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Outcomes Of Early And Delayed Intervention Of Maxillofacial Trauma

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Abstract:
Background*: Maxillofacial trauma is routinely evaluated on the basis of high and low velocity injuries, types of fractures in the literature. On the other hand, we have evaluated them on the basis of timing of surgery after trauma and their outcomes. In India RTA (Road traffic accidents) scenario is quite different from other countries. The highway traffic consists of a variety of vehicles from a cyclist, a two-wheeler, a four-wheeler to a heavy loaded truck. Animals like cows and dogs frequent the highways. Hence, we have classified the patients based on Single jaw and Panfacial fractures with or without the presence of extensive soft tissue injuries.*
Materials and Methods*: In this retrospective record-based descriptive study, 200 patients that were treated at Sri Aurobindo Hospital between January 2023 to July 2024 for maxillofacial trauma were reviewed. Of which 176 patients were surgically operated, averaging 30 years of age and ranging from 12-70 years. For the purpose of our study these 176 patients were categorized into two groups, first of single jaw fractures(108 patients) and second of Panfacial fractures (68 patients). Single Jaw fractures were further divided as mandibular (84 patients); maxilla & zygomaticomaxillary complex fractures (24 patients). These were further evaluated and categorized as those patients who were treated within 72 hours (Early) and after 72 hours (Delayed) following injury. All patients of both the groups were treated with open reduction and internal fixation. Individual complications that of soft tissue dehiscence, plate/bone exposure, bone graft rejection, oro-antral/palatal fistula, non-union of fractured segments, infections were analyzed. These complications were again assessed on the basis of their timing; those occurring within 72 hours and those after 72 hours.*
Results*: When each type of complication was compared and evaluated, there was significantly more complication noted among delayed group than in early group.*
Conclusion: *The restoration of the aesthetics and functionality of the face, post-trauma is a critical and an arduous task. As the anatomical complexity of the face must be addressed, timely intervention to achieve optimal functional and aesthetic outcomes is pertinent. Thus, the treatment should be done at the earliest when feasible.*
Key Word: *Maxillofacial Trauma, road Traffic accidents, Head Injury, mandible fractures, panfacial trauma, early intervention*

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I. Introduction

Trauma is one of the leading causes of mortality in humans. The early identification of the nature of injuries is crucial for the patient management. The primary cause of maxillofacial trauma in developing countries are road traffic accidents. Assaults due to interpersonal violence, fall from height also contribute to facial injuries.

The introduction of high-speed engines in two-wheelers, alcohol addiction, lack of sufficient infrastructure, disproportionate increase in two-wheelers and drivers not abiding by traffic rules are the major contributing factors in maxillofacial trauma in India.

Concomitant injuries occur in about 16-35% of cases with maxillofacial injuries.[1] Due to high velocity impact these could be long bones, abdominal or head injuries.

The optimal timing of repair of maxillofacial trauma remains a source of debate in the literature as well as among maxillofacial surgeons. There is a large amount of evidence to support the thought of early reduction and fixation for decreasing post-operative complications.[2] However, equally there are evidences supporting that the early or delayed intervention may not make any difference.

Oftentimes, the timing of reduction and early intervention is beyond the control of the surgeon as maxillofacial traumas are associated with head injuries or other concomitant injuries that cause a delay in the treatment.

The primary aim of this retrospective study is to evaluate the outcomes of early and delayed intervention of maxillofacial trauma.

II. Material And Methods

The clinical records of 200 patients that were treated at Sri Aurobindo Hospital between January 2023 to July 2024 for maxillofacial trauma were reviewed. Those patients who required conservative treatment and children below 12 years of age were excluded from the study. Thus all 176 patients who were surgically operated were included in this study. Of our 176 patients, 170 were male and 6 were female, averaging 30 years of age and ranging from 12-70 years.

For the purpose of our study these 176 patients were categorized into two groups, first of single jaw fractures(108 patients) and second of Panfacial fractures (68 patients). Single Jaw fractures were further divided as mandibular (84 patients); maxilla & zygomaticomaxillary complex fractures (24 patients).

These were further evaluated and categorized as those patients who were treated within 72 hours (Early) and after 72 hours (Delayed) following injury. All patients of both the groups were treated with the same protocol, open reduction and internal fixation.

Individual complications that of soft tissue dehiscence, plate/bone exposure, bone graft rejection, oro-antral/palatal fistula, non-union of fractured segments, infections were analyzed. These complications were again assessed on the basis of their timing; those occurring within 72 hours and those after 72 hours.

