Implants in a Periodontally Compromised Patient

1A-5, 10/14/2020

Rounds Team

- Group Leader: Dr. Smithy
- Specialty Leader: Dr. Brunner
- Project Team Leader: Kendal Lane
- Project Team Participants: D1 Kimberly Padron; D2 Aliyah Howell; D3 Brandon Coppersmith

Patient

- 72 y/o
- Male
- White
- CC: “I chew like a rodent”

Medical History

- Heart attack in 1988, atrial fibrillation
- Pt has defibrillator
- Previous 1 pack/day smoker, quit 12 years ago
- Medications: atorvastatin, metoprolol, irbesartan, aspirin, Xarelto, sotalol, metformin, digoxin
- Medical consults sent to cardiologist and PCP regarding clearance and Xarelto
- Pt held Xarelto 2 days prior to surgery

Dental History

- Periodontal disease
- Caries
- Extractions
- Bone grafting
- Scaling and root planning
- RCTs

Radiographs

Radiographs

Radiographic Findings

- Maxillary sinus in close proximity to remaining bone
- #12 RCT underfill
- Generalized bone loss

Clinical Findings

- Furcation involvement #18, 19, 30
- Mobility #4, 7, 8, 9, 10, 11, 18, 19, 23, 24, 25, 26, 30
- #12 fractured at the marginal gingiva
- Wear and erosion #23, 24, 25, 26
- Abfractions #20, 21, 28, 29
- Missing #1, 2, 3, 5, 12, 13, 14, 15, 16, 17, 31, 32
- Well-defined white hyperkeratosis on attached gingiva B #30 and LR edentulous area

Specific Findings

- Missing #3, 5, 13, 14
- #12 fractured at the marginal gingiva and underfilled RCT
- Maxillary sinus in close proximity to remaining bone

Periodontal Charting

			1			2	1		1	1	1						MOBILITY
																	FURCA
		P	P P		P P P	P P P	P P	P P	P P P	P							PLAQUE
																	BOP
			4 4 4		3 3 3	4 4 4	4 4 4	4 4 4	4 4 4	4 4 4							MGJ
		1 1 1	9 7 7		5 4 4	6 4 4	5 2 3	3 2 2	2 2 2	4 2 4							CAL
		1 1 1	4 2 3		3 2 3	4 2 3	3 1 3	3 1 2	2 1 2	4 1 3							P.D.
			5 5 4		2 2 1	2 2 1	2 1 0	0 1 0	0 1 0	0 1 1							FGM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
			4 3 3		2 1 0	2 2 1	0 1 0	0 1 0	0 0 0	1 2 2							FGM
		1 1 1	3 2 3		2 1 4	4 2 3	3 1 2	3 1 2	2 1 2	3 2 3							P.D.
		1 1 1	7 5 6		4 2 4	6 4 4	3 2 2	3 2 2	2 1 2	4 4 5							CAL
																	MGJ
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			P P		P P	P P P	P	P	P P	P							PLAQUE
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																	PROGNOSI
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		P	P P	P P	P P	P P	P P P	P P P	P P P	P P	P P	P P	P P P	P P P			PLAQUE
																	BOP
		4 4 4	3 3 3	3 3 3	3 3 3	2 2 2	2 2 2	2 2 2	2 1 2	2 2 2	5 5 5	6 6 6	6 6 6	6 6 6			MGJ
		5 3 5	5 4 5	4 3 4	3 2 3	3 3 3	3 3 4	4 3 3	2 2 2	3 2 3	4 3 4	4 4 4	5 4 6	6 5 5			CAL
		3 2 3	3 2 3	3 2 3	2 1 2	2 1 2	2 1 3	3 1 2	2 1 2	2 1 2	3 2 3	3 2 3	3 2 4	4 3 3			P.D.
		2 1 2	2 2 2	1 1 1	1 1 1	1 2 1	1 2 1	1 2 1	0 1 0	1 1 1	1 1 1	1 2 1	2 2 2	2 2 2			FGM
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17		
		2 2 2	3 4 3	2 3 2	0 0 0	1 1 1	2 3 2	2 3 1	1 2 1	1 1 1	3 4 3	2 3 2	1 1 3	1 2 2			FGM
		3 2 3	3 1 2	3 1 2	2 1 2	3 1 3	3 1 2	3 1 4	3 1 2	2 1 2	3 1 3	3 2 3	4 2 3	3 2 3			P.D.
		5 4 5	6 5 5	5 4 4	2 1 2	4 2 4	5 4 4	5 4 5	4 3 3	3 2 3	6 5 6	5 5 5	5 3 6	4 4 5			CAL
		4 4 4	2 2 2	3 3 3	5 5 5	6 6 6	4 4 4	5 5 5	3 3 3	4 4 4	2 2 2	3 3 3	3 3 3	3 3 3			MGJ
																	BOP
		P	P P	P P		P P P	P P P	P P P	P P P	P P	P P	P P	P P P	P P P			PLAQUE
		1											2	2			FURCA
		1				1	1	1	1				1	1			MOBILITY

