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ORIGINAL ARTICLE

Clinical Outcome and Quality of Life in Patients of Lefort Fractures

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ABSTRACT

Purpose: Maxillofacial fractures are a growing concern globally due to their increasing incidence, associated injuries, morbidity, disfigurement, function loss, economic implications, and postoperative quality of life issues. The objective of the study is to determine the clinical outcome and quality of life in patients with Lefort fractures.

Methodology: The present research is an observational and descriptive investigation, including a sample of 53 patients diagnosed with Lefort fracture. The study was done at the Nishtar Institute of Dentistry in Multan, Pakistan, spanning from September 2023 to February 2024. Following the endorsement of the research by the Ethical Review Board of the hospital, patients were recruited using a nonprobability sequential sampling method. The researchers used a self-constructed questionnaire as a means of evaluating clinical outcomes and quality of life that occurred after a Lefort fracture. The data underwent statistical analysis, and findings and observations were derived from the analysis.

Results: The study examined the outcomes of different treatments for patients with Le Fort fractures, focusing on Type I, Type II, and Type III fractures. open reduction is performed on 12 patients with Type I, 12 patients with Type II, and 7 patients with Type III Lefort fractures. On the other hand, conservative therapy is performed on 3 patients with Type I, 9 patients with Type II, and 10 patients with Type III Lefort fractures. Results showed that open reduction led to more consistent improvements across various symptoms and complications compared to conservative therapy. Patients experienced pain in the mouth/face area, chewing difficulties, aesthetic deformity, daily routine activity improvement, neurosensory deficit improvement, malocclusion correction, and mastication improvement.

Practical Implication: The study reveals that open reduction is a more effective treatment for Le Fort fractures than conservative therapy, especially in patients with significant pain, chewing difficulties, aesthetic deformities, or malocclusion, resulting in better functional and aesthetic outcomes and improved quality of life.

Conclusions: Le Fort fractures are three types of injuries to the midface region, each resulting from different impacts in traffic accidents. Type I fractures occur from direct impact to the front of the face, involving a horizontal separation of the maxilla from the craniofacial skeleton. Type II fractures involve a pyramidal separation of the midface, resulting from vertical force transmission from head-on collisions or severe frontal impacts. Specific facial bone fracture patterns result from blunt face trauma. Though uncommon, they are commonly linked to other serious head and neck injuries and have low fatality rates. Before therapy, Le Fort fracture patients had a much worse psychological quality of life. Refer patients to psychologists or psychiatrists for further assessment and treatment of remaining psychological and social relationship difficulties.

Keywords: Le Fort fracture, quality of life, Facial trauma, Blunt head trauma.

INTRODUCTION

Le Fort injuries refer to intricate fractures occurring in the midface region, which were named after Rene Le Fort, a researcher who conducted studies on cadaver skulls damaged by blunt force trauma[1]. Violent maxillofacial trauma, including car accidents, sports injuries, high-speed deceleration collisions, or blunt force trauma, is a common cause of Le Fort fractures (10-20% of all facial fractures)[2]. Facial fractures are more common in males than in women, with a ratio of 2.0-2.8:1. Facial fractures are more prevalent in women over the age of 70, although they increase in males every decade up to that point[3]. The human skull consists of 22 bones, with 14 facial bones and 8 cranial bones. These bones serve various functions, including protecting the central nervous system and providing structure for mastication, ventilation, and phonation[4]. Facial buttresses, divided into vertical and horizontal buttresses, are crucial for trauma and provide support for soft tissue. Vertical buttresses are paired and define the vertical height of the face, while horizontal buttresses provide cross-member stability[5]. Le Fort fractures, involving the pterygoid plate, are classified into three types: horizontal, pyramidal, and transverse, based on the orientation of the fracture, which can cause facial skeleton separation from the skull base[6]. The pterygoid plate is implicated in all forms of Le Fort fractures, which may lead to a separation of the pterygomaxilla. In the absence of a pterygoid fracture, the presence of a Le Fort fracture cannot be definitively identified Le Fort fractures and pterygoid plate fractures are closely related due to their association[7]. Le Fort fractures involve the separation of midface bones from the skull base, while pterygoid plates, thin, wing-like bony structures, can be affected in Le Fort fractures. Recognizing these connections is crucial for diagnosis and treatment planning[8]. Le Fort fractures occur in cases of sudden facial trauma, usually caused by auto accidents, attacks, or falls. Le Fort types I, II, and III are classified based on the extent of involvement of the maxillary, nasal, and zygomatic bones. While the mortality rates are very low, these fractures seldom happen in isolation and are frequently associated with significant head and neck injuries[9]. Hence, the expeditious identification and diagnosis of Le Fort fractures are crucial in order to efficiently address blunt-force facial injuries. When the upper teeth are hit from below, it may create a type I fracture. When the lower or mid maxilla is hit, it can cause a type II fracture[10]. When the nasal bridge and upper section of the maxilla are hit, it can cause a type III fracture. Le Fort fractures involve the maxillary sinus, pterygoid processes, and surrounding walls, resulting in a trans-maxillary fracture[11]. These structures disrupt the maxilla's normal structure, separating it from surrounding craniofacial structures. The involvement can have significant clinical consequences and may require surgical intervention[12]. Disarticulation of the pyramid-shaped facial bones from the rest of the skull is the outcome of a midface trauma that causes a pyramidal fracture in type II[13]. Characteristics of Le Fort Type III include ecchymosis across the mastoid area, hemotympanum, ecchymosis, bilateral periorbital edema, hooding of the orbits, enophthalmos, and cerebrospinal fluid rhinorrhea and otorrhea[14].

