From Our Office
to Yours...

The replacement of missing teeth with dental implants has become the standard of care for treating many cases of missing teeth. Even with reported implant success rates of 90% to 98%, attendant reports of implant failure due to peri-implant disease are increasing. The disease begins initially as peri-implant mucositis, a bacterially mediated inflammatory lesion limited to the soft tissues surrounding the implant similar to gingivitis—and develops into peri-implantitis, an inflammatory bacterial condition like periodontitis which leads to the gradual loss of the bone supporting the implant.

This issue of The PerioDontaLetter will review the latest information on the causes and prevention of the increasing prevalence of peri-implant disease along with protocols for treatment. As always, we welcome your comments and suggestions on this growing challenge in implant dentistry.

The Increasing Prevalence of Peri-Implant Disease

Several studies have suggested that as many as 80 percent of patients will develop peri-implant mucositis, and as many as 56 percent of patients will develop peri-implantitis. An even greater frequency of peri-implant diseases was recorded for smokers.

The causes of peri-implant disease are complex and influenced by a variety of factors. Determining the cause(s) of peri-implant disease is critical to developing the appropriate treatment to rescue the implant.

The primary factors in the pathogenesis of peri-implant disease and the potential for subsequent implant failure include:

1. The presence of active periodontal disease.
2. Inadequate oral hygiene.
3. Excess cement left around the implant collar and threads.
4. Faulty restorations, including incompletely seated abutments, open crown margins, and overcontoured restorations.

Figure 1. Treatment of peri-implantitis involving implant thread contamination can be very difficult and unpredictable.
5. Poorly positioned implants.
6. Excessive occlusal forces such as bruxism and malocclusion.
7. Systemic diseases such as diabetes, and bisphosphonate-related osteonecrosis of the jaw.
8. Smoking and drug abuse.

**Preventing Peri-Implant Disease**

It appears that both the clinicians who restore the implant and those who place the implant and those related osteonecrosis of the jaw. Systemic diseases such as bruxism and malocclusion. Excessive occlusal forces such as cement-retained restorations. It is absolutely essential that residual cement be removed when a cement-retained restoration is used. Unfortunately, the onset of these inflammatory signs and symptoms can take years to develop and is not often discovered until there is substantial loss of attachment.

- The cementation process must be well controlled. Wadhwani has presented an approach to minimize excess cement which allows the clinician to control cement flow by using a custom-made duplicate abutment. The use of a die spacer provides sufficient space to accommodate a thin layer of cement.
- Fabricating a polyvinyl siloxane copy abutment allows extra cement to be extruded out of the crown extra-orally before it is seated.
- Clinical data has shown that subgingival cement remnants are nearly impossible to remove.
- Few cements, if any, are tested for antibacterial properties.
- The soft tissues adhere to an abutment surface via a fragile hemidesmosomal attachment—the weakest cell attachment in the body. As a result, the implant

**Figure 2.** Severe bone loss with an 11mm direct facial pocket. **Figure 3.** Ten months after flap debridement, decontamination of the implant surface and guided bone regeneration, significant bone regeneration appears to have formed.

**Figure 4.** Sixteen months after surgery, the radiographic appearance of the bone remains stable.
attachment can be readily disrupted by cement flow.

- Custom abutments have generally become the standard of care. These permit the design of the abutment crown interface to be well-controlled.
- The patient must be able to adequately clean the restoration with an oral hygiene device such as an interproximal brush. The embrasure space simplifies access for enhanced plaque control.
- Pontic areas should be convex rather than concave to ensure cleansability.
- The peri-implant tissues should be monitored for early indications of disease. Treatment should begin immediately to prevent the development of peri-implantitis associated with bone loss.

Screw-retained restorations virtually eliminate the problems associated with cement-retained restorations.

The implant industry is developing new, innovative designs which simplify screw-retained restorations.

One such design is the angulated screw channel (ASC) abutment which simplifies screw access.

Diagnosing and Treating Peri-Implant Diseases

Peri-implant mucositis is a reversible condition and requires minimal intervention to treat.

Thorough mechanical debridement of the area along with improved plaque control and local antimicrobials such as chlorhexidine irrigation is usually sufficient to resolve peri-implant mucositis.

On the other hand, treating peri-implantitis is problematic at best.

Once infection and bone loss starts, treatment becomes unpredictable, at times complex, and particularly difficult to perform due to bacterial contamination of the implant surface.

Nonsurgical Treatment

Currently, the only proven way to stop the progress of peri-implantitis is mechanical debridement to remove the bacteria and their byproducts.

The use of antimicrobial oral rinses, irrigation, and local drug delivery systems have been shown to have a beneficial adjunctive effect when used in combination with mechanical debridement.

Surgical and Regenerative Treatment

If nonsurgical therapy has been attempted and the inflammation has not resolved, surgical therapy is required.

A full-thickness flap around the affected dental implant must be raised to completely expose the cement on the implant surface. The implant can then be mechanically debrided to fully remove the retained cement.

Curettage can and should be used to remove the bacteria from the implant surface.

Other methods to debride a plaque-contaminated abutment or implant surface include sonic and ultrasonic scalers, lasers, air-powder abrasion, various chemical solutions such as citric acid, hydrogen peroxide and saline.

Schwarz et al have described a modification of the contaminated implant surface which involves removal of the threads to the bone level and polishing the surface in conjunction with removal of all granulation tissue. This effectively turns the affected surface into an

Figures 5 and 6. Moderate periodontitis has progressed to severe peri-implantitis, making treatment very difficult and unpredictable.
abutment, thus making it more hygienic.

**Laser Treatment**

Some clinicians have reported success in removing infection and even regenerating bone using laser therapy.

The laser has been shown to help mitigate the bacterial infection without apparent damage to the implant itself at the same time leaving the surrounding tissue intact.

McCawley and Rams found laser treatment immediately suppressed putative bacterial pathogens in deep periodontal pockets to below culture detection limits.

A recent patient study demonstrated laser treatment was able to reverse bone loss, increase crestal bone mass, and reduce probing depth, thus permitting reversal of peri-implantitis.

Arisu and Chellini found that laser treatment may possibly stimulate alveolar bone growth at the cellular level.

Kim et al found laser treatment not only increased osteoblast activity but efficiently accelerated mineral deposition.

### Regenerative Treatment

The optimal outcome of peri-implantitis treatment is regeneration of the lost supporting tissue around the implant.

Various regenerative technologies including bone and soft-tissue grafts, growth factors, and barrier membranes have been used to rebuild lost tissue support around the “ailing” implant.

### Conclusion

Many of the complications which ultimately lead to implant failure are iatrogenic and preventable.

Determining the restoration type and design is arguably the most challenging component related to implant success.

This is particularly relevant when the restoration must compensate for site, depth, or angulation deficiencies in implant position.

Early detection and treatment of peri-implant diseases is the most significant factor in preventing implant loss.