Potential dental treatment plan for patient with Down Syndrome

Evidence Based Dentistry Rounds
Specialty: Special Needs

Group: 9

Team:9B-2

Date: 10/28/2020

Rounds Team

- Group Leader: Dr. Derderian
- Specialty Leader: Dr. Gequillana/Dr. Domagala
- Project Team Leader: D4 Jose Gonzalez
- Project Team Participants:
- D1 Olivia Gloria
- D2 Tamara Faris
- D3 Sean Townsend

Patient

- 52 years old
- Female
- Caucasian
- CC: "She is due for a cleaning. No concerns. We would call right away if there was anything wrong."
- Patient with Down Syndrome

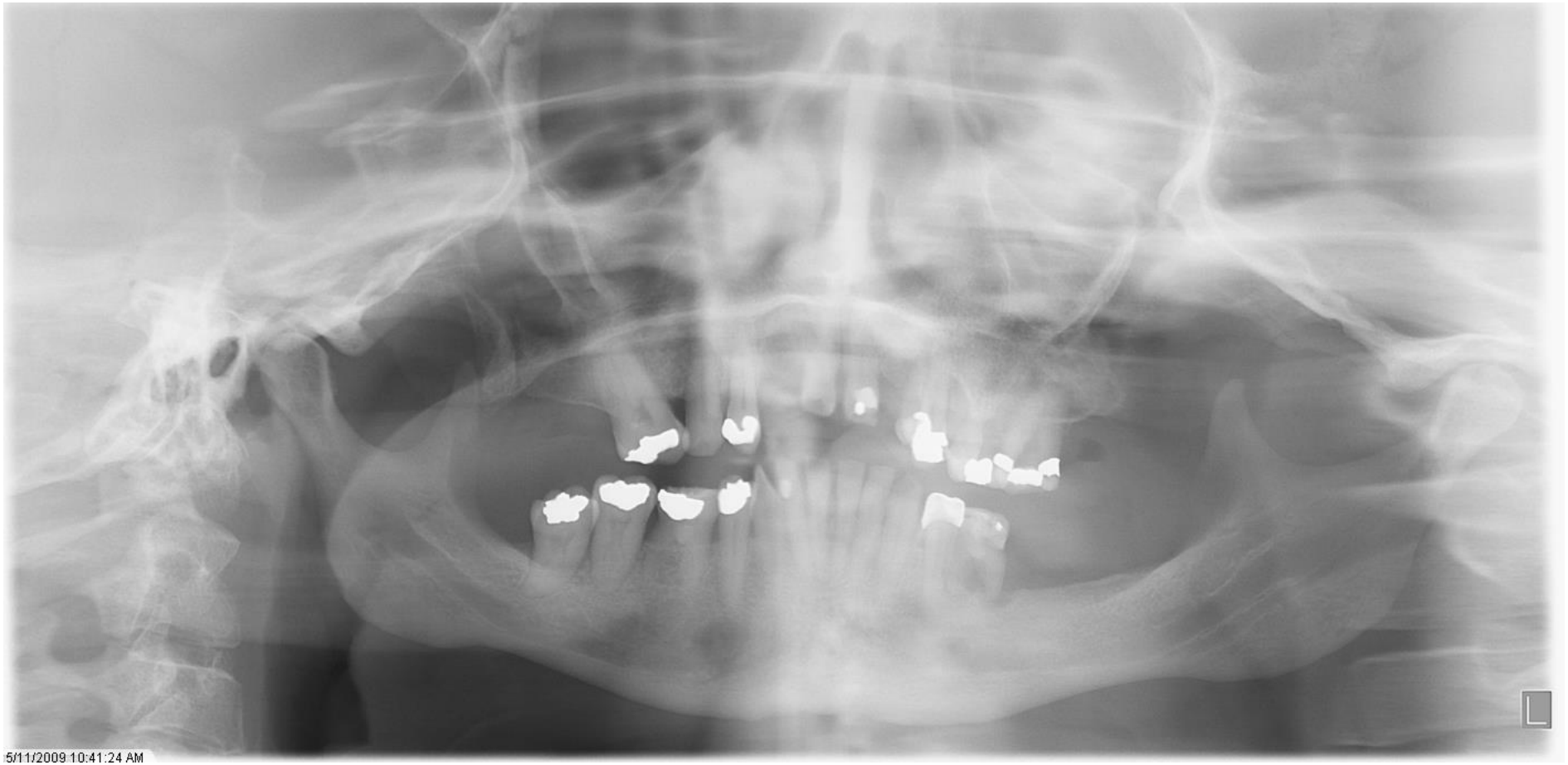
Medical History

- Current & past: No known drug allergies
  - Diagnoses: Down Syndrome, hypothyroidism
  - Conditions: Frequent urination
  - Medications: Simvastatin, Levothyroxine, Vesicare
  - Yes to Are you taking birth control pills, fertility drugs or hormonal replacement?
  - Hormonal replacement

Dental History

- Missing: #1,2,4,7,10,16,17,18,19,21,31,32
- #11 Gross caries
- Deciduous teeth present
- Macroglossia
- Prophys, amalgams, resins, extractions
- #20 D2791 Fullcast predom.base met.crn