When assessing a patient with maxillofacial trauma, it is important to adhere to the protocols outlined by advanced trauma life support (ATLS). These protocols cover topics such as stabilizing the airway and cervical spine, providing breathing and ventilatory support, paying close attention to circulation and hemorrhage control, evaluating the patient's disability and neurologic status, and controlling exposure and environmental factors[15]. If the airway blockage caused by a midfacial bone

fracture is not identified and treated quickly enough, it might be fatal[16]. If intranasal injury might occur, orotracheal intubation would be necessary[17].

Collaborating with a trauma surgeon is essential for treating and managing Le Fort fractures. In cases when life-threatening injuries are handled, final surgery may be undertaken following stabilization[18]. Repairing the nasal and orbital structures, reestablishing correct tooth occlusion, and repairing the facial projection and affected sinus canals are all part of fracture therapy[19]. Le Fort fractures have a higher mortality rate than simple midface fractures, with progressive mortality rates[20]. They are associated with visual problems, diplopia, mastication difficulties, and breathing difficulties. Factors like BMI, implant type, and smoking history don't impact infection rates[21]. This study aims to evaluate the clinical outcome and quality of life in patients with Lefort fractures, a type of maxillofacial trauma. Epidemiological studies are crucial for understanding this type of injury, which can help establish effective treatment and recommend preventive measures to decrease its incidence.

MATERIAL & METHODS

This study is a descriptive research that involves a sample of 53 patients who have been diagnosed with Lefort fractures. The research was conducted at the Nishtar Institute of Dentistry in Multan, Pakistan, from September 2023 to February 2024. After receiving approval from the hospital's Ethical Review Board, patients were selected for the study using a non-probability sequential selection procedure. The investigation encompassed all volunteers, regardless of their age or gender. This study encompasses all documented cases that involve both medicolegal and non-medical legal reporting, and possess adequate available data. Case records lacking enough data and those reporting fractures other than Lefort fractures were excluded based on predetermined criteria. The patient's guardian granted informed consent after receiving a detailed description of the study design, the use of data for research, and an evaluation of the risk-benefit ratio. Demographic data regarding the patients, including their age and gender, was collected. Following their injuries, the patients underwent examinations and the findings of the initial assessment were recorded. The research participants underwent surgical intervention to treat Lefort fractures. The fractures were managed with various treatment protocols, including observation and the use of traction elastics. However, in some cases, it may be necessary to mobilise the fragments, perform open reduction, and apply stiff fixation. A group of surgeons carried out the surgical treatments. Follow-up evaluations were carried out every 12 weeks. The data was subjected to statistical analysis, resulting in the formation of findings and observations. The data analysis involved the utilisation of t-tests and chi-square testing.