Diagnosis

- ADA Stage IV- Advanced Chronic Periodontitis
- AAP Stage IV, Grade B
- Medium caries risk
- Medium oral cancer risk

Problem List

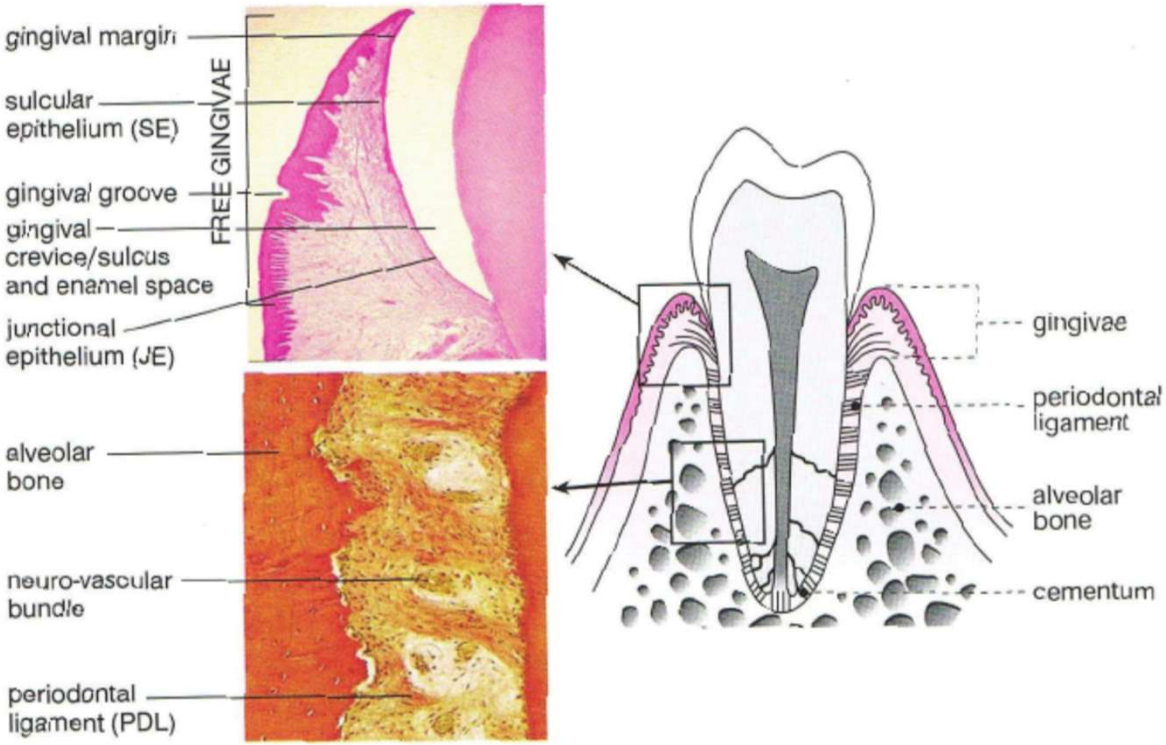
- Fractured tooth
- Missing teeth
- Periapical radiolucency
- Periodontal disease

Clinical Photographs

Clinical Photographs

What is the periodontium?

