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IP International Journal of Periodontology and Implantology

Journal homepage: https://www.ijpi.in/

Case Repot

Management and prevention of rare complication of mandibular fracture after inferior alveolar nerve transposition in edentulous atrophied mandible in implant dentistry: An unusual case report

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ARTICLE INFO

Article history:
Received 29-03-2023
Accepted 10-04-2023
Available online 22-04-2023

Keywords:
Dental implant
Inferior alveolar nerve
Nerve transposition
Mandibular fracture

ABSTRACT

Edentulism can be a debilitating handicap. Nowadays, most dental surgeons believe that the most basic restoration for the edentulous mandible should be an implant retained overdenture with two implants placed in the anterior mandible. Treatment options for edentulous mandible range from complete denture to implant supported fixed restorations implant retained and tissue supported overdentures, implant retained and implant supported over dentures and hybrid fixed prostheses or bone anchored bridges. With proper selection and treatment planning, using dental implants to support restoration replacing missing teeth can provide long lasting functional and aesthetic restorations. However, in atrophic mandible many problems can arise. In this rare case report, we are highlighting some of the challenges involved in management of atrophic edentulous mandible in a diabetic old patient with implant retained tissue supported overdentures, (IRTOD) which later required inferior alveolar nerve (IAN) trans positioning due to severely atrophic mandible and resulted in accidental mandibular fracture. The key to prevent these types of failures is proper treatment planning. With this article we want to enlighten some useful keys for preventing these kinds of failures.

1. Introduction

Mandibular fracture that occurs after inferior alveolar nerve transposition is extremely rare. Most of them are presented in the literature as case reports. When such a complication occurs, the case should be managed with previously reported cases and surgeon experience. The transposition of the inferior alveolar nerve is an advanced surgery in the field of implant dentistry that often requires special training. It was introduced first in 1977 for pain relief of denture pressure on superficially located mental nerves.[1] After the popularity of implants increased, this technique was re-introduced in order to increase implant length in the posterior mandible with insufficient space between the ridge crest and the inferior dental canal.[2] Complications are often focused upon the neurosensory alterations in the lower lip; however, mandibular fracture is rarely reported but is the major complication.[3,4] This event is iatrogenic; however, its management should be based on the principles of mandibular jaw fracture treatment.

This case report presents the surgical management of a diabetic old-aged patient with a mandible fracture from bed

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https://doi.org/10.18231/j.ijpi.2023.008

side trauma after a few weeks of inferior alveolar nerve transposition and placement of endosseous implants.

2. Case Report

A 75-year-old diabetic and hypertensive male patient visited the clinic with complain of looseness of lower denture and inability to eat food and speech problems. He had been wearing removable partial dentures in his upper and lower jaws since 15 years, along with a few fixed restorations in his upper front teeth with compromised form and function. He was very apprehensive towards implants. On intraoral examination, poor stability was noticed i.r.t mandibular denture and atrophic mandible with sharp alveolar ridges, no pain or soreness of underlying mucosa. (Figure 1)

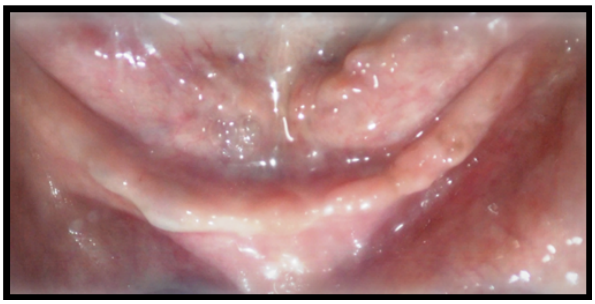


Fig. 1: Atrophic ridge

The patient was advised for OPG and CBCT scan to evaluate the amount of bone in the mandible and look for the positioning of the inferior alveolar nerve. After careful evaluation and motivation of patient, we planned for implant retained and tissue supported complete overdenture in mandible to maximize the area of support for prosthesis.

We placed two Nobel BioCare Active implants after one year (2016) in the lower anterior region between the mental foramina to take advantage of sufficient bone available due to the fact that mandibular anterior teeth are usually the last teeth to be lost. (Figure 2)

With this positioning, we could place implants away from the fulcrum line, also, in order to avoid denture rotation. The patient was given IRTOD in mandible uneventfully. After a few months, the patient expressed his willingness to implant retained fixed restoration in upper jaw also in place of removable partial denture.