RESULTS

Fracture Classification			
	Le Fort I	Le Fort II	Le Fort III
Fracture Type	19	27	7

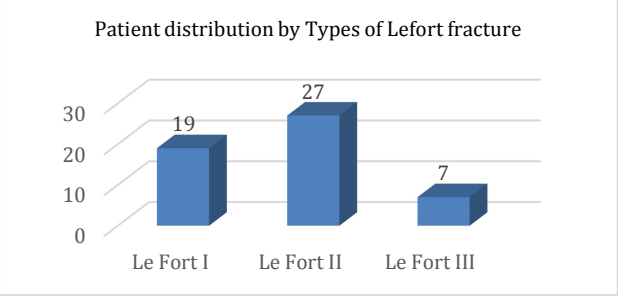

Figure 1: Distribution by fracture classification

The distribution of associated facial fractures by fracture classification is shown in Figure 1. Le Fort I fractures with a total of 19 cases observed. Following Le Fort I fractures, there are 27 cases of Le Fort II fractures recorded(most common) . The Le Fort III fractures category includes 7 cases, representing the least common type among the three Le Fort classifications.

Fracture Types vs Surgical Procedure					
		Fracture Classification			
		Type I	Type II	Type III	Total
Group	Open Reduction	12	12	7	31
	Conservative Treatment	3	9	10	22
Total		15	21	17	53

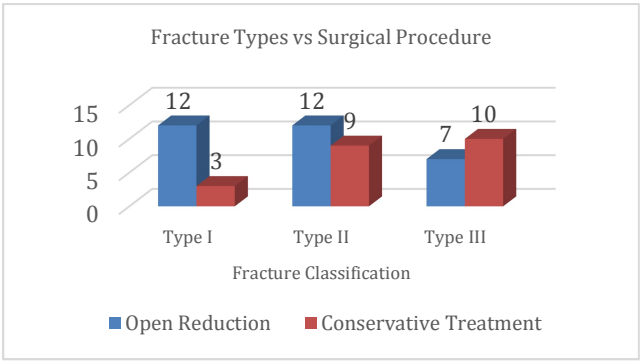

Figure 2: Treatment Performed In Fracture

The open Reduction approach involves surgical intervention where the fractured bones are realigned through a surgical procedure. According to the figure, open reduction was performed on 12 patients with Type I Lefort fractures, 12 patients with Type II Lefort fractures, and 7 patients with Type III Lefort fractures. This indicates that surgical realignment was the chosen treatment for these patients across the different types of Lefort fractures. Conservative Therapy typically involves non-surgical methods aimed at managing the fracture without invasive procedures. According to the figure, conservative therapy was applied to 3 patients with Type I Lefort fractures, 9 patients with Type II Lefort fractures, and 10 patients with Type III Lefort fractures.

Surgical Procedure vs Pain in Mouth/Face Area			
		Have Pain	Do not have pain
Group	Open Reduction	31	0
	Conservative Treatment	14	8

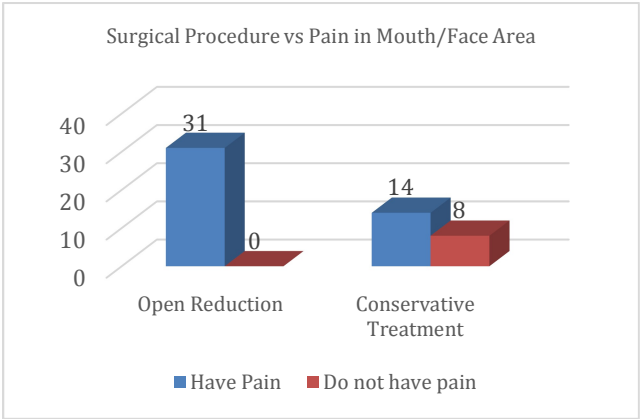

Figure 3: Pain in Mouth/Face Area

Out of 31 patients who received open reduction treatment, all experienced Pain in the mouth/Face Area. Among the 14

patients who underwent conservative treatment, all experienced Pain in the mouth/Face Area. However, it's important to note that 8 patients who underwent conservative treatment did not experience Pain in the mouth/Face Area.