III. Result

The Study was conducted with the aim to evaluate the outcomes of early and delayed intervention of maxillofacial trauma. A total of 176 patients met the criteria to be included in the study of which 108 patients were categorized as Single Jaw fractures and 68 patients were categorized as Panfacial fractures.

All patients were evaluated on the basis of their timing of definitive treatment i.e. within 72 hours (Early, 36%) and after 72 hours (Delayed, 64%) following injury. The clinical diagnosis was made on the basis of clinical presentation, physical examination and imaging. All patients were treated by Open reduction and internal fixation under general anesthesia and by the same team of oral and maxillofacial surgeons.

40 patients with Single Jaw fractures were treated within 72 hours (Early) of initial injury and 68 patients were treated after 72 hours (delayed) of the initial injury. Similarly, 23 patients with Panfacial fractures were treated within 72 hours and 45 patients after 72 hours.

The post-operative complications were evaluated as within 72 hours of surgery and after 72 hours of surgery.

In single jaw fractures only 1 patient reported with post-operative complication within 72 hours and 7 patients after 72 hours of surgery. While in panfacial group 5 patients reported with complications within 72 hours of surgery and 10 patients reported after 72 hours of surgery.

Assessment of the complications revealed that 6 patients (3%) in the early Group and 17 patients (10%) had post -operative problems among the total 176 patients.

Soft tissue dehiscence and suture dehiscence constituted 4.5%(8) of all complications where 4 patients were in the early treatment group and 4 were in the late group. Post-operative infection was present in 3.4% (6) patients where only 2 patients were from the early treatment group and 4 from delayed group. Nerve injuries was observed in 6.25% (11). They were among the same patients who also presented with other complications mentioned above. Among them 2 were in early group and 9 were in delayed group.

All the following complication were observed only in the delayed treatment group. Plate/bone exposure in 2.8%(5 patients) ,Bone graft rejection in 0.56% (1 patient), Oro-antral/palatal fistula in 1.13 %(2 patients), non-union of fracture segments in 0.56%(1 patient), ophthalmic complications 0.56%(1 patient) were observed.

When each type of complication was compared and evaluated, there was significantly more complication noted among delayed group than in early group. (Fig 1)

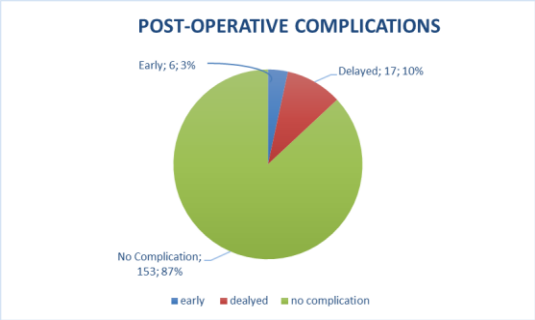

Fig 1 Post-operative complications

IV. Discussion

Road traffic accidents are one of the frequent causes of maxillofacial injuries. These can be either high-impact or low impact injuries. Fractures that involves both hard and soft tissue loss are of special challenge to the clinicians. Various protocols have been proposed in the literature[3] that focus on extensive injuries with hard and soft tissue loss, presence of infection, multiple foreign body contamination etc. The timing and approach to these cases is not clearly mentioned in the literature.

Generally, facial injuries resulting from high-velocity trauma can present significant challenges for healthcare providers. The management of these complex injuries has been a subject of ongoing debate with researchers exploring the optimal timing and approach for treatment. In a meta-analysis, Bhattacharya[5] concluded that immediate closure of facial injuries should be the preferred approach, followed by secondary closure of complex tissues. This recommendation aligns with the general principles of trauma management, where the preservation of vital structures and the prevention of complications are paramount. As with all trauma injuries, the management of high-velocity maxillofacial injuries requires meticulous attention to detail.

Our study does not specify whether the wounds were contaminated or clean as emergency treatment is provided to all patients. In cases where extensive lacerations & contaminations were present, the patients were treated immediately in the emergency department. The wounds were debrided (mud, stones, pebbles, plastics, etc.), trimming of macerated tissue or any infected tissue was done to achieve clean and healthy margins. Single layer stay sutures were placed until the patient could be taken up for definitive surgery. Thus, the contaminated wounds were converted into clean wounds within 2 hours of presenting in the emergency department. Prophylactic antibiotics were administered to keep these wounds infection free.