- *The Periodontium is a functional support system of tissues that surround and attach teeth to bone. It is formed by four main tissues: gingiva, cementum, periodontal ligament, and alveolar bone.*



I., U. Madukwe. "Anatomy of the Periodontium: A Biological Basis for Radiographic Evaluation of Periradicular Pathology." *Journal of Dentistry and Oral Hygiene*, vol. 6, no. 7, 2014, pp. 70–76., doi:10.5897/jdoh2014.0119.

What can cause the loss of the interdental papilla ?

- *When delivering implant surgery, an implant with the best prognosis should be chosen that will work well with the patient's bone as the healing and long-term outcome of the implant and surrounding tissues depend on this. The trauma and change to the bone will play an effect on the dental papilla heights, widths, and health. After an implant is placed, there is no natural PDL. The bone in this area will therefore be at risk for resorption. If there is resorption, thinning of the bone, and or prolonged healing time for the soft tissue around the implant without gingival regrowth, it can lead to dental papilla loss.*

How can we prevent this loss?

- *To combat this, bone or soft tissue grafts are used. Adding in a bone graft will help to stabilize the site and the underlying bone, while the soft tissue grafts aid the gums and tissue in healing.*
- *Ensuring appropriate healing in the bone and dental papilla contribute to the long-term function of dental implants.*

FRIZZERA, Fausto et al. Treatment of peri-implant soft tissue defects: a narrative review. Braz. oral res. [online]. 2019, vol.33, suppl.1 [cited 2020-09-29], e073. Available from: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1806-83242019000200603&lng=en&nrm=iso>. Epub Sep 30, 2019. ISSN 1807-3107. http://dx.doi.org/10.1590/1807-3107bor-2019.vol33.0073.

D3 PICO

- **Clinical Question: Does an implant supported bridge or two single implants on either side of a natural tooth have a higher success rate?**

PICO Format

P: A patient with two edentulous spaces on each side of a natural tooth

I: Two single implants

C: Extract a natural tooth and place a 3 unit implant supported bridge

O: What would have a higher success rate

PICO Formatted Question

- In a patient with two edentulous spaces on each side of a natural tooth, does two single implants, or extracting the natural tooth and placing a 3 unit implant supported bridge have a higher success rate?

Clinical Bottom Line

- Both the bridge or single implants are a viable option. Which option is best for the patient depends on factors such as bruxism and caries risk.

Search Background

- **Date(s) of Search:** 10/1-10/6
- **Database(s) Used:** Pubmed
- **Search Strategy/Keywords:** implants, occlusal overload, implant occlusion, three-unit implant, three-unit bridge stress, three-unit implant posterior maxilla

Search Background

- **MESH terms used:** bite force, dental implantation, dental implants, dental occlusion, dental prosthesis retention, three-unit FPD, stress distribution

Article 1 Citation, Introduction

- Citation: Sannino G, Pozzi A, Schiavetti R, Barlattani A. Stress distribution on a three-unit implant-supported zirconia framework. A 3D finite element analysis and fatigue test. *Oral Implantol (Rome)*. 2012;5(1):11-20.

- Study Design: Authors used an FEA model (3d) reproducing a 3-unit FPD to evaluate stress levels in the components under several loading conditions using a Y-TZP coping. The model simulated an ideal osseointegration. Three loads from different directions (0,15,35) were selected. Axial and oblique loads of 100 N and 300 N were applied to points on the fpd.

