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Peri-implantitis: an Unusual Presentation

Abstract: Rehabilitation with dental implants is not without post-placement complications, one of which is peri-implantitis. Peri-implantitis is a progressive inflammatory disease which affects the hard and soft tissues around a dental implant. The consequent bone resorption and reduced osseointegration significantly affects the long-term viability of the implant fixture. Without treatment, peri-implantitis can progress in an accelerating, non-linear pattern.

The aetiology of peri-implantitis is debated in the literature. Consequently, over the last ten years there have been numerous consensus meetings debating this topic and various guidelines have been written and updated by experts in the field. There is extensive, sometimes conflicting, literature on the subject in the scientific journals. The aetiological factors involved and the management of the condition remains up for debate...

In 2011, a new patient attended the University Dental Hospital of Manchester with nine Xive implants (Dentsply Sirona), four maxillary and five mandibular. For various reasons the maxillary implants were all restored, however, only three of the mandibular implants were restored and two were left buried. In 2016, the patient returned with signs and symptoms of peri-implantitis around the most mesial buried implant (LL6 region). The potential reasons why this may have occurred were investigated and forms this case report.

CPD/Clinical Relevance: Peri-implantitis may be associated with apparently buried implants.

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Osseointegration is considered a prerequisite for the long-term clinical success of dental implants. Osseointegration of a dental implant can be defined as the continuing structural and functional coexistence between living bone and

the surface of a load-bearing implant.¹ Clinically, an implant can be regarded as osseointegrated when there is no relative movement between the implant and the bone in direct contact during functional loading, therefore, the implant fixture provides stable support for the prostheses.

There remains a lack of agreement in the dental implant literature with regards to the definition of implant success. Albrektsson *et al* proposed the commonly accepted criteria for the assessment of implant success at the implant level,² including implant immobility, less than 0.2 mm vertical bone loss annually following the first year, and absence of pain, infection, or peri-implant radiolucencies. A systematic review identified frequently used parameters for assessing implant success, specifically, success at the implant level, peri-implant soft tissue, prosthetics and patient evaluation.³

It is recognized that dental

implants are subject to marginal bone loss. In the first few years following placement, marginal bone loss (MBL) is rarely pathological, but is instead the result of an adaptive response to surgical trauma and implant loading.⁴ Measuring bone loss around a dental implant is controversial. Probing around natural teeth has proven to be a fundamental tool to assess periodontal health. However, probing depths alone are of limited diagnostic value for dental implants, due to the surgically created sulcus, which allows for the emergence profile and prosthesis connection. Defining a range of probing depths compatible with peri-implant health is not straightforward.⁵ Increasing probing depths over time may be indicative of bone loss but may not necessarily represent peri-implant disease. Monitoring of peri-implant health is recommended, which includes periodic documentation of the following clinical parameters: bleeding on probing, peri-

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Figure 1. Peri-implantitis on the two distal mandibular dental implants nine years after placement. Despite numerous treatment modalities being attempted, symptoms only subsided following removal of these implants.



Figure 2. A facial view following maxillofacial reconstruction outside of the UK.



Figure 3. Definitive implant prostheses constructed at UDHM *in situ*.

implant pocketing and stability of crestal bone levels, with the aim of identifying any potential problems early.⁶

The term 'peri-implantitis' first appeared in a study by Mombelli *et al* in 1987.⁷ Peri-implantitis has been defined as a 'plaque-associated pathologic condition occurring in the tissue around dental

*implants, characterized by inflammation in the peri-implant mucosa and subsequent progressive loss of supporting bone.*⁸ Subsequent to the proceedings of the 1st European Workshop on Periodontology (EWP), Albrektsson and Isidor presented definitions for two peri-implant disease entities in a consensus report in 1994, being peri-implant mucositis and peri-implantitis.⁹ Modified definitions were published after the 6th EWP to include the collective term peri-implant disease.¹⁰ However, the problem exists when both the following situations are defined as peri-implantitis: the classical crater defect seen in Figure 1, and an anterior dental implant placed in a narrow width of bone which progressively loses the buccal plate, but retains the mesial and distal bone height. Clearly, these are two distinct disease entities with different underlying causative factors but both are described in the literature as peri-implantitis.¹⁵

