

# Duplicate Infraorbital Nerve - An Uncommon Anatomical Variation of Branch of Maxillary Nerve

*Running title: Duplicate infraorbital nerve*

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**Abstract:** *The main objective of the proposed case report is to explain the anatomy of the trigeminal nerve, its branches, variations and to apply the statement in producing excellent anaesthesia in head face and neck region. Two cases reported at the time of treatment of fractures with the presence of two infra-orbital nerve on one side of face. The patient did not give history of any paresthesia or symptoms with the eyes, nose, ear, teeth region in the past (the areas supplied by the trigeminal nerve). The nerve branches were properly segregated and fractured segments were reduced using titanium plates. The wound was closed and patient was put up on follow up for months. The patient hadn't complained about any loss of sensation postoperatively too.*

**Keywords:** Infraorbital nerve, Zygomatico complex fracture

## 1. Introduction

The trigeminal nerve (fifth cranial nerve or simply CN V) is a nerve responsible for sensation in face. It is considered as the largest cranial nerve among all. It is motor cranial nerve depicting functions such as chewing, swallowing, phonation. It has three major branches which further divides and have sub branches. The maxillary nerve (V2) is the second largest branch of the trigeminal nerve (V) - with mandibular branch (V1) being the first largest and ophthalmic (V3) being the smallest. The maxillary nerve is a purely sensory nerve among the three sub-branches. It supplies the maxillary teeth and gingiva, the adjoining part of the cheek, hard and soft palate mucosa, pharynx, nose, skin of temple, face, lower eyelid and conjunctiva, upper lip, labial glands, oral mucosa, mucosa of the maxillary sinus, middle ear as well as the mobile part of the nasal septum.<sup>1</sup> The maxillary branch of trigeminal nerve courses itself to various sub branches namely, middle meningeal, zygomatic, pterygopalatine, infra-orbital nerves. Infraorbital nerve as the name suggests opens itself from the infraorbital foramen and supplies regions. To discuss the innervation, the infra-orbital nerve is a direct extension of the maxillary division of the trigeminal nerve. It courses anteriorly through a canal within the bone of the orbital floor and provides superior alveolar nerves for the sensory innervations of the maxillary teeth (posterior teeth, premolars and molars except distal root of 1<sup>st</sup> molar).<sup>2</sup> The infraorbital nerve then emerges from the infra-orbital foramen and gives 4 branches, the inferior palpebral, the external nasal, the internal nasal and the superior labial branches, which supplies the skin of the eyelid, nose, cheek and upper lip. They are normally two in number in most of the population; one on each side. The main cause of sensation loss can be iatrogenic injury or accidental injury to the infraorbital nerve of the involved side. Injury may consist of an avulsion injury or partial/ complete disruption of the nerve. Computed tomography technology with triplanar three dimensional reconstruction software's and Magnetic resonance imaging are the two specialized imaging modalities which have enhanced our ability to recognize the course of the nerve through its bony canal till the area it has peripheral nerve branches. Injury may result in transient or permanent hypoesthesia, paresthesias, or neuralgias of the face. The distance from the infra-orbital

foramen to the inferior border of the orbital rim is from 4.6 to 10.4 mm<sup>3</sup>

The incidence of mid-face and zygomatic complex fractures presenting with fracture lines running through the inferior orbital foramen resulting in post-traumatic sensory disturbance has been studied and documented through the years. Road traffic accidents and injury are common events occurring in various places of India and areas in the world. The most commonly documented cause for such sensory disturbance is nerve impingement by fractured segments which have been reduced or fixed inadequately. It further adapts and leads to variation in the nerve course.<sup>4</sup>

The primary aim of stating the case report is to increase awareness of the variations in various branches of trigeminal nerve especially infraorbital nerve. So, that surgeon will be well aware about the changes and course of the sub branches and surgery will be performed accordingly to it.

## 2. Case Report 1

A 22 years old male presented with history of trauma in a road traffic accident 1 day back in Shree Narayana Hospital, Raipur. There was history of unconsciousness for an hour, history of bleeding from mouth. No history of bleeding from ear/nose, vomiting, convulsions. Preoperatively the patient didn't give any loss of sensation over the distribution of Infra orbital nerve. The patient was assessed and diagnosed with a bilateral Lefort II fracture with CLW frontal region. He was brought to the operating room for routine open reduction and internal fixation of the facial fracture. Fracture was accessed through maxillary vestibular approach. At the time of reflection of flap two distinct infraorbital foramina each with an independent neurovascular bundle were observed (Figure 1). With great care, the surgical dissection was carried out around both the main and duplicate neurovascular structures to better visualize this uncommon variation and also to prevent any iatrogenic trauma to both structures. The fracture was then carefully reduced and fixed using titanium plate, screws. It was successfully repaired and patient was put on follow up for months. Patient didn't complain of any immediate or latent postoperative loss of sensation over the distribution of infra-orbital nerve.

### 3. Case Report 2

Another patient 24 year old male reported with history of trauma due to bike skidding in RTA on the same day in Shree Narayana Hospital. There was no history of unconsciousness, no history of bleeding from nose/ear, no history of vomiting/convulsions. Preoperatively the patient denied any loss of sensation over the distribution of infraorbital nerve. Routine blood and radiographic investigations were carried out. The patient was diagnosed with zygomatico complex fracture of the left side. This Patient was also brought to the operating room for routine open reduction and internal fixation of the fracture under general anesthesia. Fracture was accessed through maxillary vestibular approach. At the time of reflection of flap in this case also again observed two distinct infraorbital foramina each with an independent neurovascular bundle (Figure 2). With great care, the surgical dissection was carried out around as same in the above case. The fracture was then carefully reduced and fixed using reconstruction titanium bone plates and screws. The wound was closed with sutures. The patient was kept on liquid diet for a week and discharged. Periodic follow up visits were noted down. Patient did not complain of any immediate or latent postoperative loss of sensation over the distribution of infraorbital nerve later on. The fractured segments healed down properly with passing time.

### 4. Discussion

Adequate knowledge of neurovascular bundles during facial head and neck surgeries is important to guide the surgeon to properly dissect and avoid injuries to these vital structures. Infraorbital nerve has been extensively investigated regarding its location, its origin from the canal, duplication of its foramen and the neurovascular bundles. Previous report of duplicated infraorbital nerve has been described by Kuvat et al., in their study.<sup>5</sup> Our case report presents two different cases of variation of infraorbital nerve. Bilateral involvement of the variation of various branches of the maxillary nerve hasn't been reported till date.

The incidence of mid-face and zygomatic complex fractures presenting with fracture lines running through the inferior orbital foramen resulting in post-traumatic sensory disturbance has been well studied and documented through the years.<sup>1</sup> Surgically relevant intraoperative anatomical landmarks can be useful because of the complex regional anatomy encountered during transmaxillary approaches to the anterior skull base.<sup>6</sup>

### 5. Conclusion

The case report concludes the information of two patients on the anatomy and variations of the maxillary nerve and its branches. Two cases reported with presence of double infraorbital nerve on one side. The mentioned variations are often the cause of anaesthesia failure or surgical complications. A thorough understanding of the anatomy and the variations of the nerve will allow surgeons for careful planning and implementation of anaesthesia and also

surgical procedures involving the maxillary nerve and its branches.

### 6. Acknowledgement

Shree Narayana Hospital, Raipur

### 7. Conflict of Interest

There were no conflicts of interest present.

### References

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