

International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

Complications of Le Fort-I fracture

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ABSTRACT:

Background: This study was conducted to assess the complications of Le Fort-I fracture. **Material and methods:** This study was conducted at DR Rajender Prasad Government Medical College, Kangra, Tanda, Himachal Pradesh. This study comprised of 75 participants who were admitted to the hospital for road traffic accident. The subjects were informed about the procedure and were asked for consent. It was observed that out of 75 subjects, 50 subjects had Le Fort I fracture. The subjects were examined for any complications. The subjects who were willing to participate had been included in the study while those who were not willing to participate had been excluded from the study. Statistical analysis had been conducted using SPSS software. **Results:** In this study of 50 subjects with Le Fort I fracture, 43 were males and 7 were females. The most common complication observed was swelling of upper lip in 24 subjects, followed by loosening of teeth in 19 subjects, bruising of palatal surface in 5 subjects and malocclusion in 2 subjects. **Conclusion:** In this study, majority of the subjects were males. The most common complication of Le Fort I fracture in this study was swelling of upper lip, followed by loosening of teeth.

Keywords: le fort I, swelling, malocclusion, bruising.

Received Date: 19 March, 2024

Acceptance Date: 22 April, 2024

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This article may be cited as: Rana SS, Kumar R. Complications of Le Fort-I fracture. Int J Res Health Allied Sci 2024; 10(3):5-8.

INTRODUCTION

Among the classification of maxillary fracture, the Le Fort classification is the best-known categorization. Le Fort (1901) completed experiments that determined the maxilla areas of structural weakness which he designated as the "lines of weakness". According to these results, there are three basic fracture line patterns (transverse, pyramidal and craniofacial disjunction). A transverse fracture is a Le Fort I fracture that is above the level of the apices of the maxillary teeth section, including the entire alveolar process of the maxilla, vault of the palate and inferior ends of the pterygoid processes in a single block from the upper craniofacial skeleton. Le Fort fractures result in both a cosmetic and a functional deficit if treated inappropriately.¹

Bones fractured in a Le Fort I fracture include the lower nasal septum, the inferior portion of the pyriform apertures, the canine fossae, both zygomaticomaxillary buttresses, the posterior maxillary walls, and the pterygoid plates. The most

consistent and uniting feature of a Le Fort fracture is the presence of bilateral pterygoid fractures. Pterygoid fractures are found in all three classes of Le Fort fractures, and are the key to establishing the diagnosis.²

Originally described by Rene Le Fort in 1901, Le Fort fractures are specific facial bone fracture patterns that occur in the setting of blunt facial trauma (most commonly involving motor vehicle collision, assault, or falls).^{3,4} All Le Fort fracture types involve the pterygoid processes of the sphenoid bones and therefore, disrupt the intrinsic buttress system to the midface-however further differentiation of Le Fort types I, II, and III depends on involvement of the maxillary, nasal, and zygomatic bones.⁵⁻⁷ Though mortality rates are low, these fractures seldom occur in isolation and are often associated with serious injuries of the head and neck.⁸ Thus, the ability to quickly recognize and diagnose Le Fort fractures is crucial for proper management of blunt-force facial trauma.

This study was conducted to assess the complications of Le Fort-I fracture.

MATERIAL AND METHODS

This study was conducted at DR Rajender Prasad Government Medical College, Kangra, Tanda, Himachal Pradesh. This study comprised of 75 participants who were admitted to the hospital for road traffic accident. The subjects were informed

about the procedure and were asked for consent. It was observed that out of 75 subjects, 50 subjects had Le Fort I fracture. The subjects were examined for any complications. The subjects who were willing to participate had been included in the study while those who were not willing to participate had been excluded from the study. Statistical analysis had been conducted using SPSS software.

RESULTS

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Males	43	86%
Females	07	14%
Total	50	100%

Out of 50 subjects with Le Fort I fracture, 43 were males and 7 were females.

Table 2: Complications of Le Fort I fracture.

Complications	Number of subjects	Percentage
Swelling of upper lip	24	48%
Loosening of teeth	19	38%
Bruising of palatal surface (Guerin's sign)	05	10%
Malocclusion	02	04%
Total	50	100%

The most common complication observed was swelling of upper lip in 24 subjects, followed by loosening of teeth in 19 subjects, bruising of palatal surface in 5 subjects and malocclusion in 2 subjects.



