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INFRAORBITAL NERVE INJURY;

ASSESSMENT OF RECOVERY FOLLOWING OPEN AND CLOSE TREATMENT METHODS IN ZYGOMATIC COMPLEX FRACTURE

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ABSTRACT… **Objective:** To compare the frequency of the recovery of infraorbital nerve injury following zygomatic complex fracture management with open reduction and close reduction. **Study Design:** Randomized controlled trail study. **Setting:** Oral & Maxillofacial Surgery Department of Dentistry, Liaquat University Hospital, Jamshoro. **Period:** From 17th October 2015 to 16th October 2016. **Material and Methods:** Total 168 patients with zygomatic complex fracture with infraorbital nerve injury were included and equally divided in Close (Group-A) and Open (Group-B**)** reduction. Neurosensory evaluation was done. The areas were examined bilaterally anterior cheek, lateral side of the nose and upper lip. After 24 weeks if two successive positive responses were obtain then result was called recovery. Descriptive statistics were applied. Stratification was done using Chi square test. **Results:** The mean duration of fracture in group A was 21.41±9.81 hours while in group B it was 20.65±9.11 hours. The assessment after 24 weeks showed better results in Group B as compared with Group A. Recovery of infraorbital nerve injury was observed 13.1% in group A and 94% in group B. **Conclusion:** The frequency of recovery is high with open reduction as compared to closed reduction.

Key words: Recovery, Infraorbital Nerve Injury, Zygomatic Complex Fracture, Open Reduction, Close Reduction.

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INTRODUCTION

In all the maxillofacial injuries after the nasal region injury zygomatic complex is the 2nd most common injured area of the mid-face and they composed upto15% of all facial bone fracture.[1,2,3,5]

In zygomatic complex fracture the incidence of infraorbital nerve injury is 64.4% and 95% cases of zygomatic complex fracture involves infraorbital foramen and may cause some degree of sensory disturbances ranged from 30 to 80%.[4,6,7,10] Infraorbital nerve injury is mainly a compression type of injury in zygomatic complex fracture as a result of displacement of infraorbital rim margin, entrapment of nerve as it leaves the infraorbital foramen in addition tissue swelling, edema, ischemia, laceration and nerve compression or traction also symptoms may vary from hypoesthesia, hyperesthesia, dysthesia, paresthesia to numbness of effected site i-e nose upper lip and heaviness or loss of sensation of teeth, these alteration of sensation of infraorbital nerve depends upon the severity of trauma and bony displacement.[2,9,11]

Hypoesthesia following adjustment of mid-face and zygomatic complex fractures specifies injury to the infraorbital nerve. Although hyperesthesia alongside the dispersal of the infraorbital nerve has been recognized, it is reasonably occasional in incidence.[12,15,17,18] The rate of long-term neurosensory discrepancies in different studies varies from 10% to 50%.[15,16]

The aim of my study to evaluate the recovery of infraorbital nerve injury in zygomatic complex fracture patient treats with open or close method. On literature search it has been observe that on this topic locally and internationally is very scanty. In our routine practice we are using close reduction method for zygomatic complex fracture but according to literature open reduction have

better result. If result of my study will show better result in term of recovery of infraorbital nerve injury then this technique could be recommended and practice as first line of treatment in zygomatic complex fracture.

DATA COLLECTION PROCEDURE

Stage 1. Patients fulfilled the inclusion criteria were included in this study. Informed and written consent was taken before enrollment in study and after explain the surgical procedure and its outcomes.

Stage 2. Diagnosed Patients with isolated unilateral zygomatic complex fracture with infraorbital nerve injury were taken.

Stage 3. Patients were divide in two groups (Group 1 and Group 2) by random number table each group operated under general anseathesia either open or close reduction method of treatment.

Stage 4. The neurosensory evaluation included light touch sensations examined with cotton wool, directional sensation with a blunt probe, pain perception with 27 gauge needle and thermal responsiveness with ethyl chloride saturated dental swab test within the skin areas supplied by infraorbital nerve.