Radiographs 5/11/2009



Radiographs 4/30/2010

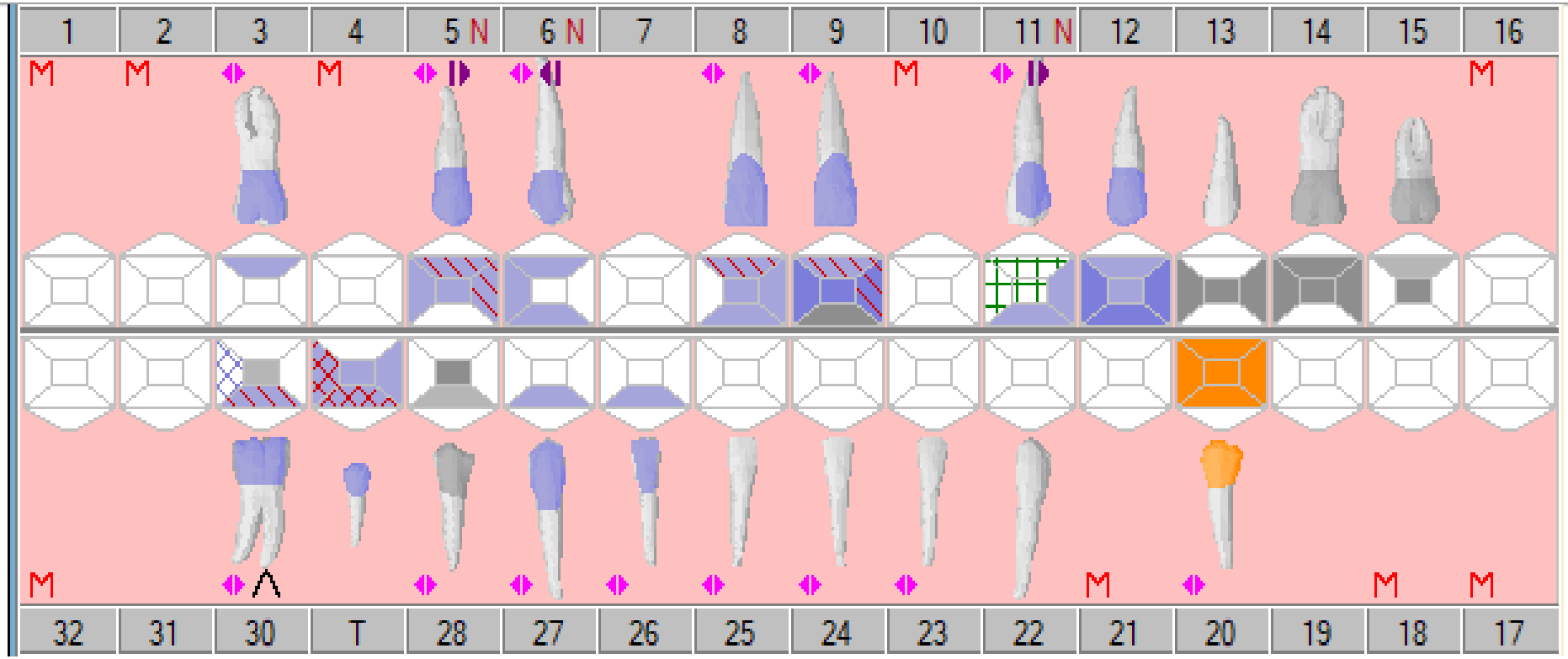
Radiographs 2/25/2020

Radiographs 9/19/2019

Radiographic Findings

- Missing: #1,2,4,7,10,16,17,18,19,21,31,32
- Taurodontia #30

Clinical Findings



Clinical Findings

Clinical Findings

Specific Findings

- #20 as abutment for removable
- Generalized bone loss
- Inferior alveolar nerve canal size
- open interproximal contacts
- Teeth shifting

Periodontal Charting 10/16/2017

																			MOBILITY
																			FURCA
																			PLAQUE
												B	B B	B B B	B B				BOP
		4 4 4		4 4 4	5 5 5		5 5 5	5 5 5			5 5 5	5 5 5	6 6 6	6 6 6	7 7 7				MGJ
		4 4 3		3 2 3	3 2 2		2 2 2	1 1 1			3 2 3	3 1 4	1 2 2	2 2 3	2 3 2				CAL
		2 2 2		2 2 3	3 2 2		3 2 3	3 2 2			3 2 3	3 2 4	2 2 2	2 2 3	3 3 2				P.D.
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		2 2 2		2 2 2	2 2 2		2 1 2	2 2 3			2 2 3	2 1 3	2 2 4	2 1 3	1 2 3				P.D.
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31		30	T	28	27	26	25	24	23	22		21	20		19		18	17	
