TREATMENT OF LIMITED REMAINING TOOTH STRUCTURE

EVIDENCE BASED DENTISTRY ROUNDS

SPECIALTY

GROUP B

TEAM 4A-2

DATE 10/28/2020

ROUNDS TEAM

- Group Leader: Dr. Grady
- Specialty Leader: Dr. An
- Project Team Leader: Sam Miller D4
- Project Team Participants: Miranda Saitoski D1; Anum Siddiqui D2; Austin Tweet D3

PATIENT

- AGE: 33
- GENDER: MALE
- ETHNICITY: CAUCASIAN
- SMOKER
- PAST DRUG USER
- CHIEF COMPLAINT: "MY TEETH ARE MESSED UP, I JUST GOT SOBER 6 MONTHS AGO. I HAD NOT SEEN A DENTIST FOR 17 YEARS."

MEDICAL HISTORY

- Diagnoses: Anxiety, Alcoholism, Depression, Hypertension, GERD
- Conditions
  - Liver failure in December 2018 due to alcoholism
- Medications
  - **Acamprosate** (Alcoholism)
  - **Aripiprazole** (Depression)
  - Escitalopram (Depression/anxiety)
  - **Bupropion** (Smoking cessation)
  - Furosemide (Hypertension)
  - **Gabapentin** (Alcohol withdrawal)
  - **Hydroxyzine** (Anxiety)
  - Liothyronine (Depression)
  - **Pantoprazole** (**GERD**)
  - Potassium Chloride (Hypertension)
  - **Prazosin** (Hypertension)
  - Spironolactone (Hypertension)

DENTAL HISTORY

- 17 years since his last visit to a dentist
- Orthodontics as a teenager
- 1x/day brusher
- Never flosses
- Teeth have been breaking off for the last few years
- Drinks energy drinks and soft drinks frequently

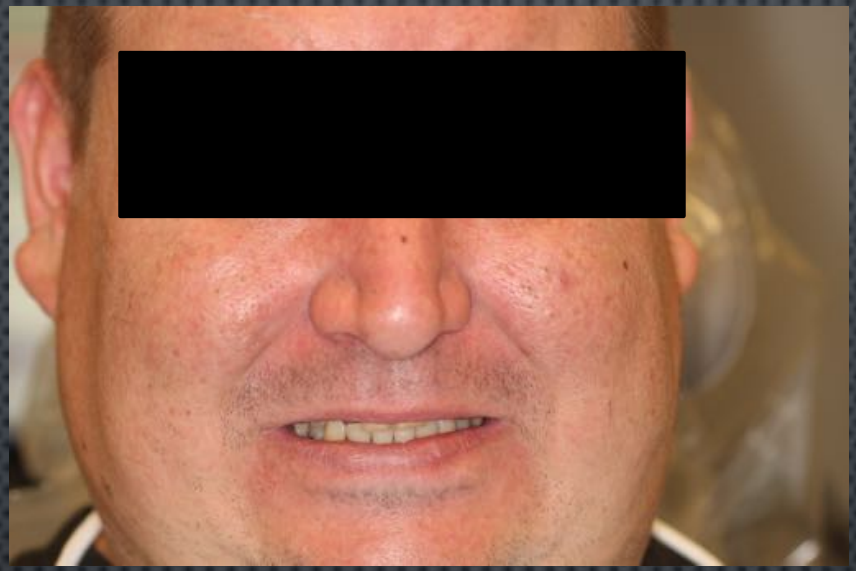
RADIOGRAPHS

#7, #10

RADIOGRAPHIC FINDINGS

- CARIES: #4-MO; #5-DO; #8-ML, DL; #9 ML, DL; #12-MOD, #18-MO, #23-DL, #26-DL; #27 ML, DL
- PARLS: #3, #19, #30, #31
- RADIOGRAPHIC CALCULUS
- RADIOGRAPHIC BONE LEVEL FROM CEJ <2MM

