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Research Article

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Efficacy of traditional closed reduction versus closed reduction in conjunction with osteotomyin nasal bone fractures

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ABSTRACT

The objective of this was to compare of traditional closed reduction and closed reduction in conjunction with osteotomy regarding patient satisfaction and complications. We performed a prospective randomized clinical trial of 80 patients with acute nasal bone fracture who underwent either traditional closed reduction (traditional CR) (n=38) or closed reduction (CR) in conjunction with osteotomy (n= 42). While patients in traditional CR group only underwent closed reduction, patients in CR in conjunction with osteotomy underwent closed reduction in conjunction with osteotomy for correcting the post reduction deformity. The study outcomes were complications, patient's satisfaction and deformity at 4 months follow-up after intervention. The rates of complications was seen in 37% and 42% in traditional CR group and CR in conjunction with osteotomy group, respectively (P<0.03). Also, the proportion of patients with complete correction in CR in conjunction with osteotomy group and traditional CR were 69% and 52.6, respectively. The proportion of patient's satisfaction from nose appearance in CR in conjunction with osteotomy group (35 of 42 patients (83.3%)) was significantly higher than traditional CR (24 of 38 patients (63.1%)) (P value=0.04).CR along with osteotomy is more effective than traditional CR regarding and patient's satisfaction and corrected deformity. So, it could be used for some of patients to prevent secondary and more aggressive procedure like open septorhinoplasty.

Keywords: Closed reduction, Nasal bone fracture, Satisfaction, Complication, osteotomy

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INTRODUCTION

Nasal bone fractures are the most common types of facial fractures(1). In addition, it has been shown that nasal bone fractures are the third most commonly broken bone in the body(2).Due to its more prominent position, it is susceptible for fracture and trauma which its fractures account for approximately greater that 50% of all facial fractures(3).

However, the treatment strategy for traumatic nasal fractures remains controversial among surgeons(4). Recommended management varies widely which may include no intervention to extensive open procedures using rhinoplasty techniques(1, 3). Traditionally, there are two surgical procedures for treatment of nasal bone fractures: closed reduction (CR) or open reduction (OR)(1). However, closed reduction is a relatively simple and less intensive technique with acceptable results. Effective reduction of nasal bone fractures is not possible using closed reduction specifically in certain nasal bone fractures(5). In most cases, it will need a subsequent surgery using open reduction

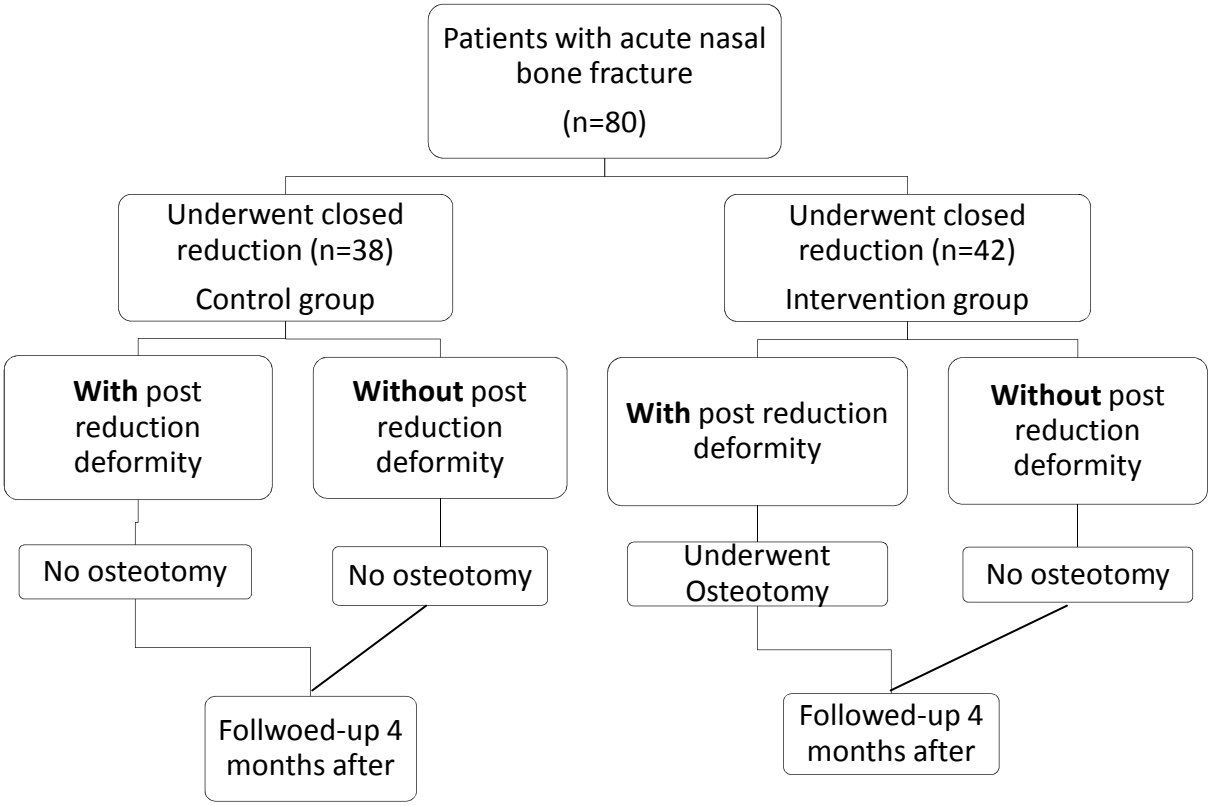
technique or external osteotomies(6). Osteotomy can lead to complications such as excessive bleeding, long-term edema, asymmetric nose, and narrowing of nasal bone(2).

