Surgical Strategies Used to Successfully Re-implant an Implant that Failed Four Times at the Same Site: A Case Report

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Although implants have been shown to have high success rates, complications such as implant failure can occur. This presents a challenging dilemma for clinicians when attempting another implant placement in the failed site. The patient in this clinical case report presented with implant failure four times at the same site. This case report describes implant placement in a site where four failed implants were previously removed and evaluates the approach used to achieve a successful outcome. Int J Periodontics Restorative Dent 2022;42:411–417. doi: 10.11607/prd.5506

Dental implants have long been documented as a successful option for restoring one or more missing teeth in partially or fully edentulous patients.1,2 Nevertheless, several potential complications and failures can occur and should be familiar to the clinician in order to prevent or treat them. One of the most serious complications is implant failure, defined as an implant’s lack to fulfill its purpose (functional, esthetic, or phonetic) because of mechanical or biologic reasons.3 The commonly accepted criteria proposed by Albrektsson et al to identify clinical evidence of implant failure include: mobility, radiolucency surrounding the implant, pain, and loss of > 1 mm of bone in the first year of function and 0.2 mm every year thereafter.4,5 Some causes of implant failure include osseointegration failure, implant fracture, overload ing, poor implant positioning, and peri-implantitis.

The first-year overall survival rate for implants has been reported to be between 92% and 97%.6 Failed implant sites present a challenging dilemma to the clinician when attempting a second placement in a failed site,6,7 and the implant survival rate for an implant placed in a previously failed site is 83.5%.8 The implant survival rate is reduced to 60% for a third attempt at implant placement at the same

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Moreover, according to Lang et al, implant success rates in sites without previous failures decrease from 95.4% at 5 years to 92.8% at 10 years.10

In the clinical case presented herein, the patient had an implant that failed four times at the same site. The patient was skeptical and distrustful. He came to New York University’s Ashman Department of Periodontology & Implant Dentistry seeking a solution to his problem.

This case report presents a patient who underwent implant placement in a site where four failed implants were previously removed and evaluates the approach used to achieve a successful outcome.

Materials and Methods

A 36-year-old man presented to the Ashman Department of Periodontology & Implant Dentistry at New York University, seeking advice for treatment of an edentulous maxillary right first molar site that had four previous implant failures (Fig 1). He reported that the extracted molar was removed in 2014 due to endodontic failure, and an implant was placed (Fig 2). In 2015, the implant failed due to a lack of initial stability caused by poor bone quality and was removed (Fig 3). A second implant was placed 3 months later and restored (Fig 4). At the time of occlusal loading, the implant was mobile and was removed. In 2017, a third implant was placed and restored (Fig 5). One year later, the third implant became mobile from excessive occlusal loading, exacerbated by parafunctional habits on the implant, and was explanted. The fourth implant was placed 4 months later, but it failed after 3 weeks, again showing mobility due to poor bone quality and a failure to establish good initial stability (Fig 6). The patient was discouraged and distrustful. The risks and benefits of another implant placement were explained in detail to the patient. Treatment options were presented, and the patient opted for an implant placement for the fifth time. This information was discussed thoroughly with the patient, and informed consent for the subsequent attempt was obtained.

The patient’s medical and family histories were unremarkable. He reported taking multivitamins and...
vitamin D supplements. A periapical radiograph was taken prior to the fifth implant placement. It did not reveal any pathology in the maxillary right molar area, with the exception of a radiolucency where the previous implant was removed (Fig 7). A presurgical CBCT scan confirmed adequate bone width, with decreased bone height due to the sinus proximity (Fig 8). An impression was taken for a night guard and sent to the laboratory for fabrication. Prior to the surgery, the patient received full-mouth scaling and root planing and was instructed in proper oral hygiene care. The maxillary left second premolar was also restored with a composite filling.

On the day of the surgery, the area was locally anesthetized with 2% lidocaine hydrochloride with epinephrine 1:100,000 (Henry Schein). A mucoperiosteal buccal flap was elevated via a mesial vertical releasing incision located on the mesial aspect of the maxillary right first premolar. The flap was reflected apically to expose a portion of the lateral bony wall of the maxillary sinus. Following the technique originally described by Tatum, an ovoid lateral window was prepared using a round, diamond bur. Only a thin layer of bone was removed at each passage of the bur. The sinus membrane was exposed, and perforation was not detected by direct inspection. Once exposed, the sinus membrane was elevated using sinus elevators (Sinus Lateral Lift Kit, Zimmer Biomet). The membrane was again evaluated for perforation by direct vision and also via the Valsava technique, neither of which indicated a perforation. The sinus membrane was kept elevated while the implant osteotomy was prepared using a surgical guide. A 4.8 × 12-mm bone level SLActive Roxolid implant (Straumann) was placed with a submerged approach. Using the sinus cortical bone to increase initial stability, a torque value of 35 Ncm was achieved. The residual space between the sinus membrane and the maxillary sinus floor was grafted with a xenograft (small-particle, cancellous Bio-Oss, Geistlich). Following a periosteal releasing incision, primary closure was achieved, and the flap was sutured with 4/0 chromic gut sutures (Henry Schein). A postsurgical radiograph showed the implant in a proper position (Fig 9).