Surgical Procedure vs Difficulty in Chewing			
		Difficulty in chewing	No Difficulty in chewing
Group	Open Reduction	31	0
	Conservative Treatment	17	5

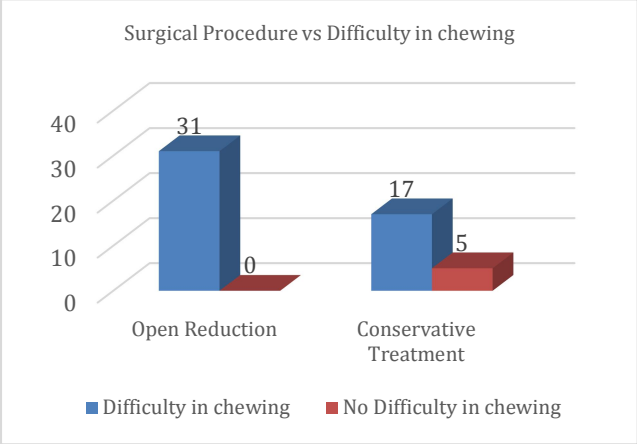

Figure 4: Difficulty in chewing

All 31 patients reported difficulty in chewing after receiving open-reduction treatment. This suggests that this treatment method might commonly lead to chewing difficulties as a post-treatment outcome. Conservative Treatment Group: In contrast, among the 22 patients who received conservative treatment, a smaller proportion (5 patients) did not experience difficulty in chewing. This indicates that conservative treatment may have a varied impact on chewing abilities, with a notable subset of patients not experiencing this particular issue.

Surgical Procedure vs Aesthetic Deformity				
		Aesthetic Deformity	No Aesthetic Deformity	
Group	Open Reduction	31	0	31
	Conservative Treatment	19	3	22
Total		50	3	53

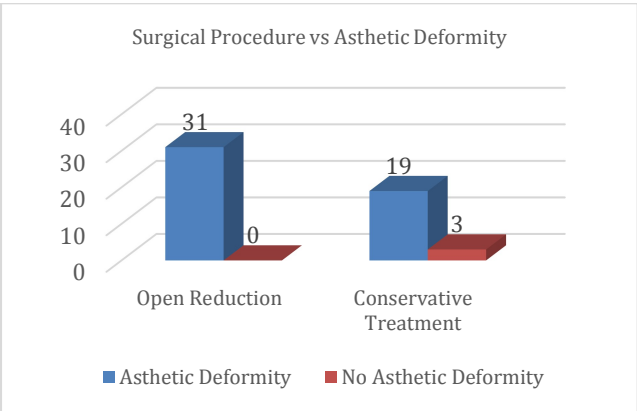

Figure 5: Aesthetic Deformity

All 31 patients experienced aesthetic deformity, indicating that this treatment method did not prevent aesthetic changes following the procedure. Among the 22 patients who received conservative treatment, a majority (19 patients) experienced aesthetic deformity, but a notable minority (3 patients) did not. This suggests that conservative treatment may have been associated with a lower incidence of aesthetic deformity compared to open reduction.

Surgical Procedure vs Effect on Daily Routine Activity			
		Effect On Daily Routine Activity	No Effect On Daily Routine Activity
Group	Open Reduction	31	0
	Conservative Treatment	2	20

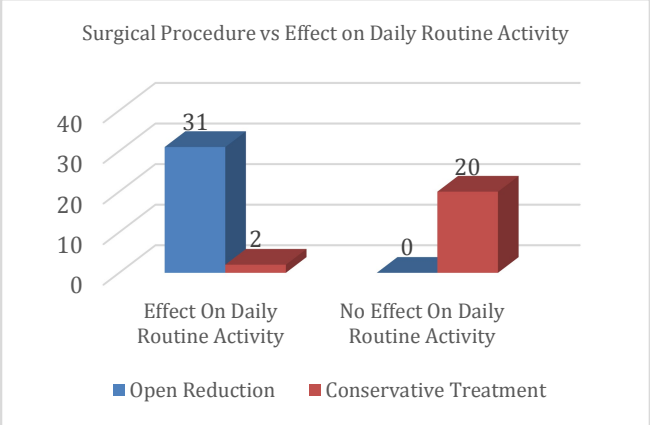

Figure 6: Effect on Daily Routine Activity

Among the 31 patients who received open reduction treatment, all of them experienced improvement in daily routine activity. In contrast, the 22 patients who underwent conservative treatment, Out of which 20 patients undergoing conservative treatment, none reported improvement in daily routine activity while 2 patients undergoing conservative treatment experienced improvement in daily routine activities.