8 months later (August 2017) 6 Nobel BioCare Active implants in maxilla were placed immediately after loading and after 3 months secondary stability was checked. Upon receiving satisfactory results, a permanent implant retained fixed prosthesis was given i.r.t 13, 14,15,16,17 and 24,25,26,27. Full mouth rehabilitation was done. (Figure 3)

After 3 months (November 2017) patient complained of slight soreness and discomfort while eating. Reinforced lower overdenture with titanium mesh was given to relieve the symptoms. (Figure 4)

Fig. 2: Implant retained overdenture

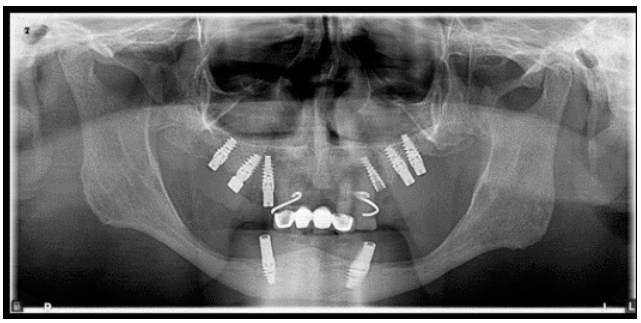


Fig. 3: Flapless freehand implants in maxilla

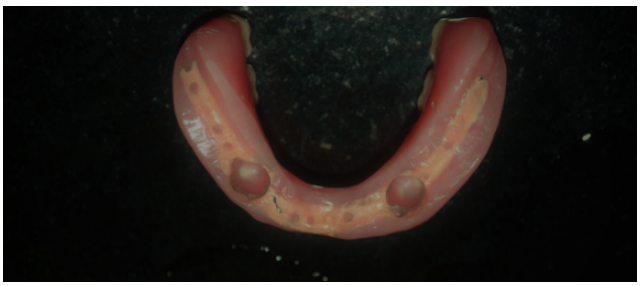


Fig. 4: Reinforced lower overdenture with titanium mesh

Owing to the fact that the patient had been wearing removable partial denture before, which was replaced by an implant retained a fixed prosthesis, so a changed occlusal pattern created more pressure along the lower IRTOD and resulted in faster bone resorption.

Soon after 6 months (May 2018) patient again visited the clinic with complain of severe discomfort along the lower alveolar ridge and pain while eating. We observed ulcers in mandibular buccal mucosa. OPG confirmed surfacing of the inferior alveolar nerve in the highly atrophic mandible. (Figure 5)

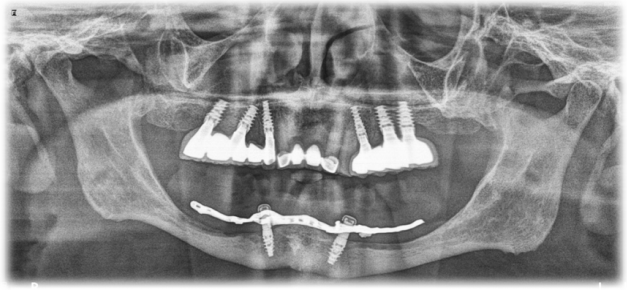
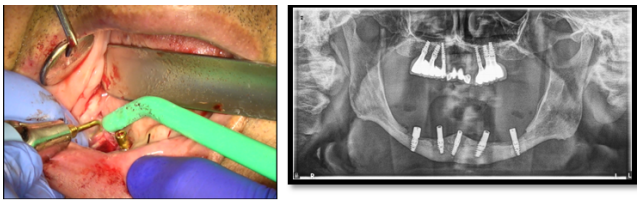


Fig. 5: Surfacing of inferior alveolar nerve

So we planned for Piezo assisted inferior alveolar nerve (IAN) trans-positioning along with bicortical implants in the posterior region to gain anchorage and three more implants in the lower front region. (Figure 6 6a,b)



a) b)

Fig. 6: a) Piezo assisted inferior alveolar nerve trans-positioning **b)** Three more implants

We explained about postoperative sequel of IAN trans-positioning and educated the patient about numbness in the lower lip, chin and adjacent area.

After 1 month, in June 2018 patient came up with severe discomfort and swelling near the lower left angle of the jaw with a history of bed side trauma to chin 2 days back. OPG revealed displaced mandibular body fracture, mesial to the distal implant placed on the left side. (Figure 7)

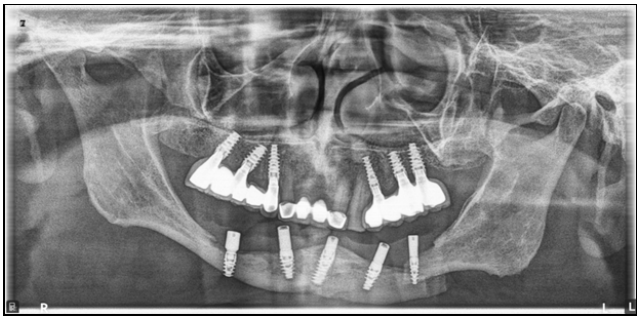


Fig. 7: Fracture of mandible

Chair side bone plating was done under local anaesthesia to approximate the displaced fractured segments and the distal implant was removed. (Figure 8)

