

Modified Segmental Osteotomy for Relocation of Malpositioned Implant: Case Report

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Abstract:

Obtaining a good cosmetic and proper mastication in oral rehabilitation with dental implants are directly linked to the correct positioning of the implant in the alveolar bone. The malposition of the implant is a challenge in rehabilitation, which can often compromise the entire process. In cases of severely malpositioned implants, one has the option to remove it or leave it submerged under bone and gums. Another option is the modified segmental osteotomy that aims repositioning osseointegrated implant with the surrounding bone. The objective of this case report is to present a case where an implant was severely malpositioned after surgically assisted rapid maxillary expansion, requiring a modified segmental osteotomy technique to reposition it.

Key Words: Implant relocation, malpositioned implant, segmental osteotomy

Introduction

Correct positioning of the implant in the alveolar ridge is a key factor for longevity and success in prosthetic rehabilitation using dental implants. A severely positioned osseointegrated implant is a challenge to obtain the aesthetic and masticatory function, a challenge that can become impossible.¹ Leave the implant buried, i.e., covered by gingival tissue, intraosseous or remove it, are treatment options. Remove the implant can result in defects in soft tissue and hard tissue, requiring

corrections with advanced regenerative procedures prior to the installation of a new implant, requiring a long treatment time.

A recent change in segmental osteotomy technique is adding a new treatment option that consists in performing osteotomies through the displacement of the malpositioned implant and the surrounding bone block to the correct position.^{2,3} The objective is similar to segmental osteotomies that are performed in orthodontics and orthognathic surgery to reposition malpositioned maxillary teeth that do not respond adequately to orthodontic movements.^{4,5}

Another surgical procedure, surgically assisted rapid palatal expansion (SARPE), aims to promote an increase in maxillary transverse dimension by surgical separation in the palatal region, which consequently leads to change the position of the teeth. Later those teeth will be realigned by orthodontic treatment, which will not occur with the osseointegrated implant. Thus, when SARPE is undertaken in a patient with dental implants, those implants cannot be moved orthodontically and will eventually be malpositioned. The objective of this case report is to present a case where an implant was severely malpositioned after SARPE, requiring a modified segmental osteotomy technique to reposition it.

Case Report

A 30-year-old woman with good general health was referred to the Oral and Maxillofacial Surgery Department of the University General Hospital of the University of Cuiaba for surgical correction of transverse maxillary atresia. On examination, it was observed that in addition to the transverse maxillary atresia, an osseointegrated implant was placed to replace superior left canine (Figure 1a-c). Prior to the SARPE, pre-operative panoramic radiography was evaluated (Figure 2) and the patient was explained over the possibility of having the implant malpositioned.

The SARPE was performed under local anesthesia and oral sedation in an outpatient setting. The Hyrax distractor activation was started on the 3rd post-operative day, planned to go as two activations daily (¼ turn each time) until 20% of overcorrection to the inferior dental arch was achieved. During activations, it was observed that the left hemi-maxilla had greater expansion, causing an asymmetry in the frontal view of the maxilla (Figure 1d-f), but the decision was to continue the activations as planned. After approximately 18 months

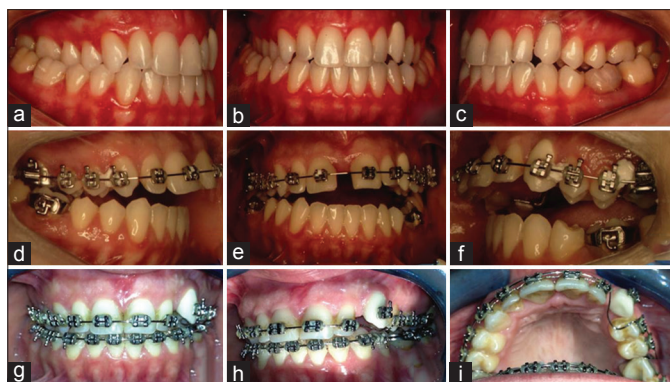


Figure 1: (a-c) Initial presentation prior to surgically assisted rapid palatal expansion (SARPE), (d and f) clinical aspect after SARPE, (g-i) clinical presentation after orthodontic treatment, just before implant relocation.

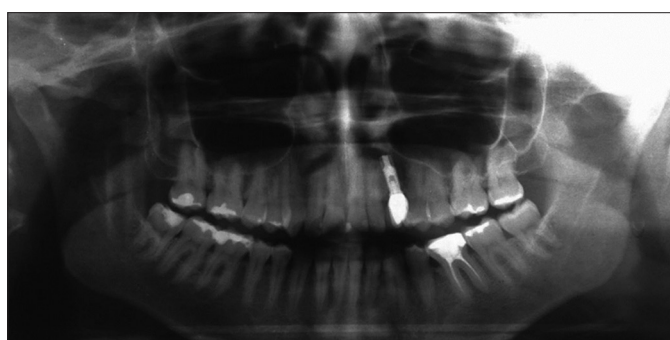


Figure 2: Initial panoramic radiograph.

of post-surgical orthodontic treatment, an acceptable dental occlusion was noticed except for the malpositioned implant (Figure 1g-i).

