

Correction of a Malpositioned Endosseous Implant by a Segmental Osteotomy: A Case Report

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A mandibular overdenture supported by 2 or 4 endosseous implants has been proven to be a reliable treatment modality for patients suffering from conventional denture problems. However, fabrication of an implant-retained mesostructure to support an overdenture is not possible in all cases. Malpositioning of implants is a common cause of failure in such cases. A case is presented in which a ball attachment caused pain and severe swelling of the floor of the mouth because of the lingual inclination of an endosseous implant. The lingual inclination of the implant was corrected by a segmental osteotomy. Six weeks later, prosthodontic treatment began, and the resultant overdenture supported by a Dolder bar was quite acceptable for the patient. INT J ORAL MAXILLOFAC IMPLANTS 2005;20:627–631

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It is well documented that an implant-supported overdenture can be an effective treatment modality for mandibular atrophy.¹ Most patients who have undergone such treatment report significant improvement in oral function and are very satisfied.² Various complications have been reported following the placement of endosseous implants, ranging from inflammation and hypertrophy of peri-implant tissues to implant loss and even fracture of the mandible.^{3–5}

Complications may occur at any stage between implant placement and fabrication of the prosthetic restoration; many even occur after prolonged follow-up.⁶ Most complications are minor, and many are avoidable. A well-known example of an avoidable

complication is malpositioning of an endosseous implant. As a result of inadequate planning, poor judgment, or losing one's orientation during surgery, implants may be placed in positions or at angulations that are less than ideal.³ Malpositioning of an implant can also be a result of a local deficiency of bone volume or quality, conditions that cannot always be anticipated preoperatively. As a consequence, there is an inherent risk of placing implants too far buccally, labially, or lingually or with too great a buccal, labial, or lingual inclination.

With regard to the interforaminal region of the mandible, a not-infrequently occurring complication is the placement of the implant in a position that is excessively lingual or with an excessively lingual inclination.⁶ This may cause irritation of the thin, mobile mucosa of the floor of the mouth and may make it unsuitable for prosthodontic purposes. Such malpositioned implants may need correction, particularly when they cause discomfort to the patient or interfere with the planned prosthetic rehabilitation. In the anterior maxilla, realignment of single implants with a segmental osteotomy has been reported.^{7–10} To date, no such reports have been reported with regard to malpositioned mandibular implants.

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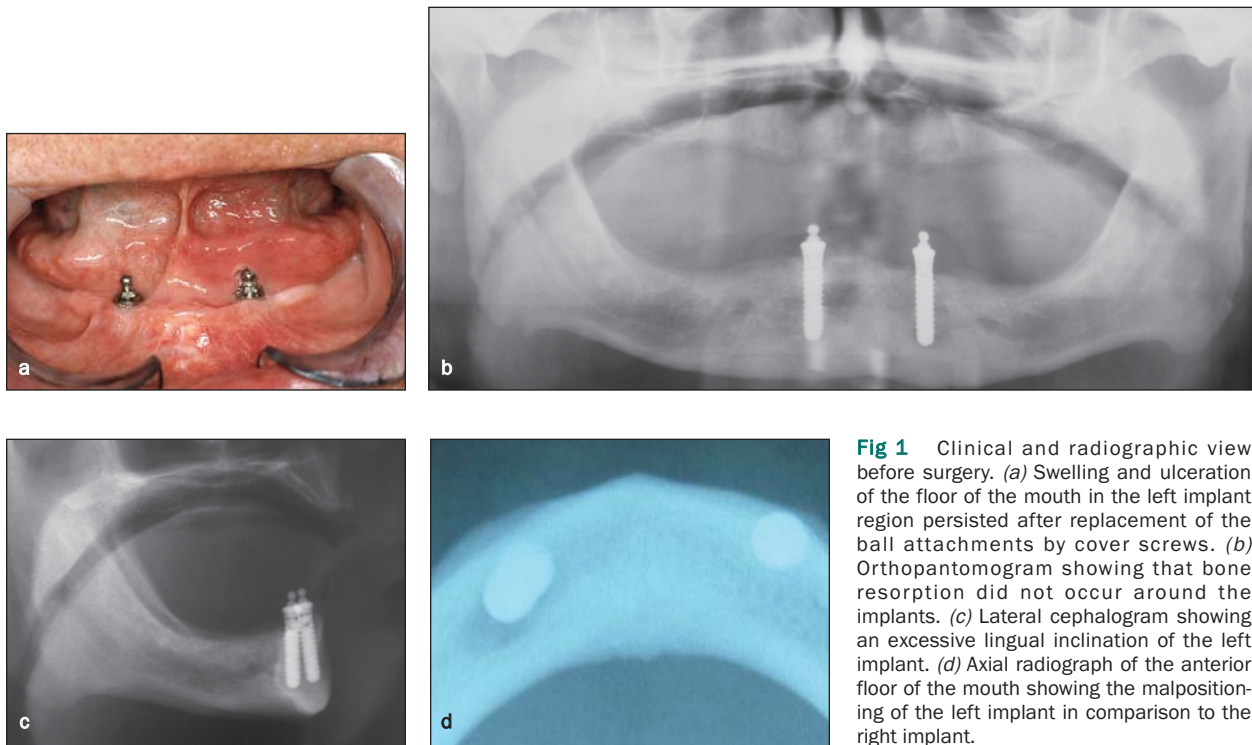