In this study, we aimed to measure and compare the outcomes of traditional closed reduction and closed reduction in conjunction with osteotomy including complications, patient satisfaction and post reduction at 4 months after reduction.

MATERIALS AND METHODS

This prospective randomized clinical trial was conducted on totally 80 patients with acute nasal bone fracture at Imam Khomeini hospital, Ahvaz Jundishapur University of Medical Sciences, from March 2014 through March 2015, in Iran. Written informed consent was obtained from all patients of the study. The study was approved by an institutional review board of our university. Inclusion criteria were acute nasal bone fractures in 7-10 days ago.

Over this period, 80 patients presented our hospital with acute nasal bone fracture, of those traditional closed reduction (traditional CR) was performed for 38(47.5%) and 42(52.5%) underwent either closed reduction or closed reduction in conjunction with external osteotomy if the patient had post reduction deformity (CR with corrective procedure).



The process of patient's assignment into the study group is shown in Figure 1. While patients in traditional closed reduction group only underwent closed reduction despite they had post reduction deformity (n=38), patients in closed reduction in conjunction with osteotomy underwent closed reduction and then if they had post reduction deformity they underwent osteotomy for correcting the post reduction deformity.

Patients were excluded if they had naso-orbitoethmoid (NOE) fractures, nasal bone fracture associated with any other fracture of facial bones, fractures led to maxilla dropping, and nasal fractures associated with severe septal fractures.

Traditional CR was defined as traditional reduction by manipulation without incisions. Then internal packing and external splint placed. Internal packing was removed in 5 days and external splint was removed in 7-14 days. In the CR in conjunction with osteotomy, due to patients even after closed reduction still had deformity underwent osteotomy. Both traditional CR and CR along with osteotomy were performed by single faculty member in the

operating room of Otolaryngology–Head and Neck. In the CR in conjunction with osteotomy group, all operations were performed under general anesthesia.

Patients were followed up at 4 months after nasal bone fracture reduction. End-points of follow-up were the rate of complications and patient's satisfaction with nose appearance. Assessing surgical outcome of nasal deformity at 4 months after intervention was according to presence of epistaxis nasal, adherence, hyposmia and nasal septum deviation bone indentation.

Statistical analysis was carried out using IBM SPSS Statistics version 20. Chi square tests were utilized to test the differences between categorical variables. All analyses were performed on two-sided test at the significance level less than 0.05.

RESULTS

In total, 80 patients with acute nasal bone fracture were recruited, 38 patients traditional CR group and 42 patients in CR in conjunction with osteotomy group. Demographic and clinical characteristics of study patients are presented in Table 1.Of 38 participants of CR group, 17 (44.7%) and 21 (55.2) were female and male, respectively. Similarly, of 42 subjects in CR with osteotomy group, 20 (47.6%) and 22 (52.4) were female and male, respectively. Although, the distribution of gender was not significant between groups (P = 0.006).The mean of age in traditional CR and CR in conjunction with osteotomy groups was 27.3 ± 8.3 and 26.18 ± 7.12, respectively (P value = 0.2). None of patients was at less than 10 years old. While the most prevalent age range in this study was at range of 10-30 years old (76.3%).

The most cause of trauma in both traditional CR and CR in conjunction with osteotomy groups was accident and then was falling, while the less frequent cause of trauma in both groups resulted from sport activity (P value = 0.2). There were no statistical significant differences between two groups regarding the history of past surgery and also past deformity (P= 0.1 and P= 0.5, respectively).

