

Status and Management of Nerves in Strategic Locations of Facial Fractures

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Abstract: Aims: Pre-operative evaluation, recognition, avoidance and management of nerve injuries pre-operatively and intra-operatively. Effective steps taken to reduce the injury and to release the entrapment if any. Materials and methods: A total of 192 cases have been studied for 10 months period from February 2018 till November 2018. 172 patients were male and 20 patients were female. All these cases were been evaluated for head injuries associated injuries and nerve injuries pre-operatively if any and intra-operative corroboration and avoidance of nerve injuries. Patient underwent Open Reduction Internal Fixation (intra oral approach-104, Extra oral approach-88) Following nerves were taken into account. In cases of fracture Mandible 1) Marginal mandibular nerve, 2) Inferior alveolar nerve 3)Cervical branch of facial nerve 4) Infra orbital nerve and frontal branch of facial nerve in cases of fracture zygoma and maxilla. There is no conflict of interest. Consent was obtained from all patients. Result: A total of 192 patients with cranio-maxillofacial trauma referred to our center from February 2018 till November 2018 with mean age of 36.56 ± 10.65 (ranging from 18 to 60). Among the patients 172 (89.6%) were men and 20 (10.4 %) women. Motor vehicle accidents were the most common mechanism of injury for maxillofacial fractures followed by assault trauma, fall and sport trauma. The demographic and clinical characteristics of the patients are summarized in Table 1. Frequency of nerve injuries was 5.7 % (11patients). Regarding facial nerve the most common involved branch was frontal branch reported in 5 (1%) patients. Regarding trigeminal nerve the inferior alveolar branch was the most common involved branch reported in 4 patients (%) followed by infraorbital branch in 3 (27.2%). The most prevalent fracture occurred in mandible followed by zygomatic bone. The majority of patients with nerve injury were 18-55 years old (Table 3). Open reduction intra-oral approach was performed in 104 (54.17%) patients and extra-oral approach in 88 patients (22.4%). Conclusion: 1.Pre-operative and postoperative evaluations of facial and trigeminal nerves are very important especially in the region of face in the era of evidence based medicine and consumer era. 2. The avoidance of iatrogenic injuries and management of injuries of these nerves if detected early are important as a part of surgery is stressed in this paper.

Keywords: Nerve injuries, Entrapment, Release, Neurosensory dysfunction (NSD), Repair

1. Introduction

Cranio-maxillofacial traumas are common injuries in patients referring to emergency departments and needs special care because of head injuries. Cranio-maxillofacial trauma may occur on the upper face, midface including LeFort I, LeFortII, LeFort III, nasoethmoidal complex (NOE) or zygomaticomaxillary complex (ZMC) and on the orbital floor^{1,2}. Based on the type of accident the most common bone fractures are nasal bones, mandible, and the zygoma³. In developing ed countries the leading cause of maxillofacial trauma is road traffic accident followed by assault, stumbling or falling from height, sports and industrial accidents, however in developed countries the most common cause of maxillofacial is assault^{4,5}. Cranio-maxillofacial fractures may involve nerves and lead to some complications such as paresthesia and neurosensory dysfunction (NSD). The NSD may be persistent because of surgical manipulation, surgical dissection, or a combination of these factors⁶. The aim of this current study was to document and evaluate the frequency of nerve injuries pre-operatively and management of injuries of these nerves if detected early in patients with cranio-maxillofacial trauma.

Aims

- 1) Pre-operative evaluation, recognition, avoidance and management of nerve injuries pre-operatively and intra-operatively
- 2) Effective steps taken to reduce the injury and to release the entrapment if any.

2. Materials and Methods

192 cases have been studied for 10 months period from February 2018 till November 2018. All these cases were been evaluated for head injuries associated injuries and nerve injuries pre-operatively if any and intra-operative corroboration and avoidance of nerve injuries. Patient underwent ORIF(intra oral approach-104,Extra oral approach-88) Following nerves were taken into account

In cases of fracture Mandible

- 1) Marginal mandibular nerve
- 2) Inferior alveolar nerve
- 3) Cervical branch of facial nerve
- 4) Infra orbital nerve and frontal branch of facial nerve in cases of fracture zygoma and maxilla.

There is no conflict of interest. Consent was obtained from all patients.

3. Result

A total of 192 patients with cranio-maxillofacial trauma referred to our center from February 2018 till November 2018 with mean age of 36.56 ± 10.65 (ranging from 18 to 60). Among the patients 172 (89.6%) were men and 20 (10.4 %) women. Motor vehicle accidents were the most common mechanism of injury for maxillofacial fractures followed by assault trauma, fall and sport trauma.

Frequency of nerve injuries was 5.7 % (11 patients). Regarding facial nerve the most common involved branch was frontal branch reported in 5 (1%) patients. Regarding trigeminal nerve the inferior alveolar branch was the most common involved branch reported in 4 patients (%) followed by infraorbital branch in 3 (27.2%). The most prevalent fracture occurred in mandible followed by zygomatic bone. The majority of patients with nerve injury were 18-55 years old. Open reduction intra-oral approach was performed in 104 (54.17%) patients and extra-oral approach in 88 patients (22.4%).

