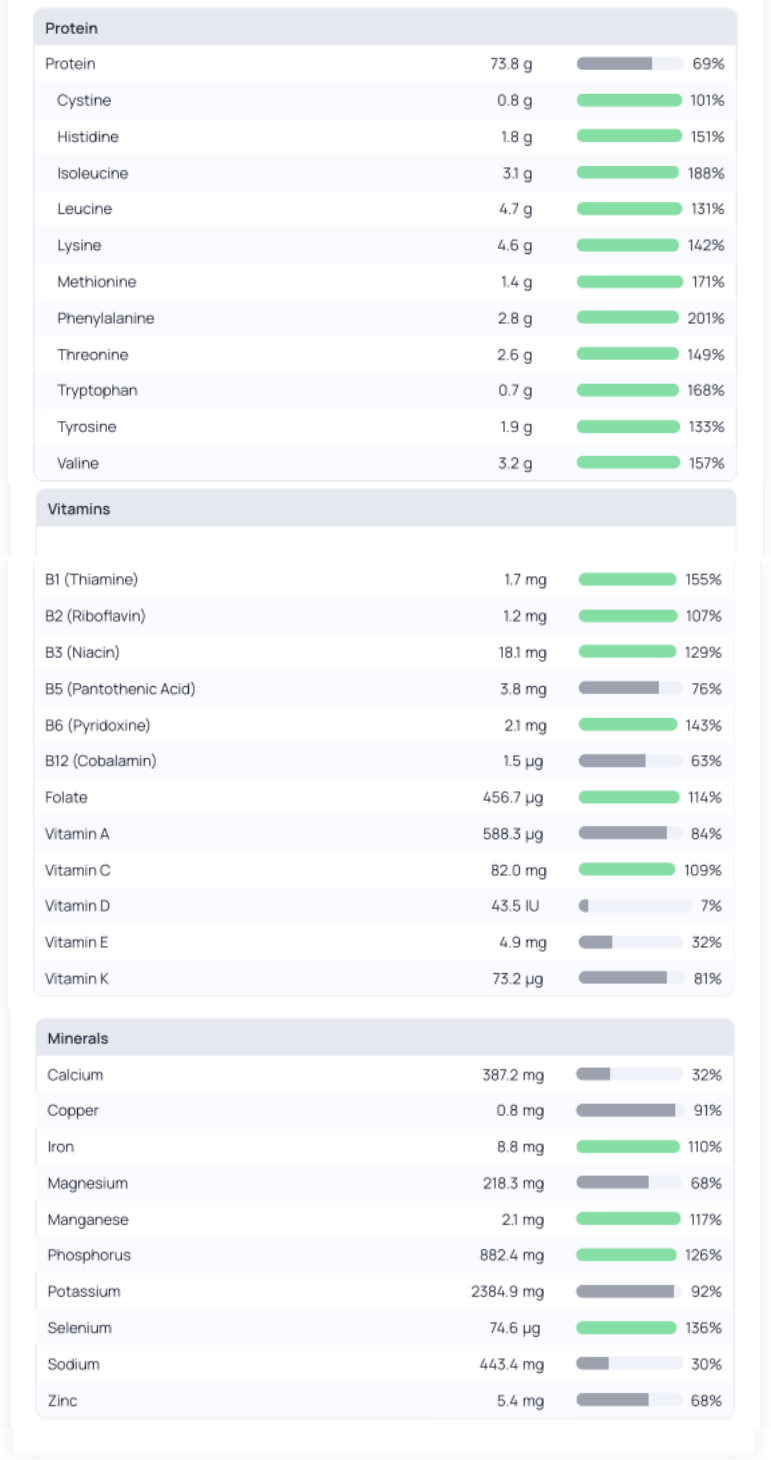
Highlighted Nutrients

Fiber	Iron	Calcium	Vit.A	Vit.C	Vit.B12	Folate	Potassium
136%	109%	32%	84%	109%	63%	114%	91%

General		
Energy	962.0 kcal	56%
Alcohol	0.0 g	N/T
Caffeine	0.0 mg	N/T
Water	814.9 g	30%

Carbohydrates		
Carbs	137.3 g	64%
Fiber	28.7 g	136%
Starch	55.1 g	N/T
Sugars	43.5 g	N/T
Net Carbs	108.4 g	56%

Lipids		
Fat	15.2 g	27%
Monounsaturated	5.4 g	N/T
Polyunsaturated	3.2 g	N/T
Omega-3	0.5 g	48%
Omega-6	2.0 g	18%
Saturated	4.2 g	n/a
Trans-Fats	0.7 g	n/a
Cholesterol	253.4 mg	N/T



Protein		
Protein	73.8 g	69%
Cystine	0.8 g	101%
Histidine	1.8 g	151%
Isoleucine	3.1 g	188%
Leucine	4.7 g	131%
Lysine	4.6 g	142%
Methionine	1.4 g	171%
Phenylalanine	2.8 g	201%
Threonine	2.6 g	149%
Tryptophan	0.7 g	168%
Tyrosine	1.9 g	133%
Valine	3.2 g	157%

Vitamins		
B1 (Thiamine)	1.7 mg	155%
B2 (Riboflavin)	1.2 mg	107%
B3 (Niacin)	18.1 mg	129%
B5 (Pantothenic Acid)	3.8 mg	76%
B6 (Pyridoxine)	2.1 mg	143%
B12 (Cobalamin)	1.5 µg	63%
Folate	456.7 µg	114%
Vitamin A	588.3 µg	84%
Vitamin C	82.0 mg	109%
Vitamin D	43.5 IU	7%
Vitamin E	4.9 mg	32%
Vitamin K	73.2 µg	81%

Minerals		
Calcium	387.2 mg	32%
Copper	0.8 mg	91%
Iron	8.8 mg	110%
Magnesium	218.3 mg	68%
Manganese	2.1 mg	117%
Phosphorus	882.4 mg	126%
Potassium	2384.9 mg	92%
Selenium	74.6 µg	136%
Sodium	443.4 mg	30%
Zinc	5.4 mg	68%

- Average daily kilocalories
    - The three day diary nutritional analysis measured an average kilocalorie consumption of 1,367 kcal/day.
        - Patient exceeded daily average on one occasion
        - The report generated and included in this report was generated based on a 7-day nutritional analysis. However, only three days are being considered.

• Inadequacies and excesses
    - On average the patient is consuming foods that are high in fat, protein, and carbohydrates.
    - Inadequate food group
        - N/A
    - Exceeded
        - Fat (72% average)
        - Carbohydrates (73% average)

• Carbohydrate Analysis
    - Fermentable carbohydrates are cariogenic due to the sugar and/or sweeteners contained within the food that is absorbed by bacteria to produce acid.
    - Foods containing high-fructose corn syrup, fructose syrup, corn sugar, maize syrup, crystalline fructose, glucose syrup, and corn syrup solids.
    - Cariogenic foods consumed by patient:
        - Bread
            - Contains sugars and starch
        - Cereal
            - Presweetened cereals contain sugars
        - Rice
            - Contains sugars and starch
        - Pasta
            - Contains sugars and starch
        - Banana's
            - Contains starches
        - Canel's Gum
            - Contains sugars and other artificial flavors

    - Exposures

Forms of sugar	When eaten	Day 1	Day 2	Day 3	Total
Liquid	With meals	2	1		3
	Between meals				
Solid	With meals	1	1	2	4
	Between meals	1	1	1	3

Grant Total = 3 (Sugar in liquid form)
Grand Total = 7 (Sugar in solid form)

$$\frac{3}{\text{Liquid Exposure}} \times \frac{20 \text{ min}}{\text{pH below 5.5}} = \frac{60}{\text{Acid Production}} \div 3 \text{ days} = \frac{20}{\text{Daily liquid acid Production}}$$

. 7 .	x	. 40 min .	=	. 280 .	÷ 3 days	=	. 93 .	
Solid Exposure		pH below 5.5		Acid Production			Daily liquid acid Production	

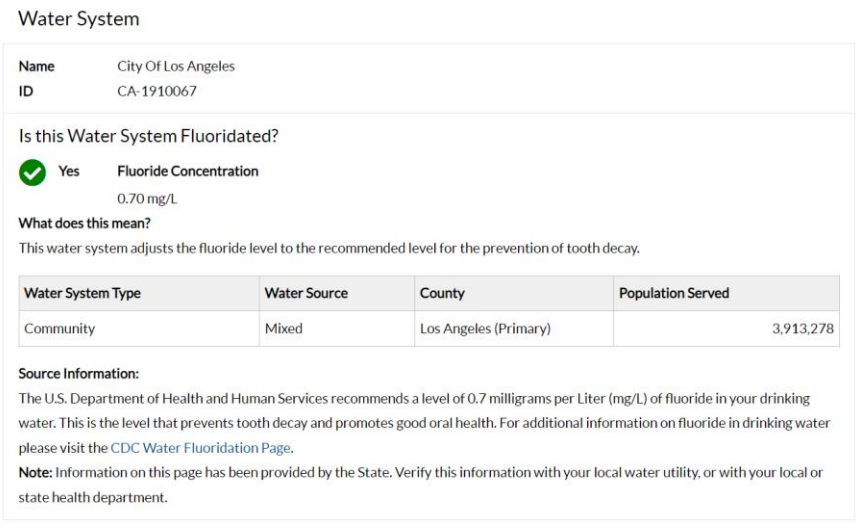
Total daily acid production =	20	+	. 93 .	=	113 min	
	Liquid acid Production total		Solid acid Production total		Total time tooth is exposed to acid daily	

4. Nutritional focus and recommendations, including rationale.
    - Limit carbohydrate intake
        - Rationale: Carbohydrates can trigger bacteria in the mouth to create acid that can harm the enamel surface of teeth. Excessive amounts of carbohydrate intake may lead to caries, especially when they are in the mouth for prolonged periods of time.
    - Substitute Canel's Gum for sugar free alternatives such as Xylitol or Ice Breakers
        - Rationale: Bacteria in the oral cavity metabolizes sugars to produce acids that cause demineralization. Substituting Canel's Gum with sugar free alternatives will protect the teeth.
    - Rinse with water after meals to counteract acidity of foods.
        - Rationale: Rinsing with water will immediately remove food debris and sugar that is left over after eating.
    - Do not consume more than the daily recommended calories.
        - Rationale: Consuming excess calories will increase the amount of food particles that can be left behind within the oral cavity and increases the risk of attracting harmful bacteria.
    - Consume sugar and starches (i.e. bread, pasta, rice) in moderation.
        - Rationale: Limiting sugar and starches protects your teeth against plaque build up which causes inflammation and damage to the enamel surface of the teeth.

VIII. Fluoride Analysis

1. Current usage of fluoride (Type, amount, supplemental, the fluoride concentration of water in the city where patient lives)
    a. Current Use of Fluoride
        - Colgate Total – Used 4x day
            - Contains 0.454% of Stannous Fluoride to protect against cavities, gingivitis, and sensitivity.
        - Crest Pro Health Advanced – Used 2x day
            - Contains 0.02% Sodium Fluoride to protect against cavities.
        - Sparklets water – Drinks 2-3 8oz glasses of water daily
            - Contains up to 1.0mg/L of Sodium Fluoride

- Patient does not drink tap water.
  https://nccd.cdc.gov/DOH_MWF/Default/WaterSystemDetails.aspx



Water System

Name City Of Los Angeles
ID CA-1910067

Is this Water System Fluoridated?

Yes **Fluoride Concentration**
0.70 mg/L

What does this mean?
This water system adjusts the fluoride level to the recommended level for the prevention of tooth decay.

Water System Type	Water Source	County	Population Served
Community	Mixed	Los Angeles (Primary)	3,913,278

Source Information:
The U.S. Department of Health and Human Services recommends a level of 0.7 milligrams per Liter (mg/L) of fluoride in your drinking water. This is the level that prevents tooth decay and promotes good oral health. For additional information on fluoride in drinking water please visit the CDC Water Fluoridation Page.
Note: Information on this page has been provided by the State. Verify this information with your local water utility, or with your local or state health department.

2. Identification and rationale of fluoride focus
   - Continue using Colgate Total but reduce the use to 2x day to prevent overbrushing, enamel wear, and over application of fluoride. The continued use of this product containing stannous fluoride is effective in preventing bacteria accumulation. However, the patient does present with small localized white spots on the smooth surfaces of some teeth which may be an indication of excessive fluoride use or vitamin deficiency. Patient may brush a third time, if needed, without toothpaste.
   - Continue using Advance Pro Health Mouthwash to protect against cavities and eliminate residual food and debris but limit the amount used to the recommended mL per use.
   - Continue drinking Sparklets water to hydrate the body as well as obtain the benefits of its fluoride concentration.
   - 5% Fluoride Varnish is recommended at recare maintenance appointments with the hygienist every 3 months. It is the most effective method of fluoride application and at a greater concentration than home care products, it provides greater benefit with one application to patients that are at high risk of developing caries.

IX. Caries Risk Assessment

1. CAMBRA Assessment (Must be graded)
    a. Caries risk prognosis (discuss reasoning)
        - The patient is at high risk for caries due to having active dental decay within the past year, having visible clinical and radiographic evidence of caries penetration into the dentin, obvious clinical evidence of plaque on the teeth, clinical evidence of white spots on the smooth surface of teeth, and having restorations placed within the last two years.
    b. Result of CRT Bacterial Test (If applicable)
        - N/A
    c. Provide recommendations based on patient's assessment
        - Self-management goals
            - Modified Bass Technique
                - To effectively achieve a thorough cleaning and remove plaque.
                - The modified bass technique was demonstrated by clinician and replicated by the patient.
                - Helps to stimulate the blood flow within the gingiva to promote healing.
                - This method will help improve the patient's overall oral health over time.
                - Brush at least twice a day
                    - At least 30 minutes after breakfast in the morning
                    - At nighttime before bed
            - C-Shaped Flossing
                - Effectively helps to remove plaque from interproximal spaces and hard to reach areas by wrapping the floss around each mesial and distal surface of teeth to cover more surface area.
                - Gentle up and down motions were demonstrated to help avoid gingival irritation in areas with tight contacts.
                - Modified C-shaped flossing using a floss pick was also demonstrated to help the patient reach the most posterior interproximal spaces.
                - The C-shaped method was demonstrated by clinician using traditional floss and the modified C-shaped method was demonstrated by clinician using a floss pick. Both methods were replicated by patient to remonstrate understanding.
                - Floss at least once a day
            - Fluoride Products
                - 5% Sodium Fluoride Varnish application following re-care maintenance every 3months.
                - Re-mineralizes and strengthens tooth enamel
                - Helps reverse or arrest the early progression of caries
            - Tepe Interdental Brushes
                - Can be more effective in plaque removal than flossing alone

        - Great for plaque removal in open embrasure spaces or small spaces created due to mesial drifting of a tooth into the open space
        - Use at least once a day
    - End-Tuft Toothbrush
        - Effective for brushing hard to reach areas
            - Most posterior distal surfaces of teeth (molars)
                - (i.e., teeth #2, #15, #18, #31)
            - Distal surfaces of teeth when adjacent teeth are missing
                - (i.e., teeth #5 and #12)
- Referral needs
    - Extraction of root tip #13
        - Recommended to protect the exposed tooth from further disease/infection
        - Extraction will protect the adjacent teeth from the spread of disease/infection
    - #31 ML Fracture
        - Treatment will protect the tooth against pain and infection that can spread to adjacent teeth.
    - #16 L Fracture
        - Treatment will protect the tooth against pain and infection that can spread to adjacent teeth.
    - #11 MFL Caries
        - The carious lesion will progressively get worse over time which can lead to unrestorable damage and possible infection.
    - Nightguard
        - Recommended to protect teeth from further damage of excessive forces due to clenching and grinding
        - Prolongs the longevity and aesthetics of your teeth with proper oral hygiene

d. Provide education and written information on caries control and management.
    - To prevent future caries the following is suggested:
        - Routine brushing 2x day at morning and night time
        - Flossing 1x day
        - Use of mouth rinse containing fluoride 1x day
        - 3-month maintenance re-care hygiene appointments
        - 5% Sodium Fluoride at each re-care appointment
        - Substitute gum for sugar free alternative such as xylitol or ice breakers
        - Reduce carbohydrate intake

*Provide copy of graded CAMBRA Assessment PE

West Los Angeles College
Department of Dental Hygiene
Process Grading Form

Student Name Airel Harte
Date 11/08/22
Instructor Chambers

Oral Hygiene Instruction - Caries Risk Assessment (CAMBRA) assessment Grade: 3.0

Preparation	Pass	No Pass
Explains the benefits of oral hygiene instruction and caries risk assessment to patient	Cw	
Establishes appropriate patient/operator positioning — Pt need to be at eye level		
Uses verbal and nonverbal communication skills to establish patient/provider relationship	Cw	

Assessment	Pass	No Pass
Assesses the patient's current oral hygiene status and caries risk by interview, clinical observation and assessment form.	Cw	
Uses saliva test if available	Cw	
Disclose and determine the Plaque Index if applicable. It allows the patient to self-evaluate.	Cw	
Asks the patient to demonstrate brushing, flossing, and other oral care techniques	Cw	
Assesses patient's oral structure, occlusion, tissue contour, types of the embrasure and manual dexterity	Cw	
Determines dental knowledge of the patient	Cw	

Interpretation and Plan	Pass	No Pass
Interprets appropriate risk level using a risk assessment form High (Caries)	Cw	
Customizes the oral health care plan based on the patient's needs and status	Cw	
Selects appropriate preventive aids and products for the risk level (Include options for antimicrobials, fluoride, xylitol, sealants, and frequency of radiographs and dental hygiene services) Modified Brushing technique + flossing, IP brushes, End Tuft B, Good snacking habits, FlO mouthrinse	Cw	

Implement and Instruction	Pass	No Pass
Discusses disease concepts and engages patient	Cw	
Discusses goal and technique to improve oral hygiene status and caries risk status	Cw	
Demonstrates appropriate tooth brushing method, flossing method, Interproximal cleaning method, and other preventive homecare agents	Cw	
Demonstrates by using the tell-show-do approach	Cw	
Allows patient to give feedbacks and evaluates the patient's ability to perform recommended instruction	Cw	

Professionalism	Pass	No Pass
Provides instruction and demonstration in a caring manner	Cw	
Manages patient care and provides service in a timely manner within 15 minutes.	Cw	
Documents patient's oral hygiene status and specific OHI instruction given to patient in patient's record.	Cw	
**Appropriate protective wear and infection control throughout the process.	Cw	

** These asterisks indicate critical criteria. When asterisk criteria are not performed correctly, summary evaluation grade will "0".

Summary Evaluation

4	3	2	1	0
Sudent demonstrated correct sequence and proper technique without guidance.	The student demonstrated 1-2 minor errors and required minimal guidance.	Student demonstrated 3 minor errors required guidance but corrected with verbal feedback	Student required constant guidance, demonstrated 4 errors, difficulty completing the task	Student required constant guidance, unable to complete task. Student-made more than 4 errors or ONE critical error.

Recommended night guard.

Form #13 Oral Hygiene Instruction/CAMBRA 2021

CARIES RISK ASSESSMENT FORM – CHILDREN AGE 6 AND OVER/ADULTS

Date: 11/08/22 **Assessment Date:** 11/08/22 **Is this (please circle) baseline or recall**

Please use this form with your patient and explain their caries risk. Give the filled out form to the patient as reference.

NOTE: Any one YES in Column 1 signifies likely "High Risk" and an indication for bacteria tests	YES = CIRCLE 1	2	3	Comments:
1. Risk Factors (Biological Predisposing Factors)				
(a) Has active dental decay in the past year	YES			
(b) Frequent (> 3 times/day) between-meal snacks		YES		# times/day: 2 Types: Apple / Banana
(c) Drinks sports beverages NO		YES		# times/day:
(d) Recreational drug/tobacco/alcohol use NO		YES		
(e) Saliva-Reducing factors (medications/radiation/systemic)		YES		
(f) Child or adolescent has special health care needs NO		YES		
(g) Orthodontic appliances NO		YES		
2. Protective Factors				
(a) Home/work/school in fluoridated community Buys Sparkletts			YES	Zip Code: 90028
(b) Fluoride toothpaste at least 2x daily Colgate			YES	# times/day: 4x day
(c) Fluoride mouthrinse (0.05% NaF) daily			YES	2x day
(d) 5000 ppm F fluoride toothpaste daily			YES	
(e) Fluoride varnish in last 6 months NO			YES	3 years since last thy sp
(f) Chlorhexidine prescribed/used one week each month during the last 6 months NO, 3yr ago			YES	
(g) Xylitol gum/lozenges 4x daily last 6 months NO			YES	
(h) Calcium and phosphate paste during last 6 months NO			YES	
3. Disease Indicators - Clinical Examination				
(a) Visible cavities or radiographic penetration of the dentin	YES			
(b) Radiographic proximal enamel lesions (not in dentin)	YES			
(c) White spots on smooth surfaces Yes	YES			
(d) Restoration in the last 3 years 2 fills ~~VP~~ VL	YES			
(e) Plaque is obvious on the teeth and/or gums bleed easily		YES		
(f) Visually inadequate saliva flow NO		YES		
(g) Exposed roots NO		YES		
(h) Deep pits and fissures Yes		YES		
(i) New remineralization since last visit (List teeth):			YES	Teeth:

Overall Caries Risk (circle): **HIGH** **MODERATE** **LOW**

EXTREME RISK=HIGH RISK + SEVERE SALIVARY GLAND HYPOFUNCTION

Bacteria/Saliva Test Results: MS: LB: Flow Rate: ml/min: Date:

Self-management goals:

1. Modified Bass Technique
2. Fluoride products
3. Tepe Interdental brushes

Since Last Visit:

New Cavitation: (Y) N

New White Spot Lesions: (Y) N

Dental Pain: Y / (N)

Referral Needs: Extract #13 root tip, #11 MFL Caries, #16 L fracture #31 ML Fracture

(Updated: 8/19/14)UCLA

X. Dental Hygiene Treatment Plan

1. Smoking Cessation program recommendations. (if applicable)
    a. N/A
2. Recommendation of sealant application (provide rational)
    a. N/A
3. Consideration of possible implications of systemic conditions.
    a. Hypertension and medications used to treat hypertension may cause a change in the size and shape of gums, especially when there is the presence of plaque biofilm. In the case of inflammation or infection in the oral cavity, this can cause an increase blood pressure because of the increase of sympathetic activity. In addition, poor oral health can interfere with the control and treatment of hypertension. Hypertension also causes vasoconstriction of the blood vessels. In this case, I will not use another vasoconstrictor such as epinephrine during dental treatment.
    b. Hypothyroidism can cause poor periodontal health, altered tooth morphology, and delayed wound healing. Other characteristics like macroglossia, dysgeusia, and delayed eruption are also common however, they do not pertain to the patient in this cases.
    c. Obesity correlated with a poor nutrition in combination with poor oral health can lead to gingivitis and periodontal conditions. People with obesity are also more likely to suffer from periodontal disease than people that are not obese.
    d. Be mindful that patient is allergic to Penicillin and notate this in patient file as well as referral documents.
4. Consideration of possible implications of local factors/conditions
    a. The presence of plaque is a local contributory factor in periodontal disease. As plaque begins to harden it becomes calculus. Calculus is porous and contains a variety of bacteria that can absorb toxins that will contribute to destruction of the periodontium.
    b. Malocclusion makes it challenging to clean the interproximal spaces. In addition, it affects the patient's bite. This leads to an increase in plaque accumulation which progresses to periodontal disease.
    c. Anatomical features can make oral hygiene challenging in difficult to reach areas (i.e., furcation involvement present on the buccal aspect of #18, #19, #30, #31).
    d. Occlusal trauma as a result of clenching and grinding have caused injury to the teeth causing fractures on tooth #16, tooth #31 and attrition on mandibular anterior teeth and maxillary anterior teeth.
5. Possible implications of medications on oral health.
    a. Long term use of Levothyroxine has affected the oral cavity due to recurring infection at the gingival crevice.
    b. Metoprolol, Hydrochlorothiazide, and Ramipril have not had dental implications on the patient. However, taking these medication do cause orthostatic hypotension so it is important to keep this in mind when adjusting the patients position during and after dental treatment.
    c. Potassium supplements: N/A
6. Physical limitation or disability
    a. N/A
7. Referral to a DDS and other medical discipline (provide reasoning)

a. Physician referral
    - It has been 3 years since the patient was last seen by the physician. It is important to stay up-to-date with regular check ups to monitor and control hypertension. Lifestyle changes and/or new medication may be needed. If left unmonitored, it can lead to other serious health concerns.
    - Medications for hypothyroidism need to be monitored on a consistent basis as adjustments to dosages and medications may be needed.
    - Obesity is a concern because it causes health and oral risks. Seeing a physician regularly can benefit the patient by being referred to a nutritionists or recommending other courses of action to help prevent diabetes, heart disease, and stroke.

b. DDS Referral
    - Extraction of root tip #13
        - Recommended to protect the exposed tooth from further disease/infection
        - Extraction will protect the adjacent teeth from the spread of disease/infection
    - #31 ML Fracture
        - Treatment will protect the tooth against pain and infection that can spread to adjacent teeth.
    - #16 L Fracture
        - Treatment will protect the tooth against pain and infection that can spread to adjacent teeth.
    - #11 MFL Caries
        - The carious lesion will progressively get worse over time which can lead to unrestorable damage and possible infection.
    - Nightguard
        - Recommended to protect teeth from further damage of excessive forces due to clenching and grinding
        - Prolongs the longevity and aesthetics of your teeth with proper oral hygiene

8. Rationale for the treatment plan and patient needs (provide reasoning)
    a. Treatment Plan
        - Full mouth scaling and root planning
        - Local anesthesia: Mepivicaine, no epi.
        - 4-6 week periodontal re-evaluation
    b. Rationale
        - Patient requires scaling and root planning to eliminate periodontal inflammation and remove causal factors such as plaque and calculus which are found in generalized supragingival and subgingival areas.
        -
9. **Goals and Objectives** of the dental hygiene treatment
    - The goal of scaling and root planning is to create and maintain oral health with proper function and teeth that are aesthetically pleasing.
    - The objective to attain this goal involves multiple dental visits. The first visit involved the initial assessment appointment where all pertinent information was gathered and collected. The subsequent 4 appointments involves scaling and root planing by quadrant with local anesthesia (3%

Mepivicaine, no epinephrine). The last appointment involves re-evaluation 4-6 weeks after the last scaling and root planing appointment During the re-evaluation, de-plaquing may be required, new data is collected and gathered, and depending on the healing of periodontal pockets, the administration of Arestin may be recommended.

