

## A Prospective Study on the Analysis and Distribution of Panfacial Fractures at Patna Medical College Hospital, Bihar, India

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### Abstract:

**Background:** Panfacial fractures, resulting from high-velocity impacts, present significant diagnostic and management challenges due to their complex nature. This study aimed to explore the patterns, clinical presentations, and treatment outcomes of panfacial fractures, particularly in comparison to other maxillofacial injuries.

**Methods:** A prospective study was conducted at Patna Medical College Hospital, Patna, India. It included patients with simultaneous fractures of the upper, middle, and lower third of the face. Exclusions were isolated fractures, medically compromised patients, and non-consent. Treatment methods varied from conservative to Open Reduction and Internal Fixation (ORIF), with data collected on patient demographics, injury causes, treatment methods, time to surgery, and hospital stay. Statistical analysis was performed using SPSS version 21.0.

**Results:** The study comprised 50 patients, with a significant majority (60%) aged 18-40 years and predominantly male (92%). Road traffic accidents were the leading cause (82%), with a notable lack of safety gear usage (90%) and high alcohol consumption (64%). Treatment varied, with 21% requiring invasive airway management. The average time to surgery was nine days, with an average hospital stay of 13.9 days. Surgery duration for panfacial fractures averaged 4 hours and 26 minutes.

**Conclusion:** Panfacial fractures predominantly affect young males and are often associated with lifestyle risks like not using safety gear and alcohol consumption. These fractures demand resource-intensive care, with longer hospital stays and surgery times compared to other maxillofacial injuries.

**Recommendations:** Public health interventions targeting safety awareness and lifestyle changes in high-risk demographics are essential. Additionally, healthcare systems should be equipped to manage the complex and resource-intensive nature of panfacial fracture treatment.

**Keywords:** Panfacial Fractures, Maxillofacial Injuries, Road Traffic Accidents, Public Health Interventions.

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### Introduction

The intricate nature of panfacial fractures, encompassing a spectrum of complex injuries involving the facial skeleton, necessitates a comprehensive understanding of their patterns and clinical presentations [1]. These injuries, often the result of high-velocity impacts, pose significant challenges in both diagnosis and management. This study aims to elucidate the distinct characteristics of panfacial fractures, particularly in comparison to other maxillofacial injuries.

This study seeks to ascertain whether panfacial fractures differ from other maxillofacial injuries in terms of the time required for intervention and the duration of hospital stay. The timing of surgical intervention is a critical factor in the management

of these injuries, with implications for both clinical outcomes and resource allocation [2]. The duration of hospital stays, an indicator of the burden placed on healthcare resources, also merits thorough investigation. By analyzing these parameters, the study aim to evaluate the impact of panfacial fractures on the hospital's resources and operations.

The primary objective is to delineate the pattern and clinical presentation of panfacial fractures treated at the institution. This involves a meticulous analysis of the incidence, etiology, and anatomical distribution of these injuries. Recognizing the various clinical manifestations of panfacial fractures is crucial in formulating an effective treatment strategy.

## Methodology

**Study Design:** A prospective study was conducted.

**Study Setting:** The study was carried out at Patna Medical College Hospital (P.M.C.H), Patna, India, in a duration of 'January 2023 to June 2023'.

**Participants:** Patients who sustained fractures of the upper, middle, and lower third of the face simultaneously during the study period were included.

**Inclusion Criteria:** Patients with simultaneous fractures of the upper, middle, and lower third of the face.

**Exclusion Criteria:** Patients with solitary fractures of the upper, middle, or lower third of the face, medically fragile patients, and those who did not consent to participate.

### Procedure:

- At the Emergency Department (ED), initial emergency intervention was carried out to stabilise patients and treat ailments such as head traumas, blunt abdominal trauma, and pneumothorax.
- Both the general surgeon and a maxillofacial surgeon performed a comprehensive physical examination to assess fracture sites and related injuries.
- The orthopantomograph (OPG), paranasal sinus view (PNS), cone-beam CT (CBCT), and computed tomography (CT) were among the diagnostic imaging modalities.
- Depending on the patient's state, the treatment was either closed (conservative) or open surgically using Open Reduction and Internal Fixation (ORIF).