Figure 1: Le Fort I fracture line



Figure 2: Guerin's sign (bruising on palate)

DISCUSSION

In the general population, the most common causes of facial fractures are associated with assaults and motor vehicle accidents (MVAs), 36% and 32%, respectively.⁹ A smaller percentage is accounted for

by falls (18%), sport injuries (11%), occupational accidents (3%), and gunshot wounds (2%).⁹ Additionally, the mechanism of action of the injury can be associated with the presenting facial fracture pattern.

Specifically, MVAs and gunshot wounds present commonly with a higher proportion of panfacial fractures, compared with sports-related accidents associated with upper midface fractures, and assaults that are linked to mandibular and nasal fractures. A review of fifty-one articles on LeFort fractures showed that most are resultant from high-velocity MVA's and that the severity of fracture type sustained occurred with increasing frequency.¹⁰In a retrospective epidemiological study of midface fractures, the highest incidence was among patients aged 20–29 years old (35.9%), with a higher proportion among males (M:F, 9.6:1).

Le Fort fractures account for 10% to 20% of all facial fractures. These may be potentially life-threatening and disfiguring in patients in whom the injury is significant. Le Fort I fractures (trans-maxillary fracture) result from a force directed low on the maxillary rim in a downward direction. This occurs in the horizontal plane at the level of the base of the nose. A direct blow to the lower face causes fractures that involve all 3 walls of the maxillary sinus and pterygoid processes. The fracture extends around both maxillary antra, through the nasal septum and the pterygoid plates. This causes palate-facial separation. However, this fracture does not involve the glabella or zygoma.¹¹ This study was conducted to assess the complications of Le Fort-I fracture.

In this study of 50 subjects with Le Fort I fracture, 43 were males and 7 were females. The most common complication observed was swelling of upper lip in 24 subjects, followed by loosening of teeth in 19 subjects, bruising of palatal surface in 5 subjects and malocclusion in 2 subjects. **Lee KC et al (2019)**¹²reported the characteristics of Le Fort fractures and to quantify the associated hospital costs. From October 2015 to December 2016, the National Inpatient Sample was searched for patients admitted with a primary diagnosis of a Le Fort fracture. Predictor variables were drawn from demographic, admission, and injury characteristics. The outcome variable was hospital cost. Summary statistics were calculated and compared among Le Fort patterns. Univariate comparisons and multivariate regression analyses were conducted to determine predictors associated with cost. A total of 519 patients were identified in this cohort. Associated injuries included skull fractures (28%), intracranial hemorrhage (13%), cervical spine injury (9.8%), and concussion (9.1%). Seventy-three percent of patients received open reduction and internal fixation (ORIF) for their facial fractures during their admission, 13% received a tracheostomy, and 10% were mechanically ventilated for at least 1 day. The ventilation ($P < .01$) and tracheostomy ($P < .01$) rates increased with Le Fort complexity, as did length of stay (LOS; $P < .01$), costs ($P < .01$), and charges ($P < .01$). The mean costs of treating Le Fort I, II, and III fractures were \$25,836, \$28,415, and \$47,333, respectively. Increased cost was independently associated with younger age, male

gender, African-American ethnicity, Le Fort II and III patterns, motor vehicle accident etiology, mechanical ventilation requirement, tracheostomy, ORIF, transfer to an outside facility, and increased LOS. The prevalence of head injuries and the need for respiratory support substantially increased with Le Fort complexity. Hospital costs were not markedly influenced by the diagnosis and management of associated injuries. Instead, costs were predominantly driven by fracture complexity and the need for necessary procedures, such as ORIF, tracheostomy, and mechanical ventilation.

Wood Matabele KL et al (2023)¹³assessed patient outcomes after operative management of Le Fort fractures, and examine factors influencing the risk for developing postoperative complications, through utilization of the ACS-NSQIP database. The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was queried for cases recorded between 2012 and 2019 with International Classification of Disease (ICD)-9 and ICD-10 codes corresponding to Le Fort fractures. Patient demographics, clinical variables, and postoperative variables were recorded. Logistic regression analysis was conducted to identify independent risk factors for postoperative complications. Identification of cases with appropriate ICD codes, and exclusion of those with missing data, yielded 562 patients for analysis. There were no cases of minor complications and 14 cases of severe complications (3 cases of wound dehiscence, 3 cases of transfusion requirement, 1 case of failure to wean from the ventilator for more than 48 h, 1 pulmonary embolism, and 8 cases of reoperation), corresponding to an overall complication rate of 2.49%. Logistic regression analysis revealed steroid use as an independent predictor of severe postoperative complications (OR =13.73, 95% CI: 1.08-128.02, $P =0.02$).

CONCLUSION

In this study, majority of the subjects were males. The most common complication of Le Fort I fracture in this study was swelling of upper lip, followed by loosening of teeth.

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