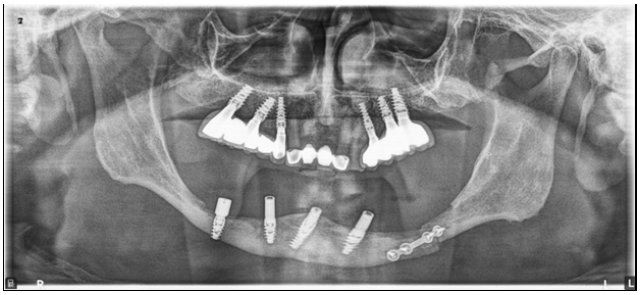


Fig. 8: Distal implant removed

After a month, the patient again complained of mobility in the lower jaw and difficulty with eating. OPG revealed displaced segments along the fracture line. Unstable mandibular movements and relative avascular cortical bone in diabetic patient caused screw loosening which resulted in displacement of fractured segments. (Figure 9)

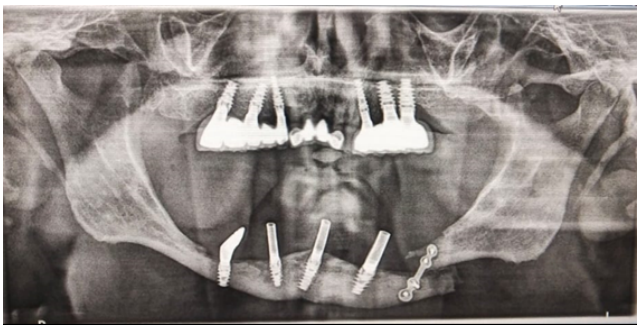


Fig. 9: Screw loosening leading to displaced mandible

We employed the principal of circum-mandibular wiring (splinting) to immobilize the proximal segment of the mandible and to stabilize the occlusion. This technique is usually indicated in the fracture cases of young children below 12 years of age to avoid injury to the developing tooth buds. Likewise, in edentulous patients, who also have a compromised blood supply, and no teeth to give intermaxillary fixation this technique is very helpful. So, on these lines, we extended the flange area of the prosthesis to achieve maximum stability. (Figure 10)

The patient was followed up regularly and shown poor neuromuscular control and persistent paraesthesia along the lower jaw region.

After about 6 months (Jan 2019) OPG showed unexpected positive remodelling along the fracture site, which further stabilized the occlusion and the patient was able to eat from the affected site, though paraesthesia was persistent. (Figure 11)

Though it was a mal-union, the patient was not having trouble while eating, so we did not try any intervention at this stage considering status of his bone and medical condition.

Fig. 10: Stabilizing the occlusion

Fig. 11: Positive remodelling

Regular follow-up was done to assess the situation of the lower jaw and occlusion. The 2-year follow-up OPG (Jan 2021) depicted positive remodelling and secondary bone healing. Occlusion was satisfactory along with stable soft and hard tissue architecture. Nerve healing also took place and sensations were regained in the lower jaw region over a period of 3 years. (Figure 12a,b)

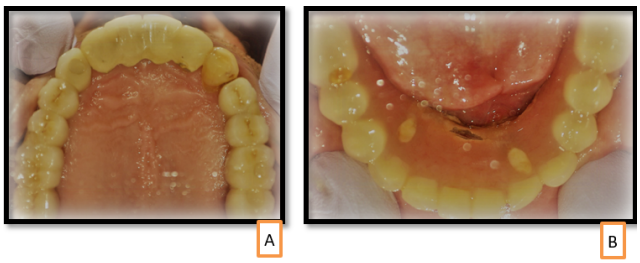


Fig. 12: a,b Stable occlusion

We have been very fortunate in this case that bone remodelling took place and occlusion was re-established even with a malunion of bones which was not anticipated in a diabetic old aged patient in an atrophied mandible. The patient was extremely cooperative during this sophisticated treatment, which yielded complimentary results against all odds.(Figure 13)

3. Discussion

Implant-supported prosthesis has become the first choice of treatment for many elderly edentulous patients owing to the comfort and quality of life with this treatment. With IAN transpositioning, implants can be placed in patients with atrophic mandible also, who were not considered ideal candidates for implant supported prosthesis earlier.

