

## Original Research Article

# A HOSPITAL BASED PROSPECTIVE STUDY TO EVALUATE AND COMPARE THE VERTICAL V/S HORIZONTAL VESTIBULAR INCISION IN TREATING ZYGOMATICOMAXILLARY COMPLEX (ZMC) AT NEWLY ESTABLISHED TERTIARY CARE CENTER

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## ABSTRACT

**Background:** The zygomatic buttress is the practically and fundamentally critical vertical buttress. The strength and support of the midface are mainly by the buttresses. A study was done to evaluate and compare vertical with horizontal vestibular incision to reduce and plate fractures involving zygomatic buttress.

**Materials & Methods:** This is a hospital based prospective study done on 20 patients with midface fracture involving zygomatic buttress those who reported in dental and ENT department at our hospital during one-year period. Intraoperative evaluation and comparison of exposure time and time taken for surgery, herniation of the buccal fat pad and exposure of the fracture site were performed, followed by postoperative evaluation and comparison of pain, wound, sialoceles formation and infection done on 7th, 14th and 21st days.

**Results:** Evaluation and comparison for visualization of fractures, exposure time was  $18.24 \pm 7.28$  minutes in vertical incision groups &  $12.66 \pm 6.34$  minutes in horizontal incision groups, which was statistically significant. Intraoperative buccal fat herniation was present in 4 patients in horizontal incision groups. The comparison of pain score at different interval on days 7th, 14th and 21st postoperatively were statistically non-significant.

**Conclusion:** We concluded that intraoral vertical incision can be efficiently used for the reduction and fixation of zygomaticomaxillary complex fractures.

**Keywords:** Zygomaticomaxillary Complex Fractures, Vertical Incision, Horizontal Incision, Exposure of Bone, Zygomatic Buttress.

## INTRODUCTION

The zygomatic buttress is the practically and fundamentally critical vertical buttress. The strength and support of the midface are mainly by the buttresses. Zygomatic buttress is the foremost commonly broken bone in all types of facial breaks. The strength and support of the midface are mainly by the buttresses, which are also known as pillars of the face. The zygomatic-maxillary buttress starts above the first molar and travels along the lateral maxilla through the zygomatic bone, along the lateral orbital rim through the frontal processes of the zygoma, and finally through the zygomatic process

of the frontal bone.<sup>[1]</sup> Vertical pillars primarily transmit all masticatory forces towards the base of the skull.<sup>[2]</sup> The major causative factor for the fracture of the main buttress is road traffic accidents. While other causes involve falls and assault. Sports injury is the least responsible factor causing midface and zygoma fractures.

Proper history, clinical inspection and palpation will help in the diagnosis. Disruption of the Dolan's lines, orbital line, zygomatic line, maxillary line and loss of elephant trunk appearance are the radiographic findings seen on Waters view and jug handle view. Other important lines to be taken into consideration are McGregor-Campbell's lines.<sup>[1,3]</sup> Few

zygomatico-maxillary complex (ZMC) fractures are non-displaced, for which a conservative approach is undertaken. According to various analyses, 8%-51% of ZMC fractures do not require any surgical intervention. For open reduction with or without fixation of midface fracture, there are many well documented surgical approaches and incisions, both intraoral and extraoral.<sup>[4]</sup> The intraoral vestibular approach for the maxilla is most commonly used when one has to perform any of the procedures on the central and peripheral midface region.<sup>[3]</sup> It gives appropriate visibility and accessibility to the complete facial region of the midface, including the arch up to the inferior orbital rim and frontal process of the maxilla.<sup>[3]</sup> This incision may cause injury to Stensen's duct.<sup>[5]</sup> The posterior part of this incision is not so easy to suture, so wound dehiscence can occur, leading to plate exposure and infection. A study was done to evaluate and compare vertical with horizontal vestibular incision to reduce and plate fractures involving zygomatic buttress.

## MATERIALS AND METHODS

This is a hospital based prospective study done on 20 patients with midface fractures involving zygomatic buttress those who reported in dental and ENT department at our hospital during one-year period. Male or female with the age >18 and <60 was included. Vertical vestibular incision was evaluated in the parameters of accessibility, visibility and exposure of the fractured buttress and complication and then compared with findings of horizontal incision. The clinical study evaluated and compared exposure to the fracture site, exposure time, buccal fat herniation and complications of healing such as wound dehiscence, postoperative pain, infection and sialocele formation on the 7th, 14th and 21st day. All patients were operated on under general anaesthesia through nasal intubation by the same surgeon following all standard aseptic protocols. An obliquely placed vertical curvilinear was placed 8-10

mm anterior to Stenson's duct. A horizontal anterior extension may be placed 3-5 mm above the mucogingival line if needed. This incision starts superiorly from the body of the zygoma up to the alveolar bone of the maxilla. Subperiosteal dissection is performed to allow adequate access to the fracture site. This incision was performed on Group A patients. On palpation of malar eminence and the buttress, a horizontal incision was marked 3 mm above the mucogingival line, which extended posteriorly behind the buttress and anteriorly towards the nasal rim. Full-thickness, mucoperiosteal incision was made starting on the body of the zygoma and extending to the maxillary alveolus and buttress region. Subperiosteal dissection is performed in all directions to allow adequate access to the fracture site. This incision was performed in Group B patients. No standardized protocol for closure of incision was fixed or pre-decided. After performing fixation, closure of both vertical and horizontal incision was performed using resorbable round body 3-0 Vicryl suture by interrupted technique in almost all the cases. Statistical analysis was done using the chi-square test and paired sample t-test for quantitative data. For all statistical analyses, probability levels of  $P < .05$  will be considered statistically significant.

