IMPLANTS AND COMPLICATIONS OF CERVICAL ROOT RESORPTION - A CASE REPORT

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Invasive cervical root resorption frequently results in the loss of the affected tooth, which can come at a considerable functional and aesthetic cost to the patient. Many of these cases are now treated with implant replacement which involves further surgical and financial costs. Numerous papers reporting on cervical root resorption have looked at the possible aetiology of Multiple Idiopathic Cervical Root Resorption (MICRR), a term which is used when no previously identified aetiological factor can be determined. A detailed literature review by Liang et al (2003) of the reported cases of MICRR failed to identify a common cause and the exact aetiology remains unclear. This paper reports on the management of a case of MICRR, which involved implant replacement for two of the affected teeth. Removal of the resorbing area and root filling one adjacent tooth proved successful in preventing its loss. This case highlights the importance of close clinical and radiographic follow up of these patients.

Introduction

External inflammatory root resorption (EIRR) is the most common type of external root resorption (ERR). It commonly presents as a bowl shaped resorptive defect that penetrates into dentine. It can be subcategorised into those parts of the tooth where it can occur. Cervical root resorption makes up about 4% of all ERR cases (Scoville 1996).

Common aetiological factors of cervical root resorption have been listed as:

• **Physical** - Tooth trauma, surgical procedures, orthodontic movement, periodontal root planning and bruxism.

• **Chemical** - Agents used within root canal system e.g. internal bleaching with external heat and high concentrations of hydrogen peroxide (30-38%).

Cementoenamel disjunction, where there is a fault at the junction of the enamel and dentine, has been recognised as a risk factor. It is a histological variation (Bergmans et al 2002) that can occur in up to 10% of teeth.

Physical or chemical injury can lead to damage to bone, cementum and dentine. This can produce chemical changes within the affected tissues and may result in the formation of multinucleated giant cells, commonly referred to as 'clasts'. These cells are responsible for continuing hard tissue resorptive processes. They are joined by cells such as macrophages and monocytes in the resorptive activities. Collectively these cells orchestrate a complex interplay of molecular biological events, involving cytokines, enzymes and hormones that influence the progression of resorption (Ne et al 1999).

Cervical root resorption often begins at the cervical aspect of the tooth and progresses inwards. As it approaches the pulp it usually spares it by leaving a thin layer of predentine and instead progresses circumpulpally, so that extensive dentinal destruction can occur without pulpal involvement (Scoville 1996). Sometimes, however resorption can progress rapidly (Ne et al 1999), and if it does the root canal will often be penetrated.

Identifying EIRR

Clinical and radiographic

Differentiation between root caries and cervical root resorption is sometimes difficult but it is crucial in trying to plan the correct treatment. Root caries is usually identified clinically as a soft lesion of dentine associated with gingival recession. It often presents radiographically, as an ill defined, radiolucent patch or saucer like lesion. In contrast, cervical root resorption is often first discovered radiographically as an incidental finding. It can be identified radiographically as a single radiolucent patch in the cervical region (Ne et al 1999). It is often located in the supra alveolar portion of the tooth. It usually does not involve the subcrestal part of the root (Berglundh et al 1997) and a defining feature is a sharp edge seen at the cavity border. On clinical examination, cervical root resorption is usually covered by soft tissue and when explored with a probe produces a hard sensation accompanied by a sharp scraping sound. In advanced cases, involving the crown of the tooth, a pink coronal discoloration may be seen. This appearance is created by the translucent appearance of granulation tissue which, when it penetrates under the enamel, produces a deep red colour (Bergmans et al 2002).

Histological evaluation

External Inflammatory Root Resorption (EIRR) usually presents as a bowl-shaped resorption area penetrating into the cementum and dentine with inflammation of adjacent periodontal tissue. The presence of infected or necrotic pulp in the root canal is noted in cases where the resorption had penetrated the pulp (Ne et al 1999).

In the periodontium, granulomatous tissue is usually present with lymphocytes, plasma cells and polymorphonuclear leukocytes. The adjacent resorbing surface of the root exhibits many

Howship's lacunae, which occasionally contain osteoclasts (Ne et al 1999).

