

# Mandibular Body Fracture during Inferior Alveolar Nerve Transposition: Review of Literature

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## Abstract

Inferior alveolar nerve transposition is a useful adjunctive surgery in implant dentistry when there is insufficient bone between the ridge crest and the inferior dental canal. However, if this surgery is done carelessly, complications such as mandibular fracture and permanent lower lip numbness can occur. This article reports the first case of bilateral mandibular body fracture occurring during inferior alveolar nerve transposition. The surgical management of a complicated bilateral displaced mandibular body fracture is explained herein. A literature review of mandibular fracture after inferior alveolar nerve transposition is also presented. Adhering to the principles of fracture, treatment is mandatory for the successful management of mandibular fracture after inferior alveolar nerve transposition.

**Keywords:** Dental implant, inferior alveolar nerve, mandibular fracture

## INTRODUCTION

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

## CASE REPORT

The patient was a 51-year-old female who required mandibular posterior dental implants. A preoperative cone-beam computed tomography showed 7 mm of bone between the ridge crest and

the inferior dental canal. The surgeon decided to do a bilateral inferior alveolar nerve transposition concomitant with dental implant insertion.

In this patient, bilateral jaw fracture occurred after nerve transposition and bicortical insertion of dental implants (two on each side). The surgeon put the patient in intermaxillary fixation (IMF) with IMF screws and used only wire osteosynthesis near the fracture edges on the left side. The right-side fracture was treated by closed reduction.

In the postoperative radiograph, a wire was pulled through the bone, and proximal segments were rotated bilaterally in the superior and medial direction.

The patient came back 6 months later with malocclusion and mandibular angle depression. Malunion on the left side and nonunion with rounding of bony edges on the right

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side were observed. There was also a limitation in mouth opening (30 mm/MIO).

One week before surgery, botulinum toxin (Botox)<sup>®</sup> was injected into the masseter and temporal muscles to reduce the muscle forces and eliminate the need for coronoidectomy.

The extraoral submandibular incision was used to access the fracture sites. The malunion segments on the left side were osteotomized, and after the teeth were placed into the appropriate occlusion, internal fixation with a reconstruction plate was done. On the right side, there was a 25-mm gap between the two segments. Dental implants inserted in the left mandibular body prevented drill penetration into the bone adjacent to the fracture for osteosynthesis. A 5-hole titanium miniplate and a 5-hole titanium reconstruction plate were used for internal fixation. Cancellous chips were used to fill the bony gap on the right side. This gap was maintained using an 8-hole titanium reconstruction plate [Figure 1]. The postoperative period was uneventful.

## DISCUSSION

Fracture of the mandible after inferior alveolar nerve relocation is mentioned as being rare; it is the most infrequent complication of inferior alveolar nerve transposition.<sup>[5]</sup> This event happens in jaws with narrow buccolingual dimensions and lingual position of the inferior alveolar nerve. The apicobasal distance of the mandibular canal from the mandibular inferior border is another important measurement. Using large diameter implants adjacent to each other and the engagement of the inferior alveolar nerve by the implants can also weaken the compression band of the mandible. This can also serve as a contributing factor.<sup>[6]</sup>

The buccal cortical plate reaches its maximum thickness in the second molar region. The dimensions of the buccal window play

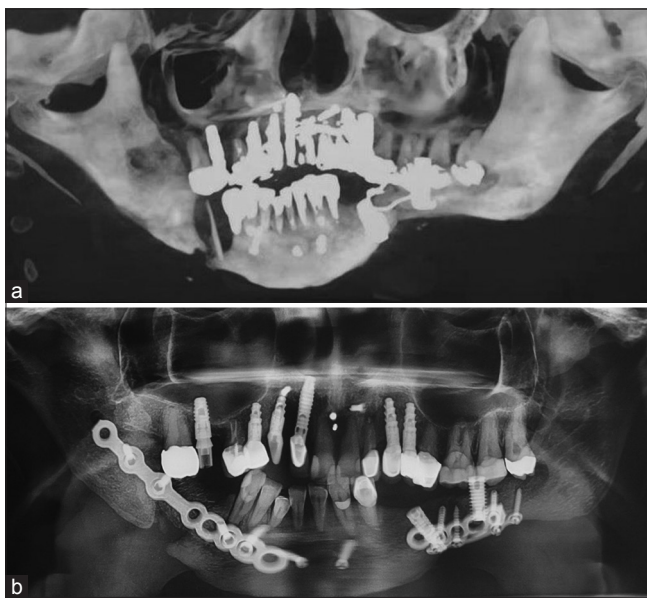
a vital role in this topic. The lowest limit of the bony window to the inferior mandibular border is recommended to be >7 mm,<sup>[7]</sup> and the window should measure 6 mm vertically.<sup>[8]</sup> The maximum amount of bone superior to the buccal bony window should be preserved for the anchorage of dental implants. If these requirements are not present, then bone grafting before inferior alveolar nerve transposition is recommended.<sup>[9]</sup>