CLINICAL PHOTOS



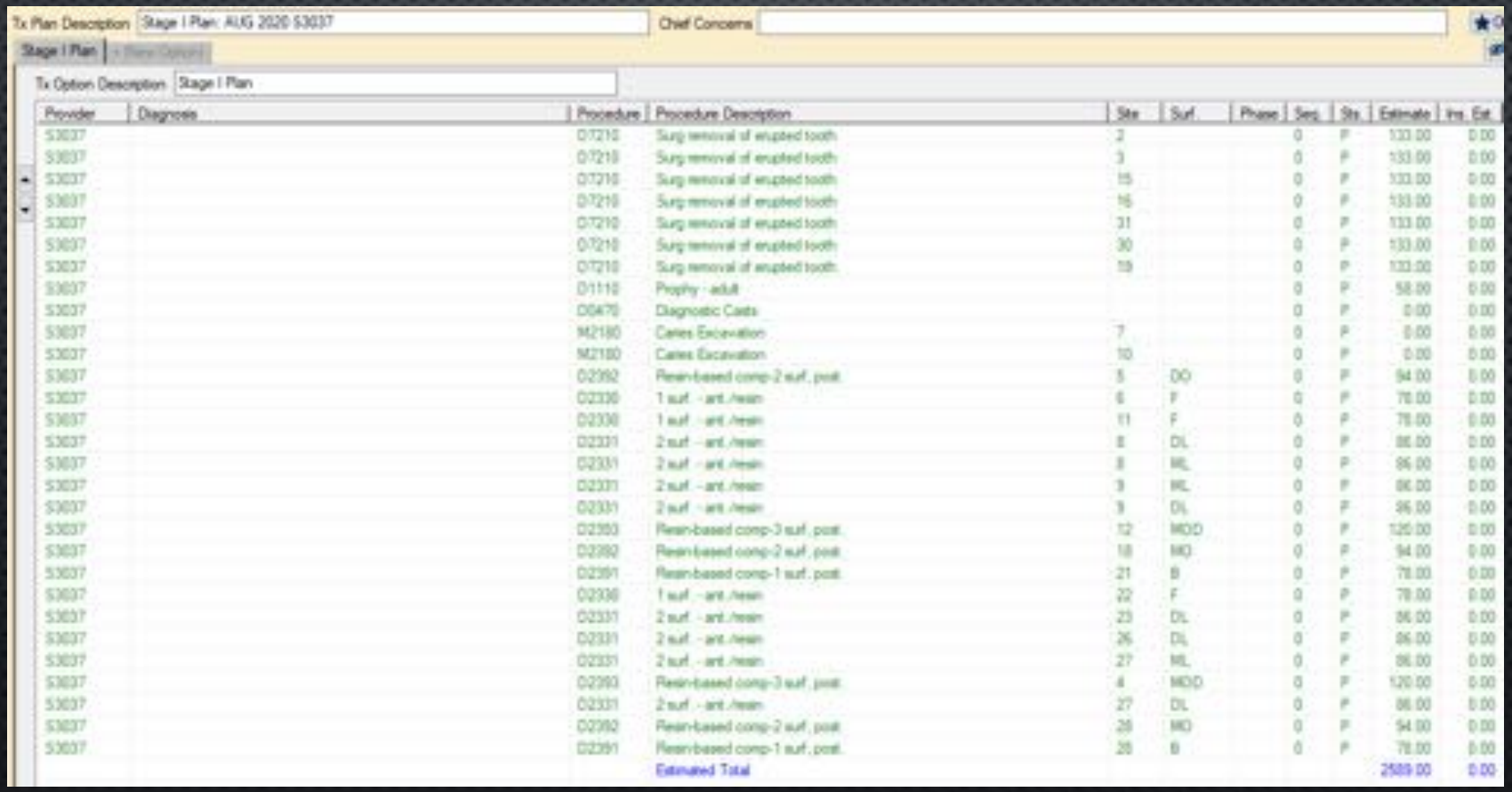
CLINICAL FINDINGS

- -Occlusal and buccal caries
- -Gross Decay: #2, #3, #7, #10, #15, #19 #30, #31
- -Buccal/Facial decay: #6 #11, 21, #22, #27, #28
- -Decreased inter arch space right posterior

PERIO CHART


Chart
In Progress
Tx History
Forms
Attachments/Consents
Perio
Tx Plans
Medications
Labs
Chart Add
MOBILITY
FURCA
PLAQUE
BOP
MGJ
CAL
P.D.
FGM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FGM
P.D.
CAL
MGJ
BOP
PLAQUE
FURCA
PROGNOSIS
PROGNOSIS
FURCA
PLAQUE
BOP
MGJ
CAL
P.D.
FGM
32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17
FGM
P.D.
CAL
MGJ
BOP
PLAQUE
FURCA
MOBILITY