10. Treatment plan: Complete Dental Hygiene Diagnosis and Care Plan (numbers of appointments and sequence of treatment, etc.)
    a. Medical Assessment
        - 64-year-old, adult, Hispanic, female
        - Medical Precautions: High Blood pressure, Hypothyroidism, Penicillin Allergy
        - Medications:
            - Levothyroxine 50mg taken 1x every morning for hypothyroidism.
            - Metoprolol 50mg taken 1x every morning for treatment of hypertension.
            - Hydrochlorothiazide 25mg taken 1x every morning for treatment of hypertension.
            - Ramipril 20mg taken 1x day every morning for treatment of hypertension.
            - Potassium Chloride 8mg taken 1x day with meal for electrolyte supplementations.
        - ASA II due to blood pressure, medications, and penicillin allergy
    b. Dental history:
        - Caries:
            - #2 MOL, #10 MFL, #14 O, #15 O, #16 O, #18 OB, #19 OB, #29 O, #31 OB were treated 5-7 years ago due to caries.
            - #1, #17, and #32 were extracted due to caries 32 years ago
            - #20 was extracted 11 years ago due to caries
            - #3 and #4 were extracted 5 years ago due to caries
            - #13 root tip was extracted two months ago due to caries
            - #11 M has current caries
        - Periodontal
            - Patient has history of scaling and root planing ~3 years ago.
        - Last Dental Visit: 3 years ago
            - Reason for visit: Evaluation and Hygiene Services (SRP)
        - Last Radiographs: BWs/Pas 3 years ago
    c. Oral Assessment
        - Extra/Intra Oral Exam Findings: WNL
        - Occlusal Classification

        - Right Canine: Class III
        - Right Molar: Unidentifiable due to missing opposing tooth
        - Left Canine: Class II
        - Left Molar: Class I
        - Overbite: N/A
        - Overjet: 1mm
        - Crossbite: N/A
        - Maximum Opening: 47mm
        - TMD: Asymptomatic popping on left side and deflection to the right side upon opening
    - Special Dental Prostheses (Dentures, Implants, etc.): N/A
    - Caries Risk Assessment/ Defective Restorations:
        - #11 M caries
        - #13 retained root tip with caries
    - Gingival Description (Color, Consistency, Contour, Texture)
        - Maxillary Free Gingiva: Pink, soft, smooth, rolled borders
        - Maxillary Attached Gingiva: pink, edematous, glossy with loss of stippling
        - Mandibular Free Gingiva: pink, soft, smooth, rolled borders
        - Mandibular Attached Gingiva: pink, edematous, glossy
    - Probing, BOP's and Exudate:
        - Probing Depth: Generalized 2-3mm pockets with localized 4-7mm pockets
        - BOP: 17%
        - Exudate: N/A
    - Recession and Mucogingival Involvement:
        - Recession: Generalized 2-3mm of recession with localized 1 and 4mm
        - Mucogingival Involvement: N/A
    - Furcations: Class II: Buccal surface of tooth #18, #19, #30, and #31
    - Mobility: Class I tooth #18
    - Periodontal Classification: Generalized Stage III, Localized Stage IV
    - WLAC Calculus Code: 4-Medium on URQ, ULQ, and LLQ. 5-Medium Heavy on LRQ

Dental Hygiene Human Needs	Patient's Needs	Goal and Care Plan
Chief Complaint	- Patient wants to fix fractured teeth and remove retained root tip - Patient also wants a dental cleaning	- Refer patient to DDS for treatment of fractured teeth and retained root tip - Perform full mouth Scaling and Root Planing with local anesthesia for patient comfort
Protection from health risks	- Medical conditions include hypothyroidism, hypertension, and allergy to Penicillin.	- Treatment recommendations are suitable to protect against further progression of periodontal disease. - Treatment recommendations also protect against interference of thyroid hormone production and hypertension. - There will not be any use or recommendations to take Penicillin during or after treatment.
Freedom from head and neck pain	- Patient has a low pain tolerance and has stated that she does not like visiting any health facilities - Pain free treatment and easy to follow recommendations that are also pain free. - Patient does not have any other concerns pertaining to her head and neck.	Treatment recommendations include anesthesia - Will provide comfort during subgingival instrumentation OHI recommendations are pain free - Brushing with an electric toothbrush - Brush distal surfaces of posterior molars with an end tuft toothbrush - Flossing with traditional floss using C-shaped method - Flossing with Proxybrush in large embrasure spaces - Mouth rinse (which one recommended?) (Fluoride?) - Sugar Free Gum
Wholesome facial image	The patient reports feeling dissatisfied with the appearance of her teeth because she can visibly see the calculus in the interproximal spaces of the mandibular anterior teeth when she smiles.	- Appearance of the gingiva will improve - Appearance of the teeth will improve - Patient will understand and see the difference in her oral health after supra and subgingival calculus has been removed. - Facilitates maintenance interproximally
Skin and mucous membrane integrity of head and neck	- Patient is concerned with the space between her teeth and the gingival inflammation present. - There is no concern with the head and neck regions.	Protects against the progression of periodontal disease - Reduced pocket depths - Reduced gingival inflammation/appearance - Reduced BOP

		- Sugar Free Gum to replace Sugary Gum (Canel's Mexican Gum) - Wrigley's EXTRA Gum - Ice Breakers - Epic Xylitol Gum (comes in different flavors) - Disrupts tooth-eating acid attacks as they happen
Biologically sound and functional dentition	Fractures Root tip Carious Lesion(s) Furcation Involvement Malocclusion	- Referral to DDS to address fractured teeth, retained root tip, carious lesions, and malocclusion. - Full mouth scaling and root planing to prevent the progression of bone loss and furcation involvement.
Conceptualization and problem solving	Patient doesn't understand why there is plaque and calculus present as she states she brushes routinely on a daily basis.	Educating patient and allowing patient to feel comfortable enough to engage and ask questions regarding her treatment and OHI recommendations.
Responsibility for oral health	- No dental exam or dental hygiene services within the last three years - Inadequate plaque control - Inadequate understanding of periodontal disease - Inadequate oral hygiene home care routine/ techniques	Communication - Explained treatment to patient and involved her in treatment planning and implementation - Patient understanding of treatment, treatment outcomes, and responsibility of continued oral hygiene home care - Plaque control - Calculus removal - Recall maintenance visits - Referral to DDS for extraction of root tip, extraction of fractured teeth, and treatment of carious lesion

Appointment Plan

Appointment	Date/Interval	Procedures:
1. Screening	Initial Appointment	Vitals Medical Assessment EO/OI Examination FMX Restorative Assessments Periodontal Assessments
2. ULQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Before and After Intraoral Photos Plaque Index

		Present Treatment Plan ULQ Scaling and Root Planing - Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - PSA, 0.9mL - AMSA, 1.4mL
3. LLQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Plaque Index LLQ Scaling and Root Planing - Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - IA, 1.5mL - Lingual block, 0.3mL - Buccal block, 0.3mL
4. LRQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Plaque Index LRQ Scaling and Root Planing - Magnetostrictive and Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - IA, 1.5mL - Lingual block, 0.3mL - Buccal block, 0.3mL
5. URQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Plaque Index URQ Scaling and Root Planing - Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - Supraperiosteal, 0.6mL - AMSA, 1.4mL
6. Re-eval	4-6 weeks later	Vitals Medical Assessment EO/IO Examination Reassessment Evaluate the need for Arestin Before and After Intraoral Photos

		Plaque Index De-plaque - Hand Scale Polish Fluoride Varnish
Maintenance	3 months later	Vitals Medical Assessment EO/IO Examination Reassessment Periodontal Maintenance - Hand Scale Polish Fluoride Varnish

11. Vitals at each appointment
    a. First Appointment: Assessment
        - BP: 138/88 mm Hg
            - Hypertension Stage I
        - P: 64 bpm
        - R: 18 bpm
        - T: 96.5°
        - SpO2: 96%

    b. Second Appointment: ULQ SRP with Local Anesthesia
        - BP:136/84 mm/Hg
            - Hypertension Stage I
        - P: 62 bpm
        - R: 14 bpm
        - T: 98.3°
        - SpO2: 99%
    c. Third Appointment: LLQ SRP with Local Anesthesia
        - BP: 138/86 mm/Hg
            - Hypertension Stage I
        - P: 64 bpm
        - R: 16 bpm
        - T: 97.5°
        - SpO2: 97%
    d. Fourth Appointment: LRQ SRP with Local Anesthesia
        - BP: 132/86 mm/Hg
            - Hypertension Stage I
        - P: 66 bpm
        - R: 14 bpm
        - T: 96.5°
        - SpO2: 97%
    e. Fifth Appointment: URQ SRP with Local Anesthesia
        - BP: 136/84 mm/Hg
            - Hypertension Stage I
        - P: 72 bpm
        - R: 16 bpm
        - T: 97.1°

- SpO2: 96%

f. Sixth Appointment: Periodontal Re-evaluation
   - BP: 138/84 mm/Hg
     - Hypertension Stage I
   - P: 60 bpm
   - R: 18 bpm
   - T: 97.5°
   - SpO2: 97%

12. Oral hygiene instruction at each appointment (be specific, include rationale)

Before initial oral hygiene instructions:

- Intra-oral photos with disclosing solution were shown to patient to demonstrate areas with plaque. Patient attested to brushing and flossing regularly and stated she did not know why there was so much plaque and calculus. I thought perhaps this may be true to an extent and perhaps the patient simply doesn't have the correct technique. I asked the patient to demonstrate her brushing technique and sure enough there were a lot of areas being missed during brushing. There was a lot of unorganized movement of the toothbrush in the mouth and it was a clear indication to me that there was a lot to work on.
- It was explained to the patient that undisturbed plaque adheres to the surface of teeth and uses saliva as a means for colonization, nutrition, and transportation. The sugars that are stored within plaque give off exposures to acids that are harmful to the periodontium. When we leave this plaque undisturbed in the oral cavity, it begins to mineralize and become calculus. The mineralization process can occur in as little as a few hours to a few days.
- We followed this discussion with radiographic evidence of subgingival calculus deposits, bone loss, and furcation involvement to demonstrate to the patient the effect that plaque and calculus have already had on her oral health.

a. During the assessment appointment I thought that it was important not to overwhelm the patient with oral hygiene recommendations, so I began with the two that I felt were the most important, brushing and flossing.
   - Modified Bass Technique
     - Using a soft bristled toothbrush angle bristles at a 45-degree angle into the sulcus. Vibrate the bristles in a short back and forth motion gently massaging the gingiva. Do not apply pressure to avoid irritating the gingiva. Move the toothbrush across the arch with the same overlapping back and forth motion. Then brush downward (for maxillary teeth) and upward (for mandibular teeth) to remove plaque biofilm. This method will provide gingival stimulation which stimulates the blood flow to aid in getting rid of bacteria. I recommended brushing at least twice a day. Once in the morning (at least 30 minutes after breakfast) and once at nighttime before bed.
   - C-Shaped Flossing
     - Using an 18-inch long piece of floss wrap each end around each middle finger while leaving ½ inch of floss between the fingertips. Insert the floss in between the teeth in a gentle seesaw motion. Be

careful not to force your way in between tight contact spaces to avoid irritating the gingiva. Wrap the floss closely around each proximal surface of each tooth making a C-shape and move the floss in and up-down motion. This method will help get rid of plaque biofilm in hard-to-reach areas where the bristles of the toothbrush cant reach. A modified C-shaped flossing method was also demonstrated to the patient with floss picks for the most posterior teeth. I recommended flossing at least once a day.

b. During the second appointment we touched base on previous oral hygiene recommendations and the patient affirmed that my previous recommendations were being followed.
    - Gum Substitution
        - To add on, we discussed substituting Canel's Gum for a sugar free alternative like Ice Breakers or Xylitol. This will reduce the daily sugar exposure on the teeth and will help prevent added acid production that can be harmful to the oral cavity.
    - Proxabrushes
        - I recommended the use of interdental proxabrushes to help facilitate flossing in open embrasure spaces to remove plaque biofilm more effectively. I provided patient with samples of TePe interdental brushes in various sizes for her use in her oral hygiene home care routine.
c. During the third appointment I assessed plaque build up in the previously scaled quadrant. We discussed the modified bass technique once again and patient replicated my demonstration to show understanding.
        - I introduced the end-tuft toothbrush to the patient to assist her with reaching the distal surfaces of the most posterior teeth. An end-tuft toothbrush was provided to the patient for her home use.
        - I asked patient her thoughts on an electric toothbrush as I felt she may benefit from it far greater than the manual toothbrush. However, patient stated she was not interested in it due to the cost. I did not continue discussing the electric toothbrush at this point. Instead I reinforced the modified bass technique and advised patient that, with proper use, the manual tooth brush will also provide great benefit.
d. For subsequent appointments four and five, previous OHI recommendations were reinforced.
e. Visit six: Periodontal re-evaluation appointment.
        - The patient stated her daughter bought her an electric toothbrush for Christmas. It has proven to be beneficial to the patient for plaque control. I advised patient to use the electric toothbrush at a 45 degree angle, just like the manual toothbrush, and move the toothbrush head a long the arch. Other previous recommendations were again reinforced.

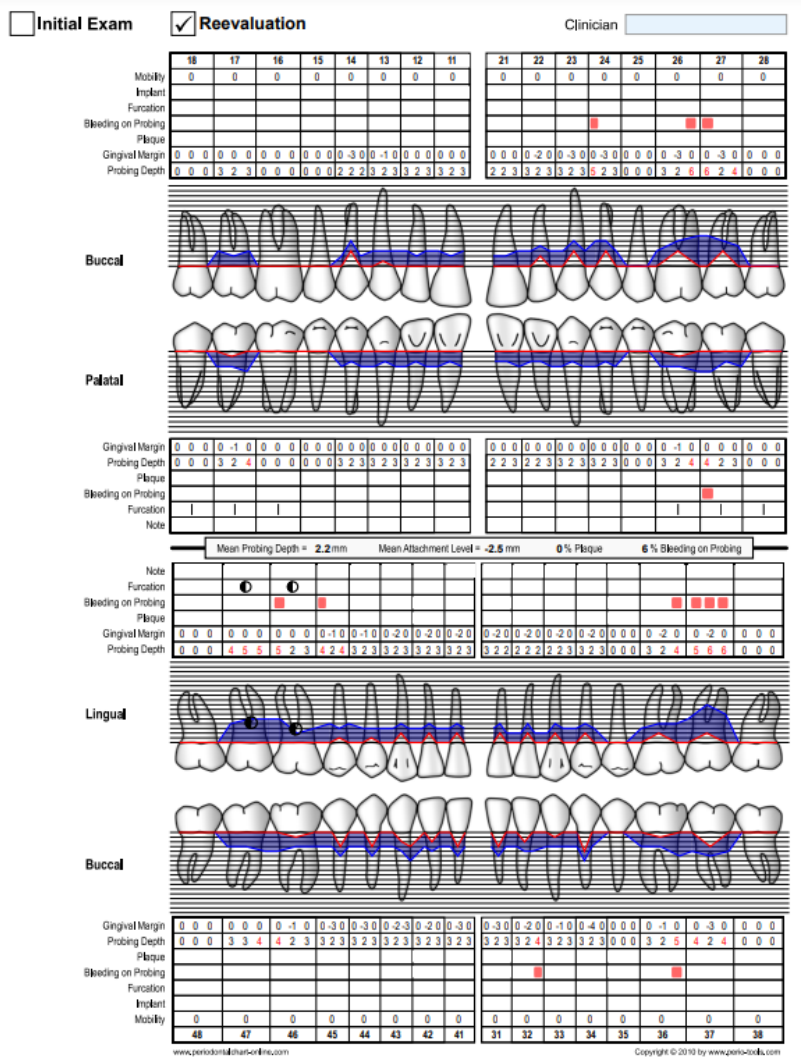
13. Fluoride Recommendation (provide rational)
    a. 5% Sodium Fluoride Varnish at re-care maintenance appointments
        - Rationale: The primary mechanism of action includes preventing plaque build up and enhancing remineralization of enamel. It is the most effective fluoride option in protecting the enamel surface of teeth as it

prolongs fluoride exposure for a few hours at a time. The patient is at a high risk for caries, therefore application of fluoride varnish at a 3 month interval is ideal for the patient.

14. Rationale for periodontal maintenance appointment interval and follow up visits
    a. 3-month periodontal maintenance appointment interval
        - Rationale: Due to the extent of bone loss, it is important to have routine periodontal maintenance appointments at a 3-month interval. The harmful bacteria begins to recolonize within 9-11 weeks and it is important that professional intervention occur every 12 weeks to disturb the bacteria from colonizing and causing further destruction of the periodontium. This also prevents the need for periodontal surgery, prevents inflammation, prevents the need for local anesthetic, and prevents the need for another scaling and root planing treatment.

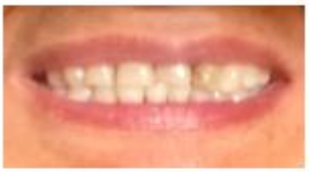
XI. Re-Evaluation & Post Instructions Status

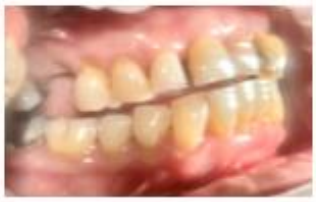
1. Periodontal Re-Evaluation
   *Include copy of periodontal probing



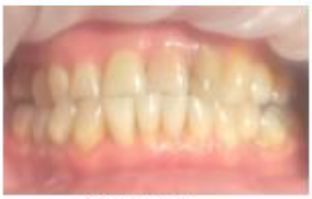
*Include, set of 12, post-treatment photos

After Treatment

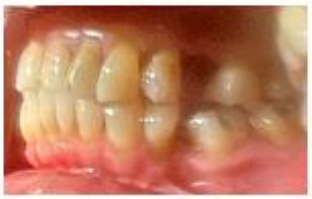




Right (Buccal) view

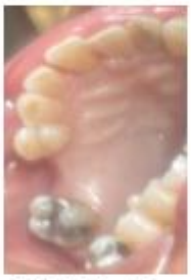


Anterior view

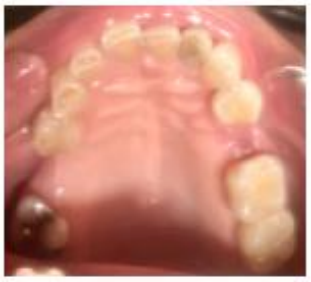


Left (Buccal) view

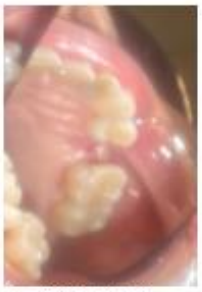
Palatal view



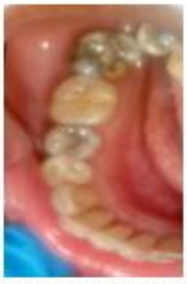
Right (Palatal) view



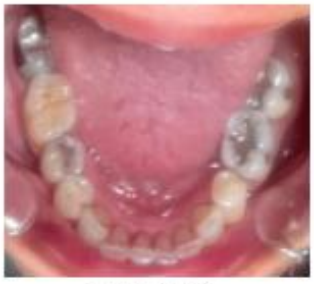
Palatal view



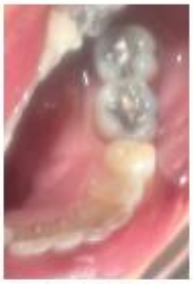
Left (Palatal) view



Right (Lingual) view



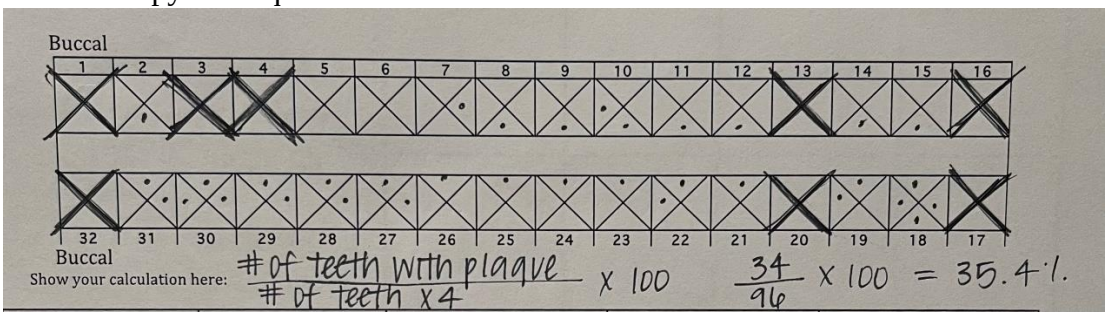
Lingual view



Left (Lingual) view

Lingual view

2. Full mouth Plaque Index (Post instructions Date, PI) include picture of disclosing.
   *Include copy of Plaque Index



Calculation: Plaque Index = $\frac{\text{\# of teeth surfaces recorded with plaque}}{\text{\# of teeth x 4}} \times 100$

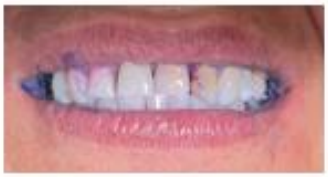
Plaque Index = $\frac{34}{96} \times 100$

Plaque Index = 35.4%

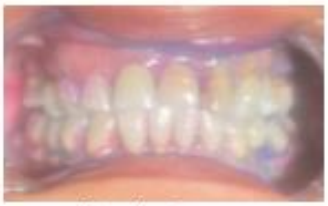
The patient's plaque index score showed an improvement of 20.3%. While this is progress, there is still work to do to achieve adequate plaque control.

*Include 2 – 3 photos of disclosed plaque

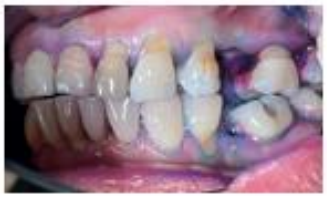
After Treatment



Right (Buccal) view



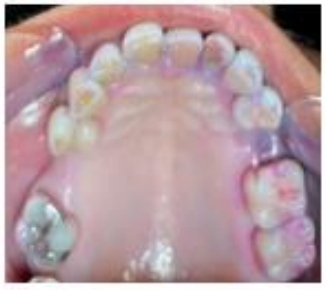
Anterior view



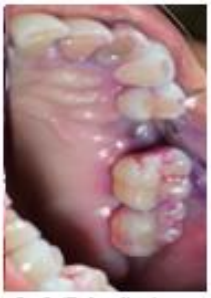
Left (Buccal) view

Palatal view

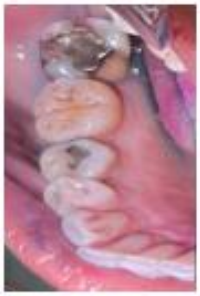
Right (Palatal) view



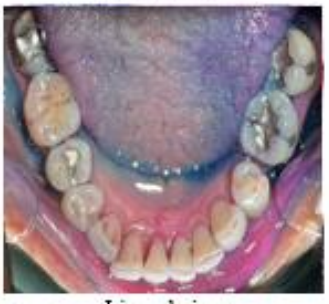
Palatal view



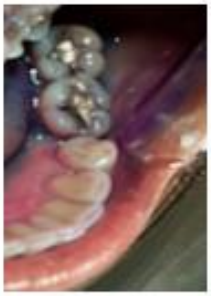
Left (Palatal) view



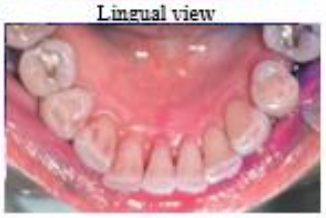
Right (Lingual) view



Lingual view



Left (Lingual) view



Lingual view

3. Patient compliance with recommended home care (oral hygiene/ prevention instructions/nutrition/referral).

    - Compliance: Fair
    - It was evident that patient made an effort to follow through with oral hygiene recommendations. However, they were not followed routinely on a daily basis as recommended as there was still moderate plaque accumulation and 4 areas where calculus was beginning to form again.
    - Patient did visit the DDS for root tip extraction of tooth #13 and extraction of fractured tooth #16. A future appointment for treatment of tooth #31 and #11 is pending for the near future.

XII. Discussions (Not outline format, essay format)

The overall treatment outcomes included reduced pocket measurements by 1-2mm, reduction in plaque buildup by 20.3%, and a reduction in bleeding on probing by 11%. The gingiva still appeared slightly inflamed and edematous due to the presence of plaque. However, this is also likely due to the correlation of hypothyroidism and obesity with periodontal disease. The patient recognized that she was overdue for a visit to her physician's office and wanted to remain active in taking care of her overall health, especially after learning about the correlation of her systemic conditions and her oral health.

Prior to her participation in the project, the patient was not well informed with regard to what oral hygiene instructions are suitable for her. She felt that brushing and flossing alone is what needed to be done in order to maintain a healthy oral cavity. She was not aware that there were specific brushing and flossing techniques that provide greater benefit than her current technique. Furthermore, she was not aware of the systemic correlation between her medical conditions which included high blood pressure and hypothyroidism with periodontal disease. She was able to learn new techniques for taking care of her oral health and gain new knowledge and understanding about her systemic health. She also learned about the cariogenic factors in foods that are high in carbohydrates and the effects of acid exposure on the teeth. These foods should be eaten in moderation and with minimum exposure to teeth. Patient also learned to rinse with water after meals to counteract the acidity of foods.

During the re-evaluation appointment, I assessed that it was best for the patient to remain on a 3-month maintenance recall as the level of periodontal destruction that has occurred as well as the amount of plaque biofilm present required attention on a more frequent basis. Periodontal pathogens begin to recolonize in the mouth within 9-11 weeks. Therefore, a 3-month recall is ideal. During subsequent appointment, I could better treat the patient by

reducing her time in the dental chair. If the patient presents with medium calculus again, I will use a piezo to facilitate calculus removal. If I had the experience that I have now after a year of scaling patients, I would have scaled two quadrants within one appointment. This will also reduce the amount of time and visits needed to complete treatment. It wasn't always easy for the patient to travel to the clinic and her continued efforts demonstrate her desire to have a healthier oral cavity.

The main goal that we set out to achieve was to see improvement in her overall oral health. I believe this goal was met. However, there is still work to do to achieve and maintain a healthy status. The patient needs to take one to two recommendations at a time and incorporate them into her daily routine. Once she feels comfortable with these new techniques and dental aids, she should continue incorporating the other recommendations. I believe the patient wants a healthy oral cavity and I believe she is willing to do what it takes but education is progression and it takes time.