Fig 1 Clinical and radiographic view before surgery. (a) Swelling and ulceration of the floor of the mouth in the left implant region persisted after replacement of the ball attachments by cover screws. (b) Orthopantomogram showing that bone resorption did not occur around the implants. (c) Lateral cephalogram showing an excessive lingual inclination of the left implant. (d) Axial radiograph of the anterior floor of the mouth showing the malpositioning of the left implant in comparison to the right implant.

In this article, a case report is presented concerning a patient suffering from pain and swelling of the anterior floor of the mouth because of a malpositioned implant in the mandible. The patient was not able to wear his prosthesis. The excessive lingual inclination of the implant, which had been placed in the left canine region, was corrected with a segmental osteotomy.

CASE REPORT

A 59-year-old man was referred to the Department of Oral and Maxillofacial Surgery of the Groningen University Hospital for treatment of a malpositioned implant in the mandibular left canine region. In a private practice, 2 ITI implants (Straumann, Waldenburg, Switzerland) had been placed in the left and right canine regions of the edentulous mandible. The surgeon reported that no complications had occurred during the surgery. The implants were considered stable at the time of placement and became osseointegrated. After a healing period of 3 months, prosthetic treatment was started.

A Dolder bar with a clip attachment was planned to support the overdenture, but the clinician noted the excessive lingual angulation of the left implant. The inclination was such that the bar would have been located over the floor of the mouth. Therefore, it was decided to use ball attachments to retain the prosthesis. One week after placement of the prosthe-

sis, the patient was not able to wear the overdenture because of severe pain and swelling of the floor of the mouth in the left canine region. Even though the lingual part of the denture was removed, pain and swelling persisted. As the dentist was not able to fabricate an adequate overdenture for the mandible, he advised the patient to have the left implant removed and replaced by a new endosseous implant.

The patient refused this treatment, whereupon the dentist referred the patient for a second opinion. Clinical examination confirmed that lingual overangulation of the left implant had prevented the creation of a satisfactory prosthesis. The anterior floor of the mouth was swollen, especially in the area of contact between the mucosa of the floor of the mouth and the left ball attachment (Fig 1a). Radiographic examination revealed that no bone resorption had occurred around the implants and that bone height below the implant was sufficient to allow for surgical correction (Figs 1b to 1d).

An impression was made of the mandible, and cast surgery was performed. The implant segment had to be repositioned 4 mm buccally and 2 mm coronally to achieve the correct position (Fig 2a). On the basis of this positioning a surgical template was fabricated with the left implant in correct alignment (Figs 2b and 2c). The repositioned implant abutment on the surgical cast was registered in the template. The patient was scheduled for a local osteotomy to correct the angulation of the implant.



Fig 2 Cast surgery. (a) The malpositioned implant was realigned in the proper position. (b) A template was made on the cast with the malpositioned implant in the proper position. (c) The template containing abutments and screws. The template was used to ensure proper realignment of the left implant as well as to stabilize the osteotomized part.

