TOP TIPS

Top tips for managing implant complications in primary care

By Neil Macbeth[1] and Ewen McColl[2]

Introduction

Dental implant placement and restoration is becoming increasingly common in primary care.[1] With this in mind, predictable implant therapy can only be achieved with appropriate case assessment, treatment planning and surgical provision. However, dental team members may be increasingly faced with addressing biological and prosthetic implant complications at the time of implant restoration, or after delivery of the final restorative structure. Adler[2] outlines that biological and technical complications following implant placement can range from 32–52%. The range and complexity of these prosthetic and biological complications may be reasonably assessed and managed in primary care. In this short article we discuss a range of frequently occurring complications, with a range of tips on how best to manage these complications in primary care.

Top tips

A prosthetically driven surgical protocol, which uses an idealised final prosthetic tooth position to determine the correct three-dimensional (3D) spatial relationship for the implant fixture, supports the development of an optimal functional, biomechanical, aesthetic peri-implant mucosal margin, improving the maintenance outcome for the patient.

Augmentation protocols have also been developed to promote retention of the original bone and soft tissue topographical contour (alveolar ridge preservation), minimise the inevitable post-extraction physiological bone resorption and influencing the bone and soft tissue modelling and remodelling process. The potential to improve the morphology of the healed alveolar ridge and to retain the volume of the alveolar bone foundation, enables reconstruction of the ridge using an idealised prosthetic or implant-supported solutions.

Prevention

1. Maintenance and planning for complications

a. **Periodontal health.** Healthy peri-implant tissue is characterised by the absence of inflammation and swelling around the implant, no evidence of redness or bleeding on probing (BOP) and the lack of suppuration at the implant-mucosal margin. A stable zone of keratinised mucosa is also seen as being beneficial to the long-term health of the peri-implant tissue, as it prevents tissue displacement during function, aids patient comfort and facilitates plaque removal.

b. **Maintenance**. Compliance with biofilm control around the implant/restoration interface is key to longer-term implant success and survival, with the importance of this highlighted to the patient during the consent process. Oral care of the implant must encompass mechanical cleaning through brushing and the use of interproximal cleaning aids (TePe) or, our preferred method, of using floss (Super), wrapped around the implant and 'towelled' below the mucosal margin. Additional adjuncts such as water and air flossers and antiseptic mouthwashes may be useful but should not replace mechanical plaque removal.

c. **Biomechanical complications.** Control of occlusal overloading of the implant structure is considered important in order to reduce the risks of implant crown fracture, screw loosening/fracture, retention of the implant-retained prosthesis and an increased potential for marginal bone loss. Screw loosening is one of the commonest causes of implant complications. Screw loosening occurs when the tensile force of the tightened screw is overloaded, leading to loss of the clamping force. Localised bacterial infection can result, leading to per-implant mucosal inflammation, sinus formation and abnormal loading of the implant. Whilst screw loosening risks can be influenced by implant positioning, type of implant, implant diameter and abutment connection and type of implant appliance, early identification of biomechanical complications is important. Prosthetic structures should be designed to share both static and dynamic loading with the remaining dentition or implant fixtures configured to distribute the tensile and compressive forces over a wide surface area of the occlusal surface. Adequate consideration should be given to the size of the occlusal surface, the size abutment, accuracy of fit in the implant abutment connection, angle correction, cantilever design and prosthetic retrievability. The design of the superstructure should also ensure adequate support to porcelain surfaces.

Figure 1 shows a prosthetic fracture following biomechanical overloading of the implant.

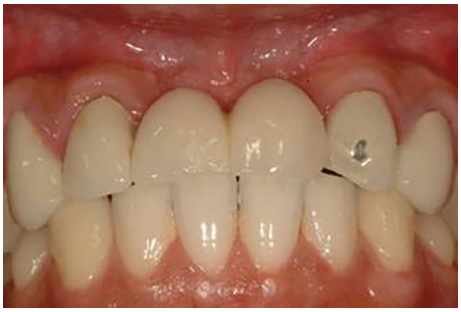

Fig. 1 Prosthetic fracture, following biomechanical overloading of the implant

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d. **Implant identification.** Replacement of the implant-supported restoration can be undertaken when bio-mechanical complications occur. However, before remedial treatment is undertaken, it is important to ensure the correct identification of the implant system and abutment components utilised. Identification of implant system can be achieved by review of past patient documentation or models, the calculation of implant dimensions, assessment of external morphology and internal connection characteristics, utilisation of implant identification websites or apps, use of artificial intelligence recognition systems, correspondence with dental implant manufacturer companies (radiograph and intra-oral images) and discussions with professional peer review groups. Once the implant systems and restorative components have been identified, the replacement crown or bridge prosthetic structure should be adapted to account for the cause factors precipitating failure of the appliance. The newly designed appliance should be designed to prevent further mechanical, aesthetic and phonetic complications.

e. **Protection of prosthetic structures.** Whilst case selection helps to identify risks, post-treatment splint therapy is considered essential to prevent occlusal overloading associated with parafunctional habits such as bruxism and local adaptive habits (nail biting).