STAGE I PLAN



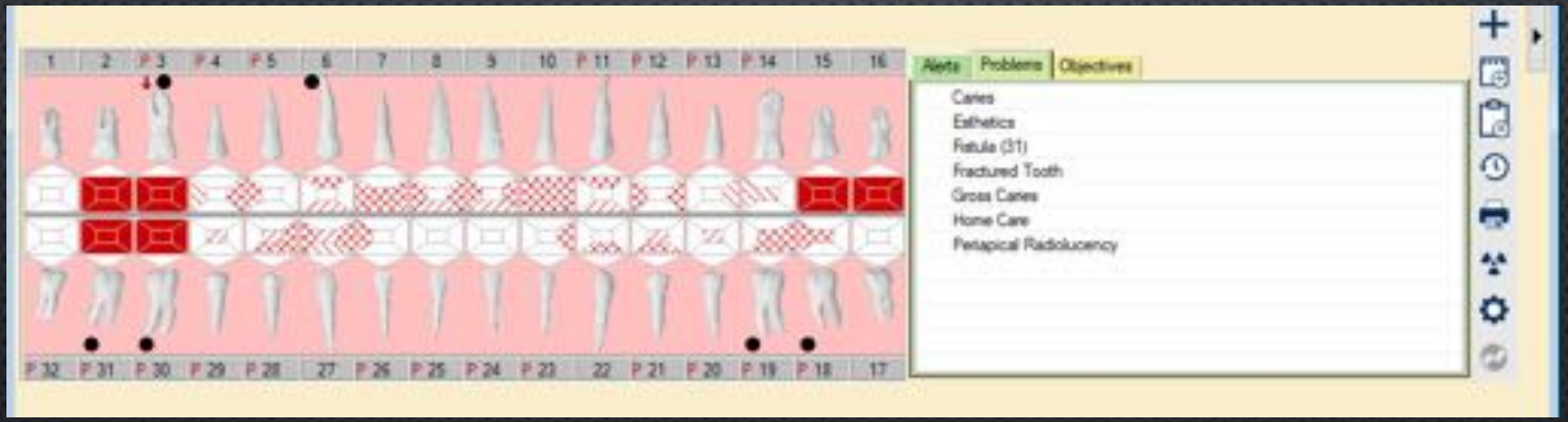
Tx Plan Description: Stage I Plan: AUG 2020 S3037 | Chief Concerns:

Stage I Plan

Tx Option Description: Stage I Plan

Provider	Diagnosis	Procedure	Procedure Description	Ste	Surf	Phase	Seq	Sts	Estimate	Ins. Est.
S3037		D7210	Surg removal of erupted tooth	2			0	P	133.00	0.00
S3037		D7210	Surg removal of erupted tooth	3			0	P	133.00	0.00
S3037		D7210	Surg removal of erupted tooth	15			0	P	133.00	0.00
S3037		D7210	Surg removal of erupted tooth	16			0	P	133.00	0.00
S3037		D7210	Surg removal of erupted tooth	31			0	P	133.00	0.00
S3037		D7210	Surg removal of erupted tooth	30			0	P	133.00	0.00
S3037		D7210	Surg removal of erupted tooth	19			0	P	133.00	0.00
S3037		D1110	Prophy - adult				0	P	58.00	0.00
S3037		D0470	Diagnostic Casts				0	P	0.00	0.00
S3037		M2180	Caries Excavation	7			0	P	0.00	0.00
S3037		M2180	Caries Excavation	10			0	P	0.00	0.00
S3037		D2392	Resin-based comp-2 surf, post	5	DO		0	P	94.00	0.00
S3037		D2330	1 surf. - ant./resin	6	F		0	P	78.00	0.00
S3037		D2330	1 surf. - ant./resin	11	F		0	P	78.00	0.00
S3037		D2331	2 surf. - ant./resin	8	DL		0	P	86.00	0.00
S3037		D2331	2 surf. - ant./resin	8	ML		0	P	86.00	0.00
S3037		D2331	2 surf. - ant./resin	9	ML		0	P	86.00	0.00
S3037		D2331	2 surf. - ant./resin	9	DL		0	P	86.00	0.00
S3037		D2393	Resin-based comp-3 surf, post	12	MOD		0	P	120.00	0.00
S3037		D2392	Resin-based comp-2 surf, post	18	MO		0	P	94.00	0.00
S3037		D2391	Resin-based comp-1 surf, post	21	B		0	P	78.00	0.00
S3037		D2330	1 surf. - ant./resin	22	F		0	P	78.00	0.00
S3037		D2331	2 surf. - ant./resin	23	DL		0	P	86.00	0.00
S3037		D2331	2 surf. - ant./resin	26	DL		0	P	86.00	0.00
S3037		D2331	2 surf. - ant./resin	27	ML		0	P	86.00	0.00
S3037		D2393	Resin-based comp-3 surf, post	4	MOD		0	P	120.00	0.00
S3037		D2331	2 surf. - ant./resin	27	DL		0	P	86.00	0.00
S3037		D2392	Resin-based comp-2 surf, post	28	MO		0	P	94.00	0.00
S3037		D2391	Resin-based comp-1 surf, post	20	B		0	P	78.00	0.00
			Estimated Total						2589.00	0.00