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		2 1 2	2 1 2	2 1 2	2 2 2	1 1 2	2 1 2	2 1 2	2 1 2	2 2 2			1 1 2						P.D.
		4 3 3	2 3 2	3 3 2	1 2 2	0 1 1	1 1 1	1 1 1	1 0 1	1 2 1			1 -2 1						CAL
		4 4 4	4 4 4	5 5 5	4 4 4	4 4 4	4 4 4	4 4 4	4 4 4	3 3 3			3 3 3						MGJ
							B												BOP
																			PLAQUE
																			FURCA
																			MOBILITY

Summaries

Number of bleeding points	9
Number of furcation points	0
Number of teeth with mobility	0
O'Leary PI	150
Pocket depths >= 4mm	0

Diagnosis

- Stage III periodontitis Grade C
- due to her clinical attachment loss, rate of progression and history of missing teeth

Problem List

- Active caries, recurrent caries, cervical caries, fractured teeth, missing teeth, open interproximal contacts, subgingival calculus, supragingival calculus

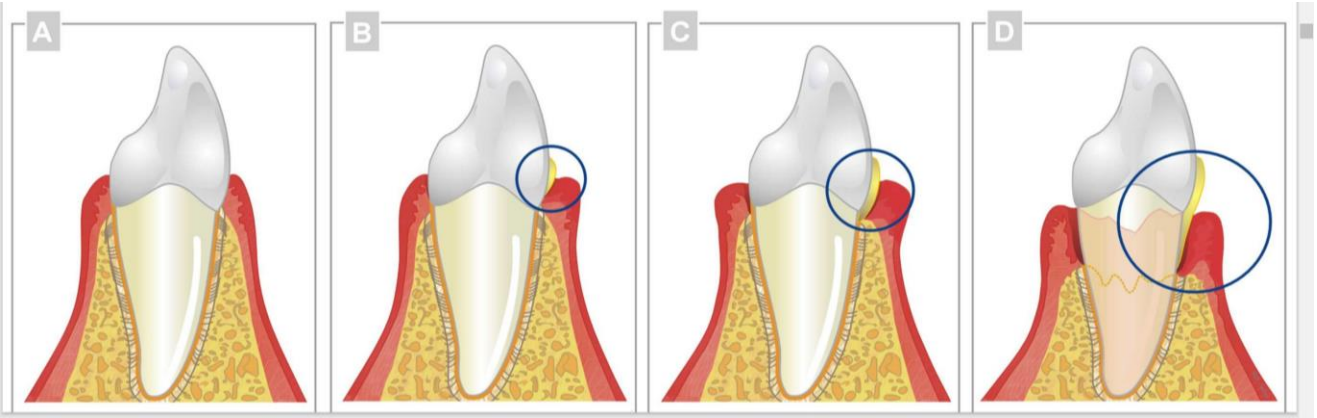
D1 Basic Science

How does Periodontal disease progress in patients with Down syndrome, leading to bone loss?