XIII. Conclusions (Not outline format, research writing format at least 2 pages)

When evaluating periodontal health, we assess the teeth and supporting structures such as the gingiva and alveolar bone. Gingival inflammation is an indication that there is presence of plaque biofilm. At this stage gingival inflammation causes reversible gingivitis. However, the indication for irreversible periodontal disease occurs when there is bone loss. Treating periodontal disease at its early onset is vital to prevent the progression of the periodontal destruction and preserve and maintain a healthy, functional and aesthetically pleasing dentition. As we know, poor oral hygiene is harmful to the oral cavity and plays an enormous role in the rate of progression of periodontal disease. However, the risks of periodontal disease are not solely related to poor oral hygiene. Some medical conditions have

their own correlation with oral health and outcomes of periodontal therapy, or lack thereof.

The patient was diagnosed with Hypothyroidism 8 years ago. It is a condition in which there is a deficiency of thyroid hormones which control many of the body's central roles such as breathing, weight, and mood and has a bidirectional relationship with periodontal disease. This is also a likely contributor to her current weight which places her within the range of obesity. With hypothyroidism, the gingiva can appear diseased even without subgingival deposits. In addition, "patients with hypothyroidism have increased subcutaneous or subepithelial mucopolysaccharides which decreases the ability of small blood vessels to constrict resulting in increased bleeding from gums" (Baiju, C., et al., 111). This supported the periodontal outcome of the patient during re-evaluation as the gingiva still appeared diseased even though the amount of plaque present was substantially reduced compared to her initial assessment appointment. The amount of calculus present reduced from nearly half of every surface of every tooth down to three surfaces during the periodontal re-evaluation appointment. Furthermore, there was also healing with the reduction of pocket depths and decreased bleeding on probing.

Like hypothyroidism, obesity also has a bidirectional relationship to periodontal disease. "So far, cross-sectional and longitudinal studies have been conducted, as well as some meta-analysis, which assess the relationship between these two conditions that are so prevalent" (Provinciali, L. S., & Fabri, G. M. C., 706). Obesity makes the patient more susceptible to periodontal disease that is initially characterized in the oral cavity as inflammation and bleeding on probing. This is in addition to nutritional choices high in carbohydrates, daily gum chewing which contains added sugars, and inconsistent oral hygiene appointments. Patients with a high BMI are also more likely to exhibit poor results to periodontal therapy due to lipoinflammation that aggravates adipokines and cytokines to produce an overgrowth of periodontal pathogens and inflammatory pockets. Based on the patient's periodontal condition during her re-evaluation appointment, she presented with localized areas of inflammation and marginalized

rolled borders. This correlates with the article written by Provinciali and Fabri in stating that the gingiva will still appear diseased.

The patient was also diagnosed with high blood pressure. There is a link between periodontal disease and high blood pressure, however, it is more commonly suggested that periodontal disease affects blood pressure and not the other way around. Nonetheless it is a cardiovascular condition that should be monitored closely. This is also a greater reason to maintain routine hygiene appointments to ensure the patients periodontal condition is under control and will not affect her high blood pressure. Given the interest taken by the patient to engage in her treatment planning and her efforts to follow through with oral hygiene recommendations, prognosis is fair. In addition, articles related to her medical conditions all suggest that while there is a correlation between periodontal disease and hypothyroidism, obesity, and high blood pressure, all of these conditions can be monitored with routine check up appointments with the physician and dental provider. This ensures taking action and maintaining control of all medical and oral conditions for a happy and healthy lifestyle.

XIV. Summary (One paragraph, essay format)

I learned a lot throughout my experience treating this patient. It was my first time treating a patient with mobility and furcation involvement. These areas seemed to be the most challenging for me as I did not have a lot of experience. In these areas I utilized my mini curettes (11/12 and 13/14). For the mobility on tooth #18 I had to remind myself to apply gentle pressure. Furthermore, I could tell that the dental chair was not the most desired place for my patient to be. She was overdue for a dental cleaning and was interested in the services. However, there was a lot of information to teach the patient about the condition of her oral health and what can be done to prevent further periodontal destruction. I learned to listen to the patient, even in quiet moments,

and cater to her oral needs. I learned that it was best not to overwhelm the patient with so much information all at once and instead, during each appointment, I provided the patient with new information that was important and significant in helping her achieve and maintain a healthy oral cavity. Through my own research I learned more about the products I was recommending to my patient, including the placement of antibiotics. I learned to carefully assess the pockets to determine the areas of healing that could still benefit from minocycline HCl microspheres. I learned a lot about the medications she is taking and learned to identify them easily in other patients taking the same medications. This taught me about the type of questions I should ask patients when I come across others with the same condition or medication(s). Lastly, I learned how to scale medium to medium-heavy calculus around the distal line angles and lingual surfaces of mandibular anterior teeth. Scaling off calculus was the fun part but still I learned to detect residual calculus, scale deep pockets, and when to come up on my fulcrum to remove calculus in deeper or hard to reach areas.

XV. References

Baiju, C., Gupta, G., Joshi, K., Kaur, P., Gupta, N. D., & Virmani, R. (2021). Proximal Relationship Between Hypothyroidism and Periodontitis: "A Clinical Representation". *University Journal of Dental Sciences*, *7*(2),109-112. Retrieved February 13, 2023, from https://ujds.in/index.php/ujds/article/view/455

Del Pinto, R., Landi, L., Grassi, G., Sforza, N. Cairo, F., Citterio, F.,Paolantoni, G., D'Aiuto, F. Ferri, C., Monaco, A., Pietropaoli, D. (2021). Hypertension and periodontitis: A joint report by the Italian Society of Hypertension (SIA) and the Italian Society of Periodontology and Implantology (SIdP). *Springer*. 28: 427-438. Retrieved February 14, 2023, from https://link.springer.com/content/pdf/10.1007/s40292-021-00466-6.pdf

Provinciali, L. S., & Fabri, G. M. C. (2023). The bidirectional relationship between obesity and periodontal disease – A narrative review. *Brazilian Journal of Health Review*. *6*(1), 702-714. Retrieved February 13, 2023, from https://ojs.brazilianjournals.com.br/ojs/index.php/BJHR/article/view/56176

XVI. Appendices

1. Copy of patient's consent form – black-out patient's name and signature area
    a. (Original consent form must be given to Professor Kamibayashi ASAP and it will be filed in the class of 2023 CCP patient folder)

West Los Angeles College
DENTAL HYGIENE PROGRAM

CLIENT CONSENT FORM

Name of Clinical Facility West LA College Dental Clinic

Client Name [redacted]

I hereby authorize the dental hygiene student named below to provide preventive and dental hygiene service. I was informed about the protocol and clinical development of the Comprehensive Care Project, as well as its benefits and possible risks. I agree to be enrolled in the project. I was able to ask questions about the project and my participation to the student and instructors. I agree to have my dental chart to be reviewed, and have copies made of it, for the sole purpose of the project. I also agree and understand that the project requires multiple appointments.

PHOTO RELEASE AGREEMENT

I hereby consent to and authorize the use and reproduction by student, or anyone authorized by the West Los Angeles College Department of Dental Hygiene, of any and all photographs that have been taken of me solely for educational purposes, without financial compensation to me.

Client Name: [redacted] Signed: [redacted]

I have informed my patient about the requirements and I will conduct the project within the parameters of the Standards of Clinical Dental Hygiene Practice.

Student Name: Airel Harte Signed: [signature]

INSTRUCTOR'S APPROVAL

I have reviewed all the assessment records and approved to have this patient enrolled in the Comprehensive Care Project.

WLAC Instructor's Name: Lisa Kamibayashi

Instructor Signature: [signature] Date: 10/20/22

2. Copy of Human Needs and Treatment Plan Form

Dental Hygiene Human Needs	**Patient's Needs**	**Goal and Care Plan**
Chief Complaint	- Patient wants to fix fractured teeth and remove retained root tip - Patient also wants a dental cleaning	- Refer patient to DDS for treatment of fractured teeth and retained root tip - Perform full mouth Scaling and Root Planing with local anesthesia for patient comfort
Protection from health risks	- Medical conditions include hypothyroidism, hypertension, and allergy to Penicillin.	- Treatment recommendations are suitable to protect against further progression of periodontal disease. - Treatment recommendations also protect against interference of thyroid hormone production and hypertension. - There will not be any use or recommendations to take Penicillin during or after treatment.
Freedom from head and neck pain	- Patient has a low pain tolerance and has stated that she does not like visiting any health facilities - Pain free treatment and easy to follow recommendations that are also pain free. - Patient does not have any other concerns pertaining to her head and neck.	Treatment recommendations include anesthesia - Will provide comfort during subgingival instrumentation OHI recommendations are pain free - Brushing with an electric toothbrush - Brush distal surfaces of posterior molars with an end tuft toothbrush - Flossing with traditional floss using C-shaped method - Flossing with Proxybrush in large embrasure spaces - Mouth rinse (which one recommended?) (Fluoride?) - Sugar Free Gum
Wholesome facial image	The patient reports feeling dissatisfied with the appearance of her teeth because she can visibly see the calculus in the interproximal spaces of the mandibular anterior teeth when she smiles.	- Appearance of the gingiva will improve - Appearance of the teeth will improve - Patient will understand and see the difference in her oral health after supra and subgingival calculus has been removed. - Facilitates maintenance interproximally
Skin and mucous membrane integrity of head	- Patient is concerned with the space between her teeth and the gingival inflammation present.	Protects against the progression of periodontal disease - Reduced pocket depths

and neck	- There is no concern with the head and neck regions.	- Reduced gingival inflammation/appearance - Reduced BOP - Sugar Free Gum to replace Sugary Gum (Canel's Mexican Gum) - Wrigley's EXTRA Gum - Ice Breakers - Epic Xylitol Gum (comes in different flavors) - Disrupts tooth-eating acid attacks as they happen
Biologically sound and functional dentition	Fractures Root tip Carious Lesion(s) Furcation Involvement Malocclusion	- Referral to DDS to address fractured teeth, retained root tip, carious lesions, and malocclusion. - Full mouth scaling and root planing to prevent the progression of bone loss and furcation involvement.
Conceptualization and problem solving	Patient doesn't understand why there is plaque and calculus present as she states she brushes routinely on a daily basis.	Educating patient and allowing patient to feel comfortable enough to engage and ask questions regarding her treatment and OHI recommendations.
Responsibility for oral health	- No dental exam or dental hygiene services within the last three years - Inadequate plaque control - Inadequate understanding of periodontal disease - Inadequate oral hygiene home care routine/ techniques	Communication - Explained treatment to patient and involved her in treatment planning and implementation - Patient understanding of treatment, treatment outcomes, and responsibility of continued oral hygiene home care - Plaque control - Calculus removal - Recall maintenance visits - Referral to DDS for extraction of root tip, extraction of fractured teeth, and treatment of carious lesion

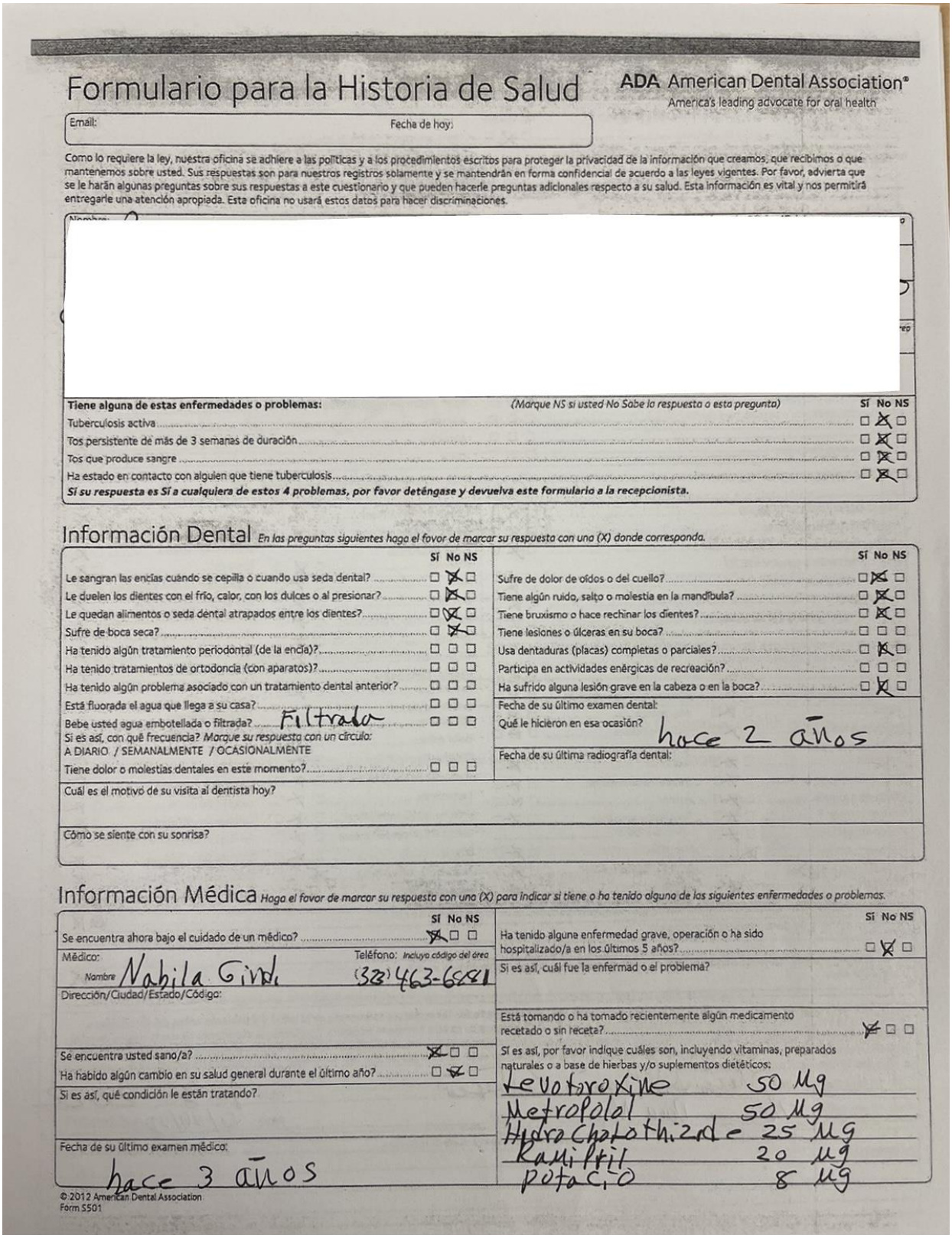
Treatment Plan
Appointment Plan

Appointment	Date/Interval	Procedures:
1. Screening	Initial Appointment	Vitals Medical Assessment

		EO/OI Examination FMX Restorative Assessments Periodontal Assessments
2. ULQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Before and After Intraoral Photos Plaque Index Present Treatment Plan ULQ Scaling and Root Planing - Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - PSA, 0.9mL - AMSA, 1.4mL
3. LLQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Plaque Index LLQ Scaling and Root Planing - Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - IA, 1.5mL - Lingual block, 0.3mL - Buccal block, 0.3mL
4. LRQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Plaque Index LRQ Scaling and Root Planing - Magnetostrictive and Hand Scale 20% Benzocaine Topical 3% Mepivicaine, no epinephrine - IA, 1.5mL - Lingual block, 0.3mL - Buccal block, 0.3mL
5. URQ SRP	One week later	Vitals Medical Assessment EO/IO Examination Reassessment Plaque Index URQ Scaling and Root Planing - Hand Scale

		20% Benzocaine Topical 3% Mepivicaine, no epinephrine - Supraperiosteal, 0.6mL - AMSA, 1.4mL
6. Re-eval	4-6 weeks later	Vitals Medical Assessment EO/IO Examination Reassessment Evaluate the need for Arestin Before and After Intraoral Photos Plaque Index De-plaque - Hand Scale Polish Fluoride Varnish
Maintenance	3 months later	Vitals Medical Assessment EO/IO Examination Reassessment Periodontal Maintenance - Hand Scale Polish Fluoride Varnish

3. Copy of the medical history form



Formulario para la Historia de Salud

ADA American Dental Association®
America's leading advocate for oral health

Email: Fecha de hoy:

Como lo requiere la ley, nuestra oficina se adhiere a las políticas y a los procedimientos escritos para proteger la privacidad de la información que creamos, que recibimos o que mantenemos sobre usted. Sus respuestas son para nuestros registros solamente y se mantendrán en forma confidencial de acuerdo a las leyes vigentes. Por favor, advierta que se le harán algunas preguntas sobre sus respuestas a este cuestionario y que pueden hacerle preguntas adicionales respecto a su salud. Esta información es vital y nos permitirá entregarle una atención apropiada. Esta oficina no usará estos datos para hacer discriminaciones.

Nombre:

Tiene alguna de estas enfermedades o problemas: (Marque NS si usted No Sabe la respuesta o esta pregunta)	Sí	No	NS
Tuberculosis activa	☐	☒	☐
Tos persistente de más de 3 semanas de duración	☐	☒	☐
Tos que produce sangre	☐	☒	☐
Ha estado en contacto con alguien que tiene tuberculosis	☐	☒	☐

Si su respuesta es Sí a cualquiera de estos 4 problemas, por favor deténgase y devuelva este formulario a la recepcionista.

Información Dental *En las preguntas siguientes haga el favor de marcar su respuesta con una (X) donde corresponda.*

	Sí	No	NS
Le sangran las encías cuando se cepilla o cuando usa seda dental?	☐	☒	☐
Le duelen los dientes con el frío, calor, con los dulces o al presionar?	☐	☒	☐
Le quedan alimentos o seda dental atrapados entre los dientes?	☐	☒	☐
Sufre de boca seca?	☐	☒	☐
Ha tenido algún tratamiento periodontal (de la encía)?	☐	☐	☐
Ha tenido tratamientos de ortodoncia (con aparatos)?	☐	☐	☐
Ha tenido algún problema asociado con un tratamiento dental anterior?	☐	☐	☐
Está fluorada el agua que llega a su casa?	☐	☐	☐
Bebe usted agua embotellada o filtrada? Filtrado	☐	☐	☐
Si es así, con qué frecuencia? *Marque su respuesta con un círculo:* A DIARIO / SEMANALMENTE / OCASIONALMENTE			
Tiene dolor o molestias dentales en este momento?	☐	☐	☐

	Sí	No	NS
Sufre de dolor de oídos o del cuello?	☐	☒	☐
Tiene algún ruido, salto o molestia en la mandíbula?	☐	☒	☐
Tiene bruxismo o hace rechinar los dientes?	☐	☒	☐
Tiene lesiones o úlceras en su boca?	☐	☐	☐
Usa dentaduras (placas) completas o parciales?	☐	☒	☐
Participa en actividades enérgicas de recreación?	☐	☐	☐
Ha sufrido alguna lesión grave en la cabeza o en la boca?	☐	☒	☐

Fecha de su último examen dental:
Qué le hicieron en esa ocasión? hace 2 años
Fecha de su última radiografía dental:

Cuál es el motivo de su visita al dentista hoy?

Cómo se siente con su sonrisa?

Información Médica *Haga el favor de marcar su respuesta con una (X) para indicar si tiene o ha tenido alguna de las siguientes enfermedades o problemas.*

	Sí	No	NS
Se encuentra ahora bajo el cuidado de un médico?	☒	☐	☐

Médico: Nombre Nahila Girdi Teléfono: *Incluya código del área* (32) 463-6581

Dirección/Ciudad/Estado/Código:

Se encuentra usted sano/a?	☒	☐	☐
Ha habido algún cambio en su salud general durante el último año?	☐	☒	☐

Si es así, qué condición le están tratando?

Fecha de su último examen médico: hace 3 años

	Sí	No	NS
Ha tenido alguna enfermedad grave, operación o ha sido hospitalizado/a en los últimos 5 años?	☐	☒	☐

Si es así, cuál fue la enfermad o el problema?

Está tomando o ha tomado recientemente algún medicamento recetado o sin receta?	☒	☐	☐

Si es así, por favor indique cuáles son, incluyendo vitaminas, preparados naturales o a base de hierbas y/o suplementos dietéticos:

Levotoroxine 50 Mg
Metropolol 50 Mg
HydroChlorothizide 25 Mg
Kamiptil 20 Mg
potacio 8 Mg

Información Médica *Haga el favor de marcar su respuesta con una (X) para indicar si tiene o ha tenido alguna de las siguientes enfermedades o problemas.*

(Marque NS si usted No Sabe la respuesta a esta pregunta)	Sí	No	NS
Usa lentes de contacto?	☐	X	☐
Articulaciones Artificiales. Ha tenido algún reemplazo ortopédico total de una articulación (cadera, rodilla, codo, dedo)?	☐	X	☐
Fecha: _____ Si es así, ha tenido alguna complicación? _____			
Está tomando o tiene que empezar a tomar un agente antirresortivo (como Fosamax®, Actonel®, Atelvia, Boniva®, Reclast, Prolia) debido a osteoporosis o a enfermedad de Paget?	☐	X	☐
Desde el año 2001, ha sido tratado/a o está actualmente en lista para comenzar tratamiento con un agente antirresortivo (como Aredia®, Zometa®, XGEVA) para dolor óseo, hipercalcemia o complicaciones esqueléticas derivadas de la enfermedad de Paget, mieloma múltiple o cáncer metastásico?	☐	X	☐
Fecha del comienzo del Tratamiento: _____			

	Sí	No	NS
Usa sustancias reguladas (drogas)?	☐	X	☐
Usa tabaco (fumado, aspirado/rapé, masticado, en bidis)?	☐	X	☐
Si es así, le interesaría dejar de hacerlo? *Marque con un círculo:* MUCHO / ALGO / NO ME INTERESA			
Bebe bebidas alcohólicas?	☐	X	☐
Si es así, cuánto alcohol bebió en las últimas 24 horas? _____			
Si es así, cuánto bebe por lo general en una semana? _____			
SÓLO MUJERES Está usted:			
Embarazada?	☐	X	☐
Número de semanas: _____			
Tomando píldoras anticonceptivas o de sustitución hormonal?	☐	X	☐
Amamantando?	☐	X	☐

Alergias. Es usted alérgico – o ha tenido alguna reacción – a:
En todas las respuestas **afirmativas**, especifique el tipo de reacción.

	Sí	No	NS
Anestésicos locales	X	☐	☐
Aspirina	☐	☐	☐
Penicilina u otros antibióticos	X	☐	☐
Barbituratos, sedativos o pastillas para dormir	☐	☐	☐
Sulfas	☐	☐	☐
Codeína u otros narcóticos	☐	☐	☐

Penicilina

	Sí	No	NS
Metales	☐	X	☐
Látex (goma)	☐	X	☐
Yodo	☐	X	☐
Polen (fiebre del heno)/estacional	☐	X	☐
Animales	☐	X	☐
Alimentos	☐	X	☐
Otros	☐	X	☐

Por favor marque con una (X) su respuesta para indicar si usted ha tenido o no ha tenido algunas de estas enfermedades o problemas.

	Sí	No	NS
Válvula cardíaca artificial (prótesis)	☐	X	☐
Previa endocarditis infecciosa	☐	X	☐
Válvulas dañadas en corazón transplantado	☐	X	☐
Enfermedad cardíaca congénita (ECC)			
ECC cianótica, sin reparar	☐	X	☐
Reparada en los últimos 6 meses (completamente)	☐	X	☐
ECC reparada con defectos residuales	☐	X	☐

Aparte de las condiciones en la lista de arriba, ya no se recomienda realizar una profilaxis antibiótica para ninguna otra forma de ECC.