Case report

In 2011, a 32-year-old patient was referred to the University Dental Hospital of Manchester (UDHM) for restoration of dental implants. In 2007, the patient suffered significant facial gunshot injuries to her left side during a conflict in the Middle East. The maxillofacial reconstruction

was undertaken originally by a USA team in Iraq, followed by a French charitable organization, that completed the surgical implant rehabilitation prior to the patient relocating to the UK (Figure 2). The implants were definitively restored at the UDHM with a screw-retained gold/acrylic bridge in 2012 (Figure 3).

The two most distal implants in the left mandible (LL6 and LL7 region) were not restored due to access and positioning limitations (Figure 4). Consequently, these two osseointegrated implants were not uncovered and were left buried. Five years later, the patient re-presented with discomfort and, on examination, a draining intra-oral sinus tract was noted. Following clinical and radiographic examination (Figure 5), a diagnosis of peri-implantitis of the LL6 implant was made. Various treatment options were discussed with the patient, ranging from non-surgical therapy, including laser detoxification, surgical therapy including guided bone regeneration, to implant explantation. As the LL6 implant was non-functional, the patient opted for implant explantation. This was successfully completed under general anaesthetic to overcome poor access issues due to trismus (Figure 6). Within 10 days, the patient was symptom-free.

The question of how the buried implant in the mandible came to develop peri-implantitis had to be considered. A second opinion on the radiographs taken 18 months apart (Figures 4 and 5) was sought from Professor T Albrektsson and Professor A Wennerberg, specialists in the field, who both agreed that a communication to the crest of the implant had to be present for this to occur. Upon closer inspection, a very small soft tissue defect was evident (Figure 7), which became more apparent with time (Figure 8). This soft tissue breach was not present in 2011, and this implant remained uncovered after its initial placement outside of the UK. On further questioning, the patient recalled an incident within the previous year where she experienced a sharp stabbing pain in the lower left quadrant when eating. She believed that this was caused by a sharp food object digging into the gum behind her bridgework. One can only speculate that this may have resulted in a small gingival breach over the LL6 implant that failed to heal, allowing an intra-oral



Figure 4. OPT following implant reconstruction.



Figure 5. OPT taken in 2017 showing bone loss around LL6 implant.



Figure 6. A sectional OPT taken following removal of the affected fixture.

communication to the coronal portion of the implant fixture.

Discussion

The prevalence of peri-implantitis in the

general population has been evaluated in the literature. In 2006, Roos-Jansåker *et al* found that, after 9–14 years of function in a group of 294 patients with 999 implants, 6.6% of all implants had peri-implantitis (corresponding to 16% of patients).¹¹ However, since this paper was published, there has been wide variation in reported peri-implantitis prevalence in the scientific literature, resulting in difficulties making a direct comparison.¹² When analysing prevalence figures on peri-implantitis, one should consider the variations in disease definition, chosen thresholds for probing depths and bone loss, and individual patient factors, eg smoking

status.¹³ At present, it is our understanding that, in the process of gaining informed consent prior to dental implant placement, there is no widely accepted value that can be quoted on the percentage of sites at risk of developing peri-implant disease. Understandably, patients can more readily weigh up the risks and benefits of a treatment modality when percentages are assigned. There is an ever-increasing awareness of peri-implant disease within the general public and media; for example in 2014, *The Telegraph* published an article on the topic entitled 'Peri-implantitis: The 'time bomb' in dental implants.'¹⁴ This increasing awareness is likely to bring with it more understanding from patients in terms of potential risks and their sequelae.

A consensus meeting on peri-implantitis in Rome in January 2016 concluded that progressive bone loss threatening implant survival is rare.¹⁵ Marginal bone loss around implants is, in the vast majority of cases, a result of immune-osteolytic reactions. Progressive marginal bone loss can be a result of numerous factors related to the patient, the clinician, maintenance, and of the implant itself, for example defective components or prosthetic overload. A combination of the above factors may lead to a shift from osteoblastic to osteoclastic activity, ultimately resulting in bone resorption (Figure 9).