- ***Periodontal disease?***

  Infection, swelling around teeth.

  Affects gums, alveolar bone, or both.



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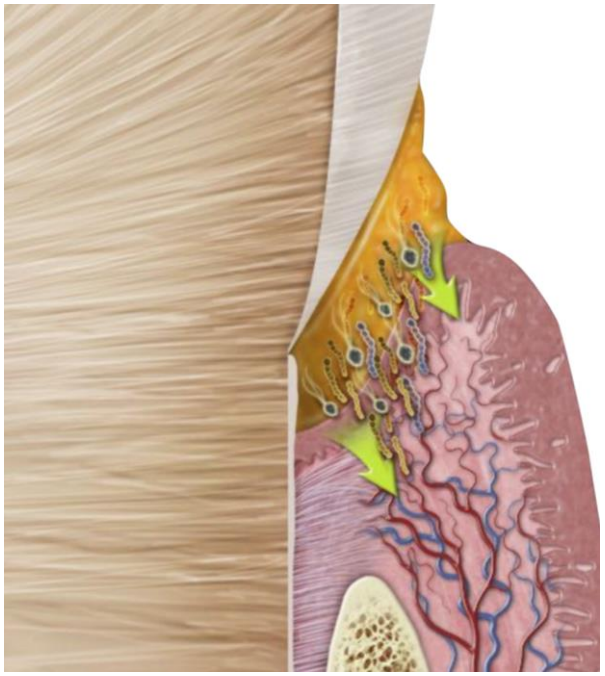
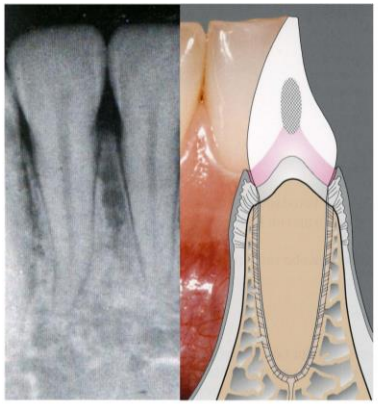
D1 Basic Science

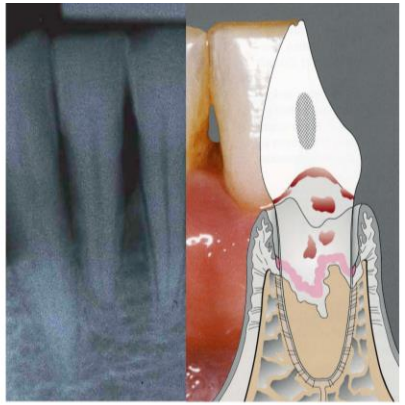
- ***Patients with Down syndrome?***

- *Commonly have other medical problems → reduced immunity*



- *Intellectual impairment*
- *May have less cooperation with self care (toothbrushing/flossing)*