	Sí	No	NS
Enfermedad cardiovascular	☐	X	☐
Angina	☐	X	☐
Arterioesclerosis	☐	X	☐
Insuficiencia cardíaca congestiva	☐	X	☐
Daño en las válvulas cardíacas	☐	X	☐
Infarto del miocardio	☐	X	☐
Soplo en el corazón	☐	X	☐
Presión arterial baja	☐	X	☐
Presión arterial alta	X	☐	☐
Otros defectos congénitos del corazón	☐	X	☐
Prolapso de la válvula mitral	☐	X	☐
Marcapasos	☐	X	☐
Fiebre reumática	☐	X	☐
Enfermedad cardíaca reumática	☐	X	☐
Sangramiento anormal	☐	X	☐
Anemia	☐	X	☐
Transfusión sanguínea	☐	X	☐
Si es así, fecha: _____			
Hemofilia	☐	X	☐
SIDA o infección por VIH	☐	X	☐
Artritis	☐	X	☐

	Sí	No	NS
Enfermedad autoinmune	☐	X	☐
Artritis reumatoidea	☐	X	☐
Lupus eritematoso sistémico	☐	X	☐
Asma	☐	X	☐
Bronquitis	☐	X	☐
Enfisema	☐	X	☐
Sinusitis	☐	X	☐
Tuberculosis	☐	X	☐
Cáncer/Quimoterapia/ Radioterapia	☐	X	☐
Dolores de pecho por esfuerzo	☐	X	☐
Dolor crónico	☐	X	☐
Diabetes Tipo I o II	☐	X	☐
Trastornos de alimentación	☐	X	☐
Malnutrición	☐	X	☐
Enfermedad gastrointestinal	☐	X	☐
Reflujo G.E./ardor persistente	☐	X	☐
Úlceras	☐	X	☐
Alteraciones de la tiroides	X	☐	☐
Derrame cerebral	☐	X	☐

	Sí	No	NS
Glaucoma	☐	X	☐
Hepatitis, ictericia o enfermedad hepática	☐	X	☐
Epilepsia	☐	X	☐
Desmayos o ataques epilépticos	☐	X	☐
Alteraciones neurológicas	☐	X	☐
Si es así, especifique: _____			
Alteraciones del sueño	☐	X	☐
Usted ronca?	☐	X	☐
Alteraciones mentales	☐	X	☐
Especifique: _____			
Infecciones recurrentes	☐	X	☐
Tipo de infección: _____			
Alteraciones renales	☐	X	☐
Sudor nocturno	☐	X	☐
Osteoporosis	☐	X	☐
Inflamación persistente de los ganglios del cuello	☐	X	☐
Cefaleas graves/jaquecas	☐	X	☐
Pérdida de peso severa o rápida	☐	X	☐
Enfermedades venéreas	☐	X	☐
Orina en forma excesiva	☐	X	☐

Le ha recomendado algún médico o su dentista anterior que tome antibióticos antes de su tratamiento dental? ☐ X ☐

Nombre del médico o del dentista que se lo recomendó: _____ Teléfono: *Incluya código del área* ( )

Tiene alguna enfermedad, condición o problema que no figure más arriba y que cree que yo debería saber? ☐ X ☐
Explique por favor: _____

NOTA: Se encarece tanto al doctor como al paciente que discutan detalladamente todos los aspectos relevantes de la salud del paciente antes del tratamiento.
Certifico que he leído y comprendido lo que aparece más arriba y que la información entregada en este formulario es exacta. Comprendo la importancia de que la historia de salud sea fidedigna y de que mi dentista y su personal puedan confiar en ella para realizar mi tratamiento. Reconozco que todas mis dudas sobre las preguntas de este formulario han sido respondidas satisfactoriamente. Yo no responsabilizaré a mi dentista ni a ningún miembro de su personal por las acciones que puedan tomar debido a los errores o a las omisiones que yo haya podido cometer al com

Firma del Paciente/Apoderado: [redacted] Fecha: 9-30-2022

Firma del proveedor: [redacted] Fecha: 9/29/22

A SER COMPLETADO POR EL ODONTÓLOGO/A

Comentarios: _____

4. Copy of the oral hygiene progress form (PI and MBI form)

West Los Angeles College
Health Science Division
Department of Dental Hygiene
Process Evaluation Form

Student Name/Number: Ariel Harte
Date: 10/24/22
Instructor: Velasco
Attempt: Feedback 1st 2nd 3rd

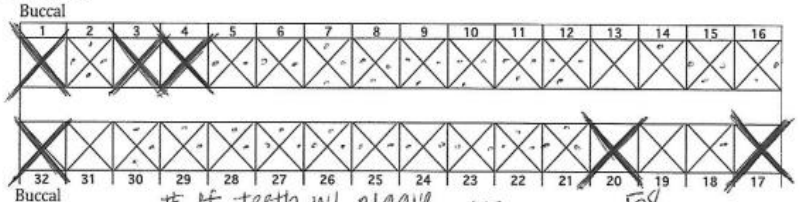
PLAQUE INDEX

Process Evaluation	Pass	No Pass	Notes
- PE form ready / Student name, date, and attempt filled in			
- Discusses rationale, benefit, and outcome of disclosing and plaque index for patient			
- Prepares all necessary armamentarium			
- Neatly discloses patient's teeth			
- Identifies plaque on similar teeth surfaces as instructor			
- Calculates plaque index identified by student and instructor correctly - Student's calculation is within 10% difference of instructor's			
- Demonstrates professional behavior and uses dental terminology - Demonstrates professional patient management			
- ***Maintains infection control throughout entire evaluation			

*** = *Indicates critical criteria. If competency is not met, student will receive a summary evaluation grade of "0".*

STUDENT FINDINGS

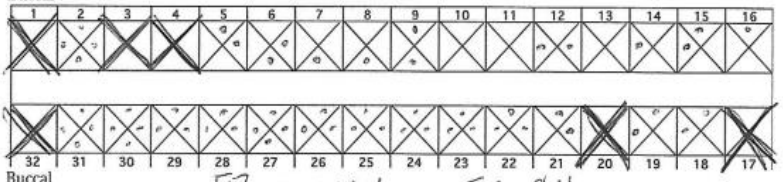
Buccal



Buccal

Show your calculation here: # of teeth w/ plaque / # of teeth x 4 x 100 = 58/104 x 100 = 55.7

Buccal



Buccal

Show your calculation here: 57/104 x 100 = 54.8

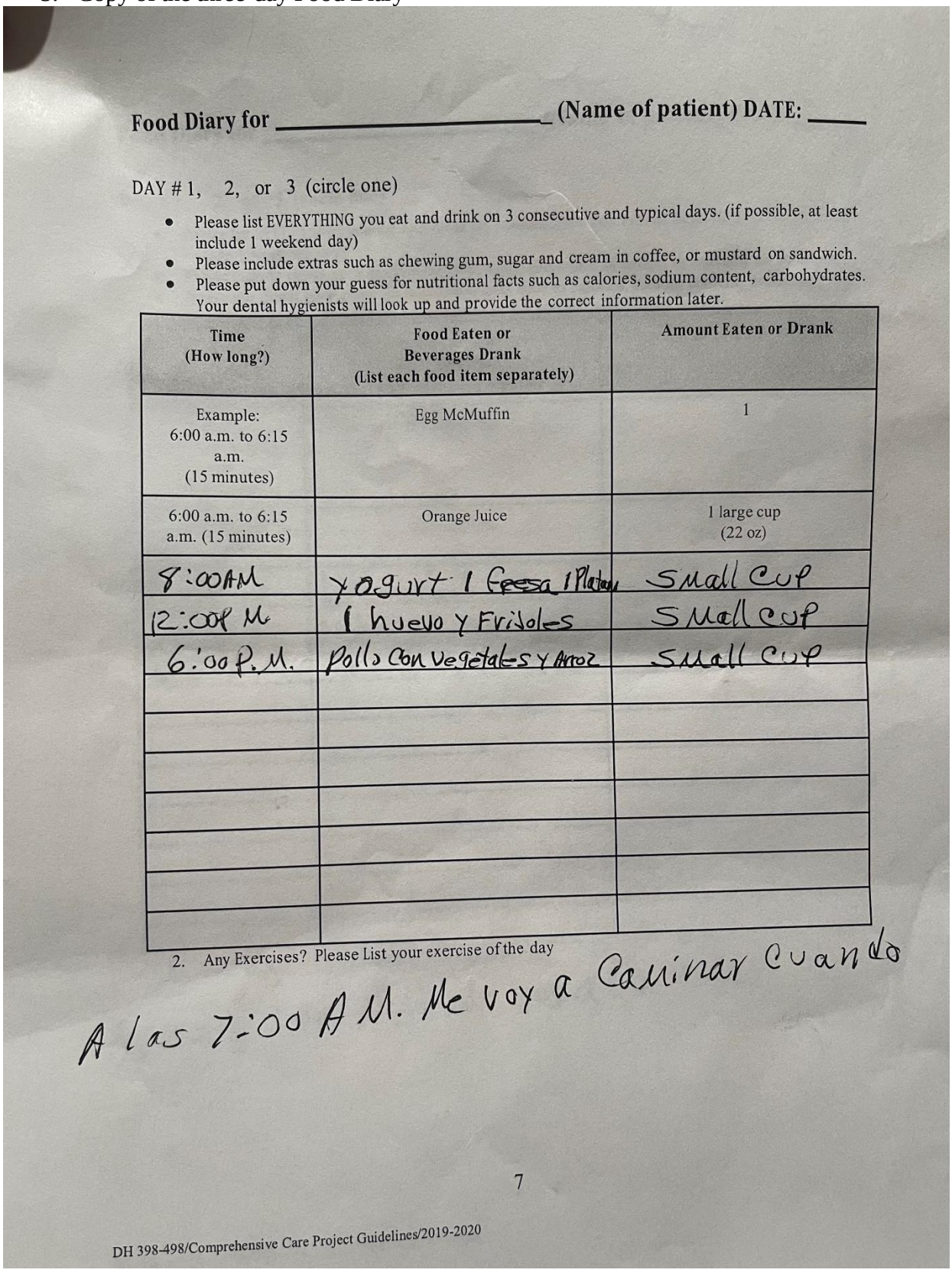
4	3	2	1	0
Student demonstrated correct sequence and proper technique without guidance.	Student demonstrated 1-2 minor errors and required minimal guidance.	Student demonstrated 3 minor errors, required guidance but corrected with verbal feedback.	Student required constant guidance, demonstrated 4 errors, difficulty completing task.	Student required constant guidance, unable to complete task. Student made more than 4 errors or ONE critical error.

Velasco
Instructor Signature

4.0
Grade

Plaque Index -2021

5. Copy of the three-day Food Diary



Food Diary for _____ (Name of patient) DATE: _____

DAY # 1, 2, or 3 (circle one)

- Please list EVERYTHING you eat and drink on 3 consecutive and typical days. (if possible, at least include 1 weekend day)
- Please include extras such as chewing gum, sugar and cream in coffee, or mustard on sandwich.
- Please put down your guess for nutritional facts such as calories, sodium content, carbohydrates. Your dental hygienists will look up and provide the correct information later.

Time (How long?)	Food Eaten or Beverages Drank (List each food item separately)	Amount Eaten or Drank
Example: 6:00 a.m. to 6:15 a.m. (15 minutes)	Egg McMuffin	1
6:00 a.m. to 6:15 a.m. (15 minutes)	Orange Juice	1 large cup (22 oz)
8:00AM	Yogurt 1 Fresa 1 Platano	Small Cup
12:00 P.M.	1 huevo y Frijoles	Small Cup
6:00 P.M.	Pollo con Vegetales y Arroz	Small Cup

2. Any Exercises? Please List your exercise of the day

A las 7:00 A.M. Me voy a Caminar Cuando

7

DH 398-498/Comprehensive Care Project Guidelines/2019-2020

Food Diary for _____ (Name of patient) DATE: _____

DAY # 1, 2, or 3 (circle one)

- Please list EVERYTHING you eat and drink on 3 consecutive and typical days. (if possible, at least include 1 weekend day)
- Please include extras such as chewing gum, sugar and cream in coffee, or mustard on sandwich.
- Please put down your guess for nutritional facts such as calories, sodium content, carbohydrates. Your dental hygienists will look up and provide the correct information later.

Time (How long?)	Food Eaten or Beverages Drank (List each food item separately)	Amount Eaten or Drank
Example: 6:00 a.m. to 6:15 a.m. (15 minutes)	Egg McMuffin	1
6:00 a.m. to 6:15 a.m. (15 minutes)	Orange Juice	1 large cup (22 oz)
7:00 A.M.	Licuado de leche c/p	Mediano
12:00 P.M.	1 Chile Relleno Con Frijoles	Mediano
5:00 P.M.	Spagethi Con Vegetales	Mediano

3. Any Exercises? Please List your exercise of the day

Alas 6:00 A.M. Me Voy a Caminar

Food Diary for _____ (Name of patient) DATE: _____

DAY # 1, 2, or 3 (circle one)

- Please list EVERYTHING you eat and drink on 3 consecutive and typical days. (if possible, at least include 1 weekend day)
- Please include extras such as chewing gum, sugar and cream in coffee, or mustard on sandwich.
- Please put down your guess for nutritional facts such as calories, sodium content, carbohydrates. Your dental hygienists will look up and provide the correct information later.

Time (How long?)	Food Eaten or Beverages Drank (List each food item separately)	Amount Eaten or Drank
Example: 6:00 a.m. to 6:15 a.m. (15 minutes)	Egg McMuffin	1
6:00 a.m. to 6:15 a.m. (15 minutes)	Orange Juice	1 large cup (22 oz)
7:00 A.M.	Cereal Con leche	Small
12:00 P.M.	Sanguish de tor key	Mediano
4:00 P.M.	Frijoles Con Arroz	Small

1. Any Exercises? Please List your exercise of the day

6:00 A.M. Me voy a Caminar

1711

1367 avg

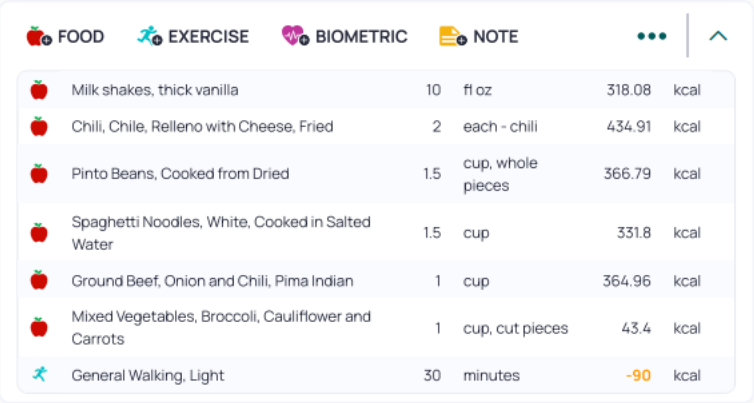
6. Copy of the nutritional analysis from the computer analysis

Thursday

FOOD EXERCISE BIOMETRIC NOTE

Kellogg's, Special K Cereal, Original	1.5	cup, whole pieces	180.18	kcal
Milk, Whole	1.5	cup	223.26	kcal
Turkey Sandwich, with Mayo	1	sandwich	449.44	kcal
Spanish Rice, Mexican Rice, without Meat	1	cup	183.15	kcal
Pinto Beans, Cooked from Dried	1	cup, whole pieces	244.53	kcal
General Walking, Light	30	minutes	-90	kcal

Friday



FOOD EXERCISE BIOMETRIC NOTE

Milk shakes, thick vanilla	10	fl oz	318.08	kcal
Chili, Chile, Relleno with Cheese, Fried	2	each - chili	434.91	kcal
Pinto Beans, Cooked from Dried	1.5	cup, whole pieces	366.79	kcal
Spaghetti Noodles, White, Cooked in Salted Water	1.5	cup	331.8	kcal
Ground Beef, Onion and Chili, Pima Indian	1	cup	364.96	kcal
Mixed Vegetables, Broccoli, Cauliflower and Carrots	1	cup, cut pieces	43.4	kcal
General Walking, Light	30	minutes	-90	kcal

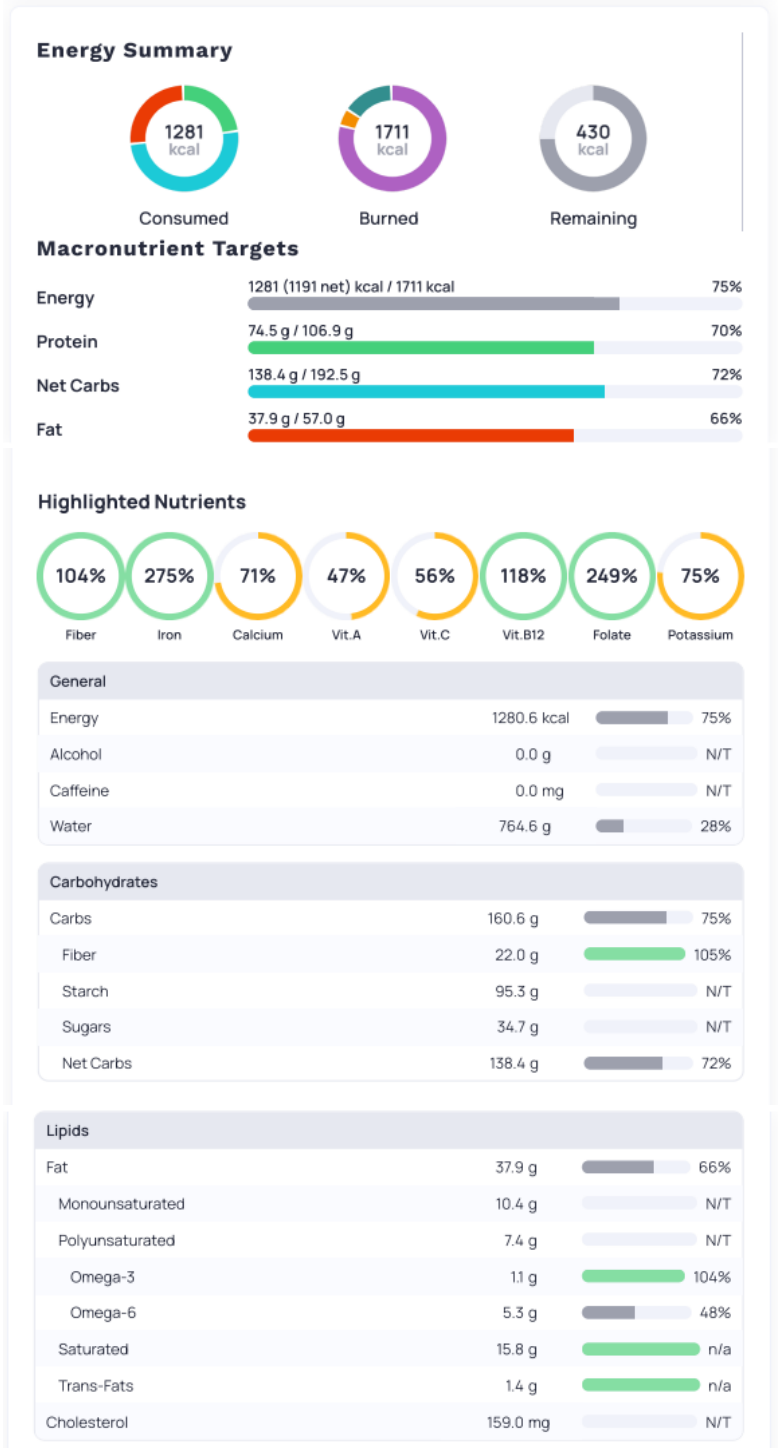
Saturday

FOOD EXERCISE BIOMETRIC NOTE

Weight	189	lbs		
Yogurt, Greek, nonfat, strawberry, Chobani	1	× 5.30 oz	120	kcal
Bananas, Raw	1	large - 8" to 8 7/8" long	121.04	kcal
Eggs, Cooked	1	medium	68.2	kcal
Pinto Beans, Cooked from Dried	1	cup, whole pieces	244.53	kcal
Chicken Breast, Skinless	1	small	181.65	kcal
Spanish Rice, Mexican Rice, without Meat	1	cup	183.15	kcal
Mixed Vegetables, Broccoli, Cauliflower and Carrots	1	cup, cut pieces	43.4	kcal
General Walking, Light	30	minutes	-90	kcal

7. Copy of carbohydrate analysis from the computer analysis

Thursday



Energy Summary

Consumed	Burned	Remaining
1281 kcal	1711 kcal	430 kcal

Macronutrient Targets

Energy	1281 (1191 net) kcal / 1711 kcal	75%
Protein	74.5 g / 106.9 g	70%
Net Carbs	138.4 g / 192.5 g	72%
Fat	37.9 g / 57.0 g	66%

Highlighted Nutrients

Fiber	Iron	Calcium	Vit.A	Vit.C	Vit.B12	Folate	Potassium
104%	275%	71%	47%	56%	118%	249%	75%

General		
Energy	1280.6 kcal	75%
Alcohol	0.0 g	N/T
Caffeine	0.0 mg	N/T
Water	764.6 g	28%

Carbohydrates		
Carbs	160.6 g	75%
Fiber	22.0 g	105%
Starch	95.3 g	N/T
Sugars	34.7 g	N/T
Net Carbs	138.4 g	72%

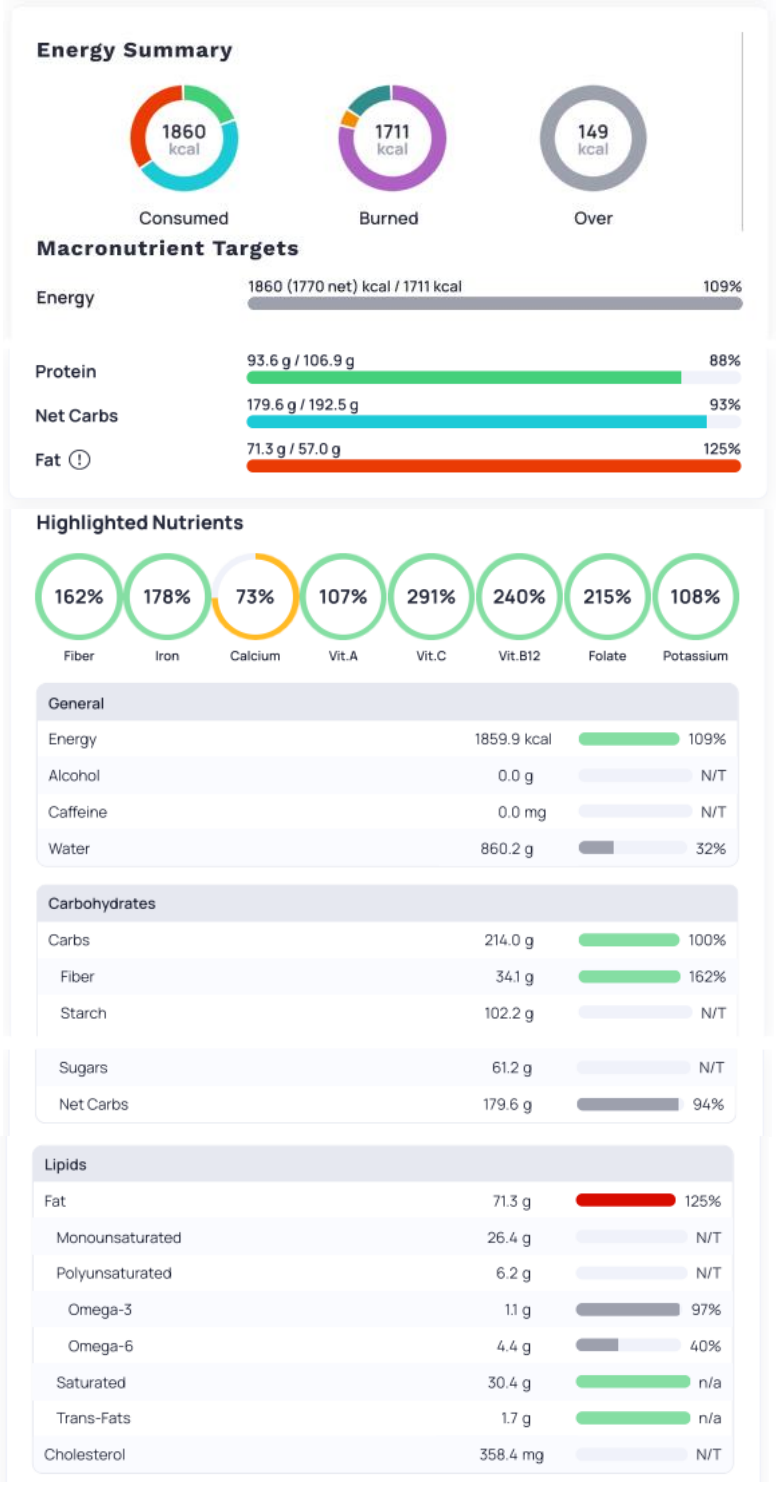
Lipids		
Fat	37.9 g	66%
Monounsaturated	10.4 g	N/T
Polyunsaturated	7.4 g	N/T
Omega-3	1.1 g	104%
Omega-6	5.3 g	48%
Saturated	15.8 g	n/a
Trans-Fats	1.4 g	n/a
Cholesterol	159.0 mg	N/T

Protein		
Protein	74.5 g	70%
Cystine	0.9 g	106%
Histidine	2.0 g	168%
Isoleucine	3.5 g	213%
Leucine	6.0 g	166%
Lysine	4.9 g	151%
Methionine	1.6 g	200%
Phenylalanine	3.6 g	253%
Threonine	2.9 g	172%
Tryptophan	1.0 g	224%
Tyrosine	2.6 g	187%
Valine	3.9 g	192%

Vitamins		
B1 (Thiamine)	2.3 mg	208%
B2 (Riboflavin)	1.6 mg	141%
B3 (Niacin)	16.0 mg	114%
B5 (Pantothenic Acid)	3.9 mg	78%
B6 (Pyridoxine)	1.8 mg	117%
B12 (Cobalamin)	2.8 µg	119%
Folate	997.4 µg	249%
Vitamin A	332.9 µg	48%
Vitamin C	42.4 mg	57%
Vitamin D	292.5 IU	49%
Vitamin E	5.7 mg	38%
Vitamin K	28.2 µg	31%

Minerals		
Calcium	857.4 mg	71%
Copper	0.8 mg	92%
Iron	22.0 mg	275%
Magnesium	211.2 mg	66%
Manganese	2.2 mg	125%
Phosphorus	1062.5 mg	152%
Potassium	1955.5 mg	75%
Selenium	101.0 µg	184%
Sodium	1399.5 mg	93%
Zinc	7.3 mg	91%

Friday

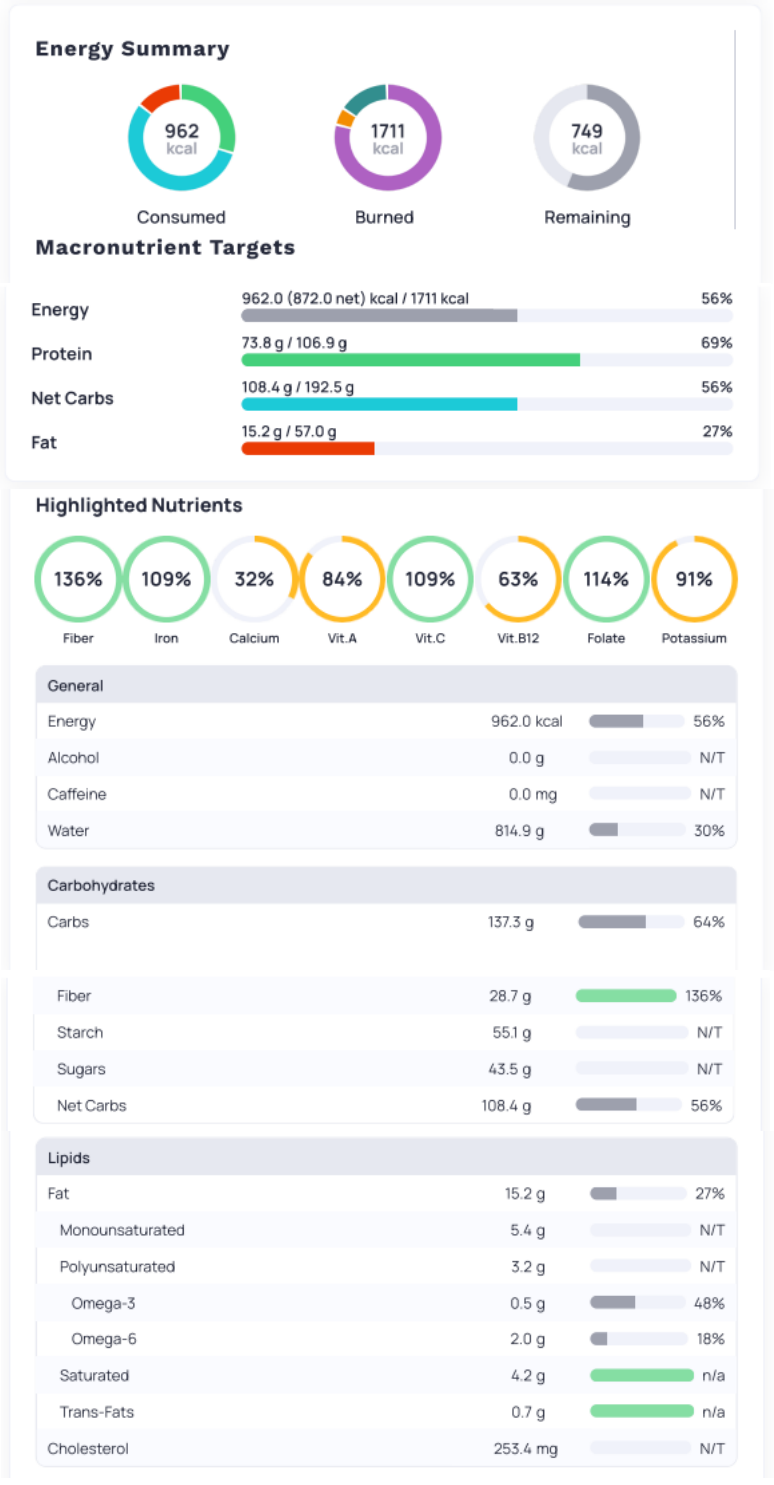

Energy Summary
1860 kcal
Consumed
1711 kcal
Burned
149 kcal
Over
Macronutrient Targets
Energy
1860 (1770 net) kcal / 1711 kcal
109%
Protein
93.6 g / 106.9 g
88%
Net Carbs
179.6 g / 192.5 g
93%
Fat
71.3 g / 57.0 g
125%
Highlighted Nutrients
162% Fiber
178% Iron
73% Calcium
107% Vit.A
291% Vit.C
240% Vit.B12
215% Folate
108% Potassium
General
Energy 1859.9 kcal 109%
Alcohol 0.0 g N/T
Caffeine 0.0 mg N/T
Water 860.2 g 32%
Carbohydrates
Carbs 214.0 g 100%
Fiber 34.1 g 162%
Starch 102.2 g N/T
Sugars 61.2 g N/T
Net Carbs 179.6 g 94%
Lipids
Fat 71.3 g 125%
Monounsaturated 26.4 g N/T
Polyunsaturated 6.2 g N/T
Omega-3 1.1 g 97%
Omega-6 4.4 g 40%
Saturated 30.4 g n/a
Trans-Fats 1.7 g n/a
Cholesterol 358.4 mg N/T