Surgical Procedure vs Psychological Discomfort				
		Improvement in Psychological Discomfort	No Improvement in Psychological Discomfort	
Group	Open Reduction	31	0	31
	Conservative Treatment	10	12	22
Total		41	12	53

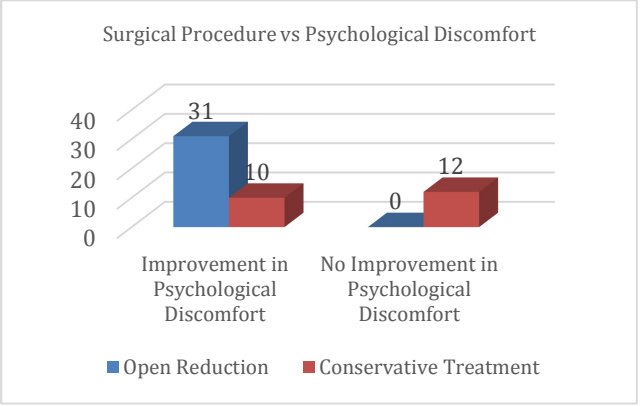

Figure 7: Psychological Discomfort

31 patients who underwent open reduction treatment. All patients experiencing an improvement in psychological discomfort. This suggests that, based on the treatment received, there was

reduction in psychological discomfort among any of the 31 patients in this group. In contrast, there were 10 patients in the conservative treatment group reported improvement in psychological discomfort despite receiving conservative treatment. While 12 patients with conservative treatment reported no improvement in psychological discomfort. This indicates that regardless of the treatment approach—whether surgical or conservative—psychological discomfort remained unchanged for all patients in this group.

Surgical Procedure vs Improvement in Neurosensory Deficit				
		Improvement In Neurosensory Deficit	No Improvement In Neurosensory Deficit	
Group	Open Reduction	31	0	31
	Conservative Treatment	1	21	22
Total		32	21	53

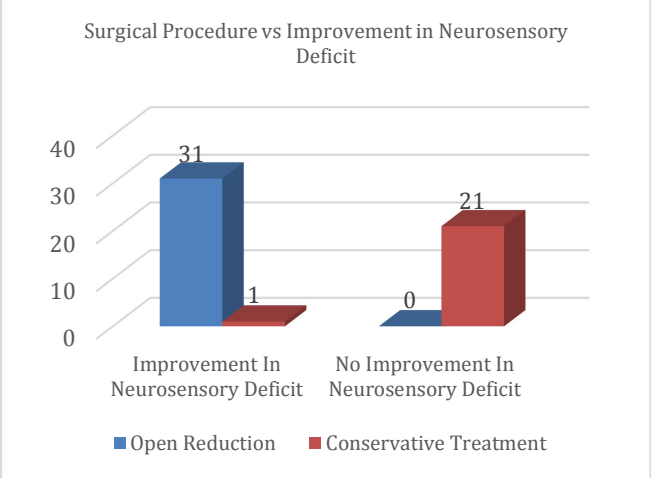

Figure 8: Improvement in Neurosensory Deficit

A total of 31 patients who underwent open reduction treatment reported experiencing improvement in their neurosensory deficits. Conversely, among the patients who received conservative treatment—typically non-surgical approaches such as immobilization or physical therapy—21 patients did not experience improvement in their neurosensory deficits. While 1 patient with conservative therapy experienced an improvement in neurosensory deficit. Conservative treatment is chosen based on factors like the nature and severity of the injury, aiming to promote natural healing processes without surgical intervention.

Surgical Procedure vs Correction of Malocclusion				
		Correction of Malocclusion	No Correction of Malocclusion	
Group	Open Reduction	31	0	31
	Conservative Treatment	6	16	22
Total		37	16	53

Out of 31 patients who underwent open reduction, all experienced correction of malocclusion. This means that all 31 patients showed improvement in their dental alignment as intended by the treatment. Six patients received conservative treatment for malocclusion. Among them, all six patients also experienced correction of malocclusion, indicating successful outcomes with this treatment approach for those individuals. In contrast, among the sixteen patients who received conservative treatment, sixteen did not experience any correction of malocclusion. This suggests that the conservative treatment method was not effective for these particular patients, possibly due to the severity of their malocclusion or other factors affecting treatment outcomes.