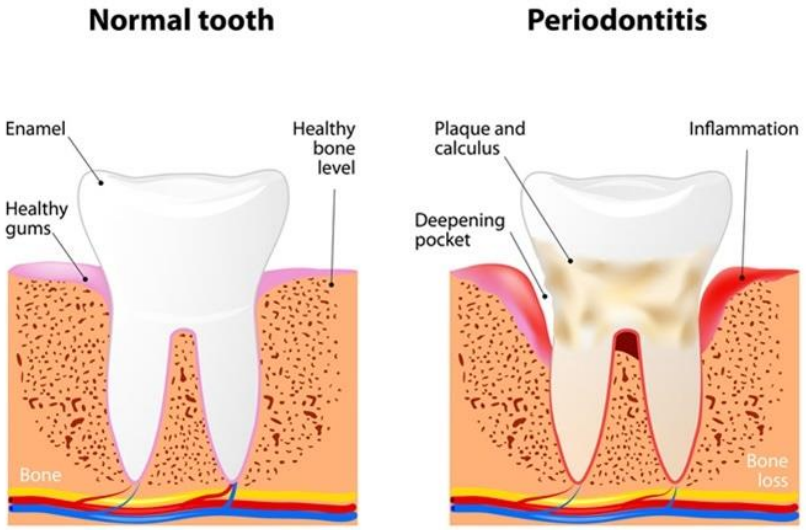




Controlling periodontal disease in DS patients

Prevention

- Early and regular visits to the dentist
- Educating the patient and caregiver
- OHI
- Periodontal evaluation
- Fissure sealants
- Topical fluoride application



Controlling periodontal disease in DS patients

Non-surgical Treatment

- SRP
- Topical antimicrobial agents/chlorhexidine
- Low-level laser therapy as an SRP adjuvant?

D3 PICO

- **Clinical Question:**
- **Will a removable/fixed treatment plan or maintaining the existing dentition offer the patient a better outcome?**

PICO Format

P: Patients with Down Syndrome

I: Maintaining Existing Dentition

C: Implant Retained Dental Prosthesis

O: Improve Functionality and Quality of Life

PICO Formatted Question

- **In patients with Down Syndrome, is it better to maintain existing dentition versus implant retained dental prosthesis to improve functionality and achieve a better quality of life.**

Clinical Bottom Line

- **In patients with Down syndrome, a large percentage of individuals who become edentulous in older age. Many individuals lose their teeth due to aggressive periodontitis, making it difficult to wear dentures. This research is being done to determine whether implant therapy are a viable option for dental treatment.**

Search Background

- **Date(s) of Search:**
  - **October 10th, 2020**
  - **October 19th, 2020**
  - **October 20th, 2020**
- **Database(s) Used:**
  - **Pubmed, Google Scholar, Cochrane Library**
- **Search Strategy/Keywords:**
  - Intellectual disabilities, dental, implant, Down Snydrome

Search Background

- MESH terms used:
  - Treatment
  - Edentualism
  - Dental Care
  - Success rates
  - Outcomes

Article 1 Citation, Introduction

- Citation:
- Posse, Jacobo Limeres, et al. "Survival of Dental Implants in Patients with Down Syndrome: A Case Series." *The Journal of Prosthetic Dentistry*, vol. 116, no. 6, Dec. 2016, pp. 880–884., doi:10.1016/j.prosdent.2016.04.015.
- Study Design:
  - Multicenter, Retrospective, Observational study
- Study Need / Purpose:
  - The need for tooth replacement in individuals with Down syndrome (DS) is explained by the high prevalence of dental agenesis and by the premature loss of teeth through severe periodontal disease. Dental implants may be the dental procedure of choice in some of these patients.

Article 1 Synopsis

- Method
  - Questionnaire was sent to the centers within the Spanish Society of Special Needs Dentistry
    - Demographic details, Oral health status, Information on surgical and prosthetic phases, Follow-up visits
  - Patients with Down syndrome selected needed to be over 18 years of age, at least 1 dental implant and a prosthesis for up to 1 year
  - Statistical software determined variable to explain implant failure
- Results
  - 25 patients (13 M and 12F) and Mean age of 34
  - 73 total implants placed(30 M and 43 F implants) by 5 different surgeons
    - Mandible 43 and maxilla 30, 11 implants required bone regeneration
  - Mean implant loading was 4.1 months
  - 17 implants failed (14 post surgical) in 8 patients

Article 1 Synopsis

- Conclusions
  - Decreased dental implant success rate for Down Syndrome patients
    - Down syndrome (P=0.074) and General population (P=<0.01)
  - Most implants failed in osseointegration phase
    - DS elevated risk of osteoporosis, elevated immune dysfunction, reduced antibody responds, T-Cell proliferation, chemotaxis interference
- Limitations
  - Limited Sample size
  - Not randomized control group
  - Reason of failure not fully understood

Article 1 Selection

- Reason for selection
  - Article was a case series on implant success rates for individuals with Down syndrome
- Applicability to your patient
  - This article researches the possible outcome of dental implants for replacement of missing teeth
- Implications
  - Practicing dentists should be cautious in replacing missing teeth with dental implants in Down syndrome patients

