

CLINICAL CASE REPORT

# Periodontal Disease and Diabetes Mellitus: Case Report

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## Introduction

The mechanisms linking oral and systemic health are of utmost importance in patients with chronic inflammatory disease. In this particular case, the patient presented with chronic poorly diabetes mellitus, which is known to have a negative impact on periodontal health. Periodontal pathogens have been found to illicit biomolecular responses that result in poor glycemc control. Aside from diabetes the patient was also being treated for cardiovascular disease; hypertension and also for hyperlipidemia. Patients with diabetes have a greater chance of cardiovascular complications than those without diabetes(1). Periodontitis and cardiovascular disease are linked through several biomolecular pathways, including the inflammatory response to bacteremia. The patient also presented a 10 pack-year history of smoking.

## Patient History

The present case report is about a 65-year-old female patient who was admitted to the Dalhousie University Dental Clinic for an initial screening and treatment planning. The patient had a chief complaint of, "My teeth are getting loose and my private dentist's fees are too expensive, so I cannot afford my needed dental treatments". Detailed history of her medical

and dental conditions along with her social habits was taken.

## Medical History

The patient's medical history included type II diabetes mellitus (DM), hypertension, hyperlipidemia, and gout. The patient was diagnosed with DM 12 years prior, and her average blood glucose was relatively well controlled (5-7mmol/L). The prescribed medications for treatment of DM were Metformin, 500mg 1x/day, and Gliclazide, 30mg 2x/day. Dental implications to consider are taste disorder and morning scheduling of appointments to decrease risk of stress induced hypoglycemia. The patient was diagnosed with hypertension and hyperlipidemia one year prior to initial dental visit at the school. The patient's blood pressure was well controlled (120/80 mmHg) with Sandoz-Condesartan 12.5mg, 1x/day. The patient's hyperlipidemia was well controlled with Rosuvastatin, 40mg 1x/day.

The patient also reported a history of Gout. The last episode was in February 2013 and she had two episodes within the prior year. The patient believed that specific foods and drinks brought on the episodes.

## Dental history

The patient stated that in the last 4 years her teeth had become progressively looser. She also reported sensitivity to hot and cold of the remaining maxillary teeth.

Prior to being treated at the dental school, the patient reported no flossing and brushing once per day with a manual toothbrush. The last time she had seen a dentist was 6 years prior.

## Social habits

The patient does not currently smoke but reported that she quit smoking over 20 years ago. She confessed to smoking about a half pack of cigarettes a day for 20 years. The patient does not consume alcohol.

## Clinical and radiographic findings

Extraoral findings were within normal limits. Intraoral clinical and radiographic findings indicated questionable prognosis for all of her teeth. A panoramic radiograph and full mouth series of intraoral radiographs (including vertical bitewings and periapical) were taken at the screening

appointment (September 2013) (see Appendix A).Gingival margins were red and edematous and generalized heavy calculus and plaque accumulation (PI=100%) were noted. The following teeth were missing: 3-8, 3-6, 4-5 and 4-6. Full mouth probing depths, recession, clinical attachment level, mobility, and furcation involvement were recorded. The deepest pockets were present at 4-3, 4-4, and 4-7. More than half of her teeth showed generalized advanced bone loss with CAL ranging from 8mm to 12mm plus mobility of grade 2 or 3.The 4 lower incisors were splinted with a composite periodontal splint. The maxillary teeth were especially sensitive to cold, air, and water. (See Appendix B for periodontal charting). There was sinus pneumatization due to loss of the posterior maxillary teeth (2-6) as well.

### Diagnosis

Upon completion of the initial comprehensive examination a diagnosis of generalized advanced chronic periodontitis was made for her based on Armitage classification (2). Modifying factors included diabetes mellitus and a history of smoking.

### Prognosis

Initial comprehensive examination determined the prognosis of all maxillary teeth, 4-1, 3-1, 4-3 and 4-7 to be hopeless, according to McGuire's classification system(3), and teeth4-2 and 3-2 had questionable prognosis as well.

Two major factors contributing to the patient's periodontal status could be due to her poor oral hygiene and systemic medical condition besides being a former smoker. The patient mentioned that her diabetes was recently controlled, however, her fasting blood glucose level was still greater than the normal range (7.5mmol/L) on the morning of most of her appointments.