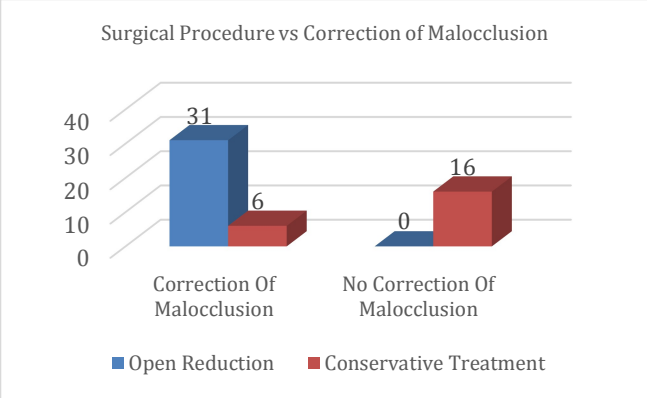

Figure 9: Correction of Malocclusion

Surgical Procedure vs Improvement in Mastication				
		Improvement In Mastication	No Improvement In Mastication	
Group	Open Reduction	25	6	31
	Conservative Treatment	0	22	22
Total		25	28	53

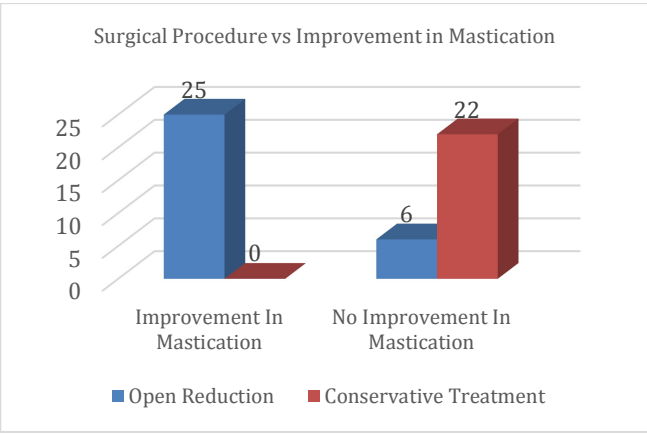

Figure 10: Improvement in Mastication

Out of 31 patients who underwent open reduction, 25 of them experienced an improvement in their mastication (chewing ability) while 6 did not experience an improvement in their mastication. This suggests that the treatment was highly effective in enhancing masticatory function for this group of patients. In contrast, among the 22 patients who underwent conservative treatment, none of them experienced improvement in mastication. This indicates that while a majority saw improvement, a notable portion did not experience enhanced chewing ability with conservative methods.

Surgical Procedure vs Relief of Pain				
		Relief of Pain	No Relief of Pain	
Group	Open Reduction	31	0	31
	Conservative Treatment	0	22	22
Total		31	22	53

Out of a total of 31 patients who underwent surgical reduction, all experienced alleviation of their pain. This indicates that surgical intervention was effective in relieving pain in all cases

within this group. In contrast, among the 22 patients who received conservative treatment, none experienced relief from their pain. This suggests that conservative treatment methods, which typically involve non-invasive or non-surgical approaches, were not successful in alleviating pain for any of these patients.