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

Double click table to activate check-boxes

Article 2 Citation, Introduction

- Citation:
- Najeeb, Shariq, et al. "Outcomes of Dental Implant Therapy in Patients With Down Syndrome: A Systematic Review." *Journal of Evidence Based Dental Practice*, vol. 17, no. 4, 14 Dec. 2017, pp. 317–323., doi:10.1016/j.jebdp.2017.05.003
- Study Design:
  - Systematic Review
- Study Need / Purpose:
  - The objective of this systematic review is to critically analyze and summarize studies to ascertain the outcomes and survival of dental implants placed in jaws of DS patients.

Article 2 Synopsis

- Method
  - Detailed electronic search on PubMed, ISI Web of Science, Google Scholar, Embase and Central
    - Key words "dental implant" "Down syndrome" "prosthodontics"
  - Criteria for article selection
  - Data extracted
    - Type of study, patient's age range, number of implants, implant dimensions, type of loading, number of failed implants and follow up
- Results
  - 8 out of 156 studies were selected
    - 81 dental implants in 36 DS patients
  - Type of implant loading ranged from immediate to 1 year after placement
  - 21 of 81 implants failed

Article 2 Synopsis

- Conclusions
  - Patients with DS have a higher risk of implant failure
    - Reason of failure not well understood
- Limitations
  - No large-scale randomized controlled trails
    - care reports and case series show evidence of diminished success

Article 2 Selection

- Reason for selection
  - This article reviewed a large selection of article to analyze the success of implants in DS patients
- Applicability to your patient
  - This article confirms that implants are not the first treatment of choice for improving quality of life and function in DS patients
- Implications
  - Practicing dentists should aware of negative outcomes associated with implant placement in Down syndrome patients

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Article 3 Citation, Introduction

- Citation:
- Baus-Domínguez, Maria, et al. "Metallothioneins in Failure of Dental Implants and Periodontitis Down Syndrome Patients." *Genes*, vol. 10, no. 9, 14 Sept. 2019, p. 711., doi:10.3390/genes10090711.

- Study Design:
  - Retrospective study of cases and controls

- Study Need / Purpose:
  - Removable appliances are contra-indicated
  - Determine whether the expression of metallothioneins (MTs) and their metabolic pathway may be identified and related to the periodontitis and lack of osseointegration of dental implants in Down syndrome patients.

Article 3 Synopsis

- Method
  - Use of retrospective study comparing:
    - 4 patients with DS, periodontal disease and 2 year implant failure
    - 7 patients with DS, with**out** periodontal disease and 2 year success implant
  - Extraction of peripheral blood during examination for analyze the RNA processing of the metabolic pathway of Metallothioneins
    - RNA collection by Qiagen's PAXgene blood miRNA Kit
    - Thermo Specific kits were used to select/measure RNA, determine gene expression in each group and perform final analysis

Article 3 Synopsis

- Results
  - MT 1 and 2 levels in patients **with** periodontal disease and **implant failure** were **lower** compared to the other group
    - MT 3 and 4 were not changed in either group
  - MT1 and MT2 are serve an important action during the first stages of bone-formatting cell differentiation
    - Strengthens hypothesis that their down regulation will lead to possible failure of implants and lack of osseointegration

Table 2. Results table, with significant values, using Transcriptome Analysis Console Software 4.0 (ThermoFisher Scientific, Waltham, MA, USA) and 4.0.1.

ID	+PD+FI (Average, log 2)	-PD-FI (Average, log 2)	Fold Change	*p* Value	Fdr *p* Value	Genetic Symbol	Description
TC1600007959	8.05	9.49	−2.71	0.0014	0.9997	MT1E	Metallothionein 1E
TC1600007966	6.8	8.06	−2.39	0.0018	0.9997	MT1H	Metallothionein 1H
TC1600011399	10.73	12.36	−3.09	0.0021	0.9997	MT1X	Metallothionein 1X
TC1600007962	12.17	13.67	−2.82	0.0023	0.9997	MT1A	Metallothionein 1A
TC1600007964	11.7	13.38	−2.95	0.0024	0.9997	MT1B; MT1C	Metallothionein 1B; Metallothionein 1C, pseudogene
TC1600007958	11.58	12.93	−2.55	0.0048	0.9997	MT1L	Metallothionein 1L (gene/pseudogene)
TC1600007957	13.82	15.05	−2.35	0.0072	0.9997	MT2A	Metallothionein 2A
TC1600007960	9.03	10.39	−2.37	0.0092	0.9997	MT1M	Metallothionein 1M
TC1600010421	10.62	11.79	−2.24	0.0118	0.9997	MT1G	Metallothionein 1G