### Treatment Plan

Initial periodontal therapy; included full arch scaling and root planing (SRP) with hand instruments and ultrasonics under local anesthetic in 2 separate appointments, following by a reevaluation after 6 weeks. At the time of the reevaluation (Appendix B), periodontal and prosthodontics consultations were done. Because of the hopeless prognosis of the maxillary teeth, clearance was planned for the maxillary arch followed by fabrication of a complete upper denture. In the mandibular arch, teeth with hopeless prognoses were extracted. The prognoses of teeth 48, 44, 33, 34, 35 and 37 had improved from questionable to poor, so it was decided to maintain these teeth (Fall 2013). Since the patient's oral hygiene was still not acceptable (PI>25%) a second round of scaling and root planning was completed

under local anesthesia with the hope of patient's self-performed oral hygiene (including brushing and flossing) would improve. After each appointment oral hygiene instructions were reviewed, following by emphasizing the important association between her periodontal status and her medical systemic condition (4). Oral hygiene instruments that were suggested to the patient were manual or electric tooth brushing, and the use of floss, super floss, Sulcabrush, and interproximal brush. Oral hygiene effectiveness was recorded at each appointment. Unfortunately, the BOP and plaque index measurements at all re-evaluations and recall examinations were not ideal. After eight weeks a the second reevaluation was done (Winter 2014) (Appendix B) at which time better oral hygiene status was noted with decreasing probing pocket depths so we were able to proceed with the prosthodontic treatment including fabrication of the lower removable partial denture that was planned for her at the initial reevaluation. The splint was also removed from the lower incisors at the end of the second round of SRP, so they could be extracted.

Oral hygiene was again stressed with the patient as she was planned for a L-RPD; which itself may cause plaque accumulation.

The patient's diagnosis after the extraction of all hopeless teeth was generalized moderate chronic periodontitis. Due to inadequate width of keratinized gingiva on the facial aspect of teeth 33, 34, 35 and44 (<2mm)(5), after the periodontal consultation by one of the periodontics instructors two free gingival grafts (FGG) were planned for her prior to the L-RPD treatment. In the meantime, we proceed with the CUD. Upon completion of the treatment in the graduate periodontics clinic by a periodontics resident (SD) (Appendix C for clinical photographs), the L-RPD treatment started.

During the fabrication of the CUD, due to the curve of Spee of the lower teeth and the mobility associated with the 3-2 and 4-2, it was determined that these two teeth should also be extracted prior to RPD fabrication. Extractions were completed on April 16, 2014.

In Fall 2014 the patient was seen for a recall examination including complete periodontal charting. BOP and plaque index had again improved since the last appointment. It was decided that the patient should continue to be seen on 3-monthperiodontal recalls and fabrication of the L-RPD could now begin. Three-month recall was suggested because of the patient's periodontal status (moderate chronic periodontitis) and the presence of modifying factors (diabetes). Recall intervals that are 3months apart will allow for removal of subgingival plaque containing periodontal pathogens, close monitoring of periodontal condition to prevent further attachment loss, and to reinforce optimal oral hygiene(6). Also, since the patient will be wearing a partial denture in

the near future it is especially important to ensure that the patient is keeping up with oral hygiene, as partial dentures are known to act as a plaque trap.

## Discussion

### *Modifying factors*

#### **Diabetes mellitus**

Poorly controlled diabetes is linked to a variety of oral health complications. Patients with poorly controlled diabetes have an increased risk of oral infections, decreased salivary flow and impaired wound healing (7). They also respond differently to bacterial plaque due to increased levels of cytokines in the gingival tissues. Also increased glucose concentration in the crevicular fluid may change the bacterial composition of the oral microbiota(8).

Periodontal disease can also have systemic effects. Systemic response to periodontal disease results in an increase in inflammatory mediators such as tumor necrosis factor-alpha and interleukins (6). These inflammatory mediators may result in increased insulin resistance and therefore make it more difficult for the patient to maintain glycemic control (1, 7, 9). Some studies have indicated that periodontal therapy may decrease HbA1c levels by approximately 0.4% (7, 10).