The zones were inspected bilaterally anterior cheek, lateral side of the nose and upper lip. Sensory function was evaluated pre operatively; post operatively, 1 week post operatively, 12 weeks post operatively, 24 weeks postoperatively. Finally after 24 weeks if two successive positive responses in these four tests were obtained then result was called recovery of infraorbital nerve function.

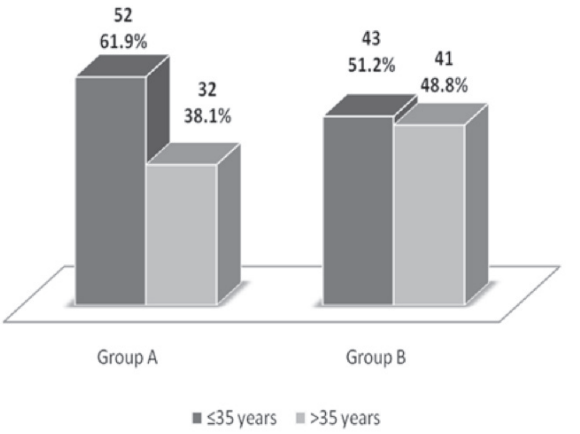
RESULTS

Table I shows frequency of gender distribution:

	Group A n(%)	Group B n(%)
Male	80(95.2)	76(90.5)
Female	4(4.8)	8(9.5)
TOTAL	**84**	**84**

Table-I. (n=168)

Graph 1 shows distribution of age groups:



Graph-1. (n=168).

Graph 2 shows duration of fracture of study groups

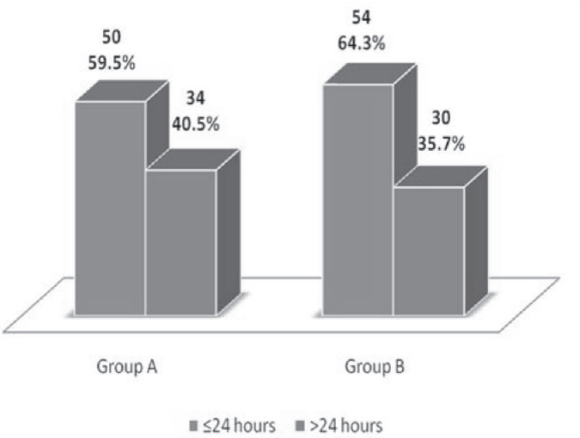


Table II shows frequency distribution of light touch sensation with cotton wool.

		n(%)	
		Group A (n=84)	**Group B (n=84)**
Pre	Positive	0(0)	0(0)
	Negative	84(100)	84(100)
After 1 week	Positive	0(0)	5(6)
	Negative	84(100)	79(94)
After 12 weeks	Positive	6(7.1)	60(71.4)
	Negative	78(92.9)	24(28.6)
After 24 weeks	Positive	5(6)	16(19)
	Negative	79(94)	68(81)

Table-II. (n=68)

Table III shows frequency distribution of directional sensation with a blunt probe.

		n(%)	
		Group A (n=84)	Group B (n=84)
Pre	Positive	0(0)	0(0)
	Negative	84(100)	84(100)
After 1 week	Positive	0(0)	3(3.6)
	Negative	84(100)	81(96.4)
After 12 weeks	Positive	4(4.8)	67(79.8)
	Negative	80(95.2)	17(20.2)
After 24 weeks	Positive	7(8.3)	14(16.7)
	Negative	77(91.7)	70(83.3)

Table-III (N=168)

Table IV shows frequency distribution of pain sensation with 27 gauge needle.

		n(%)	
		Group A (n=84)	Group B (n=84)
Pre	Positive	20(23.8)	18(21.4)
	Negative	64(76.2)	66(78.6)
After 1 week	Positive	0(0)	4(4.8)
	Negative	84(100)	80(95.2)
After 12 weeks	Positive	4(4.8)	72(85.7)
	Negative	80(95.2)	12(14.3)
After 24 weeks	Positive	7(8.3)	8(9.5)
	Negative	77(91.7)	76(90.5)

