Chapter 17 – Diagnosis and Treatment of Reversible and Irreversible Implant Complications

REASONABLE EXPECTATIONS

Implant dentistry is currently being practiced in an atmosphere of enthusiasm and optimism, because our knowledge and ability to provide service to our patients has expanded so greatly in such a short period. This enthusiasm may lead to unrealistic expectations about prognosis. Survival rates drawn from ideal patient populations participating in prospective, serial, and retrospective clinical trials are too often quoted to patients, whose individual cases may not be analogous to those in study protocols.

The complications one will observe long-term after the treatment of mainstream cases are few, and rarely severe. However, although mainstream cases are the most predictable of all implant dentistry cases, complications do arise. Complications arise more often and more seriously in intermediate and advanced cases. Aging, changing health conditions, long-term wear and tear, poor home care, and inadequate professional maintenance all contribute. In this regard, long-term complications in implant dentistry have the same etiology as periodontic, prosthodontic, and endodontic complications.

When presenting an implant dentistry treatment plan, it is important for the patient to understand that the vagaries of health represent an important variable influencing prognosis. Even if 95% of cases such as that presented by the patient survive longer than 10 years, this particular case may be one of the 5% that does not. Success cannot be guaranteed. What one can guarantee is to care, to do one’s best, and to be there to help in the rare instance that something goes wrong. Patients appreciate and benefit from straight talk.

Basic Policy in the Treatment of Troubled and Failing Implants

Some single-modality practitioners tend to remove implants of any modality other than the one they favor in the presence of a complication, whether reversible or irreversible, and even sometimes when the implant is functioning and healthy. At the same time, they spare no effort to preserve implants of a modality they do favor, whatever the complications observed. This approach requires reevaluation. It is rare that an implant exhibiting complications cannot be treated, often in the same manner in which one would treat similar complications related to teeth. Implants that can be maintained with conservative treatment of complications should be preserved. At the same time, if one determines that an implant is truly failing, the best policy is to remove it as early as possible. This too is similar to the way that one treats complications related to teeth. The over-retained failing natural tooth is a prime cause of alveolar ridge bone loss. As a general rule, failing implants cause less bone loss than do failing teeth. Failing implants should be removed as early as possible, but first one must be sure that the trouble is irreversible. Always treat troubled implants conservatively in an attempt to maintain them. Most complications are reversible.

In this chapter, an implant referred to as troubled exhibits reversible complications, and an implant referred to as failing exhibits irreversible complications.

Clinical Decisions

Over time, every dental implant practitioner must treat complications that arise in cases they or others have treated. However, such complications are observed only rarely in a properly diagnosed mainstream case. In general, the practitioner who performed the initial treatment can
approach such complications with a degree of comfort, because of familiarity with the modality and with the particular case at hand. However, cases treated by others that present with complications warrant special consideration. Is the practitioner able to treat and maintain the case? Is the complication reversible or irreversible? If the practitioner is in doubt about these questions, the case should be referred to a more experienced practitioner. A practitioner who exclusively treats mainstream cases may not be able to treat severe complications related to intermediate and advanced cases treated by another practitioner. Similarly, a single-modality practitioner may not be able to treat reversible complications related to an implant modality with which he or she is not familiar. Performing multimodal implant dentistry allows the practitioner to evaluate and treat a broader range of patients who present with complications, which in turn tends to increase one’s referral base.

CONSERVATIVE TREATMENT FOR MINOR COMPLICATIONS

Minor complications are reversible. Their etiology and treatment are very similar to those related to teeth. Periimplant problems, crestal bone loss, food impaction, poor occlusion, an inadequately designed restoration, breakage, or complications related to insufficient hygiene or poor patient habits can be treated as though they were related to teeth. Treatment of such minor complications includes gingival therapy such as gingivectomy, flaps, curettage, occlusal adjustment, dietary advice, and prosthesis modification, replacement, or repair. Treatment may include splinting or the addition of more abutments to compensate for underengineering, and always includes instruction regarding immaculate home care coupled with routine professional maintenance.