After clinical and dental casts evaluation, surgical relocation of the malpositioned implant was simulated on a semi-adjustable articulator through a segmental osteotomy. As the prosthesis over the implant was satisfactory, it was planned to use the bracket as a reference to the new position. After a trapezoidal vestibular mucoperisosteal flap (Figure 3a), a 699 drill and a chisel were used to perform two vertical alveolar osteotomies adjacent to the implant, including buccal and palatal bony walls, connected to a buccal horizontal apical osteotomy (Figure 3b). Subsequently, a "greenstick" fracture was done, followed by repositioning of the implant. The bracket on the implant was then connected to the orthodontic arch and stabilized with chemically cured resin surrounding the implant and two adjacent teeth on each side (Figure 3c). The bone gap formed by the movement of the block was filled with halogen bone graft (Geistlich Bio-Oss®, Wolhusen, Switzerland) and the crown of the implant was adjusted to be out of occlusion (Figure 3d). The acrylic resin was removed with 45 days. Radiographic control included the immediate post-operative period, 30, 90 days and 16 months. The patient is currently

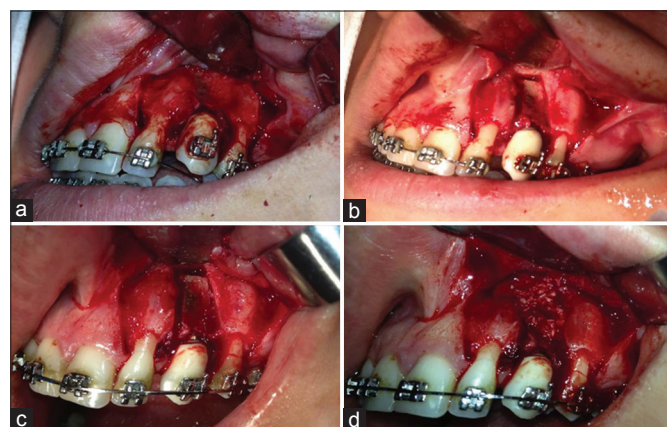


Figure 3: During implant relocation surgery, initial aspect of the implant and the surrounding bone after the creation of the mucoperisosteal flap (a); lateral and apical osteotomies performed around the implant (b); relocation of the bone-implant block (c); bone graft filling the gaps around the bone-implant block.

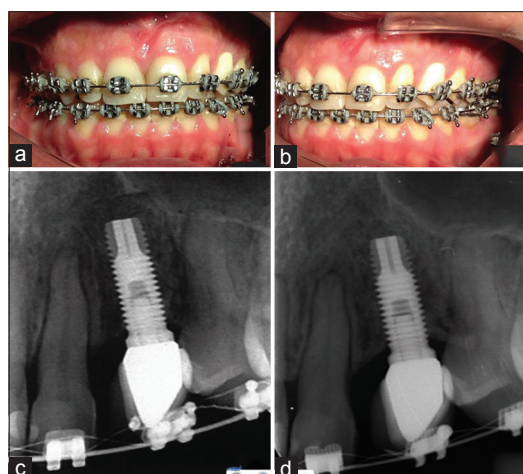


Figure 4: (a and b) Clinical aspect 16 months post-operatively, (c and d) comparison of immediate and 16 months post-operative radiographic records.

on a 16 months post-operative follow-up, the bone-implant block shows no clinical or radiographic changes, obtaining the clinical success and patient satisfaction for the treatment performed (Figure 4a-d).

Discussion

A meticulous surgical-prosthetic planning is a fundamental prerequisite for the success of dental implant treatment, especially when it comes to aesthetic areas. This plan includes the three-dimensional assessment of the position, angle, and depth in which the implant should be inserted and what type of implant should be used. Known causes of malposition of the implant are reported in the literature, such as failure to surgical planning, inaccuracies surgical guide, inexperience, factors related to growth, or insertion bone-

driven implant.¹ However, the displacement of the implant to an unfavorable position as a complication of a surgical procedure disjunction assisted orthodontic jaw treated by repositioning the implant through segmental osteotomy is not reported in the literature.

In patients in need of orthodontic treatment, requiring surgical intervention or not, the phase of rehabilitation using dental implants should be performed at the end of treatment. In our case, the patient had maxillary transverse discrepancy characterized by bilateral posterior crossbite, and an implant was installed before correcting skeletal change. After SARPE, the teeth were moved to a correct relation of occlusion although leaving a malpositioned implant since it cannot be moved orthodontically.