Aetiology and presentation

The condition of Multiple Idiopathic Cervical Root Resorption (MICRR) was first reported by Mueller and Rony, in 1930. Since then numerous other cases have been documented where none of the common initiating factors appear to have been involved and where more than one tooth has been affected.

Those authors presenting their reported cases of MICRR have suggested other possible causative or predisposing factors:

- Segmental orthognathic surgery (Hokett and Hoen 1998)
- Transplanted maxillary canines (Berglundh et al 1997)
- Secondary alveolar bone grafting in unilateral complete cleft of the lip and palate patients (De Moor et al 2002)
- Guided tissue regeneration (Blomlof and Lindskog 1998)
- Tetracycline conditioning (Ben Yehouda 1997).

Liang et al (2003) concluded in their review on MICRR, that although younger females were most frequently involved, no single common cause had been conclusively identified. The aetiology still remained unknown and no prediction of speed or pattern of progression could be made in the condition. It therefore appears that MICRR can occur spontaneously in the absence of any local or systemic factors.

Case report

A 29-year-old lady presented with a 13mm, 3.75mm diameter, Branemark fixture already placed in the upper left lateral incisor region. After an examination it was deemed that this could be restored with a 4mm Cera One second stage and crown. On detailed questioning it was found that the implant was replacing a tooth, apparently lost by resorption. The medical history was non contributory. Clinically, external resorption was detected mesiopalatally on the upper right central incisor. The periapical radiograph (Figure 1) revealed the extent of resorption.

At a subsequent appointment local anaesthesia was administered and electrosurgery was performed around the upper right central incisor to recontour the gingivae palatally and expose the resorptive lesion. The granulation tissue was excavated and no clear exposure could be detected. The defect was restored with Ketac CemTM Radiopaque (3M ESPE) and at the review appointment a month later the tooth was

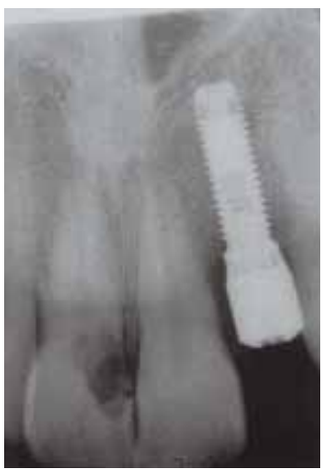

Figure 1: A radiograph showing external root resorption mesially on the upper right central incisor

Figure 2: A radiograph showing the upper right central incisor restored with Ketac Cem Radiopaque after root canal treatment had been performed

Figure 3: Clinical appearance of upper left lateral incisor restored with Cera One retained crown and following root filling and restoration of the upper right central incisor

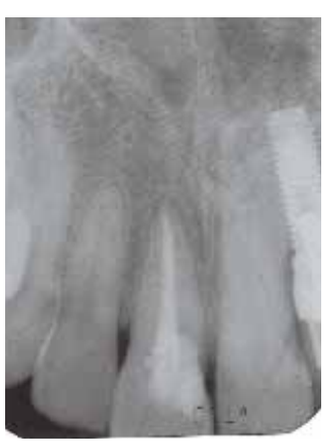

Figure 4: A radiograph to show the suspected early cervical resorption lesion on the mesial aspect of the upper left central incisor.

Figure 5: A radiograph showing external root resorption on upper left central incisorr

Figure 6: A photograph of the extracted upper left central incisor showing the palatal extent of resorption

Figure 8: A photograph showing the position of the location jig on the working model with cutomised second stages in place

asymptomatic. Three weeks later however, the patient presented with tenderness to percussion at the upper right central incisor. Root canal therapy was then initiated on the tooth and at the first appointment the tooth was chemomechanically prepared under rubber dam, with sodium hypochlorite irrigation and dressed with calcium hydroxide and IRM. A month later the root canal was further cleaned, dried and obturated with gutta purcha and TublisealTM (Sybron Endo USA) and the access was filled with Ketac CemTM Radiopaque (3M ESPE) (Figure 2).