> 'Issues associated with implant placement into the maxillary sinus may also require careful review'

2. Recall and review

a. The importance of recall should be emphasised as a component of the consent phase for implant therapy.

b. Initial review of the implant restoration should be three months post-rehabilitation, to reinforce oral hygiene compliance.

c. Further review should be at 12 months for the taking of a 6-point pocket chart[3] and LCPA to assess peri-implant soft tissue and bone stability. CGDent guidelines suggest a baseline radiograph taken at the time of completion of the prosthodontic phase of treatment with views recommended after a further 12 months. Radiographs may then be taken at intervals of up to five years[4] with close monitoring of clinical parameters determining intervals.

3. Complications

Implant complications associated with systemic disease. Medical systemic disorders can have longer-term complications for implant patients, making their management more complex. Case selection and risk parameters are important to consider when formalising treatment plans, with careful management of drug usage and patient physiological health considered essential. Conditions that may directly impact on implant treatment include myocardial infarction or cerebrovascular disease, bleeding disorders, immunosuppression, diabetes, bisphosphonate medication, psychiatric care and active cancer treatment. Patients with poorly controlled diabetes mellitus may also suffer from impaired bone formation, an increased risk of peri-mucositis and peri-implantitis after fixture placement and require elongated treatment times. The overall influence on implant survival is however recorded as being negligible.[5]

Mucosal disease. Oral diseases such as vesicular bullous disease, lupus and lichen planus may result in chronic inflammation of the peri-implant tissue affecting the patient's ability to clean around the crown-implant interface. This local restriction may predispose the patient to a higher level of peri-mucositis and peri-implantitis.

Allergic reaction. Most implants are made of titanium alloy. Even though extremely rare, some patients have been known to present with a hypersensitivity to titanium or another metal. This Type IV sensitivity can present as an altered taste, tingling and inflammation or swelling in the area. Allergy to a resin or acrylic-based prosthetic super structure is also a possibility and can present as localised discomfort, such as a burning sensation, itching, local gingival inflammation, or swelling around the prosthetic structure. If the patient has a potential metal or resin hypersensitivity, allergy testing can be undertaken prior to treatment. In cases with a known allergy, an alternative restorative material can be used, to mitigate against implant removal.

Anatomical and sensory risks. Damage to the mental and inferior alveolar nerve is a rare occurrence, but can occur during implant placement, resulting in temporary or permanent sensory impairment. Symptoms may include pain, numbness, hot or cold stimuli, itching, a tingling sensation in the mucosal tissue or discomfort on occlusal pressure. Early changes not caused by direct nerve damage can include sensory change due to reversible compression of the tissue because of oedema, haematoma, stretching of the flap and anatomical tissue. Persistent sensory change will require radiographic assessment, onward referral, and accurate recording of oral mechanoceptive, thermal and chemical tests. Early referral may assist in pharmacological, physical therapy and monitoring of the patient. Issues associated with implant placement into the maxillary sinus may also require careful patient review and appropriate referral. Chronic sinus pathology (sinusitis) due to perforation of the Schneiderian membrane and bacterial infection, will again require referral and treatment with antibiotics, chlorhexidine mouthwashes, nasal irrigation, and the use of decongestants. If symptoms persist, removal of the implant fixture is required.

Peri-implant mucositis. The clinical characteristic of peri-implant mucositis include bleeding on probing, erythema, tissue swelling and/or suppuration. An increase in probing depth is detected clinically due to a loss of tissue integrity and probing resistance. Treatment options include mechanical debridement of the implant restorative interface using hand curettes, ultrasonic instrumentation, air abrasive systems and occasional adjunctive antimicrobials or antiseptics. Local bacterial infection can sometimes occur due to cementation protocols, incorrect seating of the crown, impaction of deposits into the mucosal tissue or graft particle sequestra, following guided bone regeneration