Table-IV. N=168

Table V shows frequency distribution of thermal sensation with ethyl chloride saturated dental swab.

		n(%)	
		Group A (n=84)	Group B (n=84)
Pre	Positive	5(6)	5(6)
	Negative	79(94)	79(94)
After 1 week	Positive	0(0)	3(3.6)
	Negative	84(100)	81(96.4)
After 12 weeks	Positive	5(6)	75(89.3)
	Negative	79(94)	9(10.7)
After 24 weeks	Positive	6(7.1)	6(7.1)
	Negative	78(92.9)	78(92.9)

Table VI shows frequency distribution of recovery.

	Group A n(%)	Group B n(%)
Yes	11(13.1)	79(94)
No	73(86.9)	5(6)
Total	84	84

Table-VI. N=168

DISCUSSION

The zygomaticomaxillary complex (ZMC) is second most commonly injured area followed by nasal bone alone. The trauma of ZMC constitutes 45% of the midfacial and 25% of all the fractures of facial population. Worldwide the fracture to the facial regions are more common in males, the ratio may vary widely but males are more prone to maxillofacial trauma due to RTA, assaults, sports and war. Bakardjiev and Pechalova from Bulgaria reported a male to female ratio of 4.6:1.[19,20] In China, the male to female ratio reported after a maxillofacial injury by Zhou and coworkers in 2013 was 3.35:1.[21] Arslan et al from Turkey reported 2.8:1 male to female ratio.[22]

In a study results showed a male: female ratio of 5:3, the difference in the ratios can be due to high RTAs in females as they commonly accompany males especially on the motorbike which is itself a major cause of RTA. The age group affected was 18-39 years. The main cause in their study for ZMC fractures was interpersonal assault as opposed to our results which was RTA.[22] Balakrishnan from India also reported age group 20 to 40 being more prone to RTAs.[23]

Nerve injury following fracture may present with various pathophysiology involving traction, compression, ischemia, inflammation and physical harm of the infra-orbital nerve resulting in sensory neuropathy and motor functions in the area of innervations of infra-orbital nerve both as presenting symptom and as a postoperative impediment.[24]

A study from Iran assessed the sensor motor nerve damage in patients with maxillofacial trauma and found that infra-orbital nerve damage was the second most common nerve damaged after trigeminal.[25] As all the fractures to facial region were studied in the previously mentioned

study that might be the reason that infra-orbital nerve damage was second on the chart. In our study only ZMC fractures were evaluated which showed infra-orbital nerve paresthesia in 70.67% (n = 53) of the patients. Recorded incidence of infra-orbital nerve injury following ZMC fractures ranging from 18-83% in a study from Israel and 58 to 94% from India.[26]

Open reduction and internal fixation is one of the most used and preferred method of fixation with desirable results. De Man and Bax from Netherlands stated that reduction and fixation were important factors in the recovery of sensory disturbances of the infraorbital nerve.[27]

Vriens and Moos also reported that open reduction and internal fixation had a superior prognosis to infraorbital nerve recovery.[28] Sakavicius and workers found that function is completely repaired in 77.3% of patients after open reduction and internal fixation.[24]
Benoliel documented the neurosensory variations in the infra-orbital nerve after zygomatic fractures coped in different ways and concluded that plate fixation sanctions meaningfully enhanced restoration of infra-orbital nerve function.[29] Kumar et al, concluded that earlier the surgical intervention, more the recovery of the nerve injury is noticeable during the 1 and 6 months follow up period.[26]

CONCLUSION

The frequency of functional nerve recovery is high among individuals treated with ORIF as compared to closed reduction. So, it is recommended that every patient who presents with zygomatic complex fractures with infraorbital nerve involvement should be treated with open reduction fixation and sorted out for functional nerve recovery. However, it is also required that every setup should have their surveillance in order to know the frequency of recovery.

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2	Muhammad Hamid Ali	Assesment of complication.	
3	Syed Fida Hussain Shah	Data analysis.	
4	Syed Ghazanfar Hassan	Study design, Data collection, Results.	
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