#### **Cardiovascular Disease: Hyperlipidemia & Hypertension**

Periodontitis and cardiovascular disease are linked through their inflammatory effects. Both diseases lead to chronic states of inflammation and have effects on the vasculature if appropriate treatment is not initiated. Stimulation of inflammatory mechanisms by periodontal pathogens has been shown to have negative effects on atherosclerotic pathogenesis (1, 9).

#### **Former smoker**

The impacts of smoking on oral health are numerous. Smoking results in an increased risk for periodontitis due to impaired microcirculation, inhibition of neutrophil function, and increased calculus formation. Patients who smoke present with greater bone loss than those that don't and have decreased response to periodontal therapy (11). The cessation of smoking can decrease the progression of periodontitis, however attachment loss will not be regained (11).

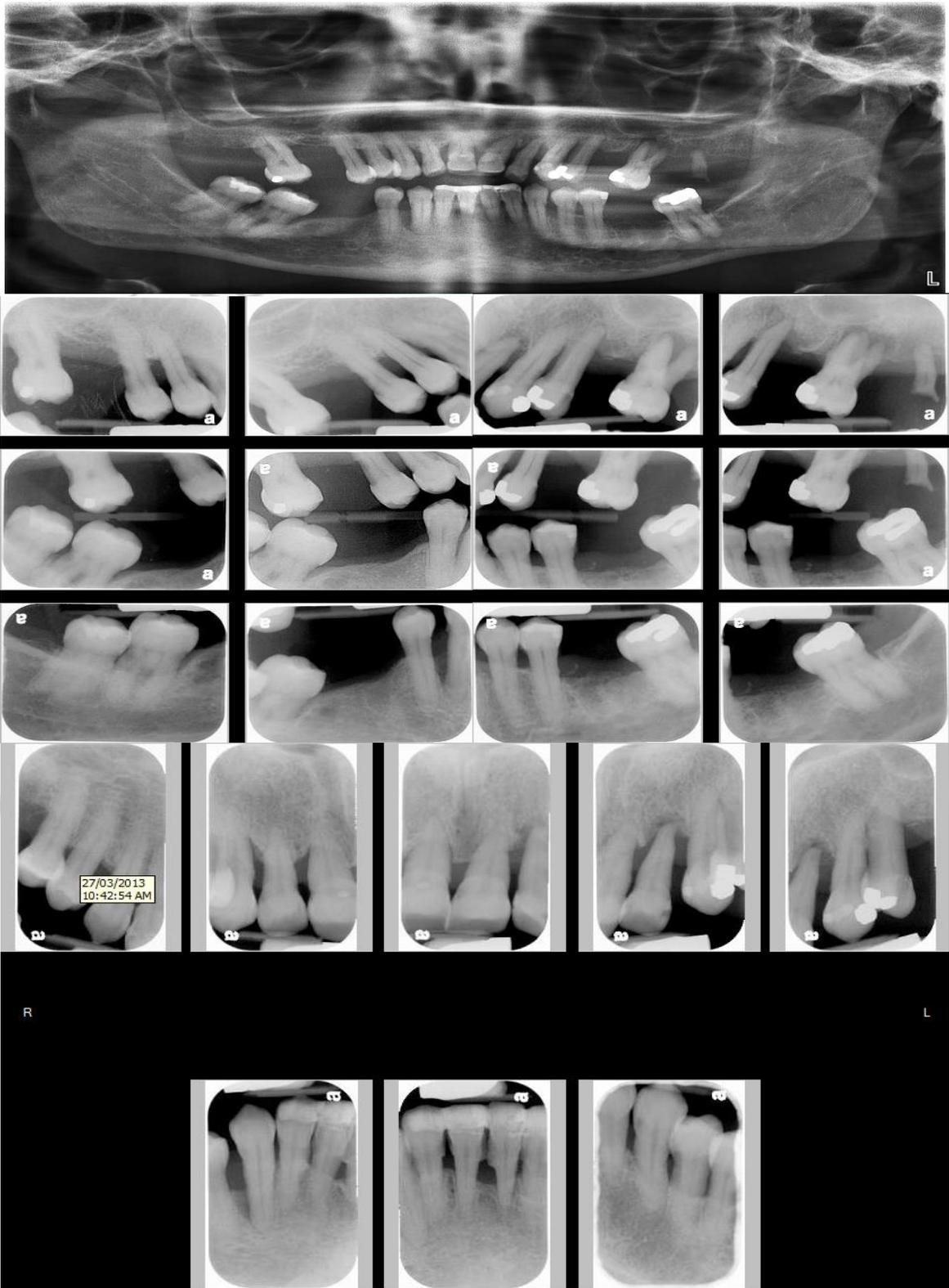
In order to see the most optimal results following initial therapy coronal and root surfaces need to be completely debrided and free of calculus and plaque deposits (12). When initial probing depths are greater than 6mm, then surgical debridement is favoured and greater clinical attachment gain can be achieved along with a greater reduction in probing depths (12). When pockets are greater than 6mm, instrumentation of deeper root surfaces may not be achievable and, therefore, flap surgery provides better access (12). Unfortunately, in this patient's case due to poor oral hygiene and constant high PI (>25%) we did not proceed with surgical debridement due to the need for a low plaque score for optimal healing to occur (12).