The implant at the upper left lateral incisor region was replaced with a 4mm Cera One (Nobel Biocare) abutment and a porcelain fused to metal crown in the standard fashion (Figure 3).

The patient was reviewed six months later when the upper right central incisor was found to be asymptomatic and radiographs showed no further signs of resorption on the tooth. A suspected early cervical resorption lesion was noted on the mesial aspect on the upper left central incisor (Figure 4).

Despite having had this finding explained and being informed of the need for close observation, the patient then

Figure 7: A radiograph showing the 5mm transmucosal abutment on the implant replacing the upper left central incisor

went abroad due to her work commitments. She was next examined three years and 10 months later. The upper right central incisor was found to have remained asymptomatic and the radiographs confirmed that there was no change. The new radiographs, however, clearly showed that the resorption had advanced at the upper left central incisor (Figure 5). On further detailed clinical exploration it was decided that the tooth was unrestorable. Following a discussion and option explanation with the patient, the upper left central incisor was gently extracted (Figure 6) using a periotome. This technique managed to preserve the buccal plate and prevent any undue bone trauma. A partial denture was fitted throughout the healing period and a 13mm TiUniteTM regular platform implant was placed one month later. A 5mm transmucosal abutment was then placed after a further four months (Figure 7). The existing Cera One (Nobel Biocare) replacing the upper left lateral incisor was removed and impressions were taken.

Due to the pattern of alveolar bone loss around the upper left central incisor the options for positioning of the implant were very limited and the implant could not be placed at an optimal angle which would aid the placement of the restorations. To overcome these difficulties the laboratory fabricated two customised second stages together with a postioning metal location jig (Figures 8 and 9). When the second stages had been screwed into position the appearance of the upper left central and lateral incisors was successfully restored with a two unit prosthesis (Figures 10 and 11).

Conclusion

Cervical root resorption can begin and progress asymptomatically and without the presence of any of the known aetiological factors. When multiple teeth are affected resorption does not necessarily occur simultaneously or at the same rate. Separate lesions can begin long periods of time apart and in different quadrants. When resorption begins, it can proceed to destroy dentine rapidly. As the ability to maintain these teeth depends to a large extent on the amount of hard tooth tissue that is lost, early diagnosis is vital. However, due to the variable

Figure 9 : A photograph showing the metal location jig postioned intraorally

Figure 10: Photograph showing the clinical appearance of the two units replacing the upper left central and lateral incisors from a palatal view

Figure 11: Photograph showing the clinical appearance of the two units replacing the upper left central and lateral incisors. The upper right central incisor has been root filled

speed of progression, the management of these cases is difficult when trying to save any affected teeth.

The most effective therapy usually involves the exposure of the resorption lacunae followed by the removal of granulation tissue. Both orthodontic and surgical techniques have been used to expose the defect (Bergmans et al 2002). Endodontic therapy should be carried out when pulpal involvement is evident. It is important to note that due to the progression of cervical root resorption it can be technically very difficult, if not impossible, to spare the pulp when restoring these defects as only a very thin layer of predentine is left intact around the root canal and due to the blood from the resorptive process this is often difficult to identify.

Standard radiographic follow up for the existing implants is becoming increasingly important as the incidence of periimplantitis appears to be higher than that reported previously (Fransson et al, 2005). This condition may have previously been missed as probing around implants has been discouraged. Klinge and colleagues (2005) reported that significant late bone loss can occur around these implants, especially in patients prone to periodontal disease. Since probing around the implants as part of routine follow up remains controversial, many practitioners will rely on periapical radiographs of the implants for monitoring. These radiographs alone may miss the radiographic change of EIRR elsewhere in the dentition of cervical root resorption patients. When the history indicates that is is appropriate, it is recommended that detailed clinical review including probing and regular radiographic examinations of the entire dentition should be taken with paralleling devices. By combining these images with radiographs taken at 15°, parallax techniques can be used to aid detection of new lesions.

Successful management of these patients should involve long term monitoring of preexisting and restored lesions as well as attempting early diagnosis of new lesions, through regular clinical and radiographic assessments.

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