Filter values of *p*-value have been correctly established as 0.05/Filter values of Fold Change have been established between 2 and −2./The SW TAC will use the correct version of R for the analysis/Fdr = False discovery rate.

Article 3 Synopsis

- Conclusion
  - MT1 and MT2 gene expression are decreased in patients with periodontal disease and implant rejection DS patients
- Limitations
  - Another group needed to complete correlation between MT1 and MT2 with implant failure and no periodontal disease
  - Larger group study is required

Article 3 Selection

- Reason for selection
  - This article shows a study researching a possible reason why implants have a higher rate of failure in DS patients through genetic expression
- Applicability to your patient
  - This study helps us understand that since our patient has periodontal disease, there is a good possibility an implant placed will be rejected
- Implications
  - If implants are being considered, a clinician should have blood work done prior to implant placement to access the levels of MT1 and MT2

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Conclusions: D3

How does the evidence apply to this patient?

- Very small amount of research done on Down syndrome patients and is lacking in strength
- Evidence found applies to this patient because our patient has down syndrome, periodontal disease, history of missing teeth, and is older in age
- We can use these articles to make a professional judgement to state, implants should be contraindicated in this patient

Conclusions: D3

- Based on the above considerations, how will you advise your D4?
  - I would advise Jose to maintain the patients dentition as long as possible
  - Dental implants is a very invasive procedure that will not be well tolerated by our patient
  - Given our patients health and oral history, dental implants would not be a viable option for our patient at this time

Conclusions: D4

Based on your D3's bottom line recommendations, how will you ***advise*** your patient?
Is it most achievable to maintain your existing dentition.

How will you ***help*** your patient?
Having 3month recall schedules will help you achieve oral health.

Discussion Questions

- Do you think It would ideal to Explain the information that would help slow the progression of the periodontal disease to the caregiver rather than the individual with down syndrome? or both?
- When do you decide to intervene in a patient with special needs and poor procedural compliance as opposed to continually maintaining and monitoring?
- Due to the common challenges of selffeeding, dysphagia, speaking, etc. in individuals with Down Syndrome, would removable prostheses cause more of a disservice than natural dentition?
- Which treatment option provides the least concern for cleanliness and oral hygiene long term?
- If this patient has low dental procedure tolerance, is it realistic to expect this patient to be able to tolerate implant placement or the lengthy appointments associated with denture fabrication? If this is the case, what measures canshould we take to increase patient tolerance ie. possibly pharmacologically?
- If implants are ultimately the chosen treatment, what recommendations can we make to increase oral hygiene for the patient or caregiver to prevent periodontal involvement and periimplantitis?

Discussion Questions

- How would the maintenance and recall appointment schedule differ between keeping the existing dentition versus a prosthesis?
- In patients with DS and natural dentition, are there any specific tools or devices that can be recommended to help improve oral hygiene?
- What emergency treatments or medications should be given if the patient is unable to tolerate the procedure?
- Are there concerns for patients with Down syndrome using removable prosthetics such as improper use, misplacement, or even a choking hazard?
- If dentures were chosen as a treatment, to what extent would macroglossia affect the retention?
- Is there an increased rate of bruxism in patients with down syndrome, if so, does this affect implant options?
- What are the different prognostic factors that apply to placing implants in a patient with Down syndrome?
- How does OHI play a factor in deciding if it is better to maintain an existing dentition versus implant retained dental prosthesis in patients with Down Syndrome?
- If intellectual and immune impairment is expected upon treatment of a patient with down syndrome what precautionary steps can be taken to enhance the dental care provided to them?

THANK YOU