## RESULTS

A total of 20 patients with midface fractures were treated during the study period, Group A— intraoral vertical incision and Group B— intraoral horizontal incision, which were chosen randomly. Evaluation and comparison for visualization of fractures, exposure time was  $18.24 \pm 7.28$  minutes in vertical incision groups &  $12.66 \pm 6.34$  minutes in horizontal incision groups, which was statistically significant. Intraoperative buccal fat herniation was present in 4 patients in horizontal incision groups (Table 1). The comparison of pain score at different interval on days 7th, 14th and 21st postoperatively were statistically non-significant.

**Table 1: Comparison of demographic & clinical profile in between groups**

Variables	Group A (No. of Patients)	Group B (No. of Patients)	P-value
Age (yrs)	32.57±2.9	30.32±2.6	>0.05
Time Taken for Exposure of Fractured Site (Min.)	18.24±7.28	12.66±6.34	<0.05*
Herniation of Buccal Fat Pad (No. of patients)	0	4	<0.05*
Visibility and Exposure of Fractured Site (Adequate)	4	10	<0.05*
Pain at 7 <sup>th</sup> day	6.53±0.76	6.75±1.08	>0.05
Pain at 14 <sup>th</sup> day	4.28±0.95	3.54±1.14	>0.05
Pain at 21 <sup>st</sup> day	1.83±0.62	1.98±0.96	>0.05

## DISCUSSION

The incidence, ethnicity, aetiology, age group and sex predilection of zygomatic injuries vary depending on the socioeconomic, political and academic standing of the population. Many studies on zygomatic fracture show a predilection of males, with a quantitative relation of 4.1:1.2 roughly over females.<sup>[6]</sup> The left zygomatic fracture is mostly seen,

mainly because of the greater number of right-handed people.<sup>[7]</sup> The data of our study showed that the mean age for zygomatic buttress fracture was 32 years for all 20 patients, including both groups A and B. The zygomatic bone has a vital role in facial structure. Changes in the zygomatic bone position cause disturbance in function. So for aesthetic and functional purposes, zygomatic-complex trauma must be diagnosed properly and effectively treated.<sup>[8]</sup>

Various approaches are effectively used for treating zygomatic-complex fractures. Pre-existing lacerations are mostly used for reduction and fixation so that it avoids extra scarring. In the cases where lacerations did not exist, properly placed incisions provide adequate exposure, with minimal morbidity and scarring. There are extraoral as well as intraoral approaches. Intraoral approaches are always better as they are scarless.<sup>[7]</sup>

Ellis and Kittidumkerng<sup>[6]</sup> studied different surgical approaches; according to their study and research, they analysed and concluded that the transoral upper vestibular approach was used most frequently, either alone or in combination with different extraoral approaches. The maxillary vestibular approach is one of the most important and least complicated approaches for the open reduction of zygomatic fractures. It gives adequate visibility to the entire midfacial region with good accessibility up to the infraorbital rim. In other extraoral approaches like trans-conjunctival, an additional intraoral approach is needed for zygomatic buttress fixation.

Rehman et al. suggested the advantages and disadvantages of various surgical approaches by research on 81 patients with zygomatic fractures to study different patterns, causes and treatment options.<sup>[9]</sup> The author also explained many benefits of transoral vestibular incision like better visibility and good exposure of fracture site.<sup>[8]</sup>

Complications with horizontal incision included buccal fat herniation, injury to Stenson's duct and damage to the infraorbital nerve. Herniation of the buccal fat pad may disturb the visibility of the fracture site if a surgeon is unable to properly retract the buccal fat pad. In our study, buccal fat pad herniation was seen in four cases (40%) with horizontal incision. With vertical incision, there was not a single case with buccal fat pad herniation. We did not find any other postoperative complication in the patient with herniation of the buccal fat pad. Exposed buccal fat pad (BFP) increases suturing time. It also intervenes in the visibility and exposure of the fracture site. In our study, buccal fat herniation did not affect exposure and visibility of the fracture site because of better retraction. The result of our study shows that for Group B, visibility and exposure of the fracture site were adequate in all ten cases, which is 100%, whereas for Group A, in four patients, 40% had adequate visibility and 60%, that is for six patients, visibility was not adequate.

The vertical curvilinear intraoral incision overcomes the complication of buccal fat pad herniation and injury to the duct causing sialocele and gives good access and visibility to the zygomatic buttress and infraorbital rim. This incision is more useful in isolated buttress and unilateral ZMC fractures than in the fractures involving bilateral zygoma, Le Fort and comminuted fractures. Vertical incision provides less visibility to the pyriform region than the horizontal incision.<sup>[9]</sup>

Complications such as postoperative wound dehiscence and infection depend on many factors like

oral hygiene and suturing technique. In our study, we observed some patients with horizontal incisions had infections and wounds gaping in the postoperative period as distal extension of incision is difficult to suture and difficult to maintain hygiene. Another observation noted in all cases with vertical incisions was the absence of wound gaping. The oblique orientation of the vertical incision eliminates the need for the transection of muscle fibres, thereby making this design less invasive than horizontal vestibular incision.<sup>[9,10]</sup> The absence of wound gaping could be attributed to the free mobility of alveolar mucosa aiding in tension-free primary closure.

## CONCLUSION

We concluded that intraoral vertical incision can be efficiently used for the reduction and fixation of zygomaticomaxillary complex fractures. This incision does provide sufficient exposure to the fracture site, and its orientation eliminates the need for muscle transection allowing abundant soft tissue for easy tension-free closure reducing postoperative complications.

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