Protein		
Protein	93.6 g	88%
Cystine	1.2 g	144%
Histidine	2.6 g	217%
Isoleucine	4.4 g	272%
Leucine	7.6 g	212%
Lysine	6.1 g	188%
Methionine	1.9 g	229%
Phenylalanine	4.5 g	317%
Threonine	3.9 g	225%
Tryptophan	1.2 g	286%
Tyrosine	3.0 g	210%
Valine	5.0 g	245%

Vitamins		
B1 (Thiamine)	1.6 mg	143%
B2 (Riboflavin)	1.8 mg	165%
B3 (Niacin)	11.9 mg	85%
B5 (Pantothenic Acid)	3.4 mg	68%
B6 (Pyridoxine)	1.7 mg	115%
B12 (Cobalamin)	5.8 µg	240%
Folate	861.2 µg	215%
Vitamin A	753.0 µg	108%
Vitamin C	218.9 mg	292%
Vitamin D	219.9 IU	37%
Vitamin E	5.7 mg	38%
Vitamin K	86.7 µg	96%

Minerals		
Calcium	882.7 mg	74%
Copper	1.3 mg	148%
Iron	14.3 mg	178%
Magnesium	286.2 mg	89%
Manganese	2.6 mg	142%
Phosphorus	1369.5 mg	196%
Potassium	2830.1 mg	109%
Selenium	130.0 µg	236%
Sodium	1220.8 mg	81%
Zinc	13.9 mg	173%

Saturday

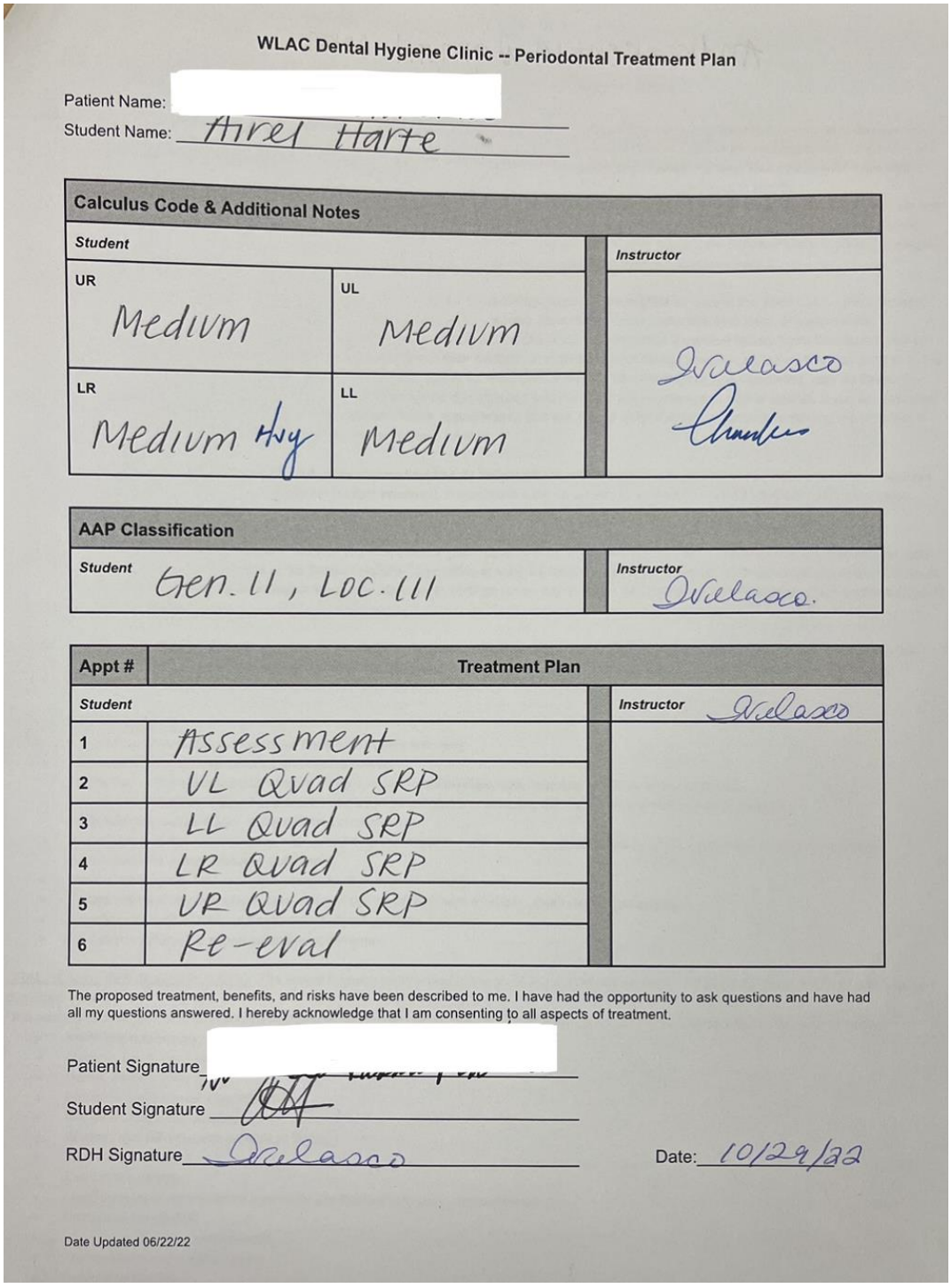

Energy Summary
962 kcal
Consumed
1711 kcal
Burned
749 kcal
Remaining
Macronutrient Targets
Energy 962.0 (872.0 net) kcal / 1711 kcal 56%
Protein 73.8 g / 106.9 g 69%
Net Carbs 108.4 g / 192.5 g 56%
Fat 15.2 g / 57.0 g 27%
Highlighted Nutrients
136% Fiber
109% Iron
32% Calcium
84% Vit.A
109% Vit.C
63% Vit.B12
114% Folate
91% Potassium
General
Energy 962.0 kcal 56%
Alcohol 0.0 g N/T
Caffeine 0.0 mg N/T
Water 814.9 g 30%
Carbohydrates
Carbs 137.3 g 64%
Fiber 28.7 g 136%
Starch 55.1 g N/T
Sugars 43.5 g N/T
Net Carbs 108.4 g 56%
Lipids
Fat 15.2 g 27%
Monounsaturated 5.4 g N/T
Polyunsaturated 3.2 g N/T
Omega-3 0.5 g 48%
Omega-6 2.0 g 18%
Saturated 4.2 g n/a
Trans-Fats 0.7 g n/a
Cholesterol 253.4 mg N/T

Protein		
Protein	73.8 g	69%
Cystine	0.8 g	101%
Histidine	1.8 g	151%
Isoleucine	3.1 g	188%
Leucine	4.7 g	131%
Lysine	4.6 g	142%
Methionine	1.4 g	171%
Phenylalanine	2.8 g	201%
Threonine	2.6 g	149%
Tryptophan	0.7 g	168%
Tyrosine	1.9 g	133%
Valine	3.2 g	157%

Vitamins		
B1 (Thiamine)	1.7 mg	155%
B2 (Riboflavin)	1.2 mg	107%
B3 (Niacin)	18.1 mg	129%
B5 (Pantothenic Acid)	3.8 mg	76%
B6 (Pyridoxine)	2.1 mg	143%
B12 (Cobalamin)	1.5 µg	63%
Folate	456.7 µg	114%
Vitamin A	588.3 µg	84%
Vitamin C	82.0 mg	109%
Vitamin D	43.5 IU	7%
Vitamin E	4.9 mg	32%
Vitamin K	73.2 µg	81%

Minerals		
Calcium	387.2 mg	32%
Copper	0.8 mg	91%
Iron	8.8 mg	110%
Magnesium	218.3 mg	68%
Manganese	2.1 mg	117%
Phosphorus	882.4 mg	126%
Potassium	2384.9 mg	92%
Selenium	74.6 µg	136%
Sodium	443.4 mg	30%
Zinc	5.4 mg	68%

8. Copy of Dental Hygiene Diagnosis and Care Plan



WLAC Dental Hygiene Clinic -- Periodontal Treatment Plan

Patient Name: [redacted]

Student Name: Ariel Harte

Calculus Code & Additional Notes			
Student			*Instructor*
UR: Medium	UL: Medium		Drelasco
LR: Medium Hyg	LL: Medium		

AAP Classification		
Student		*Instructor*
Gen. II, Loc. III		Drelasco.

Appt #	Treatment Plan	
Student		*Instructor* Drelasco
1	Assessment	
2	UL Quad SRP	
3	LL Quad SRP	
4	LR Quad SRP	
5	UR Quad SRP	
6	Re-eval	

The proposed treatment, benefits, and risks have been described to me. I have had the opportunity to ask questions and have had all my questions answered. I hereby acknowledge that I am consenting to all aspects of treatment.

Patient Signature [redacted]

Student Signature [redacted]

RDH Signature Drelasco Date: 10/29/22

Date Updated 06/22/22

9. Copy of all articles used in this project

Case Report

University J Dent Scie 2021; Vol. 7, Issue 2

Proximal Relationship Between Hypothyroidism and Periodontitis: "A Clinical Representation"

Abstract:

Hypothyroidism is a systemic condition in which thyroid gland is underactive and production of thyroid hormones is diminished, resulting in metabolic slowdown.

Thyroid disease can lead to imbalance in hemostasis of the body and affect the healing capacity of tissues. This case report presents the influence of thyroid hormone dysfunction and its impact on periodontal disease progression in 55 year old female patient giving the chief complaint of bleeding gums and increased gum size. The report emphasizes the need for interventions by health care providers in patients with hypothyroidism to preserve their oral and overall health.

Keywords: Periodontitis, hypothyroidism, thyroid hormone, gingival inflammation

Introduction:

Hypothyroidism is the glandular disorder, hormonal abnormality in humans. Symptoms of this disease may manifest as asymptomatic to multisystem involvement.[1] In hypothyroidism there is decreased production of thyroxine (T4), triiodothyronine (T3), and calcitonin.[2] (Little, 2006) hormones which causes decreased bone metabolism, maturation, and turnover and negatively affects bone homeostasis.[3] Periodontitis is one of the prevalent oral condition affecting the mankind today because of lifestyle related disorders. The association between periodontal disease and hypothyroidism might be due to common immunoinflammatory pathways in disease pathogenesis.[4] The fact is well established that the endocrine system can modulate the immune system in a bidirectional manner.5It has been hypothesized that inflammatory mediators such as prostaglandin E2, interleukin-1, tumor necrosis factor-a, and matrix metalloproteinases released locally as a consequence of periodontal disease lead to an alteration in bone hemostasis and might represent a risk factor for other systemic diseases.[4,6] Indeed, the relationship between hypothyroidism and periodontitis offers a potential explanation for how acute and chronic inflammation, such as what occurs during periodontitis, might affect thyroid hormone production.[7]

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DOI: https://doi.org/10.21276//ujds.2021.7.2.22

However, there is a paucity of documented literature assessing the relationship between thyroid hormone imbalance and periodontal health. This case report presents a patient with periodontal disease and hypothyroidism.

Case history:

A 55 year old female patient reported to the Department of Periodontics with the chief complaint of bleeding gums and increased gum size. Patient was apparently asymptomatic 1 year back then she started experiencing an increase in size of gums. Patient also gave the history of hypothyroidism for the past 5 years but had not been taking medication for the past 2 years.

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Hematological Examination:

Since the patient stopped taking medication since last two years, a complete blood picture was needed to assess systemic thyroid hormone levels. On chemiluminescent immunoassay, thyroid stimulating hormone (TSH) levels were found to be more than 150 IU/mL. Thus, increase in the severity of hypothyroidism was noted. On further investigation she gave the history of abrupt increase in body weight and bulkiness on face since the past 6 months. Patient did not present any past relevant dental or medical history.

Intraoral examination:

On intraoral examination, subgingival calculus, periodontal pocket ranging 6-8mm in depth with respect to teeth number 11,12,16,17,21,23,26,27 with reddish pink, enlarged, bulbous, nonscalloped, soft, edematous, rolled out margins (nondeflecting contours) of gingiva with loss of stippling and bleeding on probing were found in associated sites. OHI-S and Plaque index of the patient is 2.83 and 1.2 respectively which statedfair oral hygiene of the patient. The case was classified as localized stage II, grade B periodontitis (Figure 1).

In dentistry, prevalence and severity of the periodontal diseases in patients with hypothyroidism have been documented in the literature. However, there were only few studies reported presenting the relationship between periodontal diseases and hypothyroidism.

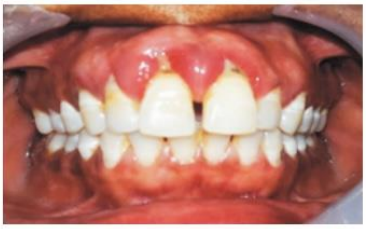

Figure 1 - Clinical picture at baseline

Therapeutic intervention:

As patient was systemically compromised, consent from endocrinologist was sought before carrying out any dental treatment.

Phase 1 periodontal therapy involving oral hygiene improvement and maintenance instructions along with intensive oral prophylaxis and medication for hypothyroid condition as prescribed by endocrinologist was provided to the patient. After phase 1 therapy, patient was recalled and reevaluated after one month (Figure 2). No major changes in the clinical condition was observed. Bulkiness of the gingiva and bleeding of probing were still present despite of absence of subgingival deposits.

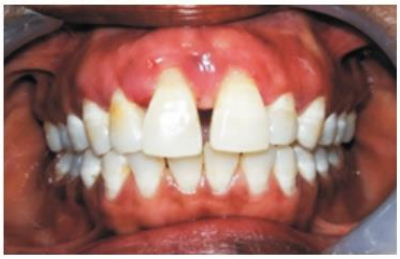

Figure 2 - Clinical picture at 1 month

Follow up and outcomes:

Patient was advised for meticulous oral hygiene practices and to continue medication for hypothyroid condition. Patient was then recalled after 3 months. Marked improvement was seen in the Periodontal condition following 3 months. Bulkiness of gingiva, pocket depth and bleeding on probing was substantially decreased.

Patient was recalled every 3 months (Figure 3) to keep a check on the systemic thyroid hormone levels and compliance with the supportive periodontal therapy. At 6 month (Figure 4), patient presentedwith healthy periodontal condition. The gingiva appeared to be normal in terms of colour, size, consistency, contour and surface texture.

In addition, the patient happily mentioned about reduced bulkiness of face and bodyweight expressing her desire to show compliance with medications and supportive periodontal therapy.

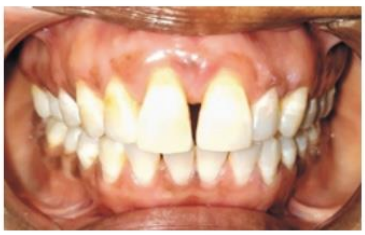

Figure 3 - Clinical picture at 3 months

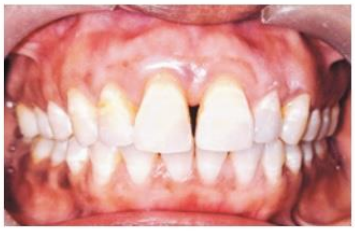

Figure 4 - Clinical picture at 6 months

Discussion:

Serum TSH concentrations represent the most reliable indicators of thyroid status. The American thyroid association recommends that all patients should obtain a serum TSH determination at the age of 35 years and be followed up every 5 years.8 Treatment should be initiated at low doses with slow titration based on serum thyroid-stimulating hormone (TSH) assessment. Normal serum TSH ranges are higher in the elderly patient; thus, higher serum TSH goals may be needed as a patient ages. The American Thyroid Association (ATA) suggests the target serum TSH to 4-6 mIU/L in people age 70 to 80 years.

It is also a commonly prevailing disorder in the adult Indian population and is common among pregnant females. Patients with hypothyroidism have increased subcutaneous mucopolysaccharides due to decrease in the degradation of these substances. The presence of excess subcutaneous or subepithelial mucopolysaccharides may decrease the ability of small blood vessels to constrict and may result in increased bleeding from infiltrated tissues including the mucosa and skin. Hence, the determination of the influence of thyroid hormone imbalance in periodontitis may be important for the prevention of morbidity related to this condition.[11]

In the present clinical scenario, the patient complained about increase in gum size with local factors involvement. Initial approach to tackle the case was treatment of periodontitis along with the normalization of TSH levels following which size of the gums decreased substantially and so was bleeding. But this took whole of 6 months due to the susceptibility of hypothyroid patients to infection leading to longer exposure of the unhealed tissue to pathogenic organisms.

Patients with hypothyroidism have increased subcutaneous or subepithelial mucopolysaccharides which decreases the ability of small blood vessels to constrict resulting in increased bleeding from gums.11 However, in this case, phase 1 therapy was initiated alongwiththerapy for hypothyroidism under medical supervision. Hence, while treating oral disease with underlined systemic hormonal abnormality, goal should be to impart implement synergistic preventive and therapeutic modalities to the patient for the speedy and healthy recovery.

One of the strength while handling this case was association of medical and dental care associated with the institution. Interdisciplinary discussions and approach for the treatment made it more feasible to handle the present case and treating it in righteous way.

The results suggest that patient of periodontitis with hypothyroidism can not be treated alone with periodontal therapy but should be treated along with medication of hypothyroid condition. This gives the appropriate results.
Informed consent: Patient provided informed consent to publish her case report when asked for.

References:

1. Roberts CG, Ladenson PW. Hypothyroidism. Lancet. Hypothyroidism. Lancet. 2004;363(9411).
2. Little, J. W. (2006). Thyroid disorders. Part II: Hypothyroidism and thyroiditis. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics, 102(2), 148–153. 10.1016/j.tripleo.2005.05.070
3. Mosekilde, L. , Eriksen, E. F. , & Charles, P. (1990). Effects of thyroid hormones on bone and mineral metabolism. Endocrinology and Metabolism Clinics of North America, 19(1), 35–63. 10.1016/S0889-8529(18)30338-4
4. Araujo, V. M. , Melo, I. M. , & Lima, V. (2015). Relationship between periodontitis and rheumatoid arthritis: Review of the literature. Mediators of Inflammation, 2015, 259074–259015. 10.1155/2015/259074
5. Klein, J. R. (2006). The immune system as a regulator of thyroid hormone activity. Experimental Biology and Medicine (Maywood, N.J.), 231(3), 229–236. 10.1177/153537020623100301
6. Habashneh, R. A. , Khader, Y. S. , Alhumouz, M. K. , Jadallah, K. , &Ajlouni, Y. (2012). The association between inflammatory bowel disease and periodontitis among Jordanians: A case□control study. Journal of

Periodontal Research, 47(3), 293–298. 10.1111/j.1600-0765.2011.01431.x

7. Genco, R. ,Offenbacher, S. , & Beck, J. (2002). Periodontal disease and cardiovascular disease: Epidemiology and possible mechanisms. Journal of the American Dental Association (1939), 133(Suppl), 14s–22s. 10.14219/jada.archive.2002.0375
8. Ladenson PW, Singer PA, Ain KB, Bagchi N, Bigos ST, Levy EG, et al. American Thyroid Association guidelines for detection of thyroid dysfunction. Arch Intern Med 2000;160:1573-5
9. Baloch Z, Carayon P, Conte-Devoix B, Demers LM, Feldt-Rasmussen U, Henry JF, et al.; Guidelines Committee, National Academy of Clinical Biochemistry. Laboratory medicine practice guidelines. Laboratory support for the diagnosis and monitoring of thyroid disease. Thyroid 2003;13:3-126. 7.
10. Unnikrishnan AG, Kalra S, Sahay RK, Bantwal G, John M, Tewari N. Prevalence of hypothyroidism in adults: An epidemiological study in eight cities of India. Indian J EndocrinolMetab 2013;17: 647-52
11. Silverton SF. Endocrine disease. In: Greenberg MS, Glick M, editors. Burket's Oral Medicine Diagnosis and Treatment. 10th ed. Spain: BC Decker Inc; 2003. p. 578-91.

The bidirectional relationship between obesity and periodontal disease – a narrative review

A relação bidirecional entre a obesidade e a doença periodontal – uma revisão narrativa

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ABSTRACT
Periodontal diseases (PD) are multifactorial, chronic and infectious-inflammatory diseases that destroy periodontal attachment tissues and bacterial biofilms. Obesity is a chronic, multifactorial disease in which there is an excessive accumulation of body fat that harms the health and well-being of an individual. Periodontal diseases are important in the context of general health since they may be linked to several systemic diseases, such as obesity. This article aims to highlight the bidirectional relationship between obesity and periodontal disease. Materials and methods: The bibliographic review covered the PubMed, LILACS, and SciELO databases, and comprised studies and articles about the possible correlation between obesity and periodontal diseases between 2017 and 2021. In this context, periodontal diseases and obesity are similarly chronic, multifactorial, inflammatory and complex diseases which may interact with each other. The biological mechanisms responsible for the pathophysiology between periodontal diseases and obesity have not been fully understood. Their possible correlation is based on the production of hormones and cytokines via adipose tissue, altering the inflammatory response and interfering with the immune system. The data from this review demonstrate a lack of clinical studies assessing the role of periodontal diseases as a risk factor and as aggravation of obesity. Moreover, these data may support clinical research in this context.

Keywords: body composition, obesity, overweight, periodontitis.

RESUMO
Doenças periodontais (PD) são doenças multifatoriais, crônicas e infecciosas-inflamatórias que destroem tecidos periodontais de apego e biofilmes bacterianos. A obesidade é uma doença crônica, multifatorial, em que há uma acumulação excessiva de gordura corporal que prejudica a saúde e o bem-estar de um indivíduo. As doenças periodontais são importantes no contexto da saúde geral, uma vez que podem estar ligadas a várias doenças sistêmicas, como a obesidade.

Este artigo visa destacar a relação bidirecional entre obesidade e doença periodontal. Materiais e métodos: A revisão bibliográfica abrangeu as bases de dados PubMed, LILACS e SciELO, e incluiu estudos e artigos sobre a possível correlação entre obesidade e doenças periodontais entre 2017 e 2021. Neste contexto, as doenças periodontais e a obesidade são igualmente crônicas, multifatoriais, inflamatórias e complexas que podem interagir entre si. Os mecanismos biológicos responsáveis pela fisiopatologia entre as doenças periodontais e a obesidade ainda não foram totalmente compreendidos. Sua possível correlação se baseia na produção de hormônios e citocinas via tecido adiposo, alterando a resposta inflamatória e interferindo no sistema imunológico. Os dados dessa revisão demonstram a falta de estudos clínicos que avaliem o papel das doenças periodontais como fator de risco e agravamento da obesidade. Além disso, estes dados podem apoiar a investigação clínica neste contexto.

Palavras-chave: composição corporal, obesidade, sobrepeso, periodontite.

1 INTRODUCTION

Periodontal diseases (PD) are infectious-inflammatory diseases caused by the bacterial biofilm acting on a susceptible host. This bacterial biofilm triggers the destruction of the attachment tissues.[1] However, if the periodontal disease is discovered in the initial phase, it can be successfully treated with no major morbidities.[2] Approximately 20% to 60% of the world's population may have some degree of periodontal disease[3], the onset and progression of wich may be caused by biological, environmental and behavioral factors.