#### **Limitations of patient treatment in the undergraduate clinic:**

Unfortunately, due to the academic schedule it is difficult for treatment in undergraduate clinics in dental faculties to permit ideal timing in terms of periodontal treatment. At Dalhousie, in the summer only the third year students provide treatments in the clinic. This may contribute to longer wait times for patient treatment. In this case, more than half the patient's teeth had hopeless prognoses and were ultimately be extracted. The patient's oral health condition was extremely poor and she also had a large draining periodontal abscess distal to the 4-3. Ideally, the patient should have been seen immediately in the clinic after treatment planning instead of having waited nearly 6 months for removal of the hopeless teeth.

Appendix A

March 27, 2013



Appendix B

September 19, 2013

2	2			2	2	1	0	0	1	2	3	3		2		Att. Ging.
1	2													1		MJG Width
				3 3 3	2 2 2	4 4 4	3 4 3						1 2 3			Furcation
6 3 6	6 8 4			5 5 11	8 10 6	7 6 6	5 6 5			2 2 4	3 2 4	3 3 6		5 3 4		RECESS
B B B	B B B			B B	B B B	B B B	B B B	B B B	B B B	B B B	B	B B B				CAL
6 3 6	6 8 4			2 2 8	6 8 4	3 2 2	2 2 2			2 2 4	4 3 3	4 3 4		5 3 4		BLEED
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	PROBING
3 3 4	5 3 4			3 2 4	6 2 5	5 2 5	5 3 5	4 3 4	4 3 4	3 3 5	4 2 3	3 2 3		3 3 3		PROBING
B B	B B B			B	B B B	B B B	B B	B	B	B B B	B	B				BLEED
3 3 5	5 6 6			2 3 7	6 2 5	5 2 5	5 3 5	9 8 9	9 8 9	5 5 7	4 3 4	3 2 6		3 3 3		CAL
				3 2 1				5 5 5	5 5 5	2 2 2	1 1 1	1 2 3				RECESS
1	2															Furcation
3	3			3	3	2	3	2	0	3	2	2		2		MJG Width
																Att. Ging.
2	2			2	1					1	2	2		2		Mobility

November 26, 2013

1	1				1	1	1	1	1	1	1	1		1		PLAQUE
2	2				1	1	1	1	0	1	2	2		2		MJG Width
1	2													1		Furcation
	1 1				1 1	2 1	1 1 1	2 2 3	3 2 2	2 1 2	1 1 1		1 2 3			G Margin
4 3 5	6 8 5				4 3 8	119 3	3 3 3	5 4 6	6 4 5	4 3 4	4 3 7	4 3 3	4 7 7		4 3 4	CAL
B B	B B				B B B	B B B	B B	B B	B	B	B B B	B	B		B	BLEED
4 3 5	5 7 5				3 2 8	9 8 3	2 2 2	3 2 3	3 2 2	3 2 6	4 3 3	3 5 4		4 3 4		PROBING
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	PROBING
3 3 4	5 8 6				3 3 5	113 3	3 2 3	3 2 3	4 2 3	3 3 2	3 2 5	3 2 4	4 2 5		3 2 3	PROBING
B B B	B B B				B	S S B	B B	B B	B B	B	B	B	B		B B B	BLEED
3 3 4	6 10 7				6 5 6	124 4	4 5 6	6 5 7	9 6 8	8 7 4	5 4 7	4 4 5	5 4 8		3 2 3	CAL
	1 2 1				3 2 1	1 1 1	1 3 3	3 3 4	5 4 5	5 4 2	2 2 2	1 2 1	1 2 3			G Margin
1	2														2	Furcation
3	3				2	2	2	2	2	0	2	2	2		2	MJG Width
	2				2	2					1	2	1		1	Mobility
1 1	1 1				1 1	1 1 1	1 1 1	1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1		1 1 1	PLAQUE