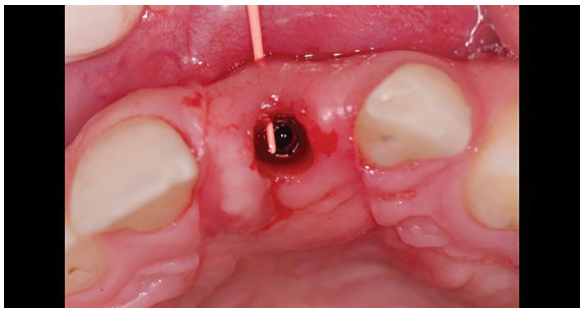

Fig. 2 Abutment-level infection, with sinus formation

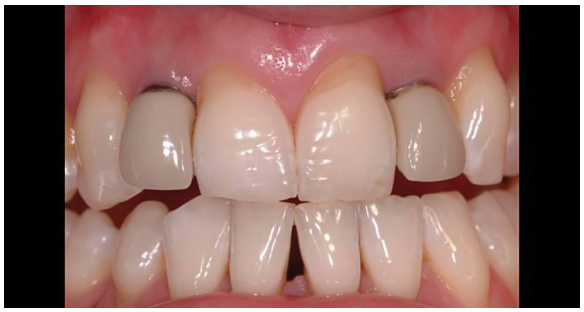

Fig. 3 Peri-implant soft tissue recession, following peri-mucositis in a patient with past poor oral hygiene and a thin peri-implant phenotype

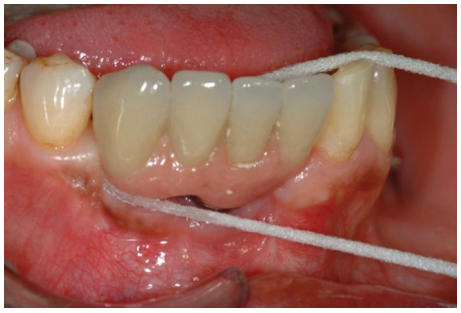

Fig. 4 Control of peri-implantitis under an implant bridge using oral health aids

at implant placement. The sources of abutment level bacterial infection can sometimes result in the development of a peri-implant abscess. Removal of the healing abutment or prosthetic crown, followed by elimination of any displaced or sequestered graft particle and local debridement, in conjunction with antiseptic irrigation of the tissues, may result in the removal of the initiating factor, allowing tissue healing. Replacement of the implant supported restoration will be required in the majority of these cases. Persistent chronic infection may require a local tissue flap to be raised to allow removal of embedded particulates and placement of a local connective tissue where thinning of the mucosal tissue is present.

Figure 2 shows abutment-level infection, with sinus formation.

Peri-implantitis is a plaque-associated pathological condition, which is the most common complication in implant dentistry. It is characterised by inflammation in the peri-implant mucosa and subsequent progressive loss of supporting bone, following initial implant healing. Increased probing depths are also seen at the implant site. Radiographic bone loss of ≥3 mm, in combination with BOP and probing depths of ≥6 mm are indicative of peri-implantitis. Suppuration and recession of the mucosal margin is frequently seen.

Figure 3 shows peri-implant soft tissue recession, following peri-mucositis in a patient with past poor oral hygiene and a thin peri-implant phenotype.

Risk factors for disease progression include plaque, smoking, history of periodontitis, abutment angle and surface roughness, lifetime of the restoration and systemic disease (diabetes). Nonsurgical therapy of peri-implantitis cases usually involves mechanical debridement of the implant surface using curettes, ultrasonic devices, air-abrasive devices or lasers, with or without the adjunctive use of local antibiotics or antiseptics, antimicrobial photodynamic therapy (aPDT) or alternative measures (air abrasive devices, galvanic treatment). Surface chemical and galvanic decontamination of the implant surface alone may not be successful in treating the disease, with surgical pocket elimination, bone recontouring, implantoplasty and regenerative techniques (bone grafts, guided bone regeneration) often required. Whilst successful treatment of the site requires concurrent plaque control and biofilm disruption, evidence suggests that the regenerative approach can be unpredictable.[6]

Figure 4 demonstrates control of peri-implantitis under an implant bridge using oral health aids. ■

Conclusions

Implant complications are not uncommon and in most cases can be managed both by a suitable preventative programme and careful monitoring of the implant and associated restoration.

You can reduce your chance of complications with dental implants by:

- Comprehensive patient assessment prior to implant treatment
- Control of the patient's risk of periodontal disease
- Adoption of a biological approach to implant placement to reduce peri-implant mucosal complications
- Early management of mucosal tissue complication
- Interproximal cleaning reinforcement
- Design of abutment and restorative margins to facilitate plaque control
- Advice on the impact of smoking and tobacco products
- Control of systemic disease risk factors
- Regular visits with your dental professional
- Properly caring for your dental restorations.
- Consider providing your patient with a mouthguard at night to reduce the risk of occlusal trauma and tissue damage.

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