The intake of macronutrients, combined with poor physical functioning, may be linked to the progression of a wide range of inflammatory diseases[4], either by direct modulation of the immune response of the host, or via the microbiome. Therefore, this also includes periodontitis.[5]

The pathogenesis of periodontitis is multifactorial, with environmental, microbial and host involvement, thus affecting disease outcomes. Many systemic conditions have been associated with periodontitis, including rheumatoid arthritis, diabetes mellitus, arterial hypertension, heart disease, chronic lung diseases and metabolic syndrome (MS).[4,6,7,8,9,10]

MS is a group of concomitant conditions that increase the risk of cardiovascular disease and double the risk of type 2 diabetes. There are several definitions of metabolic syndrome, and they differ slightly depending on the issuing institution. The National Cholesterol Education Program Adult Treatment Panel III provides the most commonly used definition. Such definition requires that individuals have at least three of the following risk factors: (a) large waist circumference, (b) low plasma levels of high-density lipoprotein cholesterol, (c) elevated plasma triglycerides, (d) high blood pressure, and (e) high blood glucose levels[11]. In addition, epidemiological evidence from the last two decades has showed an increase in periodontitis in

obese and overweight individuals. Such factors were associated with periodontitis because obesity has some effects on the systemic health, providing a greater susceptibility of the host to periodontitis, through inflammatory mediators, altered immune response, specific genetic polymorphisms and stress accentuation.[12]

Data from the National Health Survey (PNS/2019) indicate that, currently in Brazil, 60.3% of adults are overweight, the equivalent to ninety-six million people, of which 62.6% are women. Obesity, including overweight individuals, affects 25.9% of the population - about 41.2 million adults, also with a higher prevalence among women (29.5%) than among men (21.8%).[13]

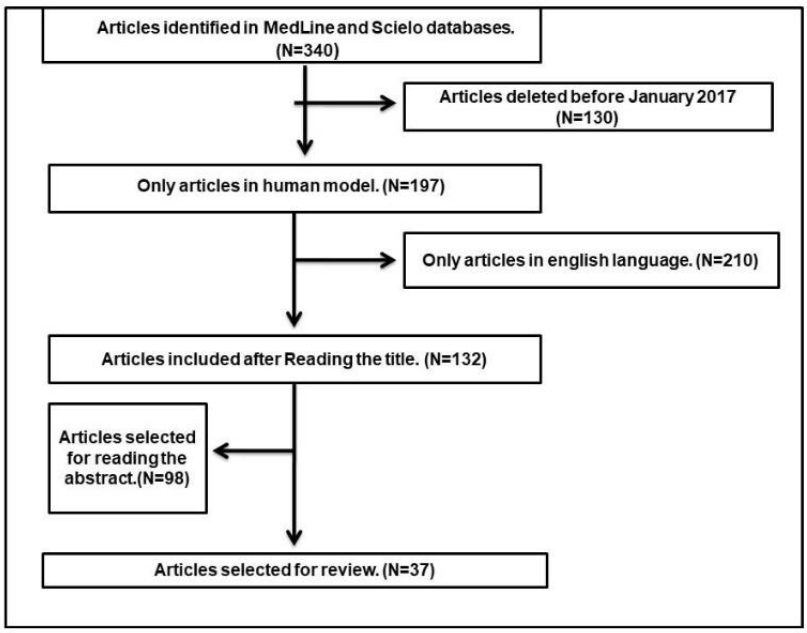
With regard to periodontitis and metabolic syndrome to date, most studies point to an association between these two conditions and demonstrate that periodontitis may contribute to or worsen the metabolic syndrome, mainly, obesity[22, 12]. However, due to the lack of longitudinal intervention studies and randomized controlled trials, the magnitude is unclear to determine the cause-effect relationship between these two diseases.[14,15]

In this context, the present study focuses on the association between periodontitis and obesity, aiming to identify and discuss them. The findings from this research may establish a solid base to improve future research and interventions in this health-disease context.

2 METHODS

This study is a narrative review of descriptive character regarding the association of periodontitis with obesity and it is appropriate to discuss the state of the art of a certain subject. This bibliographic survey was done in the LILACS, SciELO and PubMed database systems in September 2021. In addition, the Ministry of Health database was assessed. The reference period is four years. The index terms or descriptors Body composition, obesity, overweight, periodontitis and their respective Portuguese translations were used, either isolated or in combination, with no specific time interval.

Table 1: Flowchart



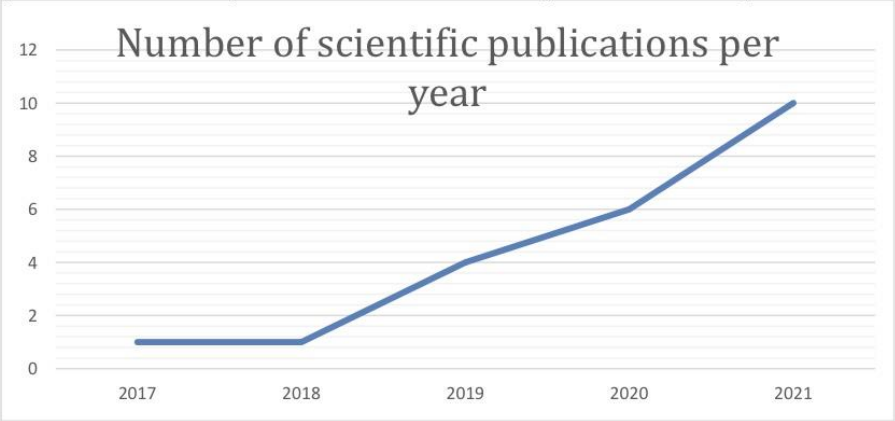
3 RESULTS

Having the index terms in the title or as keywords was the criterion used to select the articles. Another criterion was having explicit in the abstract that the text is related to periodontitis and obesity. In addition, articles in Portuguese and in English, systematic reviews or meta-analysis of all randomized and non-randomized controlled trials, case-control studies, and cohort studies published in journals were selected. Some articles were not selected because they did not have well-established inclusion criteria. Some were poorly designed and had unclear methodologies. Others had authority opinions, reports from expert committees and editorials. Non-original dissertations and studies were also excluded.

Subsequently, the previously chosen articles were analyzed in full to confirm eligibility. Other studies were also excluded because they evaluated the association of periodontal disease with other systemic diseases, such as Alzheimer's, asthma, cancer, diabetes, liver disease, chronic kidney disease, helicobacter pylori, rheumatoid arthritis, psoriasis and allergic rhinitis.

Upon reading the abstracts, 242 articles were excluded due to the research criteria. After reading the full text, 61 articles were excluded, totaling a final sample of 37 articles for a complete analysis. As shown in graph 1, specifically with regard to the 24 selected articles, the number of studies published per year varies from 2017 to 2021.

Graph 1: Number of scientific publications about the association of periodontitis and obesity from 2017 to 2021.



The studies have been biased and controversial. This fact possibly reflects the difficulty in establishing a systematic method to gather existing research related to the topic, since these publications are scarce in the scientific literature.

4 DISCUSSION

So far, cross-sectional and longitudinal studies have been conducted, as well as some meta-analyses, which assess the relationship between these two conditions that are so prevalent[7,8,23,24,25,27,30,32]. The vast majority of data demonstrate a strong association between obesity and periodontitis. [16,17, 20, 22, 23, 24, 25, 26, 28, 29, 35]. The Table 1 detailed the articles considere.

In the case-control study performed by Campos et al, a high prevalence of periodontitis was observed among the case sample (54.6%), when compared to the control sample (45.4%). The significant variables associated with the occurrence of periodontitis in the final logistic model were that of MS (odds ratio [OR] = 2.02; P = 0.003). These variables report an important risk association with periodontitis. Individuals with MS have worse periodontal status and greater prevalence, severity and extent of periodontitis[16]. In addition, the study conducted by Suzuki et al obtained an odds ratio of 2.40, a 95% confidence interval (1.11-5.22), showing that obesity, determined according to a visceral fat index, was associated with bleeding on probing.[17]

The influence of Body Mass Index (BMI) on the progression of periodontitis

In the cohort study performed by Suvan et al, it was shown that obesity compared to normal BMI was an independent predictor of worse response after nonsurgical periodontal therapy ($p<0.01$). Thus, overweight/obese individuals are more likely to suffer from periodontitis compared to normal weight individuals in the control sample. [24]In general, obese

individuals with periodontitis can significantly benefit from nonsurgical periodontal treatment, which reduces several biochemical biomarkers of obesity with or without weight loss[37]. However, in a systematic review by Silva et al, meta-analyses were analyzed for measures of gingival inflammation compared to BMI. Most studies showed no significant difference in gingival inflammation measurements regardless of the comparison performed. However, the meta-analysis showed that among individuals with periodontitis, those with obesity have significantly higher levels of gingival inflammation (no. of individuals = 240) than those who were not obese (no. of individuals = 574) (SMD: 0.26; 95% CI: 0.07–0.44).[32]

Association between the inflammatory response of obesity and periodontitis.

Lipoinflammation is a relatively new word and recent studies have associated it with nonalcoholic fatty liver disease (NAFLD)[34]. The systemic pathological condition is linked to inflammation as cardiovascular disease. The correlation is bidirectional once periodontal disease is present. The local infection burden and inflammation stimulate the hepatic response through increased dissemination of bacteria and their products along with cytokines and reactive oxygen species[35]. Nicolin et al elucidated the roles played by lipoinflammation and obesity in biochemical traffic in inflamed periodontal tissues with an interaction between both diseases. Such links can affect the clinical manifestation, progression and prognosis of periodontal diseases.[20] As Suvan et al, at the beginning of the study, Nicolin et al also showed that periodontal parameters were worse in obese than in non-obese individuals. During nonsurgical periodontal therapy, inflammatory mediators in these patients were considerably controlled with a strong association between them. [23]

In the Brazilian population-based cohort study by Nascimento et al, the total-effect model showed that those with general obesity, in the cohort period, had a higher risk of unfavorable periodontal outcomes (rate ratio [RR]: 1.45 for AL and BOP in different teeth; RR: 1.84 for AL and BOP in the same tooth). [25]

In research conducted by Gul et al, the obesity status and the severity of periodontitis showed a statistically significant association ($p = 0.017$). Therefore, overweight and obese individuals have more severe periodontitis than normal weight individuals in an Iraqi population sample. [26]

Age group as a predictive factor for the association between obesity and periodontitis.

Torrejon-Moya, in her descriptive observational study, did not obtain a conclusive result about the association of a hypercaloric diet with periodontal disease because the study is composed of an extremely young population. As a conclusion, the study suggested that because

of their early age, they tend to have a healthier diet and do more physical activities. Moreover, there is a lower incidence of periodontitis, which increases with age.[28]

Aging is associated with the development of diseases. Multisystem conditions, such as frailty, play a key role in health in older populations. Frailty is a clinical condition in older patients and it increases the risk of adverse health outcomes. Both frailty and periodontal disease are common chronic conditions in older populations and have in common several risk factors[36]. Teixeira et al observed significant differences, mainly for the degree of severe periodontitis between young adults and older adults. The first group had a significantly higher prevalence of obesity, pre-diabetes, hypertension and metabolic syndrome. The second group had a significantly higher prevalence of obesity, dyslipidemia, prediabetes, hypertension, subclinical atherosclerosis, and metabolic syndrome. Individuals with mild/moderate periodontitis also had significantly higher levels of dyslipidemia, subclinical atherosclerosis, and metabolic syndrome, with BMI significantly higher among participants with periodontitis.[29] The cohort study performed by Suvan et al also showed that obesity was an independent predictor of worse response after nonsurgical periodontal therapy ($p<0.01$).[35]

Although the vast majority of studies conclude that there is an association between metabolic syndrome and periodontitis, other studies have found weak associations or no association between these two conditions.[27,29,30,31,32,33].

Charupinijkul et al, for example, performed a retrospective cohort study in which univariate analysis indicated that overweight individuals had a 15% higher risk of progression than healthy individuals. However, when confounding factors were analyzed simultaneously, the effect of obesity was not significant, with a risk ratio of 0.98, demonstrating that obesity is not an independent risk factor for the progression of periodontitis. However, the sample group was very small. [27]

The type of diet was included in the study by Teixeira et al because it is an important characteristic of groups of patients with metabolic diseases. However, no significant associations were found with periodontal attachment loss or periodontitis, although tooth loss was lower in vegetarians ($p < 0.05$), possibly due to other characteristics of the diet in this group, such as lower consumption of cariogenic food and a highly nutritional diet. [29]

Hypertension and diabetes were the most prevalent comorbidities with 23.4% and 16%, respectively. In the cross-sectional study conducted by Alsalihi et al, in overweight individuals, 97% of the participants had periodontitis. However, BMI was not correlated with periodontitis, but waist circumference had a weak positive correlation.[30] Yilmaz and Somay also showed in a study that periodontitis was detected at a higher rate in the obesity group (58%) compared to

the control group, but the relationship between obesity and periodontal status was not statistically significant. [31]

The influence of gender on the periodontal condition associated with obesity has not been very clear yet, and definitive conclusions cannot be drawn. A pilot study revealed that periodontitis may be more prevalent in females[18,19]. In contrast, other studies reveal that periodontitis was more prevalent and severe in males[17,22]. However, this may be more related to behavioral factors than genetic factors, as men generally take less care of their oral health and do not go to the dentist as often as women.

The Figure 1 illustrates the bidirectional relationship between obesity and periodontal disease

Figure 1: Bidirectional relationship between obesity and periodontal disease according to body changes.

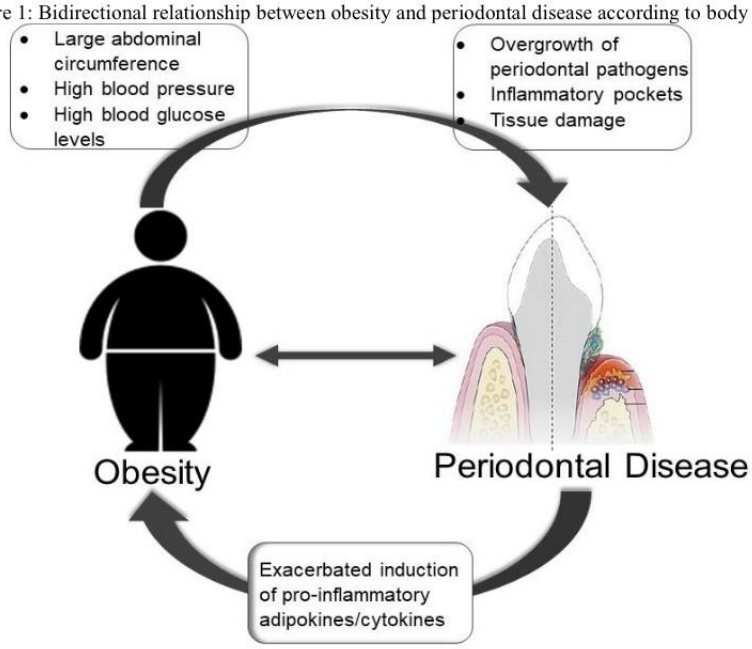


Table 2: Articles considered according to author/year, title, sample size and result.

Author/Year	Title	Sample (n)	Results
Campos et al., 2019[16]	Association between periodontitis and metabolic syndrome: a case-control study	N=488	There was a strong association between periodontitis and metabolic syndrome.
Suzuki et al., 2020[17]	Relationship between obesity indicators and gingival inflammation in middle-aged Japanese men	N=159	There was an association between obesity and bleeding on probing score.

Cioquetta et al., 2020[18]	Gender differences in the association between obesity and gingivitis in 12-year-old South Brazilian schoolchildren	N=1528	There was a strong association between obesity and gingivitis. (P<0,001)
Thomas et al., 2020[19]	Obesity generates a signature of the oral microbiota of female patients with periodontitis: a pilot study	N=19	There was a strong association between obesity and periodontitis in female patients.
Nicolin et al., 2020[20]	Can periodontal disease be linked to obesity and lipoinflammation? Mechanisms involved in the occurrence of pathogenesis	Revision	There was an association between periodontal disease, obesity and lipoinflammation.
Teixeira et al., 2020[21]	Relationship between periodontitis and subclinical risk indicators for chronic noncommunicable diseases	N=420	There was a strong association between BMI and periodontitis.
Suvan et al., 2020[23]	Effect of periodontitis treatment on the incretin axis in obese and non-obese individuals: a cohort study.	N=115	There was an association between obesity and periodontal disease.
Suvan et al., 2020[24]	Obesity as a predictor of clinical outcomes of periodontal therapy: a cohort study	N=115	There was an association between periodontal disease and obesity.
Nascimento et al., 2017[25]	Obesity and periodontal outcomes: a population-based cohort study in Brazil	N=1066	There was an association between periodontal disease and obesity.
Gul et al., 2021[26]	Association of overweight/obesity with periodontitis severity using the BPE code in an Iraqi population	N=58	There was a strong association between severe periodontitis and overweight and obesity.
Charupinijkul et al., 2021[27]	The effect of obesity on periodontitis progression: the 10-year retrospective cohort study	N=2216	There was no association between obesity and periodontitis progression.
Torrejon-Moya et al., 2021[28]	Analysis of healthy lifestyle habits and oral health in a sample of patients from the Dental Hospital of the University of Barcelona.	N=230	It was not possible to conclude an association between healthy habits related to better oral quality.
Teixeira et al., 2019[29]	Periodontal attachment loss and associations with sociodemographic and behavioral risk indicators	N=420	There was an association between the development of periodontal diseases in patients with chronic diseases.
Alsihi et al., 2021[30]	Prevalence of periodontitis in obese patients in Bahrain: a cross-sectional study	N=372	There was no association between periodontal disease and obesity.

Yilmaz e Somay, 2021[31]	Is obesity a problem that threatens oral health in adults?	N=200	There was an association between periodontitis and obesity, but it was not statistically significant.
Silva et al., 2021[32]	Association between clinical measures of gingival inflammation and obesity in adults: systematic review and meta-analyses	N=547	Significantly greater measures of gingival inflammation were observed in the groups with the highest BMI.

5 FINAL CONSIDERATIONS

Additional prospective studies are necessary to quantify or understand the mechanisms of this association. Despite this, scientific evidence points to a negative impact of obesity on oral health. On the other hand, there are very few studies that assess whether there is a greater tendency to develop obesity in patients with periodontitis. In addition, several logistical and physiological impasses are related to the therapeutic intervention of obese patients in a dental environment, indicating the need for an interdisciplinary approach. In this way, it is crucial to make the general population and the health team aware of the possible bidirectional implications between PD and Obesity, two conditions that are increasingly prevalent. Preventive action, through the dissemination of knowledge, in both conditions, may have a direct impact on the oral and general health of the population.

CONFLICT OF INTEREST

None to declare.

REFERENCES

1. Yao S, Jiang C, Zhang H, Gao X, Guo Y, Cao Z, Visfatin regulates the pro-inflammatory / pro-degradative effects induced by Pg LPS in isolated and inflamed periodontal cells through NF-κB, Biochimica and Biophysica Minutes (BBA). Cellular Molecular Research 2021.

2. Teixeira FCF, Marín-León L, Gomes EP, et al. Periodontal attachment loss and associations with sociodemographic and behavioral risk indicators. Rev Odontologia UNESP 2019.

3. Daudt LD, Musskopf ML, Mendez M, Remonti LLR, Leitao CB, Gross JL, et al. Association between metabolic review and periodontitis: a systematic and meta-analysis. Res Oral Braz 2018; 32: e35.

4. Kapila YL. Oral health inextricable connection Systemic health: species that connect multimodal relationships and periodontal disease factors to systemic diseases and conditions. Periodontology 2000 2021; 87:11-16.

5. Choowong P, Wali JA, Nguyen ATN, Jayasinghe TN, Eberhard J, Macronutrient-induced modulation of periodontitis in rodents - a systematic review. Nutritional assessments 2021.

6. Gupta S, Mohindra R, Chauhan PK, Singla V, Goyal K, Sahni V, Gaur R, Verma DK, Ghosh A, Soni RK, Suri V, Bhalla A, Singh MP SARS-CoV-2 Detection in Gingival Fluid. J Dent Res 2021; 100 (2): 187–193.

7. Gomes-Filho IS, Cruz SSD, Trindade SC, Passos-Soares JS, Carvalho-Filho PC, Figueiredo ACMG, Lyrio AO, Hintz AM, Pereira MG, Scannapieco F. Periodontitis and respiratory diseases: a systematic review with meta-analysis. Oral Speech 2020; 26 (2): 439–446.

8. Sanchez P, Everett B, Salamonson Y, Redfern J, Ajwani S, Bhole S, Bishop J, Lintern K, Nolan S, Rajaratnam R, Sheehan M, Skarligos F, Spencer LG, Srinivas R, George A. health, behavior and knowledge of patients with oral diseases in Sydney, Australia: a cross-sectional study. BMC Oral Health 2019; 19: 12.

9. Poudel P, Griffiths R, Arora A, Wong VW, Flack JR, Barker G, George A. Oral health status, knowledge and behavior of people with diabetes in Sydney, Australia. Int J Environ Res Public Health 2021; 18 (7): 3464.

10. Pirih FQ, Monajemzadeh S, Singh N, Sinacola RS, Min Shin J, Chen T, Fenno JC, Kamarajan P, Rickard AH, Travan S, Paster BJ, Kapila Y. Association between metabolic syndrome and periodontitis: the role of lipids , inflammatory cytokines, altered host response and the microbiome. Periodontology 2000 2021; 87: 50–75

11. Stone NJ, Bilek S, Rosenbaum S. Recent update of the National Adult Cholesterol Education Program Panel III: Adjustments and Options. Am J Cardiol. 2005; 96 (4A): 53E-59E

12. Ganesan SM, Vazana S, Stuhr S. Waistline to gingiva: relationship between obesity and periodontal disease - biological and management considerations. Journal of Periodontology 2021.

13. Ministry of Health. World Obesity Day: Health prepares a week of activities on the theme: [Ministry of Health] 2021.

14. Nóbrega WFS, Góes VN, Alves MRF, Andrade MA, Palmeira JT, Oliveira MEC. Metabolic Syndrome Interferes with Oral Health: An Integrative Review. REFACS 2021; 9(3).

15. Suvan J, D'Aiuto F, Moles DR, Petrie A, Owners N. Association between overweight/obesity and periodontitis in adults. A systematic review. Obesity Reviews 2021.

16. Campos JR, Costa FO, Quota LOM. Association between periodontitis and metabolic syndrome: a case-control study. Journal of Periodontology 2019.

17. Suzuki S, Onose Y, Yoshino K, Takayanagi A, Kamijo H, Sugihara N. Relationship between indicators of obesity and gingival inflammation in middle-aged Japanese men. Bull Tokyo Dent Coll 2020; 61: 153-160.

18. Cioquetta CN, Susin C, Damé-Teixeira N, Maltz M, Alves LS. Gender differences in the association between obesity and gingivitis in 12-year-old South American schoolchildren. Journal of Periodontal Research 2020; 5:559-566.

19. Thomas C, Minty M, Canceill T, Loubières P, Azalbert V, Tercé F, Champion C, Burcelin R, Barthet P, Laurencin-Dalicieux S, Blasco-Baque V. Obesity leads to an oral microbiota Signature of sex patients female with periodontitis: A Pilot study. Diagnosis. 2021; 11 (5): 745

20. Nicolin, V, Costantinides, F, Vettori E, Berton F, Marchesi G, Rizzo R, Di Lenarda. Can periodontal disease be considered linked to obesity and lipoinflammation? Mechanisms involved in the occurrence of pathogenesis. Clinic Rev Bone Miner Metab 2020; 18:43–49.

21. Teixeira FCF, Marin-Leon L, Gomes EP, Pedrão AMN, Pereira AC, Francisco PMSB. Relationship between periodontitis and subclinical risk indicators for chronic non-communicable diseases. Brazilian Oral Research 2020; 34.

22. Santos CL, Gomes RB, Morandini SF, Santos AMC, Cota LOM, Costa LCM. Association between periodontal disease and obesity: a literature review. Arq Odontol 2021; 57: 11

23. Suvan J, Masi S, Harrington Z, Santini E, Raggi F, D'Aiuto F, Solini A, Effect of periodontitis treatment on the incretin axis in obese and non-obese subjects: a cohort study. Journal of Clinical Endocrinology & Metabolism 2021; 106: 74 - 82

24. Suvan J, Harrington Z, Petrie A, Patel K, Darbar U, Donos N, D'Aiuto F. Obesity as a predictor of clinical outcomes of periodontal therapy: a cohort study. Journal of Periodontology 2020; 47: 594-601.

25. Nascimento GG, Peres KG, Mittinty MN, Mejia GC, Silva AD, Gonzalez-Chica D, Peres AM. Obesity and periodontal outcomes: a population-based cohort study in Brazil. J Periodontol 2017; 88 (1): 50-58.

26. Gul SS, Imran NK, Al-Sharqi AJB, Abdulkareen AA. Association of overweight/obesity with periodontitis severity using the BPE code in an Iraqi population. Clinical Epidemiology and Global Health 2021; 9:21-25

27. Charupinijkul, A., Arunyanak, S., Rattanasiri, S, Vathesatogkit P, Thienpramuk L, Lertpimonchai A The effect of obesity on the progression of periodontitis: the 10-year retrospective cohort study. Clin Oral Invest 2021.

28. Torrejon-Moya A, Gonzalez-Navarro B, Roca-Millan E, Estrugo-Devesa A, López-López J. Analysis of healthy lifestyle habits and oral health in a sample of patients from the Dental Hospital of the University of Barcelona. International Journal of Environmental Research and Public Health. 2021; 18 (14): 7488.

29. Teixeira FCF, Marín-León L, Gomes EP, Pedrão AMN, Pereira AC, Francisco PMSB. Periodontal attachment loss and associations with sociodemographic and behavioral risk indicators. UNESP Dentistry Journal 2019; 48

30. Alsalihi, L, Bain, C, Milosevi, A, Hassan A, Janahi A, Sivaramakrishnan G. Prevalence of periodontitis in obese patients in Bahrain: a cross-sectional study. BMC Oral Health 2021; 21: 376

31. Yılmaz, B, Somay, E. "Is obesity a problem that threatens oral health in adults?" Cukurova Medical Journal 2021;46: 1215-122

32. da Silva, FG, Pola, NM, Casarin M, Silva CF, Muniz FWMGM. Association between clinical measures of gingival inflammation and obesity in adults: a systematic review and meta-analyses. Clin Oral Invest 2021; 25: 4281-4298.

33. Nascimento GG, Leite FRM, Peres KG, Demarco FF, Correa MB, Peres MA. Metabolic syndrome and periodontitis: A structural equation modeling approach.J Periodontol. 2019; 90 (6): 655-662.

34. Ishitaq SM, Rashid H, Hussain Z, Arshad MI, Khan JA. Adiponectin and PAAR: a setup for intricate crosstalk between obesity and nonalcoholic fatty liver disease. Rev Endocr Metab Disord 2019; 20 (3): 253–61

35. Suvan JE, Finer N, D'Aiuto F. Periodontal complications with obesity. Periodontol 2000. 2018; 78 (1): 98–128.

36. Clark D, Kotronia E, Ramsay SE. Frailty, aging and periodontal disease: basic biological considerations. Periodontology 2000 2021; 87: 143-156.