Table 2 shows the findings of clinical examinations by surgeon before intervention. The most of patients had depression in right or left side of nasal bone. Other clinical findings found during clinical examinations before procedures included crepitation, epistaxis, elevation, pre orbital ecchymosis, saddle nose, rotation, longitudinal, transverse or oblique, unilateral or bilateral fractures. The comparison of these clinical examinations findings did not show significant difference between two groups (Table 2).

Our observations at 4 months follow-up after nasal fracture reduction showed that complications associated with CR group and CR in conjunction with osteotomy group included epistaxis (13.2% and 11.9%), hyposmia (15.7% and 26.1)adherence (7.8% and 14.2%) and nasal septum deviation (10.5% and14.2%)(P <0.03). On the other hand, the rates of complications in traditional CR and CR in conjunction with osteotomy were 37% and 42%, respectively (P= 0.03).

The surgeon's clinical evaluations at 4 months follow-up after intervention are presented in Table 2. The proportion of patients with complete correction, partial correction and not corrected at 4 months follow-up after intervention in CR conjunction with osteotomy group and traditional CR were 69%, 16.6%, 16.2% and 52%, 18.7%, 31.5%, respectively.

The proportion of patient's satisfaction in CR in conjunction with osteotomy group (35 of 42 patients (83.3%)) was significantly higher than traditional CR (24 of 38 patients (63.1%)) (P value=0.04).

Table 1. Demographic and clinical characteristics of the study

		Study group		P value
		Closed reduction(n=38)	**Closed reduction with osteotomy (n=42)**	
Sex	Female	17 (44.7)	20 (47.6)	0.06
	Male	21 (55.2)	22 (52.4)	
Age		27.3 ± 8.3	26.18 ± 7.12	0.2
Trauma, n(%)	Accident	10 (26.3)	15(35.7)	0.3
	Sport	7 (18.4)	3 (3.3)	
	Physical assulats	8 (28.6)	9(30)	
	Falling	13 (34.2)	15 (16.6)	
Past surgery, n(%)		4 (17.1)	2 (4.7)	0.1
Past deformity, n(%)		7 (14)	3 (10)	0.5

Table 2. Clinical evaluations by surgeon before intervention for fracture reduction				
		Study group		
		Closed reduction (n=38)	**Closed reduction (n=42)**	**P value**
Depression	Right	18 (47.4)	20 (47.6)	0.1
	Left	20 (52.6)	22 (52.4)	
	both	0	0	
Elevation	Right	14(36.8)	18(42.8)	0.1
	Left	12(31.5)	14(33.3)	
	No elevation	12(31.5)	10(23.8)	
Crepitation	No crepitation	15 (39.5)	4 (9.5)	0.006
	Right	10 (26.3)	18 (42.9)	
	Left	13 (34.2)	16 (38)	
	both	0	4 (9.5)	
Edema	Yes	10 (26.3)	20 (47.6)	0.1
	no	28 (73.6)	22 (52.4)	
Epistaxis	Yes	30 (78.9)	32 (76.2)	0.3
	No	8 (21)	10 (23.8)	
Pre orbital echimosis	Yes	28 (73.7)	25 (59.5)	0.008
	No	10 (26.3)	11 (26.2)	
	Both	0	6 (14.3)	
Saddle nose	Yes	2 (4)	0	0.15
	no	36 (94.7)	42 (100)	
Rotation	Yes	4 (10.5)	7 (16.6)	0.8
	No	34 (89.5)	35 (83.3)	
Fracture line	longitudinal	10 (26.3)	17 (40.5)	0.7
	transverse	15 (39.5)	18 (42.9)	
	Oblique	13 (34.2)	7 (16.6)	
Fracture	Unilateral	28 (73.6)	30 (71.4)	0.2
	bilateral	10 (26.3)	12 (28.5)	

Table 3. Study outcomes in closed reduction group and closed reduction in conjunction with osteotomy group				
Outcomes		Closed reduction, (n=38) n(%)	Closed reduction with osteotomy, (n=42) n(%)	P value
Complications	Epistaxis	1(2.6)	3(7.1)	<0.03
	Hyposmia	6(15.7)	11(26.1)	
	Nasal septum deviation	4(10.5)	6(14.2)	
	Adherence	3(7.8)	6(14.2)	
	No complication	24 (63)	16 (38)	
Patient's satisfaction		24(61.3%)	35(83.3%)	<0.04
Type of correction	Completely corrected	20 (52)	29(69)	<0.05
	Partiallycorrection	6 (18.7)	7(16.6)	
	Non correction	12 (31.5)	6(14.2)	