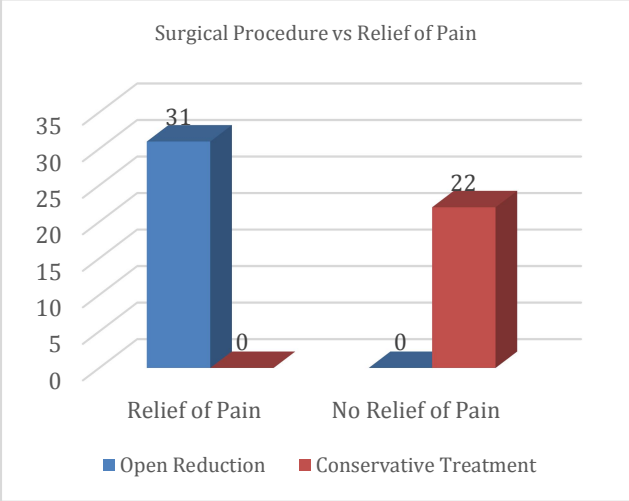

Figure 11: Relief of Pain

DISCUSSION

Facial trauma can result in a wide range of fatality rates, with complex facial fractures like Le Fort fractures having a higher mortality rate than simple midface fractures. Le Fort II fractures have a 1.94 times higher mortality risk than other fractures, and severe morbidities such as vision issues, diplopia, epiphora, trouble breathing, and difficulty masticating between teeth are associated with these fractures. Patients with Le Fort III or comminuted fractures are less likely to return to work[20]. The World Health Organization (WHO) emphasizes that optimum health is achieved when a patient's quality of life (QoL) is addressed and restored. Treatment for patients with Le Fort fractures should include assessing their QoL concerning patient satisfaction and psychological well-being[22]. Patients with Le Fort fractures at presentation had worse QoL ratings in all areas compared to healthy controls. The psychological domain had the highest score in both groups, but individuals with maxillofacial fracture demonstrated considerably lower scores in this area. There is a high correlation between anxiety and depression and maxillofacial fracture, which may lead to symptoms of post-traumatic stress disorder (PTSD), negatively impacting body image, self-esteem, and quality of life[23]. In the previous investigation, individuals with maxillofacial fractures demonstrated enhancements across all aspects of the WHOQOL-BREF throughout the postoperative evaluation phase, with the most significant improvement shown at the 12-week follow-up (Time 3). By the third time point, the healing process had advanced to a satisfactory extent, resulting in the restoration and correction of the facial profile[24]. The study analyzed the quality of life (QoL) ratings of patients who underwent closed reduction or open reduction and internal fixation (ORIF) treatment for maxillofacial fractures. The results showed that patients with closed reduction had poorer QoL ratings than those who received ORIF at Time 2[23]. This could be due to psychological and social ramifications, such as restricted eating options, compromised dental hygiene, less social engagement, and increased absenteeism in the workplace[25]. Conversely, patients with ORIF showed reduced restrictions on their activities post-intervention[25]. No significant difference in overall QoL was observed at Time 3 among patients with closed reduction or open reduction and internal fixation (ORIF). This may be due to the lack of interfragmentary mobility in both groups, which may contribute to non-union, mal-union, and potential infection, ultimately leading to a decrease in QoL[26]. The absence of disparity may also be attributed to the adherence of patients to post-operative instructions in both cohorts, resulting in more advantageous results[27]. Despite the notable improvement in QoL across all categories during the duration of therapy, patient QoL ratings in the psychological and social connections domains at the 9-week mark after treatment exhibited lower values compared to the healthy control group[28]. This finding corroborates previous studies showing a decrease in QoL ratings in the psychological and social connections domains among persons undergoing treatment for maxillofacial fractures compared to a control group of healthy individuals[29]. The study found that Le Fort (maxillary) fractures accounted for 6.6% of the total number of face fractures in trauma care facilities. The prevalence of men and individuals in their third decade of life likely stems from a greater degree of physical exertion and higher occurrence of engagement in vehicular collisions and altercations among young males[30]. The prevailing therapeutic approach in this series included open reduction, with conservative therapy and no treatment being the subsequent options[31]. The surgical procedures were conducted based on the severity of the fractures, with intraoral approaches used for Le Fort I cases, subsidiary approaches used for Le Fort II and Le Fort type-associated cases, and lateral eyebrow or upper lid blepharoplasty used for Le Fort III instances[32]. The 1.5-mm method was the most often used fixation at all Le Fort levels, demonstrating efficacy in the treatment of these fractures[33].

CONCLUSION

This research concluded the clinical outcome and quality of life of Le Fort (maxillary) fractures among patients receiving trauma care, with a specific emphasis on their attributes and approaches to treatment. The predominant demographic of patients consisted of men in their thirties, who presented with a Le Fort II fracture resulting from a vehicular collision. Face bone fractures of this kind are distinct patterns that occur as a result of forceful face trauma. While fatality rates are generally modest, they never happen alone and are often linked to more serious head and neck injuries. The research revealed that individuals diagnosed with Le Fort fractures had a significant decrease in their psychological quality of life prior to undergoing therapy. It is important for practitioners to possess knowledge of possible lingering psychological and social relationship concerns, and to appropriately direct patients to psychologists or psychiatrists for further assessment and treatment.

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