37. Silva-Boghossian C, Dezonne RS. What are the clinical and systemic outcomes of periodontitis treatment in obese individuals? Curr Oral Health Rep. 2021: 1-8

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CONSENSUS DOCUMENT

Hypertension and Periodontitis: A Joint Report by the Italian Society of Hypertension (SIIA) and the Italian Society of Periodontology and Implantology (SIdP)

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Abstract
An accumulating body of evidence supports an independent association between high blood pressure (BP) and periodontitis, possibly mediated by low-grade inflammation. This joint report by the Italian Society of Hypertension (SIIA) and the Italian Society of Periodontology and Implantology (SIdP) working group on Hypertension and Periodontitis (Hy-Per Group) provides a review of the evidence on this topic encompassing epidemiology, biological plausibility, relevance, magnitude, and treatment management. Consensus recommendations are provided for health professionals on how to manage BP in individuals showing signs of poor oral health. In summary, (1) large epidemiological studies highlight that individuals with periodontal diseases have increased risk for high/uncontrolled BP independent of confounders; (2) mechanistically, low-grade inflammation might have a causal role in the association; (3) BP profile and control might benefit from periodontal treatment in pre-hypertensive and hypertensive individuals; (4) oral health status should be evaluated as a potential risk factor for high/uncontrolled BP, and effective oral care should be included as an adjunct lifestyle measure during hypertension management. Further research is needed to optimize BP management in individuals with poor oral health.

Keywords Hypertension · Periodontitis · Cardiovascular diseases · Inflammation · Risk factors

1 Introduction

Cardiovascular diseases (CVD) are the most common non-communicable diseases globally and represent a leading cause of death worldwide, carrying noteworthy social and economic implications. Several modifiable conditions and

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unmodifiable traits contribute to the development of CVD, and high blood pressure, or hypertension, is among the major ones [1]. With the consistent and vast evidence from observational and intervention studies regarding the central role of inflammation in the pathogenesis of CVD, novel contributors to the cardiovascular risk profile are now emerging. Among others, periodontitis has been recently proposed as a modifiable non-traditional risk factor for CVD. Periodontitis is a chronic inflammatory non-communicable disease of the structures supporting the teeth, characterized by aberrant host immune fitness to the oral microbiome [2, 3].

Both hypertension and periodontitis are very common conditions, affecting at least one third of the adult population worldwide. Besides sharing common denominators, such as older age, smoking habits, male gender, overweight/obesity, low socioeconomic status, and poor education [4], novel evidence supports an independent association between the two. A recent mendelian randomization analysis has in fact provided the first proof of a common genetic background involving genes entailed in the immune function [5]. This evidence supports the pathogenic hypothesis of a proinflammatory milieu favoring both conditions, as well as related cardiovascular complications, in keeping with the mechanistic role for low-grade systemic inflammation in the onset and progression of CVD.

Other professional societies have already acknowledged that adequate professional and home oral care are part of the non-pharmacological strategy for the management of cardiovascular risk [6]. In their recent consensus report in 2019, the World Heart Federation (WHF) and the European Federation of Periodontology (EFP) concluded that successful periodontal treatment influences CVD progression, and that active management of traditional cardiovascular risk factors, including hypertension, is required in the presence of periodontitis in high-risk patients and in those with established CVD [6]. Limited evidence was indeed available regarding the role of periodontal treatment in uncomplicated settings, including the low- and moderate-risk hypertensive patients as well as those with subclinical atherosclerotic CVD. Given the relevance of non-pharmacological strategies for cardiovascular prevention at any level of baseline risk, awareness is needed among professionals in the fields of oral and cardiovascular medicine with regards to preventive measures that can effectively and safely contribute to good global health and ultimately improve patient care.

Following their joint announcement [7], the Italian Society of Hypertension (SIIA) and the Italian Society of Periodontology and Implantology (SIdP) promoted a scientific board of experts (Hy-Per Group) with the aim of reviewing the published evidence on the association between hypertension and periodontitis and discussing the following topics: (1) *prevalence of hypertension in patients with periodontal diseases*; (2) *impact of periodontitis in treated hypertensive individuals*; (3) *potential causal links between these conditions*; (4) *incident hypertension in individuals with pre-existing periodontitis*; and (5) *effect of periodontal treatment on blood pressure profile*.

2 Methods

This joint report by SIIA and SIdP aims at summarizing the published evidence on epidemiological association, possible mechanistic links, and intervention studies of hypertension and periodontitis.

Panel members were asked to review the available evidence on BP and periodontal health (top-down approach) [8] and summarize the findings under five key questions [7]. Clinical and research implications for the medical and the dental Professionals were then summarized.

3 Results

3.1 Do People with Periodontitis have a Higher Prevalence of Hypertension?

The available literature on this topic is based on the case definition of periodontitis, for which several versions were developed over years. Herein we also report on association studies that examined the relation between active disease and BP.

3.1.1 Case Definition of Periodontitis and Hypertension

The case definitions of periodontitis in the assessment of the relation with BP were based on CAL, PPD or CPI according to literature [9–14].

3.1.1.1 Prevalence The prevalence of hypertension in the presence of periodontitis in individuals aged at least 16 years has been recently evaluated as a secondary outcome of a systematic review on the association between the two conditions using 30 prospective and retrospective studies published between 2003 and 2018 [15]. In 25 out of the 30 studies included in the analysis, the prevalence of hypertension was higher in individuals with a diagnosis of periodontitis (range 7–77%) compared with those not suffering from the disease (range 4–70%) [15], while one single study confirmed the same finding in men, but not in women [16]. In parallel, the prevalence of periodontitis was greater in

individuals with hypertension (range 29–61%) compared with those without this condition (range 17–39%) [15]. The definitions of periodontitis and hypertension varied across studies.

3.1.1.2 Mean BP Values Observational evidence from 26 cross-sectional and case–control studies reporting on average mean systolic and diastolic BP in patients with (N = 46034) and without (N = 211309) periodontitis showed that the former had 4.5 mmHg higher systolic BP (95% C.I. 2.9-6.1 mmHg, $p < 0.0001$) and 2.0 mmHg higher diastolic BP (95% C.I. 1.2–2.8 mmHg, $p < 0.0001$) when compared with the latter [15]. Globally, the systolic BP component is more typically associated with periodontitis than the diastolic component.

3.1.1.3 Association Two recent meta-analyses have examined the association between periodontitis and arterial hypertension with concordant findings [15, 17]. Due to the use of several definitions in the included studies, both meta-analyses used adapted case definitions for periodontitis [9, 18]. Hypertension was defined as BP ≥ 140 mmHg/90 mmHg or the use of antihypertensive medications, with additional non-confident definitions also for this condition [15, 17].

The association between moderate-severe periodontitis and hypertension spanned from 16 to 67% (16 studies included) [17] and from 22 to 53% (20 studies included) [15], with evidence of a positive linear association driven by the severity of periodontitis. The reported findings should be interpreted in the light of the high heterogeneity observed ($I^2 > 80\%$). In addition, despite multivariable adjustments were performed, specific subgroup analyses based on gender, age and race were lacking.

3.1.2 Periodontal Disease Activity and Hypertension

Studies assessing the relation between periodontal disease activity and hypertension are based on the measurement of gingival bleeding (BoP, %), a marker of active periodontal inflammation.

An analysis of a multiethnic US representative sample of 6617 men and 7377 women aged ≥ 17 years enrolled in the Third National Health and Nutrition Examination Survey (NHANES III) indicated that BoP was the only measure consistently and significantly associated with raised systolic BP after multivariate adjustments (age, sex, ethnicity CRP, creatinine, Na^+/K^+ ratio, chronic conditions—including chronic heart diseases and/or stroke, emphysema and/or asthma, arthritis and/or lupus, diabetes, thyroid disease, cancer, and goitre—, smoking, alcohol consumption, BMI, education and poverty–income ratio) [19]. Specifically, the authors found a linear effect of BoP on BP, with higher average systolic BP by 0.5 (0.3, 0.6) mmHg and higher odds for diagnosis of hypertension (BP ≥ 140 mmHg/90 mmHg) (OR 1.1, 95% CI 1.0–1.1, $P < 0.05$) for every 10% increase in the extent of gingival bleeding [19].

The combination of gingival bleeding with markers of long standing disease (either PPD or CAL) in the periodontal inflamed surface area (PISA) was used to describe the association of poor periodontal health with BP in comparison with BoP alone among 8614 individuals (52.1% women) aged ≥ 30 years from NHANES III [20]. Participants were stratified according to PISA tertiles as "Not inflamed" (PISA = 0 mm^2), "Moderately inflamed" (0 < PISA < 37.6 mm^2), and "Severely inflamed" (PISA ≥ 37.6mm^2). A double threshold for high/uncontrolled BP was used (≥ 130/80 mmHg [21] and ≥ 140/90 mmHg [22]). The results indicate concordant findings for BoP and PISA in terms of their association with BP. In fact, compared with healthy periodontium, severe PISA and BoP were associated with 43% ($p < 0.001$) and 32% ($p = 0.006$) higher odds of BP ≥130/80 mmHg, 58% ($p < 0.001$) and 73% ($p < 0.001$) higher odds of BP ≥140/90 mmHg, and with higher systolic BP by nearly 4 ($p < 0.001$) and 5 ($p < 0.001$) mmHg, respectively [20].

Another study investigated the association of bleeding gums with high/uncontrolled BP across the clinical spectrum of periodontal disorders (gingivitis; stable periodontitis, i.e. with BoP < 10%; unstable periodontitis, i.e. with BoP ≥ 10%) using data from 5396 NHANES III participants aged ≥ 30 years [20]. Major confounders shared between hypertension and periodontal diseases (age, sex, ethnicity, poverty, BMI, hypertension diagnosis, use of antihypertensive medications, smoking habits, and diabetic status) were accounted for by applying survey-based propensity score matching (PSM). High/uncontrolled BP was defined as ≥ 130/80 mmHg [21] and ≥ 140/90 mmHg [22]. The results indicated that gingival bleeding contributes to increase the risk of high/uncontrolled BP, an effect that is amplified when BoP is considered in combination with chronic disease parameters. In particular, gingival bleeding (gingivitis; unstable periodontitis) was independently associated with 2.6 mmHg higher systolic BP ($p < 0.001$) and with about 40% greater odds of high/uncontrolled BP (OR for BP ≥ 140/90mmHg: 1.38, 95% CI 1.13–1.69, $p = 0.002$; OR for BP ≥ 130/80 mmHg: 1.42; 95% CI 1.19–1.68; $p < 0.001$) compared with no bleeding (healthy periodontium; stable periodontitis). Average systolic BP was higher among participants with unstable periodontitis than those with stable periodontitis (+ 2.1 mmHg; $p < 0.001$) or gingivitis (+ 5.3 mmHg; $p < 0.001$) [23].

3.2 Do People Treating High Blood Pressure with Medications have a Higher Risk of Uncontrolled Hypertension in the Presence of Periodontitis?

Evidence on the impact of periodontitis on the achievement of BP targets during antihypertensive treatment as the main study outcome is limited to only three cross-sectional studies, of which two on a multiethnic cohort of US individuals aged ≥ 30 years reporting on hypertension control achievement in the presence of periodontal disease compared with the absence of the disease [24, 25], and the other involving a cohort of Puerto Rican elderly aged ≥ 70 years reporting on the association with high BP in individuals with periodontal disease taking antihypertensive medications compared with those having normal BP values [26]. Globally, there is observational evidence that periodontitis is associated with increased risk of uncontrolled hypertension despite antihypertensive treatment.

3.2.1 Cross-sectional Multiethnic Cohort of Treated Hypertensives ≥ 30 Years

The first study was conducted on hypertensive adults aged at least 30 years, of various racial/ethnic background (self-declared non-Hispanic Whites, non-Hispanic Blacks, Hispanics, and mixed race/ethnicity) enrolled in the 2009–2014 NHANES campaigns, who had at least one natural tooth and without a history of heart transplant, artificial heart valve, congenital heart disease except for mitral valve prolapse, and bacterial endocarditis [25]. The sample included a proportion of smokers, diabetics, obese, and dyslipidemic participants. BP was measured with a mercury sphygmomanometer according to standardized protocols, and the average of 3 consecutive BP readings taken on the same arm was used for analyses. Periodontal health status was assessed by dentists on a full-mouth, 6-sites periodontal examination in terms of PPD and CAL, and disease severity was based on the CDC/AAP case definition for the disease [27]. The results indicate that individuals who were taking medications for high BP and suffered from periodontitis had 2–3 mmHg higher mean systolic BP compared with those without the disease before and after controlling for relevant confounders, respectively (age, sex, ethnicity, BMI, smoking status; HbA1c, total and HDL cholesterol, triglycerides, creatinine, education, poverty level, and CRP). This was confirmed in both men and women and across all age ranges, from 30–44 years, to 45–64 years, to 65 years and above. A parallel assessment indicated that the difference in mean systolic BP based on the presence or absence of periodontitis could be even wider (about 3–7 mmHg) in individuals with diagnosed, but untreated hypertension from the same NHANES cohorts. If the most recent recommendations on hypertension management were to be applied to those individuals, the risk of failing to achieve BP values like those recommended by the 2017 ACC/AHA guidelines (< 130/80 mmHg independent of age or comorbidities [28]) was 20% higher in the presence of periodontitis compared with the absence of the disease (OR 1.20, 95% CI 1.05–1.37, p = 0.008). Of note, the finding remained significant after progressive adjustment for the above mentioned possible confounders, except when serum CRP was included in the model (OR 1.19, 95% CI 0.91–1.54, p = 0.2), suggesting a possible mediating effect of systemic inflammation in the observed association, although fluctuations in the inflammatory response during chronic periodontitis with impact on serum CRP levels should be considered as an alternative explanation.

The same sample was re-analyzed based on the redefinition of hypertension treatment goals according to 2018 European Society of Cardiology/European Society of Hypertension (ESC/ESH) Guidelines for the management of arterial hypertension, which are modeled according to patients characteristics (< 130/80 mmHg if aged < 65 years and with normal renal function, < 140/80 mmHg if aged ≥ 65 years or with chronic kidney disease, independent of age [22]) [24]. The full-adjusted (sex, ethnicity, BMI, smoking habits, glycohemoglobin, cholesterol, triglycerides, education, poverty level, CRP) risk of uncontrolled hypertension was 36% higher in the presence of periodontitis compared with the absence of the disease when using the 2018 ESC/ESH treatment goals as reference (OR 1.36, 95% CI 1.05–1.78, p = 0.02) [24].

3.2.2 Cross-sectional Hispanic Cohort of Treated Hypertensives ≥ 70 Years

The second study was on 185 elderly individuals (62 males, 123 females, age range 70 to 97 years) with preserved cognitive function from the Puerto Rican Elderly Dental Health Study (PREDHS), an ancillary cohort of the Puerto Rican Elderly: Health Conditions (PREHCO) study [26]. The sample included smokers, diabetic, and obese individuals. Major reasons for exclusion from PREDHS were use of anticoagulants, renal dialysis, heart valve problems, congenital heart disease, endocarditis, hip bone or joint replacement, rheumatic fever, hemophilia, having pacemaker or defibrillator or any cardiovascular prosthesis. BP was measured on the right arm using a bell stethoscope and a mercury sphygmomanometer according to standard procedures, and antihypertensive medications were identified by a cardiologist blinded to periodontal status and BP values of participants. High BP was defined as average systolic ≥ 140 mmHg or average diastolic ≥ 90 mmHg. Periodontal health status was assessed on a full-mouth, 4-sites periodontal examination performed during home visits by 3 teams of calibrated dental examiners, and it was expressed in terms of PPD and CAL.

Disease severity was based on the CDC/AAP case definition for the disease [11]. A multivariate logistic regression was performed to evaluate the associations between periodontal disease and high BP, and a subgroup analysis was performed comparing participants taking antihypertensive medications with those having normal BP values. After controlling for potential confounders including age, sex, smoking and drinking habits, diabetes, level of physical activity in the past month, BMI, dietary habits, and home/professional dental care, severe periodontal disease was associated with more than a four-fold increase in the risk of high BP among individuals taking antihypertensive medications compared with individuals with normal BP (OR 4.63, 95% CI 1.20–17.94). The authors did not assess the risk of high BP in treated hypertensive individuals with periodontitis compared with those with a healthy periodontium.

3.3 Is There Any Evidence for a Causal Link Between Periodontitis and Hypertension?

Herein, the plausible genetic bases linking periodontitis and hypertension are described. The possible trigger role of environmental factors, like high-salt diet, and local dysbiosis is also reported.

3.3.1 Heritability of Periodontitis and Hypertension

While monogenic hypertension depends on defects of specific genes mainly involved in sodium handling and steroid hormone metabolism [29], the most common form of hypertension is a complex trait grounded on a polygenic basis and favored by environmental factors, where potentially inheritable epigenetic modifications concur to the clinical phenotype [30]. Alternative hypotheses to explain the pathophysiology of hypertension that are not centered on the kidney have recently found confirmation in an association study on 128,272 SNPs from 342,415 individuals of European ancestry. The authors identified 66 genome-wide significant loci for BP, of which 17 were novel, that cumulatively explained nearly 3.5% of the trait, with broadly comparable BP effects in South Asians, East Asian and Africans [31]. These variants were enriched for cis-regulatory elements particularly in vascular endothelial cells, suggesting their possibly relevant role in BP control through modulation of vascular tone at the systemic level. The study provided a consistent genetic basis for increased systemic vascular resistance as a pathogenic event in the development of hypertension that possibly involves endothelial permeability or vascular smooth muscle cell contractility, arguing against a single dominant renal effect in the genetic determination of intra-arterial pressure. In a study on a series of 229 monozygotic and dizygotic twins, CRP secretion itself was described as to be substantially heritable in humans, sharing genetic determination with metabolic features including BP [32]. Specifically, significant associations were found between CRP concentration and polymorphisms in the catecholaminergic/b-adrenergic pathway, providing a biological proof of concept for the role and actions of inflammation within the adrenergic system and the clinical hypertensive phenotype [32].

A certain degree of heritability was also described for periodontitis, ranging from 15% in family studies (H^2 0.15, 95% CI 0.06–0.24; $I^2 = 0\%$) to 38% in twin studies (H^2 0.38, 95% CI 0.34–0.43; $I^2 = 12.9\%$), with higher heritability for severe early-onset traits and younger individuals [33]. When studies were combined, summing up to more than 50,000 participants, nearly a third of the periodontitis variance in the population was attributable to genetic factors (H^2 0.29, 95% CI 0.21–0.38; $I^2 = 61.2\%$) [33]. Several suggestive susceptibility loci for periodontitis have been reported by genome-wide association studies (GWAS) [34, 35], some of which are intertwined with the immune system [36]. This is the case for a locus at SIGLEC5 (sialic acid binding Ig-like lectin 5) and a chromosomal region downstream of the DEFA1A3 locus (defensin alpha 1–3), which showed association with both chronic and aggressive disease and were associated with periodontitis at a genome-wide significance level [36]. The DEFA genes belong to the family of alpha defensins that are believed to be involved in phagocyte-mediated host defense against bacteria, fungi and viruses, and there is evidence of their strong expression in neutrophils and macrophages, as well as in the epithelia of mucosal surfaces. SIGLEC5 (CD170) belongs to the human CD33-related siglecs and is broadly expressed in various myeloid cells of the innate immune system and in B cells. It seems to function as an inhibitory receptor for myeloid cells to prevent inappropriate reactivity against self-tissues [37, 38]. Accordingly, it appears to be involved in maintaining leukocytes in the quiescent state until proper activation occurs through specific receptors [38].

3.3.2 Evidence for a Genetic Association Between Periodontitis and Hypertension

A two-sample Mendelian randomization analysis has been recently performed on the nearly 750,000 UK-Biobank/International Consortium of Blood Pressure-Genome-Wide Association Studies participants to ascertain the effect on BP of 4 SNPs already associated with periodontitis in GWAS studies [5]. The examined polymorphisms included those in DEFA1A3 (rs2738058) and SIGLEC5 (rs4284742) loci, which are involved in the immune function. All four SNPs were considered as a periodontitis exposure proxy and were tested in the context of the BP phenotypes. GWAS data on BP were used to extract estimates of the association between the 4 SNPs and systolic and diastolic BP [39]. The results showed that, for all the examined SNPs, the same allele was

associated with both increased risk of periodontitis and increased levels of BP [5]. Thus, this pioneer study provided the first evidence of a causal, genetic-grounded relationship between periodontitis and BP that involved, at least in part, the immune system.

3.3.3 High-Salt Diet and Dysbiosis

A role for immune cells, like regulatory T cells (Tregs), T_H17, and neutrophils, has been described for both periodontitis and hypertension [4]. Environmental factors, like high-salt diet [40, 41], as well as an altered microbiome [42] were shown to act as possible triggers to immune cells impairment (T_H17, neutrophils) with effects on periodontal health status and BP. Specifically, a high-salt diet, which is a common environmental trigger for hypertension, taken for 1 week was shown to impair antibacterial responses of neutrophils through salt-induced hyperglucocorticoidism and consequent glucocorticoid-mediated immunosuppression [41]. High-salt diet was also found to trigger tissue inflammation via T_H17 cell development mediated by an increase in serum glucocorticoid kinase 1 (SGK1) expression [40]. In parallel, a dysbiotic microbiome in the oral cavity was found to trigger T_H17 cell expansion, which mediated inflammatory tissue destruction in experimental periodontitis [42].

3.4 Are People with Periodontitis More Likely to Develop Hypertension in the Future?

Longitudinal evidence assessing the incidence of hypertension in relation with periodontal diseases is limited, including only two studies based on self-reported data, of which one on middle aged and old adult men [43] and the other on post-menopausal women [44], and two studies where clinical BP values and periodontal health status markers were measured, conducted on young adults and adults of both sexes [45, 46]. In contrast with the first two studies, where no association between self-reported periodontal health status and BP was found, an increased risk of incident hypertension in relation to periodontal disease was found in the studies based on BP values and oral health status assessments.

3.4.1 Cohorts with Self-reported BP and Periodontal Information

The first is a study on a prospective cohort of male health professionals (dentists, pharmacists, optometrists, podiatrists, osteopaths and veterinarians) enrolled in The Health Professionals' Follow-Up Study (HPFS) in 1986 who self-reported individual data on lifestyle and medical conditions on a biennial basis throughout the 20-years follow-up period (median follow-up: 16.3 years), in the assumption that their professional education and high socioeconomic status granted for data accuracy [43]. Participants were aged 40–75 years at enrollment. The study lacks measured data on periodontal health status as well as on actual BP values. Diagnosed periodontitis (yes/no) was asked at baseline and every two years thereafter, and the severity of periodontal bone loss (none, mild, moderate, severe) was investigated with a question in 1996. The examined sample consisted of 31,543 eligible participants (466,514 person-years during 20 years of follow-up). After adjusting for potential self-reported confounders (family history of hypertension, diabetes diagnosis, alcohol consumption, smoking habits, physical activity, BMI, use of supplemental multivitamins or vitamins E or D or calcium, fruit/vegetable intake, cumulative tooth loss, and periodontal disease diagnosis during the follow-up), no association was observed between self-reported baseline periodontal disease and incident hypertension (relative risk [RR] = 1.04; 95% CI: 0.98–1.10), nor between self-reported periodontitis during follow-up (RR = 1.01; 95% CI: 0.96–1.05), tooth loss during follow-up (RR = 1.03; 95% CI: 0.98–1.09), severe periodontal bone loss (RR = 1.02; 95% CI: 0.77–1.35), or number of teeth reported at baseline (< 10 or ≥ 25 teeth) (RR = 1.05; 95% CI: 0.91–1.21) and the same outcome [43].

The association of baseline self-reported periodontal disease and edentulism with incident hypertension in women was assessed within the Women's Health Initiative-Observational Study (WHI-OS) [44]. It was a prospective cohort study of 93,676 postmenopausal women aged 50–79 years at the time of enrollment between 1993 and 1998 and followed-up through 2015 (mean follow-up 8.3 years). Only participants who self-reported information on their periodontal health status and number of teeth at the 5-year questionnaire post-enrollment (1998–2003) and concomitantly self-reported neither being diagnosed with hypertension nor taking antihypertensive medications were included (N = 36,692). Information on the severity or activity of self-reported periodontal disease was not available. After accounting for potential confounders (age, ethnicity, smoking status, BMI, alcohol intake, total physical activity, diabetes, frequency of dental visits, baseline systolic BP measured with auscultatory method using a conventional sphygmomanometer, and dietary factors including consumption of red meat, sodium, and total calorie intake), women with self-reported edentulism had approximately 20% higher risk of incident hypertension compared with dentate women (HR 1.21, 95% CI 1.11–1.30). Conversely, self-reported periodontal disease was not associated with incident hypertension (HR 0.99, 95% CI 0.95–1.03).

3.4.2 Cohorts with Measured BP and Periodontal Data

The first study enrolled a sample of Japanese employees (727 males, 296 females, mean age 37.3 years, age range

20–56 years) [46], who underwent medical and dental checkups in 2002 and after 4 years and in whom BP and the other metabolic syndrome components were within normal ranges at baseline. BP was measured with an automatic device in a sitting position and a single measurement was performed (two in case an abnormal value at the first measurement was recorded). Hypertension was defined as systolic BP ≥ 130-mm/Hg or diastolic BP ≥ 85-mm/Hg based on the threshold for the definition of metabolic syndrome in Japan. Periodontal health status was assessed by dental hygienists supervised by dentists with standard protocols in terms of periodontal pockets (PPD ≥ 4 mm). After 3 years, 13.7% of individuals developed hypertension. After adjustments for age, sex, tobacco smoking, exercise, eating habits, and BMI, the risk of incident hypertension was significantly associated with the baseline presence of periodontal pockets (OR 1.5, 95% CI 1.0-2.3, $p < 0.05$) [46]. Conversely, one or more missing teeth at baseline were not associated with incident hypertension.