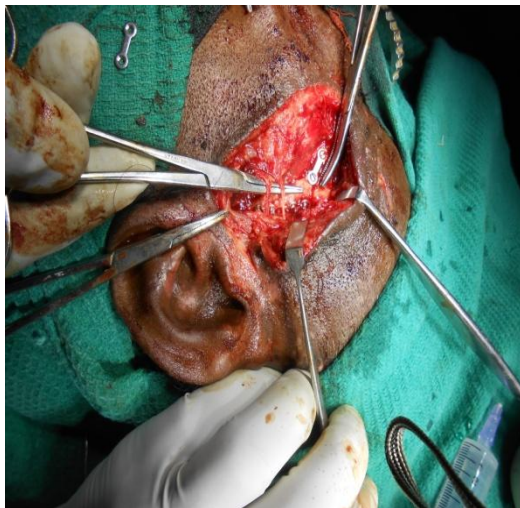


Figure 1 (A): Frontal nerve injury at the site wrinkles right side of the of zygoma fracture



Figure 1 (B): Post-op picture showing loss of right side of the forehead



Figure 1 (C, D): Post-op picture after frontal branch of facial nerve was repaired



Figure 2 (A): Loss of wrinkle left side of forehead



Figure 2 (B): Patient is able to close his eyes



Figure 2 (F): After suture removal. Patient is being planned for nerve repair at a later stage



Figure 2 (C): CT facial bone showing zygomatico complex comminuted fracture

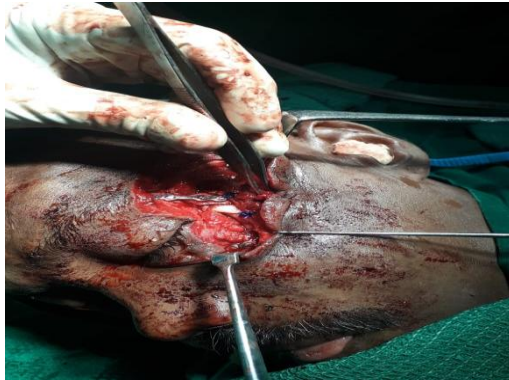


Figure 2 (D): Intra-operative where three frontal nerve branches were crushed



Figure 2 (E): Post-op picture



Figure 3 (A): Pre-op picture

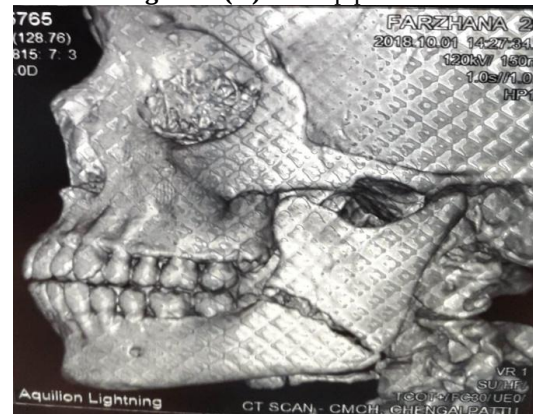


Figure 3 (B): CT facial bone showing fracture left ramus of mandible



Figure 3 (C): Externally assisted intra Oral approach done to avoid injuries to Marginal mandibular nerve

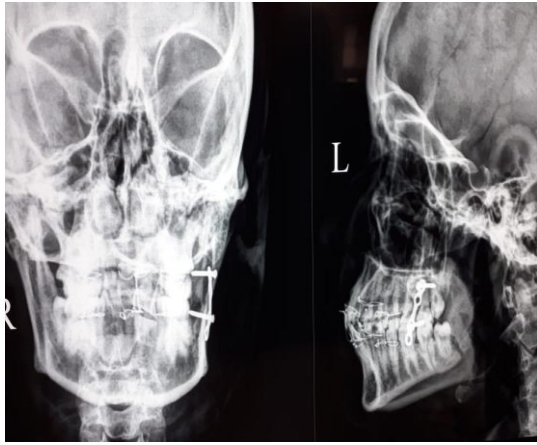


Figure 3 (D): Post-op X-ray skull AP and oblique view



Figure 3 (E): Post-op picture

4. Discussion

Why is the study?

Previous studies indicated that NSD occurs in near to 8-66.7% of patients with mandibular fracture and 15-46% with midface fracture. Moreover, other studies signified persistent maxillofacial traumas lead to sustained NSD that associated to functional sequel and complications in daily activities. The purpose of this study was to document and evaluate the frequency and management of nerve in strategic locations associated with cranio-maxillofacial trauma among the local population.

This information will help to highlight the magnitude of problem and the surgeons has to focus on the management of these nerve injuries as they are often not addressed following the treatment of cranio-maxillofacial fractures

In this study of 192 cases from Dec 2017 to Feb 2019 majority of the cases where due to RTA. Most of them are productive age group from 20 years -60 years, majority are associated with head injury. Hence neurosurgical clearance was obtained in all cases. Nine patients had associated nerve injuries and two patients had intra-operative nerve injuries(out of which one patient was operated elsewhere and one patient in our department.

Most commonly included nerve injuries were

- 1) Marginal mandibular nerve
- 2) Inferior alveolar nerve

- 3) Frontal nerve
- 4) Cervical branch of facial nerve

Marginal mandibular nerve injuries can be pre-operative and intra-operative. Intra-operative may be due to manipulation or dissection. This is avoided by intra oral exposure and also using nerve locator.

- Frontal nerve: Iatrogenic injuries are common and can be prevented by appropriate exposure and avoidance.
- Inferior alveolar nerve: Injuries can be pre-operative and intra-operative. Intra-operative injuries are due to traction. This is avoided by wide intra oral exposure.
- Infra orbital Nerve: Usually occurs when there is a fracture closer to the infra orbital foramen. The nerve has to be released otherwise there will be hypoaesthesia of the upper lip.

5. Conclusion

Majority of the nerve injuries following cranio-maxillofacial trauma have to be looked for pre-operatively and documented in the era of evidence based medicine. Intra-operative injuries can be avoided. If nerve injuries are detected intra-operatively primary repair/ release of nerves in entrapment at the fracture sites can be done.

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