It is known from the literature that a history of periodontitis is a significant risk factor for peri-implant disease development.^{16,17,18} The patient in this case had few predisposing factors¹⁵ for peri-implantitis, being medically fit and well, a non-smoker and having relatively stable periodontal health, despite there being supragingival calculus visible on the prostheses (Figure 8). When soft tissues are closely adhered to a titanium implant, theoretically a biological seal which prevents micro-organism infiltration along the implant surface is formed. However, even a fully integrated implant exhibits a space which is more susceptible to bacterial infection compared to a natural tooth.¹⁹ Therefore, one can only speculate that the localized soft tissue trauma described by the patient enabled biofilm formation onto the LL6 fixture surface. Furthermore, it can be suggested that being partially dentate put this patient



Figure 7. A clinical image showing the gingival tissues distal to the last restored implant.



Figure 8. A breach in the mucosa. The implant head can be seen.

at elevated risk, as the peri-implant microflora identified in the partially dentate is potentially more pathogenic than that found in the edentulous patient.²⁰

Conclusions

It is the authors' understanding that there is little published on cases of peri-implantitis on uncovered dental implants. The difficulty with this case is that the operating conditions in which these nine Xive implants were placed are not known. Peri-implantitis may be asymptomatic, or manifest clinical signs of suppuration or painful peri-implant mucosal swelling. In this case, the patient experienced severe

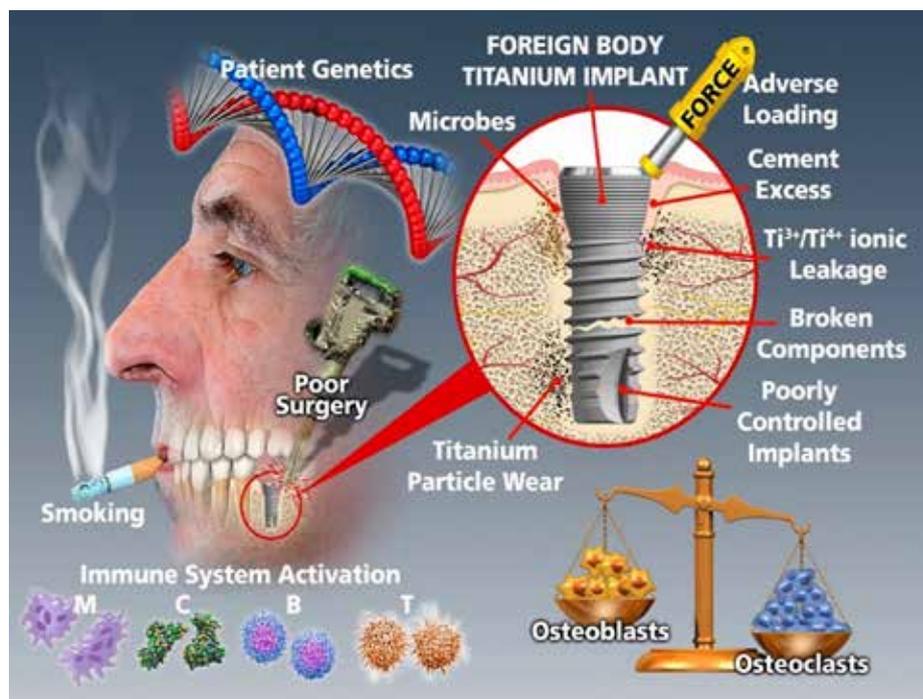


Figure 9. A series of factors work together to activate the immune system, ultimately leading to a shift in the balance between osteoblastic to osteoclastic activity. Permission granted by Prof T Albrektsson.¹⁵

pain that was only relieved following implant removal. The diagnosis of peri-implantitis and, indeed, the question of whether it is purely a title given to loss of supporting bone around dental implants, which can have multiple, non-related aetiological factors is still widely debated. There is a need for further research into the aetiology of this disease, its incidence and the treatment modalities used in its management.

Compliance with Ethical Standards

Conflict of Interest: The authors declare that they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual participants included in the article.

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