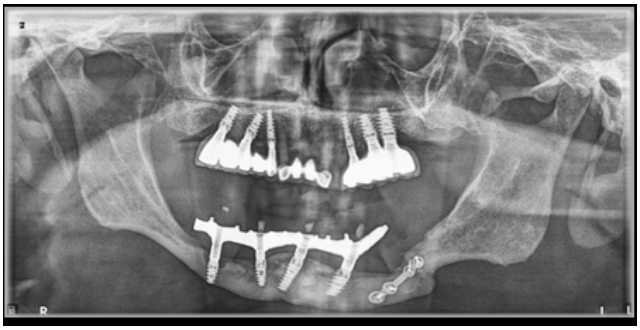


Fig. 13: Five years follow-up

After inferior alveolar nerve relocation, fracture of the mandible is mentioned as being rare; it is the most infrequent complication of inferior alveolar nerve transposition.[5] These kind of events happen in the jaws with narrow buccolingual dimensions along with lingual position of the inferior alveolar nerve. Another important measurement is the apico-basal distance of the mandibular canal from the mandibular inferior border. Using larger diameter implants adjacent to each other with the inferior alveolar nerve engagement by the implants can also weaken the compression band of the mandible. This can also serve as a contributing factor.[6]

The maximum amount of bone superior to the buccal bony window should be preserved for the anchorage of dental implants. If such requirements are not present, then bone grafting is recommended before the inferior alveolar nerve transposition.[7]

The surgeon should avoid larger diameter bicortical dental implants in jaws with smaller buccolingual and occluso-apical dimensions. The bridge design for the posterior mandible weakens the bone less than using three adjacent fixtures. Conservative bone removal is recommended in order to bring out the inferior alveolar nerve from the mandible instead of the larger buccal bony window.[8]

If the mandibular body fracture occurs during the inferior alveolar nerve transposition procedure, the dental surgeon should adhere to the principles of jaw fracture treatment.[9] One of the study stated that the construction of severely atrophic mandibles is an effective and reliable technique with dental implants in conjunction with IAN repositioning. Although neurosensory disturbances are one of the most common complications post-surgery, but they tend to resolve with time.[10] Repositioning of the inferior alveolar nerve would appear to be less invasive due to lower percentage of persistent neurosensory disorders are reported (1.56%) than transposition (12.12%). Though, both

the techniques offer a viable approach to implant placement in edentulous severely resorbed mandibles, presenting with predictable clinical and radiological results after 5 years of implant loading.[11] In present case too patient had atrophic mandible.

One of the studies showed uneventful healing process in 96 patients; however, in two patients spontaneous fracture was seen at the treated site on 3^{rd} and 4^{th} weeks postoperatively. The fractures lines appeared at a failed implant site. Both the cases were conservatively treated.[12]

In this case report, we consider various factors were responsible for mandibular fracture after IAN transposition and endosseous implant placement. The proportion of cortical bone is higher than cancellous bone in the atrophic mandible. During the IAN transposition, a significant amount of cortical bone was removed which further weakened the integrity of the atrophic mandible and continuous increased occlusal functional forces due to, implant retained fixed prosthesis in maxilla also added for fracture. Multiple implant placements with bicortical involvement also potentiate the stress within the mandible. In the end, proprioceptive changes and altered masticatory patterns due to persistent neurosensory disturbances and diabetic condition also played a role in delayed healing.

Final Considerations: - In order to prevent complications occurring in our case and considering the cases reported in the literature, we can consider that:-

1. Another feasible option for the planning of this case would have been the prior visualization for the need of all-on-4 implants in the lower jaw instead of IRTOD, and to keep the angulations and positioning of implants accordingly so that in future implants can be placed without any hassle and additional surgery. It would have saved some occlusal forces directed towards the mandible.
2. Load shearing system plates yielded good results in our case in stabilizing the fracture site and aided in the healing process.
3. Installation of short implants with a larger diameter for better distribution of functional loads, reducing the possibility of complications.

4. Conclusion

When a dentist performs an advanced dental implant procedure, the complicated conditions are unavoidable. Adhering to the principles of fracture, treatment is mandatory for the successful management of mandibular fracture after transposition of the inferior alveolar nerve.

5. Source of Funding

None.

6. Conflict of Interest

None.

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Cite this article: Gupta G, Gupta DK, Chandra N, Gupta P, Khairwa A. Management and prevention of rare complication of mandibular fracture after inferior alveolar nerve transposition in edentulous atrophied mandible in implant dentistry: An unusual case report. *IP Int J Periodontol Implantol* 2023;8(1):41-46.