PROBLEM LIST



SPECIFIC FINDINGS #7, #10

- GROSSLY DECAYED
- MAXILLARY LATERALS IN ANTERIOR CROSSBITE
- ASYMPTOMATIC IRREVERSIBLE PULPITIS

DIAGNOSIS

- #7, #10-GROSS DECAY
- PLANNED FOR CARIES EXCAVATION TO DETERMINE RESTORABILITY

Fracture and Crown Displacement

- Can happen due to occlusion forces
- So how can we reduce this possibility?
- **A Ferrule tooth structure**
  - Provided by a tooth's parallel dentinal walls from a crown's cervix to the coronal aspect
  - 1.5mm to 2mm
  - Uniform > Partial > None
- **A Ferrule**
  - 360 degree metal crown surrounding the ferrule tooth structure

What is the ferrule effect?

- How does it prevent against fracture and crown displacement?
  - **Resistance Form**
    - Can withstand masticatory stress
      - Decreases compressive stress
      - Increases tensile stress

Juloski, J., Radovic, I., Goracci, C., Vulicevic, Z. R., & Ferrari, M. (2012). Ferrule effect: a literature review. *Journal of endodontics*, *38*(1), 11–19. https://doi.org/10.1016/j.joen.2011.09.024

WHAT IS GERD?

- **Gastroesophageal Reflux Disease**
  - Affects lower esophageal sphincter
  - 18.1-27.8% America
  - In healthy individuals gastric fluid returned to stomach by peristalsis through swallowing
  - Patients with GERD have delayed acid clearance and gastric acids passed through esophagus into oral cavity
- **Risk factors:**
  - Older Age
  - High BMI
  - Smoking
  - Anxiety/depression
  - Less physical activity
  - Eating habits
    - Acidity
    - Size
    - Timing respect to sleep
- **Most common symptom is heartburn**
  - Burning sensation in chest radiating towards mouth

Effects of GERD on the Dentition

- Causes Dental Erosion because of stomach acid
  - Loss of tooth substance by chemical process not involving bacteria
- Pattern of enamel loss especially on the lingual side of teeth
- Severity of dental erosion based on
  - frequency of reflux, pH and type of acid, quality and quantity of saliva
- Associated with tooth sensitivity
- Has effect on mucosa of esophagus, oropharynx and respiratory system
- Manage through medications and through healthy diet and lifestyle
  - Control risk factors
  - Medication can cause xerostomia

https://www.hindawi.com/journals/ijd/2012/479850/

D3 PICO

- **Clinical Question: What is the best option for restoring teeth with compromised tooth structure?**

PICO FORMAT

- P: Compromised remaining tooth structure
- I: Extraction and implant placement
- C: Root canal therapy, post and core, crown
- O: Higher survival rate

PICO FORMATTED QUESTION

- For patients with compromised remaining tooth structure, will a single tooth implant compared to root canal, post, core and crown lead to a higher survival rate?

CLINICAL BOTTOM LINE

- BOTH SINGLE IMPLANTS AND RCT, POST, CORE AND CROWN OFFER HIGH SURVIVAL RATES AND ARE VALID LONG TERM OPTIONS FOR RESTORING A SINGLE TOOTH AREA. FOR OUR PATIENT, THE BEST CHOICE IS THE SINGLE IMPLANT WITH SUBSEQUENT CROWN DUE HIS POOR HOME CARE AND ORAL HYGIENE.