The patients often present with a myriad of co-morbidities and associated injuries that can significantly impact the timing and approach of surgical intervention. One of the most significant factors leading to delayed definitive treatment in our cases was the presence of head injury. Also, the fracture of long bone or blunt injury to the abdomen required multidisciplinary treatment approach, further delaying the definitive management of the maxillofacial injuries.

Gaelen B. et al[5] in their study have discussed the complications related to delayed treatment of maxillofacial trauma. The majority of injuries in their study were mandible fractures, rest were panfacial trauma. The circumstances that led to delayed treatment in their geographical areas were due to lack of surgeons and delay in transfer from rural districts. They have reported that in the group of patients with delayed treatment, 81% presented with complications whereas only 19% complication rates was observed in the early treatment group. Contrary to the previous study, Daniel Oren et al[4] discusses about the critical revascularization period during delayed treatment that can contribute to improved healing and decreased post-operative complications. However, the above study was conducted on high velocity injury patients such as gun-shot wounds, missile injuries and improvised device explosions.

Vidya et al[6] in their study enumerated a few complications associated with fracture healing (infection, non-union, mal-union), fixation devices, nerve injuries and ophthalmic complications. Secondary complications like post trauma facial deformities, temporomandibular problems and in children the growth of face being affected has also been mentioned.

When we study the complications of facial trauma, the cause and extent of the injuries is a significant contributing factor. In our study, out of 176 patients post operative complications, 3%(6 patients) were observed in the early group and 10%(17 patients) were in the delayed group.

It was observed that in early group, four patients reported with dehiscence of the wound, among whom two patients had soft tissue loss pre-operatively. Two patients with infection which were successfully managed within a week before discharge. [Fig. 2]

Fig 2 Patient operated in Early group

In the delayed group, four had post-operative infections which were managed by targeted antibiotic regimen. Five patients who had plate exposure post-operatively, had presented with soft tissue avulsion injuries pre-operatively in the fractured region. All these cases were secondarily managed by resuturing (advancement flaps) and intraoral dressings (Perio-pack dressings).

one patient was a non- compliant smoker in whom non-union of mandible was observed who was lost to follow up. Smoking proves to be a contributing factor for wound healing. Another case of comminuted mandible fracture treated with bone graft had graft rejection. Two of the patients had post-operative palatal fistula due to delayed reduction of palate. These were corrected through secondary procedures successfully.

One patient within the delayed group also presented with persistent diplopia which was not resolved post-operatively (1 month follow up). This patient was taken up for the procedure around 12 days after initial trauma. Hence in cases of orbital trauma it is advisable to perform the definitive procedure early for the better prognosis.

Nerve injuries are of common occurrence in pan facial fractures. Due to multiple fractured segments/communition, the most common type of injury is neuropraxia and rarely neurotemesis. In our study, nine patients in delayed and two in early group had paraesthesia, mostly involving infraorbital nerve(9) and 2 had supraorbital or supratrochlear involvement. They were managed surgically and medically and kept on follow up. The recovery was better in the nerves which had neuropraxia type of nerve injury.

Occlusion was assessed in all patients and no complications post operatively was observed. One of our patients with various systemic complications was rendered unfit for general anaesthesia in the initial phase and could not be treated till 12 weeks. The delay of 12 weeks had resulted in mal-union leading to severe derangement of occlusion as well as facial deformity. The segments were refractured to mobilize the bones. Anatomical reduction and Rigid fixation was done to achieve bilateral stable occlusion. Though he received delayed treatment, he did not present with any of the above mentioned complications.[Fig.3,4]

Fig 3 Patient operated in Delayed group with red arrow indicating head injury

Fig 4 Patient operated in Delayed group

The study has demonstrated more number of complications in delayed intervention group than the early group. Thus, we would like to emphasize that the treatment provided in the early days definitely give less complications and better outcomes.

V. Conclusion

Maxillofacial injuries resulting from road traffic accidents present a unique challenge in their management. The delay in treatment is often due to concomitant injuries and the patient's unstable general condition, rendering them unfit for general anaesthesia. The fact that early intervention can increase the overall risks faced by these patients cannot be over looked. Hence postponing treatment in view of systemic circumstances may prove advantageous for the patient. However restoration of the aesthetics and functionality of the face, post-trauma is a critical and an arduous task. As the anatomical complexity of the face must be addressed, timely intervention to achieve optimal functional and aesthetic outcomes is pertinent. Thus, the treatment should be done at the earliest when feasible.

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