The body’s response to gentle, thorough treatment tends to be excellent. Time and again, one observes cases that function well for many years following appropriate conservative treatment of a complication.

Among the abutment-providing modalities, conservative treatment is least often required for plate/blade forms. Root forms also tend to show a relatively low incidence of complication. Loose screws, fractured screws, fractured implants, and broken solder joints are observed in only a very small percentage of cases. Although unilateral subperiosteal implants have long-term survival rates comparable to the endosteal modalities, they exhibit a greater incidence of reversible complications. However, most unilateral subperiosteal implants are easily maintained. Sometimes, conservative treatment is frequently required over the course of a few years, and then the case stabilizes, with no complications being observed for the next several years. In time, as with all other areas of practice, treatment of minor complications related to implant dentistry becomes a routine part of practice. Fully informed patients, because of the great benefits afforded by implant dentistry, most often accept complications and their treatment with equanimity.

AGGRESSIVE TREATMENT FOR MORE SERIOUS COMPLICATIONS

Serious reversible complications require more experience and training to treat successfully. Treatment of such complications includes major peri-implant surgery, bone augmentation, gingival grafting, removal of a portion of a plate/blade form implant, removal of some struts or a portion of a subperiosteal implant, debridement of exposed threads of a root form implant, complex restorative retreatment, and sometimes, long-term antibiotic or other pharmaceutical therapies. When required, consultation or referral to a more experienced practitioner is advised.

TREATMENT OF FAILING IMPLANTS
A failing implant should be removed as soon as it is determined that its complications are irreversible. The considerations when removing implants of each of the three abutment-providing modalities are different, and these differences are important. The removal techniques are discussed separately for each. It is important to note that knowledge of removal techniques is not as widespread as knowledge of insertion, and that implant removal not in conformity with recommended techniques results in further complications, some of iatrogenic etiology.

**Removal of Failing Root Form Implants**

When a sufficient amount of bone loss, inflammation, infection, pain, or mobility is observed, or when implant fracture occurs, a root form implant is removed. Antibiotic coverage is instituted preoperatively and continued postoperatively. If the failing implant is not functioning independently, it is isolated from its prosthesis. Local anesthetic is administered. Removal of a root form implant is akin to tooth removal. Counterclockwise rotation, gentle bucco/labio-lingual luxation, and concomitant withdrawal occlusally most often unseats the implant. When a firmly seated implant must be removed, use of a coordinated trephine or XXL bur may be considered. The implant “socket” is curetted gently, and granulation tissue is removed. Portions of the socket approaching or encroaching on a sinus are curetted very gently, or tissue forceps are inserted to carefully remove granulation tissue, if present. The same is true of sockets approaching nerves, such as those in areas at or near the roof of the mandibular canal. Trim the gingival cuff as required, and undermine a small amount of soft tissue around the opening to enhance closure when suturing. Direct pressure controls bleeding. The same postoperative care provided when the implant was inserted is used now. Bone augmentation is not advised at the implant removal visit in inflamed or infected areas but may be accomplished about 4 weeks later.

**Removal of Failing Plate/Blade Form Implants**

Isolate the implant from its overlying prosthesis following antibiotic coverage. Administer local anesthetic containing vasoconstrictor, which should include block and infiltration in the mandible, and infiltration alone in the maxilla. Also infiltrate along the crest of the ridge overlying the implant. Incise the crest, reflect the buccal and lingual flaps, and pass a scalpel blade between the lingual interface of the implant body and the lingual plate of bone of the implant socket. This will sever the fibers of the perimplant ligament. While this is being done, feel whether the scalpel is stopped by bone plugs growing bucco/labio-lingually through implant vents. If these are present, as is generally the case, set an XXL bone bur into a high-speed airotor, angle the bur to pass along the same route the scalpel did, and cut through the bone plugs along the lingual surface of the implant body, using ample coolant. The entire implant is now moved bodily toward the lingual to disengage the remaining portion of each bone plug from within its vent. This is done by inserting a fine peri-osteal elevator at the buccal of the shoulder, between the buccal of the implant interface and the buccal plate of bone of the implant socket. The implant will be displaced lingually into the area created by the scalpel and bone bur. Then grasp the abutment or abutments, and lift the implant occlusally out of its socket.