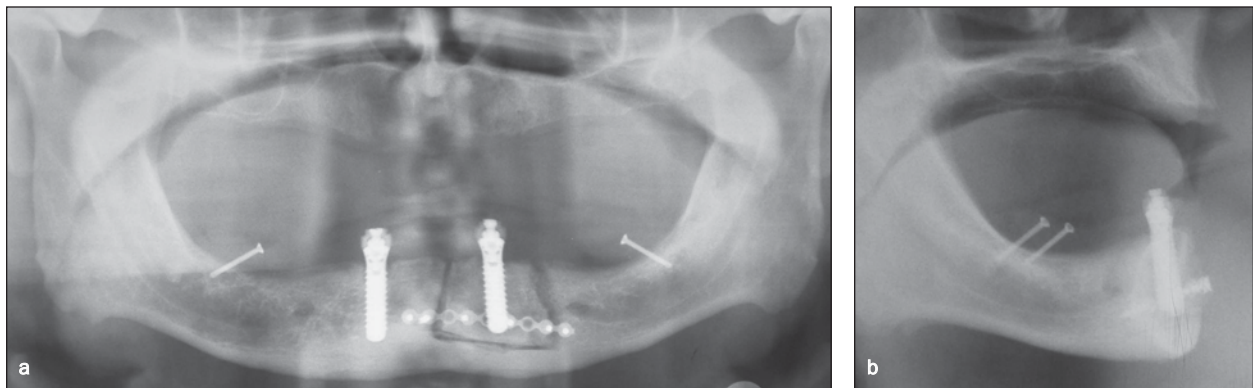


Fig 3 Radiographic images immediately postsurgery. (a) Orthopantomogram showing the osteotomy lines. The osteotomized part was fixed with a miniplate to the mandible. Stabilization of the segment was achieved by fixing the template to the implants (abutments) and jaw (screws). (b) Lateral cephalogram showing that the left implant is realigned.

The patient was treated under general anesthesia. The surgical site was infiltrated with a local anesthetic containing epinephrine as a vasoconstrictor. A horizontal incision was made in the buccal fold parallel to the ridge crest. A mucoperiosteal flap was raised to expose the mandibular ridge and identify the left mental foramen. Careful inspection confirmed that no bone resorption had occurred around the implants. Vertical cuts were made on each side of the implant but anterior to the left mental foramen (minimum distance between saw-cut and mental foramen was 5 mm) with an oscillating saw to a level of 2 mm below the apical part of the implant. Both saw-cuts were horizontally connected with the oscillating saw. Subsequently, the mobility of the segment was tested. Care was taken not to reflect the lingual mucoperiosteal flap, as survival of the segment was dependent on the preservation of this flap. The surgical template was fixed on the implants with abutment screws, forcing the segment with the left implant into the correct position. The surgical template was fixed with two 7-mm screws (Martin Medizin Technik, Tuttlingen, Germany). A 2-mm miniplate (Martin Medizin Technik) was fixed on the buccal side of the mandible (Fig 3). Bone particles harvested

in the chin region were placed in the space between the segment and mandible. The wound was sutured with Vicryl (Ethicon, Somerville, NJ).

A pressure dressing (elastic tape) was applied to the chin. The dressing was maintained for 5 days to minimize postoperative swelling and hematoma formation. The patient received a broad-spectrum antibiotic for 48 hours and 0.2% chlorhexidine mouth rinse for 2 weeks. No complications were observed postoperatively. Both subjectively and objectively, no change of sensibility in the chin and lower lip was noted. Six weeks after the surgery, both the miniplate and surgical template were removed under local anesthesia. Prosthodontic treatment was started, and a Dolder bar with clip attachment was fabricated. No swelling occurred, and no other complaints were noted during the 1-year follow-up period (Fig 4). The patient is very satisfied with his mandibular overdenture.