March 4, 2014

1					1		1			1	1	1	1		1		PLAQUE
2					1		1			0	1	2	2		2		G Width
1															1		Furcation
	1 1				2 2 2		3 2 3			4 2 3	1 1 1	1	1 2 3				G Margin
3 4 4					4 4 6		5 4 5			6 4 5	6 3 4	4 3 5	4 4 8		3 3 4		CAL
B					B		B			B	B B B	B	B		B		BLEED
3 3 3					2 2 4		2 2 2			2 2 2	5 2 3	4 2 5	3 2 5		3 3 4		PROBING
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	PROBING	
3 3 4					3 1 3		2 1 3			2 2 2	3 2 3	3 2 3	3 2 4		4 3 3	PROBING	
B					B		B			B	B	B	B B		B B B	BLEED	
3 3 5					6 4 6		5 4 7			7 6 4	5 4 5	4 4 4	4 4 7		4 3 3	CAL	
1					3 3 3		3 3 4			5 4 2	2 2 2	1 2 1	1 2 3			G Margin	
1															1	Furcation	
3					0		1			0	2	2	2		2	G Width	
					1		2			1						Mobility	
1 1					1 1		1 1			1 1	1 1	1 1	1 1		1 1 1	PLAQUE	

September 10, 2014

					3					1							PLAQUE
										2	3	3			3		G Width
					2 2 3										1		Furcation
3 3 3					4 4 5					2 2 1	1 1 1	1 2 3				G Margin	
					B					4 4 3	4 3 3	4 4 5		3 2 3		CAL	
3 3 3					2 2 2									B		BLEED	
					2 2 2					2 2 2	3 2 2	3 2 2		3 2 3		PROBING	
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	PROBING	
3 3 3					3 2 3					2 2 2	2 2 2	3 2 2		3 2 3		PROBING	
B					B					B	B	B		B		BLEED	
3 3 3					5 6 6					5 4 3	3 4 3	4 4 5		3 2 3		CAL	
					2 4 3					3 2 1	1 2 1	1 2 3				G Margin	
																Furcation	
3					3					3	5	3		3		G Width	
																Mobility	
1					1					1		1		1		PLAQUE	

**Appendix C**

May 29, 2014



Pre-treatment donor site (palate)



44 graft site



Pre-treatment graft site (44)



33, 34, 35 graft site



Pre-treatment graft site (33, 34, 35)



44 graft in place



33, 34, 35 graft in place

June 5, 2014



44 graft site 1-week post op



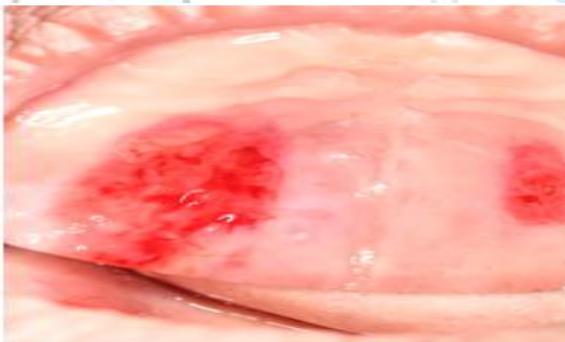
33, 34, 35 graft site 6 weeks post op



33, 34, 35 graft site 1-week post op



Donor site (palate) 6 weeks post op



Donor site (palate) 1-week post op

March 2015



Delivery of L-RPD Lower Left Side View

July 17, 2014



44 graft site 6 weeks post op



Delivery of L-RPD Lower Right Side View

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2012