

“Surgical Management of a Vertical Bony Defect in a Patient with Chronic Periodontitis”

By Rahat Ali, Specialist Registrar in Restorative Dentistry & Peter J Nixon, Consultant in Restorative Dentistry, Leeds Dental Institute.

Case Report:

Patient s Concerns:

A 60 year old patient presented at the Leeds Dental Institute with the following concerns:

- 1) Continuous, boring pain from the UL2 on biting. She could recall no history of spontaneous pain or pain at night.
- 2) She felt that the UL2 was mobile and that the associated labial gingivae was tender to touch and swollen.
- 3) She was also aware of occasional pus discharge from the UL2 region and is keen to save the tooth if possible.

History of Presenting Complaint:

1 year.

Medical History:

- 1) Hypertension: Controlled with Atenolol.
- 2) Non-Smoker/Non-Diabetic with no allergies.

Dental History:

- 1) Visits GDP every 6 months for scaling and polishing.

- 2) Pt has had UL2 instrumented twice under LA. Pt has noticed no improvement in symptoms.

Oral Hygiene Practice:

- 1) Brushes teeth twice a day with a manual tooth brush.
- 2) Occasional use of Tepe Brushes.

***Labial View of the UL2 Pre-Periodontal Peri-apical R adiograph of UL2
Therapy Discharging pus: Pre-Treatment with vertical defect:***



Intra-oral Examination:

- 1) Plaque Control: Plaque free score 50%. Multiple plaque deposits lingually on the mandibular teeth and proximally on the maxillary teeth.
- 2) BPE scores all 4s in each maxillary sextant and 3s in each of the mandibular sextants. Generalised bleeding on probing.
- 3) Minimally restored posterior dentition.

- 4) All maxillary and mandibular anterior teeth unrestored.
- 5) 6-7 mm Pocketing associated with the UL6/UL7/UR6 with sub-gingival calculus.
- 6) UL2:10 mm distal pocket/ Grade I mobile /discharging pus / TTP / tender to touch in the labial sulcus / labial sinus present/Over-erupting beyond the incisal plane/ No response to the Electric Pulp Tester.

Differential Diagnosis:

- 1) Moderate Chronic Periodontitis associated with the Maxillary Molar Teeth 2) Periodontal-Endodontic Lesion associated with the UL2

Initial Non-Surgical Management:

- 1) Oral Hygiene Instructions. Patient was shown how to use the correct sized interdental brushes correctly and how to brush the lingual aspects of her teeth more effectively.
- 2) Supra-gingival scaling and polishing.
- 3) Root-Surface instrumentation of all teeth with pockets > 4mm under local analgesia. A combination of ultrasonics, hoes and curettes were used.
- 4) Root canal therapy was performed on the UL2 under rubber dam isolation. This was done over 2 visits. The root canal system was shaped with Rotary NiTi instruments and disinfected with EDTA/Sodium Hypochlorite. The tooth was dressed with non-setting calcium hydroxide as an inter-visit medicament.

Outcome:

- 1) Plaque Control: Plaque free score 92%. Minimal Bleeding on Probing

- 2) All pockets now < 4mm, except UL2.
- 3) UL2 still had a 10mm distal pocket and was discharging pus/Grade I mobile.

Peri-apical Radiograph of UL2 Post Root Canal Therapy:



Surgical Management of the UL2:

- 1) Under Local Analgesia, a full, buccal flap was raised around the UL2.
- 2) Any Granulation tissue was removed and the root surface was instrumented with ultrasonics and curettes.
- 3) Emdogain® was applied to the root surface and Bone-Ceramic was applied to the bony defect.
- 4) Multiple 5.0 Serafast sutures were used to suture and reposition the flap.