The surgeon should avoid large diameter bicortical dental implants in jaws with small buccolingual and occluso-apical dimensions. Using the bridge design in the posterior mandible weakens bone less than using three adjacent fixtures. Conservative bone removal is recommended to bring out the inferior alveolar nerve from the mandible instead of large buccal bony window [Figure 2].<sup>[10]</sup>

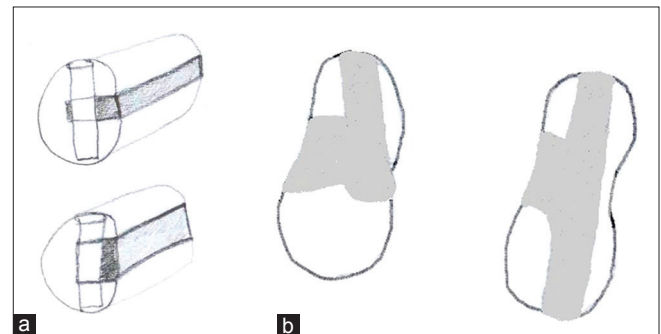
If mandibular body fracture occurs during the inferior alveolar nerve transposition, the surgeon should adhere to the principles of jaw fracture treatment.<sup>[11]</sup> If the orientation of the fracture line prevents displacement of the fragments, holding the teeth in appropriate occlusion for 4 weeks is sufficient.<sup>[12]</sup> The majority of fractures are delayed and occur in the 1<sup>st</sup> month after surgery with a radiolucent rim around the dental implants. The need to remove the loose implants causes the fracture to resemble comminuted fractures with bone loss. In such cases, the segments are not stable, and thus, internal fixation with a reconstruction plate is mandatory.

When a complication occurs that is beyond the expectations of the patient; the surgeon tries to manage it in the simplest possible way. However, in jaw fractures, the surgeon should adhere strictly to the principles of treatment to prevent further complications.

A search of the PubMed database for English-language articles on inferior alveolar nerve transposition/lateralization and mandibular fracture revealed only nine previous cases [Table 1].<sup>[10,12-17]</sup> All of them were unilateral events in partially edentulous patients, and all fractures except the case presented in this article had occurred late and not as an intraoperative complication. The term “late” is defined arbitrarily when describing surgical complications. In this study, a fracture occurring after patient discharge from the operating room, but before completion of prosthodontic fabrication and fixation was considered to be late. If a fracture occurs after the



**Figure 1:** (a) Bilateral mandibular fracture after inferior alveolar nerve transposition, (b) open reduction and internal fixation with bone grafting



**Figure 2:** Schematic pictures: (a) bicortical implants and large buccal bony window weakens the jaw; (b) slot technique with small buccal bony window not engaging inferior mandibular border

**Table 1: Demographic information of nine reported cases of mandibular fracture after inferior alveolar nerve transposition**

Number	Author and year	Right/left	Time to fracture (weeks)	Treatment	Number of cases
1	Kan <i>et al.</i> , 1997 <sup>[10]</sup>	Right	3	Titanium mesh	1
2	Karlis <i>et al.</i> , 2003 <sup>[15]</sup>	Right	4	Reconstruction plate	1
3	Luna <i>et al.</i> , 2008 <sup>[12]</sup>	Right	3	Reconstruction plate	1
4	dos Santos <i>et al.</i> , 2013 <sup>[13]</sup>	Right	3	60 days' IMF	1
5	Losa <i>et al.</i> , 2015 <sup>[14]</sup>	Right	4	Reconstruction plate	3
		Left	4		
			4		
6	Khojasteh <i>et al.</i> , 2016 <sup>[16]</sup>		4		1
7	Sharifi <i>et al.</i> , 2019 <sup>[17]</sup>	Left	2	30 days' IMF	1
Total					9

IMF=Intermaxillary fixation

osseointegration of the dental implants, it is not considered to be a complication of the inferior alveolar nerve transposition.<sup>[18]</sup>

The current case is the first bilateral fracture of the mandible after inferior alveolar nerve repositioning. Soft/liquid diet and IMF as a conservative treatment are recommended in incomplete mandibular fractures. Titanium meshes or reconstruction plates are devices used for internal fixation in displaced fractures. Free bone grafting may be needed if the mandible has severe atrophy.

**CONCLUSION**

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

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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