DISCUSSION

Placement of implants in the edentulous mandible is generally accepted as a predictable and biologically

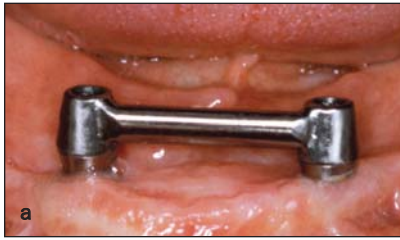
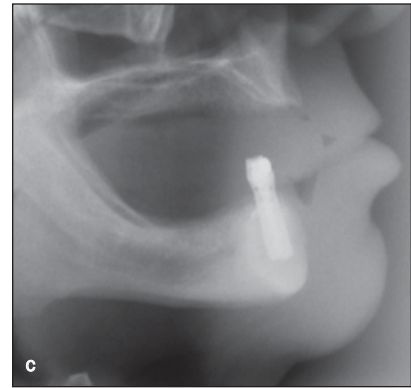
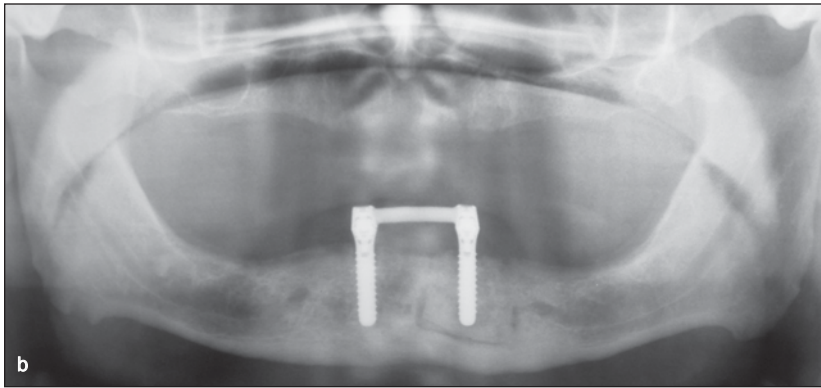


Fig 4 Clinical and radiographic view 1 year after prosthetic rehabilitation. (a) The repositioned implants could support a Dolder bar without causing swelling or pain of the anterior floor of the mouth. (b) Orthopantomogram showing the realigned left implant and the Dolder bar. (c) Lateral cephalogram showing that the osteotomized part has remained in its realigned position since healing.



sound procedure with a reasonably good prognosis. The procedure is not free of complications, however.³⁻⁵ In the present case, the reason for malpositioning of the implant may have been a result of the very large mouth opening of the patient. Commonly, the placement of implants is performed with the patient in a supine position. With an open mouth, the implants are placed perpendicularly to the ridge crest. Such a procedure may easily result in a lingual overtilting of the implants if the correct sagittal relation to the opposing occlusion is not verified. The patient should be asked to close his or her mouth to determine the inclination of the drill before the holes for the implants are drilled.

Simulation of the planned movement by model surgery helps visualize the horizontal, vertical, and rotational movements required to obtain the planned implant position, stabilization, and fixation.¹⁰ It can also reveal the need for bone removal, the osseous gaps created by surgery, and whether there will be need for grafting of the osseous defects. In this case, autologous bone grafts to fill the gaps created by surgery were harvested from the chin.

In the case presented, the angulation of the implant was unsuitable for prosthodontic purposes. In some cases, unfavorable angulation may be improved by the use of double casting for the prosthesis, ie, a primary casting plus an overcasting. Alternatively, a stock angulated abutment or even a custom-made component may be used. In the present case, this was not possible because of the lingual tilting of the implant, which might have been prevented by careful preoperative planning, including

detailed radiologic investigation and consultation with a prosthodontist.

In the present case, the patient refused to have the implant removed and asked for alternative treatment. Local osteotomy may be an alternative if there is sufficient bone beneath the apical part of the implant. In this patient, there was at least 5 mm of basal mandibular bone below the implant. When there is less basal bone beneath the implant, there is a risk of mandibular fracture. Furthermore, the floor of the mouth was very irritated and caused a lot of pain. Because a 1-phase implant system was used, covering the implant with mucosa would not result in pain relief. This would have been a solution in case of a 2-phase implant system, but here the complaints persisted after the ball attachment was removed. A technique to remove this kind of implant has been described.¹¹ However, there is always a risk of mandibular fracture, disturbed wound healing, and nonunion of the osteomized segments, among other complications.⁴

CONCLUSION

If properly planned and performed, placement of implants in the edentulous mandible is a predictable and reliable technique. In the case of malposition of an implant, a local segmental osteotomy of the area with the implant may be considered as an alternative treatment in cases where there is sufficient basal bone beneath the implant to allow for such a procedure.

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