**Data Collection and Analysis:** A thorough record of the patient's history, demographics, co-occurring injuries, emergency interventions, and treatment strategies was kept. Documentation was also done on the length of hospital stay, the time it took to operate on a panfacial fracture, and the time it took to attend following primary interventions.

**Bias:** Efforts were made to minimize bias through comprehensive data collection and by strictly adhering to the inclusion and exclusion criteria.

**Variables:** The study focused on variables such as the type of fracture, associated injuries, treatment method, time to surgery, and length of hospital stay.

**Statistical Analysis:** SPSS version 21.0 was used for analysis once data entry was completed in Microsoft Excel. A p-value of <0.05 was considered statistically significant.

### Ethical Considerations:

All subjects provided written informed permission, and the Ethics Committee approved the study protocol.

### Results

The study focused on 50 patients with panfacial fractures who met the inclusion criteria. Out of these, five patients were excluded: three due to severe illness and two who declined to participate in the study. The majority of the patients, representing a significant 60% (30 out of 50), belonged to the age group of 18–40 years. This age group forms a crucial demographic in understanding the impact and characteristics of panfacial fractures.

**Table 1: A comprehensive overview of the demographics, injury causes, and treatment details of the patients included in the study**

Parameter	Value
<b>Demographics</b>	
Total Patients Studied	50
Excluded Patients	5
Patients Aged 18-40	60% (30/50)
Male Patients	92% (46/50)
Patients Below Poverty Line	64% (32/50)
Patients Above Poverty Line	36% (18/50)
<b>Injury causes</b>	
RTA Incidents	82% (41/50)
Motorbike Accidents	74% (30/41)
Car Accidents	22% (9/41)
Pedestrian Accidents	2% (1/50)
Patients Not Using Safety Gear	90% (45/50)
Patients Consuming Alcohol	64% (32/50)
<b>Treatment</b>	
Patients Needing Invasive Airway Management	20% (10/50)
Patients Needing Non-Invasive Airway Management	50% (25/50)
Patients Not Requiring Airway Intervention	30% (15/50)

Patients Deceased at ED	4
Patients Treated with Closed Reduction	8% (4/50)
Patients Treated with ORIF (Bottom-to-Top Approach)	62% (31/50)
Patients Treated with ORIF (Top-to-Bottom Approach)	34% (17/50)
Average Time to Surgery (Days)	9
Average Hospital Stay (Days)	13.9
Average Surgery Duration (Hours)	4 hours 26 minutes

A notable finding was the gender disparity in the incidence of panfacial fractures: an overwhelming 92% (46 out of 50) of the patients were males. This statistic is indicative of the potential risk factors and lifestyle choices prevalent in this demographic. In terms of economic background, there was a clear divide: 64% (32 out of 50) of the patients were below the poverty line, while the remaining 36% (18 out of 50) were above it.

The study revealed that the majority of these fractures, 82% (41 out of 50), occurred as a result of road traffic accidents (RTAs). Within this category, the majority involved motorbike riders (74%), followed by car drivers (22%), and a pedestrian. A critical observation was the lack of safety measures among these accident victims: 91% (45 out of 50) of the patients involved in RTAs did not use protective devices such as helmets for motorbikes or seat belts for cars. Furthermore, alcohol consumption was a significant factor, with 64% (32 out of 50) of the patients having consumed alcohol prior to their accidents.

Regarding the treatment and management of panfacial trauma, various approaches were taken based on the severity and specifics of each case. Approximately 21% (10 out of 50) of the patients required invasive methods for airway stabilization, 50% (25 out of 50) needed non-invasive methods, and the remaining 29% (15 out of 50) did not require any airway intervention. Unfortunately, four patients succumbed to their injuries at the Emergency Department due to severe associated traumas. Among the surviving patients, closed treatment or Open Reduction and Internal Fixation (ORIF) under general anesthesia were the primary modes of treatment. Specifically, 8% (4 out of 50) underwent closed reduction due to the risk of quadriplegia from cervical spine fractures, and the rest were managed by ORIF.

In terms of surgical approaches for ORIF, 67% (31 out of 50) underwent a bottom-to-top approach, while the remaining 33% (17 out of 50) underwent a top-to-bottom approach. Follow-up examinations revealed that facial swelling was a common post-operative condition, with two patients showing post-traumatic facial deformities after 3 months.