- Study Need / Purpose: the purpose is to determine the stress levels of a three unit bridge under various loading conditions to explain how the bridge would hold up under the high occlusal load conditions of the posterior teeth

Article 1 Synopsis

- A 3d model was developed, and 100 N and 300 N loads over areas with angles of 0, 15 and 35 degrees were applied to the bridge, and the stress was investigated.
- Results:
  - Max stresses were found at the connectors of the bridge
  - Both connectors were vulnerable even if just one side of the bridge was loaded
  - Stress was higher with increasing load angle (axial loads are best)
  - No fracture fatigue occurred with a 100 N force, no fatigue with 300 N of force at the pontic, but fracture fatigue occurred with 300 N of force applied to the pillars of the bridge
- Conclusions: The 3d analysis gave accurate information about successful loading conditions for clinical success.
- Limitations: Further tests must be performed to ensure that the results are transferable to clinical situations

Article 1 Selection

- Reason for selection: trying to determine if a bridge would be a good option for the patient
- Applicability to your patient: Applicable, but as the study states, the study was done on a computer
- Implications: the bridge would be a successful option for the patient

Article 2 Citation, Introduction

- Citation: Sheridan RA, Decker AM, Plonka AB, Wang HL. The Role of Occlusion in Implant Therapy: A Comprehensive Updated Review. Implant Dent. 2016 Dec;25(6):829-838. doi: 10.1097/ID.0000000000000488. PMID: 27749518.

- Study Design: Two reviewers completed a literature search using the PubMed database and a manual search of relevant journals. Relevant articles from January 1950 to September 20, 2015 published in the English language were considered.

- Study Need / Purpose: the purpose is to assess the importance of occlusion in implant long-term stability. Since the implants will be replacing the posterior teeth, occlusion will play a large role.

Article 2 Synopsis

- Method: a literature search was completed using Pubmed to create a review that helps understand the role of occlusion in dental implants.
- Results/Conclusions: Recommended occlusal schemes include anterior guidance with evenly distributed contacts. Suggestions to reduce occlusal overload include reducing cantilevers, increasing the number of implants, increasing contact points, monitoring for parafunctional habits, narrowing the occlusal table, decreasing cuspal inclines, and using progressive overload with poor bone quality.
- Limitations: Minimal data is available because of the challenges of studying implant occlusion

Article 2 Selection

- Reason for selection: the single implants will be replacing posterior teeth, therefore will experience heavy occlusal forces, so correct occlusion and occlusal schemes is important for implant and bone health
- Applicability to your patient: an option for the patient is to have two implants placed in the posterior. This study will help with that.
- Implications: if some of these schemes are used with the patient, we can possibly increase the success rate of the implants.

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

- How does the evidence apply to this patient?
  - Both an implant supported bridge and two single implants are acceptable treatment options
- How will you advise the patient?
  - Single implants in the sites of #3 and #5 and a three-unit two implant supported bridge from site #12 to #14
  - Emphasize the importance of oral hygiene and regular periodontal maintenance

Discussion Questions

- Is it prudent to probe pocket depths around an implant?
- What is considered a small or acceptable pocket depth in implants?
- What options are available if the interdental papilla does not occupy the same amount of space as expected once the patient heals?
- Is an immediate implant placement contraindicated for a patient with a PARL?
- What are the indications for immediately loading an implant?
- Does the patient's periodontium need to reach a certain level of health before implant placement can occur?
- Does platform switching help prevent bone loss around implants, and if so, can this concept be applied clinically for the overall success of dental implants?
- What is the significance of interdental papilla loss?
- When considering the placement of implants in areas of tooth loss, how much vertical bone height and horizontal bone width is required standard for successful implant placement?
- What patient factors would play a role in deciding between two implants and a three unit bridge?
- Does the location of the implant or bridge within the mouth mandibular vs maxillary, anterior vs posterior, etc. influence the success rate?
- Is it more important to have retain proprioception in the natural tooth or replace the tooth with an implant that has similar loading properties to the other implants?
- What is the cost difference between a three unit bridge and two implants?
- If an implant would fail is a three unit bridge still an option?
- If there is loss of the interdental papilla following implant placement and the implant isnt as successful as expected, is there anything that can be done to restore the interdental papilla?
- Are there any surgical perio treatment options to help restore loss of papilla?