As is the case following removal of a root form, the osteotomy is curetted to remove granulation and connective tissues, with caution in areas near the sinus or the roof of the mandibular canal. Trim the edges of the incision, and undermine enough tissue to ensure complete closure when suturing. Control bleeding with direct pressure. The same postoperative care employed when the implant was inserted is employed after removal. Bone augmentation is not advised at the time of implant removal in inflamed or infected areas.

**Removal of a Failing Subperiosteal Implant**
The procedure to remove a failing subperiosteal implant is aimed at reducing the incidence of iatrogenic complications. Recall that the subperiosteal implant functions in a state of periosteal integration. It is sheathed in dense collagenous connective tissue that constitutes the outer layer of the periosteum. In failing implants, one or more struts of the implant may have dehisced into the oral cavity. Isolate the implant from its overlying prosthesis.

Following administration of antibiotics and local anesthetic containing vasoconstrictor if it is not contraindicated, start by removing the exposed struts from the implant. This is best accomplished by severing them at each point at which they emerge into the oral cavity. Use a long, slim, flame-shaped coarse diamond in a high-speed airotor with ample coolant.

Next, incise the crest of the ridge on the same line along which the initial incision was made when the implant was first inserted. Remember that subperiosteal implants are used when available bone is insufficient for endosteal implants. Thus, subperiosteal implants lie closer to the mandibular canal and sinus. The system of removal dictates that these areas be protected. The inner layer of the periosteum should remain untouched. Only the crestal portion of the sheath is severed over each strut. When a scalpel blade touches the metal implant, it quickly dulls. Therefore, have several blades at hand, to work efficiently at all times. The implant should not and cannot be pulled or torn away. Patience and slow, gentle severing of the sheath over the outer aspect of every strut is the key to success. Do not sever the sheath under the struts to ensure avoidance of landmarks. Infiltrate additional local anesthetic, if required.

When the implant is ultimately lifted out of its severed sheath, do not pull on the residual fibrous tissue. Use a tissue forceps to remove granulation tissue gently. If an antral opening is observed, be sure to undermine the reflected tissue flap sufficiently to enable closure and suturing securely over the area. Trim tissue tags from the edges of the incision before suturing. Patience and gentle, thoughtful use of the scalpel and periosteal elevator are the keys to success. The same postoperative care provided when the implant was inserted is instituted. Augmentation is not advised in inflamed and infected areas at the implant removal visit.

After removal of a maxillary subperiosteal implant, the patient is advised not to blow his or her nose, to sneeze in a way that avoids undue antral pressure, and to avoid strenuous exercise for 2 weeks.

OTHER TREATMENT OPTIONS FOLLOWING REMOVAL

Conventional removable dentures are often used after implant removal, at least as a transitional option during the time required for complete healing. Following removal of endosteal implants, if the volume of available bone is insufficient for endosteal reimplantation, a subperiosteal implant may be considered. Sometimes, removable dentures are the final solution. In the maxilla, intramucosal inserts are often recommended to ensure greater retention and stability of a total or partial removable denture. Advanced implant techniques involving soft-tissue grafting, bone augmentation, ridge width expansion, and nerve repositioning may be useful after implant removal and healing, to create enough available bone for subsequent reimplantation. This may require one or more additional years of treatment, and only should be embarked upon with adequate training and after full and complete discussion leading to informed patient consent.

REFERENCES