***Labial View of the UL2 during Surgery: Peri-apical Radiograph of UL2
3 weeks Post-Periodontal Surgery:***

Notice the bone ceramic infill

Outcome at 1 year Post Periodontal Surgery:

- 1) Plaque Control: Plaque free score 90%. Minimal Bleeding on Probing.
- 2) UL2: 3mm pocketing/Not discharging pus or bleeding on probing/no labial sinus present/no



mobility

Peri-apical Radiograph of UL2

1 year Post-Periodontal Surgery: Notice that Bony Infill has occurred



Discussion:

This case report summarises the comprehensive care of a patient with periodontal disease. The pocketing associated with the maxillary molar teeth was managed with a combination of sub- gingival debridement / improving the patient's supra- gingival plaque control. Although the UL2 was also instrumented, it did not respond to the initial round of therapy. Management of the periodontal-endodontic lesion required a combination of orthograde endodontics and regenerative periodontal therapy.

Regeneration of the periodontal architecture (post periodontal therapy) should result in the lost cementum, periodontal ligament and alveolar bone being regained (Heijl et al, 1997a). From a clinical and histological point of view, this would represent the optimal outcome of periodontal treatment. For selected cases, it is possible to regenerate the periodontal tissues using guided tissue regeneration (GTR) or Emdogain® (EMD).

EMD contains freeze dried enamel matrix proteins (the amelogenin fraction). To appreciate how EMD works, an appreciation of embryological tooth development is essential. Cementogenesis and radicular dentine formation are linked. Hertwig's epithelial root sheath (HERS) induces mesenchymal cells of the papilla to produce mantle predentine before deteriorating and forming the root surface (Hammarstrom, 1997a). The mesenchyme which is now exposed to the newly formed radicular dentine is thought to induce cementogenesis. HERS represents the apical extent of the dental organ and secretes enamel matrix proteins during root formation. These proteins are involved in the formation of acellular

cementum formation during tooth development. Indeed application of enamel matrix proteins to the roots of animal teeth (Hammarstrom, 1997a, Hammarstrom, 1997b) and human teeth (Heijl, 1997b) has been shown to promote acellular extrinsic fibre cementum formation, formation of a functional periodontal ligament and alveolar bone regeneration. Although these studies investigated the regenerative potential of enamel matrix proteins on *surgically* created bony defects, the results were very promising.

For this patient, Bone Ceramic was used in addition to EMD to locally augment the bony defect around the UL2. It is a synthetic bone material composed of 60% hydroxyapatite and 40% β - tricalcium phosphate. The latter is thought to initiate calcification and provide a source of calcium and phosphate ions during the mineralisation process. The Hydroxyapatite component of the ceramic is thought to act as a scaffold for bony deposition (Strauman®, 2007).

Randomised Clinical Control Trials on patients with periodontal disease have also suggested that EMD has place in stimulating periodontal regeneration. Heijl et al. (1997a) reported that surgical debridement and topical application of EMD promoted an increased gain of radiographic bone and clinical attachment compared to control sites (where EMD was not used) in patients with periodontitis.

Although membrane based GTR is a viable alternative to Emdogain, a Cochrane Review by Esposito et al (2009) suggests that there is no clinically significant difference between the two modalities. The patient presented in this case was keen to avoid losing her UL2 as it was in the aesthetic zone. An alternative to the treatment provided would have been to extract the tooth, await a suitable length of time to allow hard/soft tissue remodelling before providing some form of prosthesis. In a tooth with a hopeless periodontal prognosis, this may have been preferable. However for this highly motivated patient with excellent plaque control and for a tooth with an isolated vertical defect, regenerative surgery (with EMD and Bone Ceramic) was a viable but ambitious treatment option. The tooth has been asymptomatic since surgery and is objectively free from active periodontitis. It has been so for nearly 2 years now and is kept under regular review.

References:

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- 4) Hammarstrom L^b. Periodontal Regeneration in a buccal dehiscence model in monkeys after application of enamel matrix proteins. J Clin Periodontol 1997; 24: 669-677.
- 5) Esposito M, Grusovin MG, Papanikolaou N, Coulthard P, Worthington HV. Enamel matrix derivative (Emdogain(R)) for periodontal tissue regeneration in intrabony defects. Cochrane Database Syst Rev. 2009 Oct 7;(4):CD003875.
- 6) Straumann, 2007. STARGETFOCUS, Straumann®, Regenerative System – Clinical Procedures for Periodontal and Guided Bone Regeneration, Product Information.