The correct positioning and alignment of dental implants are a crucial factor in achieving satisfactory aesthetic and functional results. A moderate malposition of the implant can be successfully treated using individualized abutments structures. If the prosthetic correction is unsatisfactory, limited solutions are viable since severely malpositioned implants can become an insuperable barrier, especially in esthetic areas. In these cases, the treatment options are leaving the implant submerged below the gingival tissue or intraosseous and giving up using it as prosthetic support; or remove it surgically, which often results in defects in bone and gingival requiring corrections with advanced tissue regeneration procedures before installing a new implant. For such unfavorable cases, an alternative is presented by relocation of the implant, moving it together with the surrounding bone, by segmental osteotomy, to a better position so that it is possible to perform a satisfactory prosthetic rehabilitation.^{1-3,6,7}

This technique is derived from segmental osteotomies used in orthodontics and orthognathic surgery, which have been successfully used in dentistry for nearly 100 years.^{1,2,4} In segmental osteotomy technique for the relocation of severely malpositioned implants, it is essential to maintain the blood supply and stabilizing the implant bone block in the new position. The flap should be detached only from the buccal aspect, allowing the palatal (or lingual) periosteum to maintain vascular integrity, hence reducing the risk of necrosis.^{1,6} Other authors prefer to induce gradual movements by applying orthodontic forces or a distraction osteogenesis procedure to mobilize the block.^{8,9}

In a retrospective multicenter study, fifteen malpositioned implants relocated by segmental osteotomy technique were followed-up for different periods (01 to 15 years)¹⁰. Variables presented by the implant (survival rate and marginal bone lost), by surrounding tissues (aesthetic standards) and by the patient (discomfort, complications, and satisfaction) were

considered and the authors concluded that the relocation of the implant with segmental osteotomies could be an effective alternative to correct the position of the severely malpositioned implants, in a single surgical procedure. Other authors also reported acceptable long-term outcomes in terms of function and aesthetics.¹⁰

The surgical planning can be done with the assistance of computed tomography images to evaluate the distance of the implant to adjacent tooth root and surgical simulation on dental casts mounted on an articulator or tridimensional prototypes displaying a complete visualization of the movements required for the replacement of the implant, planning the amount of bone around the implant or the need of bone graft in some osseous gaps.^{3,7} For this, the surgical repositioning of the dental implant has the advantage of being a fast and minimally invasive treatment allowing the aesthetic and functional recovery of the implant in a single surgical procedure.^{1,10}

Conclusion

The dental rehabilitation using dental implants should be performed after orthodontic treatment combined or not with surgical procedures, and requires careful planning to the correct tridimensional positioning of the implant, permitting a satisfactory prosthetic finalization aesthetically and functionally. The segmental osteotomy technique for repositioning of dental implants is a minimally invasive and rapid resolution option that presents satisfactory functional and aesthetic results.

References

1. Stacchi C, Bonino M, Di Lenarda R. Surgical relocation of a malpositioned, unserviceable implant protruding into the maxillary sinus cavity. A clinical report. *J Oral Implantol* 2012;38(4):417-23.
2. Toscano N, Sabol J, Holtzclaw D, Scott T. Implant repositioning by segmental osteotomy: A case series and review. *Int J Periodontics Restorative Dent* 2011-Dec;31(6):e102-8.
3. Tremblay G Rehabilitation of surgically relocated integrated dental implants with and without bone morphogenesis protein-2. *J Oral Implantol* 2013;39(4):409-15.
4. Bell WH. Biologic basis for maxillary osteotomies. *Am J Phys Anthropol* 1973;38(2):279-89.
5. Bell WH, Schendel SA, Finn RA. Revascularization after surgical repositioning of one-tooth dento-osseous segments. *J Oral Surg* 1978;36(10):757-65.
6. Stacchi C, Costantinides F, Biasotto M, Di Lenarda R. Relocation of a malpositioned maxillary implant with piezoelectric osteotomies: A case report. *Int J Periodontics Restorative Dent* 2008;28(5):489-95.
7. Raghoobar GM, Visser A, Vissink A. Correction of a malpositioned endosseous implant by a segmental

- osteotomy: A case report. *Int J Oral Maxillofac Implants* 2005;20(4):627-31.
8. Ueki K, Marukawa K, Okabe K, Moroi A, Nakagawa K, Yamamoto E, *et al.* Esthetic improvement using conventional orthodontic devices after segmental osteotomy in treatment of malpositioned implants. *J Oral Maxillofac Surg* 2011;69(3):939-43.
 9. Oduncuoglu BF, Alaaddinoglu EE, Oguz Y, Uckan S, Erkut S. Repositioning a prosthetically unfavorable implant by vertical distraction osteogenesis. *J Oral Maxillofac Surg* 2011;69(6):1628-32.
 10. Stacchi C, Chen ST, Raghoobar GM, Rosen D, Poggio CE, Ronda M, *et al.* Malpositioned osseointegrated implants relocated with segmental osteotomies: A retrospective analysis of a multicenter case series with a 1- to 15-year follow-up. *Clin Implant Dent Relat Res* 2013;15(6):836-46.