The following medications were prescribed for the patient: 500 mg
amoxicillin tid for 1 week, 600 mg ibuprofen as needed for 5 days, and chlorhexidine digluconate 0.12% tid for 2 weeks. The patient was instructed to avoid excessive activity during the first few postoperative days and to refrain from rinsing his mouth or expectorating, except when required by the prescribed medications. The patient was also instructed to avoid maneuvers that could generate an increase in pressure in the maxillary sinus, such as blowing his nose or sneezing. (If the urge to sneeze occurred, the patient was instructed to do so with his mouth open.) The patient was placed on a soft diet (warm or cold) for at least 1 week.

Sutures were removed at the 2-week follow-up visit. Healing proceeded within normal limits, and no complications were reported by the patient or otherwise noted by the clinician. After 3 months of undisturbed healing, second-stage surgery was performed. Two weeks later, a pick-up impression was performed (Fig 10a). The fully seated, fixture-level impression coping was confirmed with a radiograph (Fig 10b). From this impression, a screw-retained zirconia crown was fabricated to restore the site (Fig 11). The patient was also given a night guard, which was adjusted at the visit, and the patient was instructed on cleaning the appliance and storing it between use. The night guard was brought to all recall cleaning appointments to be evaluated and adjusted if necessary. The patient was seen 3 months, 6 months, and 1 year postrestoration. At 1 year, the implant and prosthesis were functioning well, with no marginal bone loss around the implant (Fig 12).

Discussion

The placement of implants in the edentulous posterior maxilla has traditionally been challenging due to a combination of poor bone quality, atrophy of the posterior alveolar
Fig 10  (a) A final impression was made. (b) Radiographic view of the impression coping in place.

Fig 11  (a) Lateral and (b) occlusal views of the final restoration at the day of insertion. (c) Radiographic view of the final restoration.

Fig 12  (a) Occlusal and (b) radiographic views at the 1-year follow-up.
ridge, and pneumatization of the maxillary sinus following tooth extraction.\textsuperscript{12–14} Pneumatization of the maxillary sinus floor occurs following the loss of posterior maxillary teeth and results in alveolar ridge atrophy. Studies have found an increased failure rate in implants placed in poor-quality bone.\textsuperscript{14}

In the present case, the previous four implants that were placed in the same maxillary first molar site failed due to a combination of factors including poor bone quality, implant placement without sinus grafting, poor initial stability, implant overloading, and parafunctional habits. These were overcome by the use of a surgical guide at the time of placement, a sinus augmentation procedure performed simultaneously with implant placement to allow for a longer implant, and engagement of the maxillary sinus cortical floor to increase the initial stability. Sinus floor cortication has been reported to be important to improving the predictability of implant integration from a biomechanical perspective.\textsuperscript{15} A study by Choucroun et al found sinus floor cortication in 72% of cases.\textsuperscript{16}

The lateral window approach for maxillary sinus augmentation is a predictable and well-documented procedure.\textsuperscript{12} In the present case, a lateral bony window was created followed by sinus membrane elevation. The space created between the maxillary alveolar process and the elevated sinus membrane was filled with a bovine-derived xenograft material to allow for new bone formation.\textsuperscript{11,12}

When a patient experiences parafunctional habits, it is advisable to have an occlusal splint made prior to implant restoration for protection against unwanted occlusal forces. In a recent meta-analysis, bruxism was suggested as a contributing factor for the occurrence of implant complications and plays a role in implant failure.\textsuperscript{17} In the present case, the patient did not admit to being a bruxer, but the failures and wear patterns on the teeth and crowns in his dentition proved that he was. Therefore, a night guard was made prior to placement of the final restoration on the fifth implant. Oral hygiene was also taught and reviewed at each 3-month follow-up appointment. At each visit, the occlusion was examined with articulating paper to determine whether the patient had developed any trauma on the restoration during function or excursions. At 1 year postrestoration, the implant-supported crown was functioning well, with no evidence of soft tissue inflammation or bone loss.

**Conclusions**

This case report demonstrates the role of maxillary sinus augmentation with simultaneous implant placement and the importance of achieving good initial stability at the time of implant placement in a posterior maxillary site where multiple implants had previously failed. Although these results are promising, further studies are required to validate this single case report.

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**References**