SEARCH BACKGROUND

- **DATE(S) OF SEARCH: 10/5, 10/21**
- **DATABASE(S) USED: PUBMED, WILEY ONLINE LIBRARY, SCIENCE DIRECT**
- **SEARCH STRATEGY/KEYWORDS:** DENTAL IMPLANTS, ROOT CANAL THERAPY, POST AND CORE TECHNIQUE, CORE BUILD UP, SURVIVAL RATE, DENTAL CROWN

SEARCH BACKGROUND

- **MESH** TERMS USED: DENTAL IMPLANTS, SURVIVAL RATE, ROOT CANAL THERAPY, POST AND CORE TECHNIQUE, DENTAL CROWN

ARTICLE 1 CITATION, INTRODUCTION

- Torbinejad et al (2007) Outcomes of root canal treatment and restoration, implant-supported crowns, fixed partial dentures, and extraction without replacement: a systematic review. Journal of Prosthetic Dentistry, 98(4), 286-311

- Study Design: Systematic review

- Study Need / Purpose: compare survival rates of root canal treatment and restoration, implant-supported crowns, fixed partial dentures, and extraction without replacement

ARTICLE 1 SYNOPSIS

- METHOD: SYSTEMATIC REVIEW USING COCHRANE, MEDLINE, EMBASE DATABASES
  - AFTER EXCLUSION, 46 ISC, 31 FPD, 24 RCT PAPERS WERE USED
- RESULTS: SURVIVAL AND SUCCESS RATES
  - 6+ YEARS SURVIVAL: FPDS (82%), ISCS (97%), RCTS (97%)
  - 6+ YEARS SUCCESS: ISCS (95%) RCTS (84%), FPDS (80%)

ARTICLE 1 SYNOPSIS

- Conclusions:
  - Both ISC's and RCT's exhibited significantly higher survival rates compared to FPD's
  - The survival rate of ISCs and RCTs were similar after 6 years but ISCs were superior in terms of success rate
- Limitations:
  - Success rate is not a clearly defined measure and is subjective
  - Operator experience varied between various treatments
  - Does not directly compare RCTs and ISCs

ARTICLE 1 SELECTION

- Reason for selection
  - Explicitly examines survival rates of ISCs and RCTs
  - Measured intervals were over a long period of time (10 years)
- Implications
  - We can advise patient that both ISCs and RTCs provide similar survival rates and are valid treatment options

ARTICLE 2 CITATION, INTRODUCTION

- Jung et al (2012) Systematic review of the survival rate and incidence of biological, technical and aesthetic complications of single crowns on implants reported in longitudinal studies with a mean follow up of 5 years. Clinical Oral Implants Research

- Study Design: systematic review

- Study Need / Purpose: evaluated survival rate and various complications of single crowns placed on implants

ARTICLE 2 SYNOPSIS

- METHOD: SYSTEMATIC REVIEW
  - YIELDED DATA FROM 3,199 SINGLE CROWNS FROM 46 STUDIES, VARIED RESTORATIVE MATERIAL AND CROWN RETENTION METHOD USED
  - SURVIVAL: REMAINING IN SITU WITH OR WITHOUT MODIFICATION DURING THE 5-YEAR OBSERVATION PERIOD
- RESULTS
  - SURVIVAL RATE FOR IMPLANT: 97.2% AFTER 5 YEARS, 95.2% AFTER 10 YEARS
  - SURVIVAL RATE FOR CROWN: 96.3% AFTER 5 YEARS, 89.4% AFTER 10 YEARS
  - COMPLICATIONS AFTER 5 YEARS: BIOLOGICAL (7.1%), AESTHETIC (7.1%), TECHNICAL (8.8%)

ARTICLE 2 SYNOPSIS

- Conclusions
  - Survival rates were high for the implant fixtures and were lower for the crowns placed on the implants
  - Most prevalent complication was technical (screw loosening) while aesthetic and biological complications are varied
- Limitations
  - Oldest data used accounted for the highest failure rates and improved methods/materials would improve survival rate
  - Biological complications are not standardized
  - Survival rate definition is limited in nature

ARTICLE 2 SELECTION

- Reason for selection
  - Examined both survival of the implant fixture and the single crown placed on the fixture
  - Examined incidence of biological, technical and aesthetic complications of implants
- Applicability to your patient
  - Implants are one of the main options being considered due to his lack of tooth structure
  - We can recommend implants as a serious option for this patient