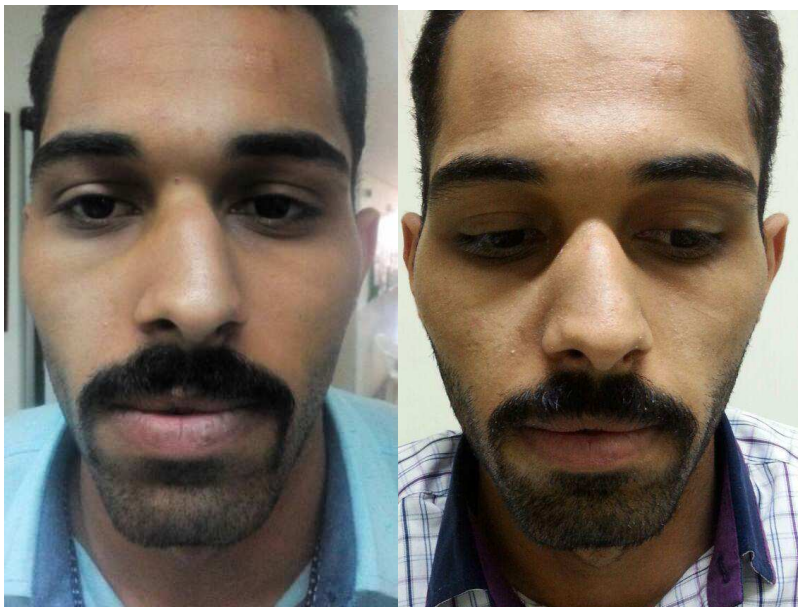


Figure 1-pre and postop image of a patient with sever deviation of nose which reducted with osteotomy

DISCUSSION

In this study, the patients mostly were young and most of nasal injuries were resulted from accident and physical assaults. These findings are consistent with the previous studies (7-9). Almost social and behavioral have main role in the incidence of nasal fractures.

There is increasing evidence that a lot of nasal fractures deformities, ranges from 14% to 50%, cannot repair with closed reduction and require more definitive procedures such as rhinoplasty or septorhinoplasty(6, 10). In the present study, the percentage of patients who need osteotomyin CR in conjunction with osteotomy group was 45.2% which is similar with world prevalence.

In the current study, most prevalent complications in both control and intervention groups were hyposmia (15.7% and 26.1%, respectively) and then nasal septum deviation (10.5% and 14.2%, respectively). In the study by Ashoor et al. (11) the more reasons of dissatisfaction were nasal obstruction (40%), deformity (30.5%), and deviated septum(11). In a previous study by Dehkordi et al. has been reported that acceptable outcome and satisfaction have obtained with closed reduction of nasal fractures in which soft tissue and nasal bone have not seriously damaged(12). Also, they reported that nasal obstruction and hump were the most reason of dissatisfaction in women and men, respectively(12). Yilmaz et al. (13)conducted a study on 24 patients with nasal fracture and showed that whatever time of reduction is close to time of injury, the higher satisfaction can be achieved. In a study, Al-Obiedi et al. showed that those patients undergoing open reduction (92.2%) have better breathing in compared with CR (75%)(14).

Previous studies suggested that open reduction is an appropriate procedure for those nasal bone fractures need to secondary surgery (15) and also is an acceptable procedure for detecting exact site of injury(16).

We found 61.3% of patients were satisfied with nose appearance in the traditional CR. In addition, we found that in the CR in conjunction with osteotomy the rate of patient satisfaction with nose appearance surgery was 83.3%.

Our study showed that in the CR in conjunction with osteotomy the rate of complications (42%) was lower than the rate of patient satisfaction. This satisfaction expression in the traditional CR group in despite of having post reduction complication may be linked to their reluctant and fear to undergo second surgery.

As Fernandas(17) and Hung et al.(6)stated that it is impossible to predict which patients who have a good reduction from the surgery's point of view at the time of surgery will finally have a good outcome. In our study the reason of undergoing osteotomy in addition to closed reduction was existence of post reduction deformities, while patients in traditional CR group no longer had post reduction deformities. Our findings confirmed the views have been stated by previous studies (6, 17).

According to our findings it can be concluded that CR along with osteotomy is better than traditional CR regarding complications, patient's satisfaction and remained deformity. It is suggested that in the presence of deformity at time of closed reduction, corrective procedures such as osteotomy can eliminate future corrective procedures which is necessary for patients who have nasal bone deformity. In addition, CR along with osteotomy can be used in patients with different types of deformity to improve final results and decrease need to secondary procedures such as open septorhinoplasty.

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