The study also highlighted the differences in intervention times and hospital stays between panfacial and other maxillofacial trauma patients. The average time from admission to surgical intervention for panfacial trauma patients was nine

days, in contrast to four days for other maxillofacial trauma cases. Similarly, the average hospital stay for panfacial fracture patients was approximately 13.9 days, which was longer than the 6.9 days for other types of facial fractures. Last but not least, the average length of surgery for panfacial fractures was around 4 hours and 26 minutes, while the average operation time for isolated facial bone fractures was 1 hour and 42 minutes.

### Discussion

The study's key findings offer significant insights into the demographic, etiological, and treatment aspects of panfacial fractures. The predominance of male patients (92%) and the significant representation of the 18-40 age group (60%) underscore the vulnerability of this demographic to such injuries. The high incidence of road traffic accidents (RTAs) as the primary cause (82%), particularly involving motorbike riders, highlights the need for targeted safety interventions in this area. Furthermore, the alarming rate of non-compliance with safety gear (90%) and the high prevalence of alcohol consumption (64%) before the accident provide critical areas for public health interventions.

The findings suggest that young males are particularly at risk of sustaining panfacial fractures, primarily due to RTAs. This trend might reflect lifestyle choices and risk-taking behaviors prevalent in this demographic. The study also underscores the significant impact of socio-economic factors, as evidenced by the majority of patients being below the poverty line (64%). This could influence both the incidence and the outcomes of such injuries, considering the potential limitations in access to healthcare and safety measures in lower socio-economic groups.

The treatment outcomes and the approaches adopted (majority being the bottom-to-top approach in ORIF) indicate the complexity and the need for individualized treatment plans for each case. The longer duration of hospital stay and the extended time to surgery for panfacial trauma patients compared to other maxillofacial injuries emphasize the resource-intensive nature of managing these cases.

Similar to the current study results, another study emphasizes the impact of panfacial fractures on both the bony framework and soft tissues, leading

to aesthetic and functional challenges [3]. It highlights the need for careful planning from the patient's arrival at the Emergency Department (ED), which corresponds with the study's focus on the necessity for meticulous initial assessment and treatment planning. Panfacial fractures, which make up 4–10% of all facial fractures and have a male to female ratio of 3:1, are most frequently caused by high-energy traumas [4]. This finding is consistent with our study, where a significant number of male patients between 18 and 40 years were predominantly affected. Panfacial fractures frequently occur in conjunction with other severe injuries such as thoracic, intracranial, and intraabdominal traumas, which can be more life-threatening than the facial fractures themselves [5]. This aligns with the observations about the complexity of panfacial trauma cases, which often require management of concurrent injuries. The critical aspect of airway management in panfacial fractures, specifically the risks associated with blind nasal intubation and the preference for tracheostomy in complex cases [6]. The study echoes these findings, emphasizing the importance of skilled airway management and the use of techniques like submental diversion. Additionally, [7-10] delve into surgical techniques and the importance of restoring the anatomical, functional, and esthetic aspects of the face. The bottom-top sequencing approach, as mentioned in the study, aligns with these references, highlighting the necessity of a structured approach to facial reconstruction.

### Conclusion

The study contributes to the growing body of evidence on the epidemiology and management of panfacial fractures. It highlights the critical role of demographic factors, injury etiology, and socioeconomic status in the incidence and outcomes of these injuries. The findings underscore the need for targeted public health interventions, improved safety measures, and tailored clinical management strategies to effectively address the challenges posed by panfacial fractures.

**Limitations:** The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

**Recommendations:** Public health interventions targeting safety awareness and lifestyle changes in high-risk demographics are essential. Additionally, healthcare systems should be equipped to manage the complex and resource-intensive nature of panfacial fracture treatment.

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### List of Abbreviations:

ED - Emergency Department  
 ORIF - Open Reduction and Internal Fixation  
 PNS - Paranasal Sinus View  
 OPG - Orthopantomograph  
 CT - Computed Tomography  
 CBCT - Cone-Beam Computed Tomography  
 RTA - Road Traffic Accident  
 GA - General Anesthesia

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