The second study included a sample of Japanese university students < 30 years (1278 males, 1310 females, mean age 18.2 ± 0.7 years, age range 18–27 years) with no self-reported history of treated/untreated hypertension, who underwent baseline general health and oral examinations in April 2010–2011 (N = 3011) and 3-year follow-up examination in April 2013–2014 (N = 2588; follow-up rate: 66.7%) [45]. BP and heart rate were obtained by using an automatic oscillometric device and BP was categorized based on the measured BP values (normal BP: < 120/80 mmHg; prehypertension: systolic BP 120–139 mmHg or diastolic BP 80–89 mmHg; hypertension: ≥ 140/90mm Hg). A second or third measure was taken if BP values were > 140/90 mm Hg; otherwise, only one BP measurement was recorded. Periodontal health status was assessed by 6 calibrated dentists with standard protocols in terms of teeth count, PPD, BoP, as well as simplified oral hygiene index for dental plaque and calculus. BMI was based on measured weight and height. Gender, age, general health conditions, eating, drinking and smoking habits, physical activity, as well as home and professional oral care habits were self-reported. There were very few current smokers and no former smokers in the enrolled sample. Based on multivariate logistic regression accounting for age, gender, smoking status, BMI, eating habits, number of teeth, simplified oral hygiene index, and baseline periodontal disease, the predictors of developing hypertension at the 3-year follow-up among individuals with baseline prehypertension included male sex (OR: 6.31; 95% CI: 2.63–15.13; $p < 0.001$), baseline sedentary lifestyle (OR: 2.90; 95% CI: 1.56–5.38; $p < 0.01$), and baseline periodontal disease defined as the presence of PPD ≥ 4 mm and BOP ≥ 30% (OR: 2.74; 95% CI: 1.19–6.29; $p = 0.02$). Conversely, baseline periodontal disease did not predict the risk of developing prehypertension (OR: 0.93; 95% CI: 0.51–1.70; $p = 0.82$).

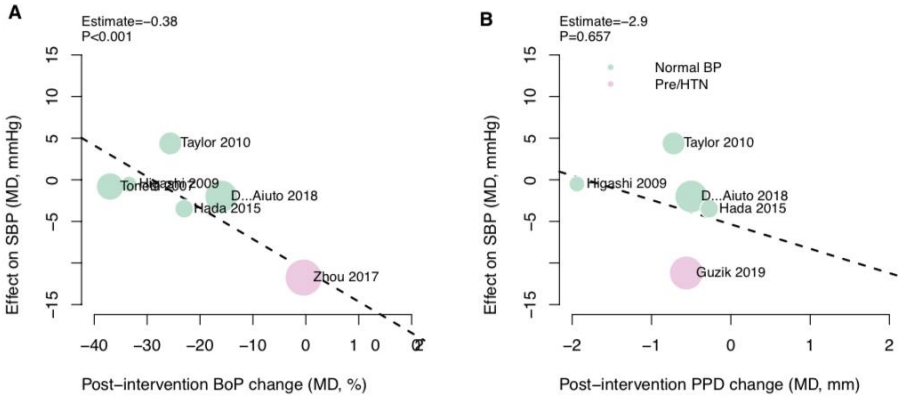

Fig. 1 Effect of periodontal treatment on systolic BP in pre-hypertensive and hypertensive individuals. **A** meta-regression between post-intervention BoP change (mean difference [MD]; %) and systolic BP (MD, mmHg). **B** meta-regression between post-intervention PPD change (MD; mm) and systolic BP (MD, mmHg). Regression slopes reflect the effect of periodontal treatment on BP in pre-hypertensive and hypertensive individuals. Data were extracted from studies included in the meta analysis by Sharma et al. [47] and the meta-regression is an original figure by the Hyper-Group. Heterogeneity was reported among studies

3.5 Is There an Effect of Periodontitis Treatment in Lowering BP and Improving BP Control in Hypertensive People?

In this section, the effect of periodontal therapy on BP as the primary outcome in three studies on individuals with pre-hypertension, treated hypertension, or resistant hypertension is examined. Globally, the results show a parallel improvement in systemic inflammatory markers and BP profile after treatment (Fig. 1). One study assessed as a secondary outcome the effect of nonsurgical periodontal therapy on BP in treated hypertensive individuals, reporting no significant changes. The impact of periodontal treatment on BP in normotensive individuals has been recently addressed [47] with evidence of no benefits (Fig. 1) and will not be discussed here.

3.5.1 Effect of Periodontal Therapy on Blood Pressure as the Primary Outcome

To date, the effect of periodontal therapy on blood pressure as the primary outcome has been reported by three studies [5, 48, 49]. Two studies were randomized clinical trials, one of which involved pre-hypertensive individuals (systolic BP between 120 and 139 mmHg or diastolic BP between 80 and 89 mmHg according to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [50] and assessed the outcome in terms of clinical BP [48], and the other one [5] included hypertensive individuals on a stable antihypertensive therapy since at least 6 months prior to enrollment and assessed the outcome using 24-hours ambulatory BP measurement (ABPM) [22]. Both RCTs involved participants with moderate to severe periodontitis [11, 27] who were randomized to either conventional or intensive periodontal treatment.

The third study [49] was a prospective cohort pilot study on individuals ≥ 40 years with severe essential refractory hypertension for at least 2 years of good adherence on a guidelines-based antihypertensive treatment strategy, and with generalized advanced chronic periodontitis. BP was assessed using an ABPM device [51].

3.5.1.1 Pre-hypertension The pre-hypertensive population trial [48] assigned patients in the intensive-treatment group to full-mouth intensive removal of dental plaque biofilms with the use of scaling and root planing, teeth extraction as needed, and local antibiotic delivery (minocycline) into the periodontal pockets once weekly for 4 consecutive weeks. Patients in the control-treatment group only accepted a conventional cycle of supragingival scaling and polishing at baseline. In addition, all patients received basic oral hygiene instructions by experienced periodontists. The total length of follow-up was 6 months, with intermediate assessments at 1 and 3 months. Clinical BP was measured using an automated device in a controlled setting [52], and the average of a minimum of two measurements recorded 2 minutes apart was used in the study.

Individuals in the intensive-treatment group (N=53) compared with those in the conventional-treatment group (N=54) showed a larger improvement in clinical measures of periodontitis (PPD, CAL, BoP) at 3 and 6 months. In the former, but not in the latter, this change was paralleled in the same time points by a decrease in clinical systolic and diastolic BP, systemic inflammation expressed as hsCRP, and circulating markers of endothelial function. The between-groups difference in systolic BP was visible as early as the first month follow-up visit, while that in IL-6 emerged at the 6 months follow-up visit only.

Specifically, systolic BP in the intensive-treatment group decreased from 129.31 ± 5.85 mmHg (baseline) to 125.83 ± 5.30 mmHg (1 month follow-up visit), 122.17 ± 5.15 mmHg (3 months follow-up visit), and 118.23 ± 5.45 mmHg (6 months follow-up visit). The diastolic BP component also decreased progressively from baseline to study end in this group. Conversely, neither systolic or diastolic BP decreased in the conventional-treatment group. The absolute between-groups difference in BP at 6 months was 12.57 mmHg for systolic BP ($p < 0.001$) and 9.65 mmHg for diastolic BP ($p < 0.001$). The observed change in clinical BP in the intensive-treatment group was accompanied by a decrease in hs-CRP, IL-6 and circulating markers of endothelial function (CD31+/CD42− endothelial microparticles), which did not occur in the conventional-treatment group, resulting in significant between-groups differences in all parameters at the study end [48].

3.5.1.2 Treated Hypertension This RCT enrolled individuals with treated essential hypertension, with or without other cardiovascular risk factors such as overweight, tobacco smoking, type 2 diabetes mellitus, and hypercholesterolemia [5]. Changes to antihypertensive medications during trial resulted in the exclusion from analysis. Intensive periodontal treatment consisted of a single session of full-mouth supragingival and subgingival tooth scaling, while conventional treatment consisted of a single session of supragingival tooth scaling. Any additional required periodontal treatment in individuals randomized to this group was postponed to the study end. All participants received dental hygiene instructions. Ambulatory BP was assessed using Spacelabs Ultralite 90217 devices in accordance with manufacturer recommendations and in agreement with the latest available protocols [22]. Full dental examination and cardiovascular evaluation, comprehensive of ABPM, blood samples collection for flow cytometry analysis and plasma cytokine measurement, as well as vascular function assess-

ment by flow-mediated dilatation (FMD) of the brachial artery, were repeated 2 months after periodontal therapy.

Intensive periodontal treatment (N = 45 patients) produced a greater benefit in terms of periodontal health compared with control treatment (N = 46 patients), leading to a significant reduction in the examined clinical measures of periodontitis (PPD, CAL). Conventional treatment determined only a small reduction in PPD. Changes in periodontal health parameters were paralleled by a decrease in ambulatory 24 h average systolic and diastolic BP only in the intensive-treatment group, leading to an absolute between-groups difference in systolic and diastolic BP of 11.1 mmHg (95% CI 6.5–15.8) and 8.3 mmHg (95% CI 3.98–12.6), respectively. The benefit of intensive treatment on BP was visible on both the daytime and nighttime BP profiles, and it was not affected by the number of antihypertensive medications (> 2 or ≤ 2). Conversely, it depended on baseline BP and age, with no significant changes in systolic BP among individuals with ambulatory 24 hours average systolic BP in the highest tertile (> 138 mmHg), and larger benefit in young individuals (age < 58 years). A formal mediation analysis indicated a significant average causal mediation effect of treatment group on systolic BP reduction attributable to changes in PPD [estimate = 3.59 (95% CI 0.52–7.10), p = 0.021; proportion of total mediated effect = 0.29 (95% CI 0.04–0.61), p = 0.021]. Intensive, but not control periodontal treatment modestly yet significantly reduced IFNγ and IL-6 levels as well as the levels of activated (CD38+) and immunosenescent (CD28null, CD57+) proinflammatory CD8+T cells, which have been shown to infiltrate kidneys and vessels in the early phase of vascular injury in hypertensive patients.

Heart rate was not modified by periodontal treatment.

3.5.1.3 Resistant Hypertension In the interventional prospective cohort pilot study on adults with severe essential refractory hypertension (N = 26; mean age: 53.6 ± 8.0 years; mean BMI: 30.6 ± 8.0; 65.4% women; 61.5% non-Whites; 11.5% smokers; 15.4% diabetics; 23.1% with a history of myocardial infarction or stroke), periodontal examination, cardiological assessment (ABPM, echocardiography for the assessment of left ventricular mass, PWV) and laboratory tests on plasma inflammatory markers were undertaken at baseline and 3 and 9 months thereafter [49]. All participants suffered from generalized advanced chronic periodontitis [10] diagnosed on a complete periodontal examination performed by the same calibrated periodontist. Non-surgical periodontal treatment was delivered as needed by a single experienced periodontist 3 months after the baseline visit. Treatment consisted of supragingival scaling using manual instruments and a sonic device, and subgingival scaling and root planing in sites with PPD ≥ 4 mm, with no limit of appointments and an average of four to six visits per patient within a 2-week period. All participants also received reiterated oral hygiene instructions consisting of a demonstration of dental floss use and Bass technique for brushing. Periodontal treatment determined a significant improvement in clinical parameters of the disease (BoP, PPD, CAL) as well as in the visible plaque index after 6 months. This result was paralleled by a significant reduction in the median values of systolic and diastolic 24-hours ambulatory BP, CRP, IL-6, fibrinogen, as well as in the mean values of measures of left ventricular hypertrophy and arterial stiffness [49]. Systolic BP decreased from a median (interquartile range) of 170 (28.8) mmHg at the time of periodontal treatment to 157.5 (40) mmHg 6 months thereafter. Diastolic BP decreased from a median (interquartile range) of 105 (21.3) mmHg at the time of periodontal treatment to 95 (11.3) mmHg 6 months thereafter. Left ventricular mass decreased from a mean weight of 234.4 ± 79.6 g at baseline to 219.4 ± 69.2 g after periodontal treatment. The authors did not explicitly state whether antihypertensive therapy remained stable during follow-up. A full ABPM report, comprehensive of mean 24 h, daily, and nocturnal BP values was not shown. Also, the lack of a control group prevents the full interpretation of the reported findings.

3.5.2 Effect of Periodontal Therapy on Blood Pressure as a Secondary Outcome

The effect of periodontal therapy on blood pressure as the secondary outcome in individuals with hypertension has been so far reported by only one study [53]. It was a non-randomized clinical trial primarily interested in endothelial function that also assessed the effect on BP of nonsurgical periodontal therapy, delivered as needed, in treated hypertensive individuals (N = 26, mean age: 54 ± 13 years; 30.8% women; 34.6% smokers; mean BMI: 23.2 ± 3.0) without diabetes mellitus, hyperlipidemia, or CVD who were on a stable (≥ 6 months prior to enrollment) antihypertensive therapy [53]. Hypertension was the only condition they were receiving medications for. No information was available on the BP measurement technique. Periodontal health status was first investigated based on a self-reported questionnaire that assessed the presence of gingival swelling and bleeding, purulent discharge, and tooth mobility and then confirmed by the dentist on a routine oral examination, leading to the identification of 17 (65.4%) hypertensive individuals who were affected by the disease and needed periodontal treatment. The severity of the disease was not reported. Their office BP, glycolipid profile, and systemic inflammatory markers recorded at baseline and 24 weeks after periodontal treatment were compared with those of a control group of hypertensive individuals without periodontitis (N = 38; mean age: 56±12 years; 26.3% women; 42.1% smokers; mean BMI: 23.1±2.8). Nonsurgical periodontal treatment included

subgingival scaling and root planing as needed, with the use of antibiotics for 4–7 days after intensive therapy, and oral hygiene instructions for mouth washing and brushing.

No information was available on the periodontal health markers at baseline or at the 24 week visit.

At baseline, hypertensive individuals with periodontitis had higher serum hs-CRP and IL-6 levels compared with the control group of hypertensive individuals without the disease. At the 24-week final visit, individuals who had received periodontal treatment had significantly lower hs-CRP and IL-6 levels compared with their pretreatment values. No other difference in clinical and laboratory features was recorded.

The lack of information on the BP measurement technique, periodontitis markers and periodontal disease severity affect the full interpretation and comparability of the reported findings.

4 Conclusions

Periodontitis and hypertension often occur as comorbidities. A positive linear association between the conditions was found, which appears to be driven by the severity of periodontitis and mostly affected the systolic BP component.

In contrast to survey-based research, studies based on BP measurement and oral health status examination found an increased risk of incident hypertension in relation to periodontal disease.

A genetic susceptibility involving inflammation and immunity exists for both hypertension and periodontitis, and polymorphisms in genes involved in the immune function were found to be shared between the two conditions. Environmental factors, like high-salt diet, as well as ecosystemic perturbations contribute to immune cells impairment with effects on periodontal health status and BP.

Based on observational evidence, periodontitis is associated with elevated risk of uncontrolled hypertension despite antihypertensive treatment. Studies on individuals with prehypertension, treated hypertension, or resistant hypertension that examined the effect of periodontal therapy on BP as the primary outcome indicate a parallel improvement in systemic inflammatory markers and BP profile after treatment. Heterogeneity exists in the evidence.

5 Clinical Implications

There is a rationale for the assessment of oral health status and BP profile in the presence of either hypertension or periodontitis.

In addition to its proven benefits on BP profile, a low-salt diet might be beneficial for periodontal health status.

The benefits of maintaining or restoring a healthy periodontium might extend to BP profile.

6 Research Implications

More mechanistic studies and large randomized clinical trials are warranted.

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References

1. Giampaoli S, Vescio MF, Gaggioli A, Vanuzzo D, [on behalf of the Research Group of the Observatory for Cardiovascular Epidemiology]. Prevalence of Arterial Hypertension in the Italian Population. Istituto Superiore di Sanità. 2021. https://www.epicentro.iss.it/ben/2002/settembre02/2_en. Accessed 1 May 2021.
2. Aimetti M, Perotto S, Castiglione A, Mariani GM, Ferrarotti F, Romano F. Prevalence of periodontitis in an adult population from an urban area in North Italy: findings from a cross-sectional population-based epidemiological survey. J Clin Periodontol. 2015;42:622–31.
3. Loos BG, Van Dyke TE. The role of inflammation and genetics in periodontal disease. Periodontol. 2000;2020(83):26–39.
4. Del Pinto R, Pietropaoli D, Munoz-Aguilera E, D'Aiuto F, Czesnikiewicz-Guzik M, Monaco A, et al. Periodontitis and hypertension: is the association causal? High Blood Press Cardiovasc Prev. 2020;27:281–9.

5. Czesnikiewicz-Guzik M, Osmenda G, Siedlinski M, Nosalski R, Pelka P, Nowakowski D, et al. Causal association between periodontitis and hypertension: evidence from Mendelian randomization and a randomized controlled trial of non-surgical periodontal therapy. Eur Heart J. 2019;40:3459–70.
6. Sanz M, Marco Del Castillo A, Jepsen S, Gonzalez-Juanatey JR, D'Aiuto F, Bouchard P, et al. Periodontitis and cardiovascular diseases: consensus report. J Clin Periodontol. 2020;47:268–88.
7. Landi L, Grassi G, Sforza NM, Ferri C, Italian working group on Hypertension and Periodontitis (Hy-Per Group). Hypertension and Periodontitis: an Upcoming Joint Report by the Italian Society of Hypertension (SIIA) and the Italian Society of Periodontology and Implantology (SIdP). High Blood Press Cardiovasc Prev. 2021;28:1–3.
8. DiCenso A, Bayley L, Haynes RB. ACP Journal Club. Editorial: Accessing preappraised evidence: fine-tuning the 5S model into a 6S model. Ann Intern Med. 2009;151:32–3.
9. Nibali L, Farias BC, Vajgel A, Tu YK, Donos N. Tooth loss in aggressive periodontitis: a systematic review. J Dent Res. 2013;92:868–75.
10. Armitage GC. Development of a classification system for periodontal diseases and conditions. Ann Periodontol. 1999;4:1–6.
11. Page RC, Eke PI. Case definitions for use in population-based surveillance of periodontitis. J Periodontol. 2007;78:1387–99.
12. Preshaw PM. Definitions of periodontal disease in research. J Clin Periodontol. 2009;36:1–2.
13. Tonetti MS, Claffey N, European Workshop in Periodontology group C. Advances in the progression of periodontitis and proposal of definitions of a periodontitis case and disease progression for use in risk factor research. Group C consensus report of the 5th European Workshop in Periodontology. J Clin Periodontol. 2005;32:210–3.
14. Papapanou PN, Sanz M, Buduneli N, Dietrich T, Feres M, Fine DH, et al. Periodontitis: consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Clin Periodontol. 2018;45(Suppl 20):S162–70.
15. Muñoz Aguilera E, Suvan J, Buti J, Czesnikiewicz-Guzik M, Barbosa Ribeiro A, Orlandi M, et al. Periodontitis is associated with hypertension: a systematic review and meta-analysis. Cardiovasc Res. 2020;116:28–39.
16. Tuominen R, Reunanen A, Paunio M, Paunio I, Aromaa A. Oral health indicators poorly predict coronary heart disease deaths. J Dent Res. 2003;82:713–8.
17. Martin-Cabezas R, Seelam N, Petit C, Agossa K, Gaertner S, Tenenbaum H, et al. Association between periodontitis and arterial hypertension: a systematic review and meta-analysis. Am Heart J. 2016;180:98–112.
18. Nibali L, Tatarakis N, Needleman I, Tu Y-K, D'Aiuto F, Rizzo M, et al. Clinical review: association between metabolic syndrome and periodontitis: a systematic review and meta-analysis. J Clin Endocrinol Metab. 2013;98:913–20.
19. Tsakos G, Sabbah W, Hingorani AD, Netuveli G, Donos N, Watt RG, et al. Is periodontal inflammation associated with raised blood pressure? Evidence from a National US survey. J Hypertens. 2010;28:2386–93.
20. Pietropaoli D, Del Pinto R, Ferri C, Marzo G, Giannoni M, Ortu E, et al. Association between periodontal inflammation and hypertension using periodontal inflamed surface area and bleeding on probing. J Clin Periodontol. 2020;47:160–72.
21. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: a Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018;71:1269–324.
22. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension. Eur Heart J. 2018;39:3021–104.
23. Pietropaoli D, Monaco A, D'Aiuto F, Muñoz Aguilera E, Ortu E, Giannoni M, et al. Active gingival inflammation is linked to hypertension. J Hypertens. 2020. https://doi.org/10.1097/HJH.0000000000002514.
24. Del Pinto R, Pietropaoli D, Monaco A, Giannoni M, Wright JT, Ferri C. Poor oral health negates benefits of antihypertensive treatment: a re-analysis of NHANES data based on 2018 ESC/ESH hypertension guidelines. J Hypertens. 2019;37:e11.
25. Pietropaoli D, Del Pinto R, Ferri C, Wright JT Jr, Giannoni M, Ortu E, et al. Poor oral health and blood pressure control among US hypertensive adults. Hypertension. 2018;72:1365–73.
26. Rivas-Tumanyan S, Campos M, Zevallos JC, Joshipura KJ. Periodontal disease, hypertension, and blood pressure among older adults in Puerto Rico. J Periodontol. 2013;84:203–11.
27. Eke PI, Page RC, Wei L, Thornton-Evans G, Genco RJ. Update of the case definitions for population-based surveillance of periodontitis. J Periodontol. 2012;83:1449–54.
28. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. 2018;71:e127–248.
29. Ehret GB, Caulfield MJ. Genes for blood pressure: an opportunity to understand hypertension. Eur Heart J. 2013;34:951–61.
30. Patel RS, Masi S, Taddei S. Understanding the role of genetics in hypertension. Eur Heart J. 2017;38:2309–12.
31. Ehret GB, Ferreira T, Chasman DI, Jackson AU, Schmidt EM, Johnson T, et al. The genetics of blood pressure regulation and its target organs from association studies in 342,415 individuals. Nat Genet. 2016;48:1171–84.
32. Wessel J, Moratorio G, Rao F, Mahata M, Zhang L, Greene W, et al. C-reactive protein, an "intermediate phenotype" for inflammation: human twin studies reveal heritability, association with blood pressure and the metabolic syndrome, and the influence of common polymorphism at catecholaminergic/beta-adrenergic pathway loci. J Hypertens. 2007;25:329–43.
33. Nibali L, Bayliss-Chapman J, Almofareh SA, Zhou Y, Divaris K, Vieira AR. What is the heritability of periodontitis? A systematic review. J Dent Res. 2019;98:632–41.
34. Schaefer AS, Richter GM, Nothnagel M, Manke T, Dommisch H, Jacobs G, et al. A genome-wide association study identifies GLT6D1 as a susceptibility locus for periodontitis. Hum Mol Genet. 2010;19:553–62.
35. Munz M, Richter GM, Loos BG, Jepsen S, Divaris K, Offenbacher S, et al. Meta-analysis of genome-wide association studies of aggressive and chronic periodontitis identifies two novel risk loci. Eur J Hum Genet. 2019;27:102–13.
36. Munz M, Willenborg C, Richter GM, Jockel-Schneider Y, Graetz C, Staufenbiel I, et al. A genome-wide association study identifies nucleotide variants at SIGLEC5 and DEFA1A3 as risk loci for periodontitis. Hum Mol Genet. 2017;26:2577–88.
37. Avril T, Freeman SD, Attrill H, Clarke RG, Crocker PR. Siglec-5 (CD170) can mediate inhibitory signaling in the absence of immunoreceptor tyrosine-based inhibitory motif phosphorylation. J Biol Chem. 2005;280:19843–51.
38. Crocker PR, Paulson JC, Varki A. Siglecs and their roles in the immune system. Nat Rev Immunol. 2007;7:255–66.
39. Evangelou E, Warren HR, Mosen-Ansorena D, Mifsud B, Pazoki R, Gao H, et al. Genetic analysis of over 1 million people

identifies 535 new loci associated with blood pressure traits. Nat Genet. 2018;50:1412–25.
40. Wu C, Yosef N, Thalhamer T, Zhu C, Xiao S, Kishi Y, et al. Induction of pathogenic TH17 cells by inducible salt-sensing kinase SGK1. Nature. 2013;496:513–7.
41. Jobin K, Stumpf NE, Schwab S, Eichler M, Neubert P, Rauh M, et al. A high-salt diet compromises antibacterial neutrophil responses through hormonal perturbation. Sci Transl Med. 2020. https://doi.org/10.1126/scitranslmed.aay3850.
42. Dutzan N, Kajikawa T, Abusleme L, Greenwell-Wild T, Zuazo CE, Ikeuchi T, et al. A dysbiotic microbiome triggers T17 cells to mediate oral mucosal immunopathology in mice and humans. Sci Transl Med. 2018. https://doi.org/10.1126/scitranslmed.aat0797.
43. Rivas-Tumanyan S, Spiegelman D, Curhan GC, Forman JP, Joshipura KJ. Periodontal disease and incidence of hypertension in the health professionals follow-up study. Am J Hypertens. 2012;25:770–6.
44. Gordon JH, LaMonte MJ, Zhao J, Genco RJ, Cimato TR, Hovey KM, et al. Association of periodontal disease and edentulism with hypertension risk in postmenopausal women. Am J Hypertens. 2019;32:193–201.
45. Kawabata Y, Ekuni D, Miyai H, Kataoka K, Yamane M, Mizutani S, et al. Relationship between prehypertension/hypertension and periodontal disease: a prospective cohort study. Am J Hypertens. 2016;29:388–96.
46. Morita T, Yamazaki Y, Mita A, Takada K, Seto M, Nishinoue N, et al. A cohort study on the association between periodontal disease and the development of metabolic syndrome. J Periodontol. 2010;81:512–9.
47. Sharma S, Sridhar S, McIntosh A, Messow C-M, Aguilera EM, Del Pinto R, et al. Periodontal therapy and treatment of hypertension-alternative to the pharmacological approach. A systematic review and meta-analysis. Pharmacol Res. 2021;166:105511.
48. Zhou Q-B, Xia W-H, Ren J, Yu B-B, Tong X-Z, Chen Y-B, et al. Effect of intensive periodontal therapy on blood pressure and endothelial microparticles in patients with prehypertension and periodontitis: a randomized controlled trial. J Periodontol. 2017;88:711–22.
49. Vidal F, Cordovil I, Figueredo CMS, Fischer RG. Non-surgical periodontal treatment reduces cardiovascular risk in refractory hypertensive patients: a pilot study. J Clin Periodontol. 2013;40:681–7.
50. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension. 2003;42:1206–52.
51. O'Brien E, Asmar R, Beilin L, Imai Y, Mancia G, Mengden T, et al. Practice guidelines of the European Society of Hypertension for clinic, ambulatory and self blood pressure measurement. J Hypertens. 2005;23:697–701.
52. Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Böhm M, et al. 2013 ESH/ESC guidelines for the management of arterial hypertension: the Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). Eur Heart J. 2013;34:2159–219.
53. Higashi Y, Goto C, Jitsuiki D, Umemura T, Nishioka K, Hidaka T, et al. Periodontal infection is associated with endothelial dysfunction in healthy subjects and hypertensive patients. Hypertension. 2008;51:446–53.