ARTICLE 3 CITATION, INTRODUCTION

- Sarkis-Onofre et al (2014) Cast metal vs. glass fibre posts: a randomized controlled trial with up to 3 years of follow up. Journal of Dentistry 42 (5), 582-587
- Study design: randomized controlled trial
- Study need/purpose: evaluated survival rate of glass fiber and cast metal posts to restore endodontically treated teeth with no remaining coronal wall

ARTICLE 2 SYNOPSIS

- METHOD: RANDOMIZED CONTROLLED TRIAL
  - EVALUATED 72 TEETH AND FOLLOWED UP AFTER 3 YEARS
  - ALL ENDODONTIC TREATMENT WAS THE SAME AND ALL TEETH WERE RESTORED WITH PFM CROWNS
  - POSTS USED WERE GLASS FIBER OR CAST METAL AND CORONAL TOOTH STRUCTURE WAS QUESTIONABLE
- RESULTS
  - SURVIVAL RATES: GLASS FIBER POSTS (97.1%), CAST METAL (91.9%)

ARTICLE 3 SYNOPSIS

- Conclusion
  - Both glass fiber and cast metal posts boast great and similar survival rates after 3 years when the amount of remaining coronal tooth structure is questionable
- Limitations
  - Very short follow up time of only 3 years and limited number of teeth tested
  - Does not include other types of posts
  - Does not define what questionable remaining tooth structure is

ARTICLE 3 SELECTION

- Reason for selection: compares survival rates of different post materials while standardizing the endodontic treatment and crown used to restore
- Applicability to your patient: since the patients in this study have poor remaining tooth structure, this study helps paint a picture of what post material to use if our patient opts to pursue this treatment

LEVELS OF EVIDENCE

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☒ **1b** – Individual RCT
- ☒ **2a** – Systematic Review of Cohort Studies
- ☐ **2b** – Individual Cohort Study
- ☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research
- ☐ **4a** – Systematic Review of Case Control Studies
- ☐ **4b** – Individual Case Control Study
- ☐ **5** – Case Series, Case Reports
- ☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- ☐ **7** – Animal Research
- ☐ **8** – In Vitro Research

STRENGTH OF RECOMMENDATION TAXONOMY (SORT)

☒	**A** – Consistent, good quality patient oriented evidence
☐	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

CONCLUSIONS: D3

How does the evidence apply to this patient?

- Literature shows that both implant supported crowns and RCT treated and restored teeth exhibit favorable and high survival rates
- Key variable in the decision making process: patient's home care
  - Patient must be able and willing to care for an endo-treated tooth like a natural tooth and patient has not yet demonstrated he can

- Advise D4 to proceed with extraction, implant placement and restoration with a single crown at both #7 and #10 sites

CONCLUSIONS: D4

BASED ON YOUR D3'S BOTTOM LINE RECOMMENDATIONS, HOW WILL YOU ***ADVISE*** YOUR PATIENT?

COUPLE OF FACTORS IN PLAY:

1. LIMITED REMAINING TOOTH STRUCTURE
2. HIGH CARIES RISK
3. PERIODONTAL DISEASE RISK

HOW WILL YOU ***HELP*** YOUR PATIENT?

EDUCATE PATIENT ON HIS HABITS EFFECTING HIS DENTITION

-SMOKING, DIETARY HABITS, ORAL HYGIENE HABITS

INFORM OF THE RISKS AND BENEFITS OF EACH PROCEDURE, AND LET HIM MAKE AN EDUCATED DECISION

DISCUSSION QUESTIONS

1. Does this differ for what tooth it is? Premolar vs. Molar vs. Canine?
2. In cases where restoring with a post and core is chosen instead of with an implant, how is it determined if a cast post and core is indicated over a prefabricated post and core?
3. In what situations would an extraction without replacement be an acceptable treatment for a patient with compromised tooth structure?
4. Would the health of the periodontium, specifically the level of bone, in that area play a role in the treatment option?
5. How does the patients GERD affect your treatment plan options?
6. What is the ideal crown to root ratio for teeth that we look to restore? Is there a point where crown to root ratio determines the tooth to be unrestorable

DISCUSSION QUESTIONS

7. What other options besides root canal therapy or implant could be considered for treatment?
8. How do we determine how much ferrule is enough?
9. How compromised must the tooth in question be to consider one restoration technique over the other?
10. Can you restore a tooth with a post core and crown if ferrule isnrsquot ideal?
11. Can a ferrule cause damage or any complications to the tooth?
12. Is GERD a contraindication to any treatment?
13. What is the ideal post material and design?