Autogenous mandibular symphysis graft for orbital floor reconstruction: a preliminary study

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Abstract

Objective The present study aimed to evaluate and analyze postoperative results of Autogenous Mandibular Symphysis graft material for orbital floor reconstruction.

Material and methods A retrospective study was conducted on 11 patients, having an isolated blow out fracture (n=4) or orbital floor defects associated with other fractures (n=7). These fractures were reconstructed with Mandibular symphysis bone grafts. The Grafts were used where the defects were more than 1.5 centimeter [1] in diameter. Follow up as long as 1.5 year was kept. Patients were evaluated at recall visits by checking various extraocular movements. Evidence of any complications like diplopia or enophthalmos, or rejection of graft or any symptoms of infection, or of paresthesia was recorded.

Results During a 1.5 year period of follow up, most of the patients had no postoperative complaints. There was good restoration of the orbital floor, with no clinical evidence of enophthalmos or diplopia. Extraocular movements were intact in all patients.

Only one patient presented with the symptoms of infection at a follow up period of 9 months. The infection subsided after removal of titanium plates, used for the stabilization of graft.

Conclusion Autogenous Mandibular Symphysis graft is a good alternative with minimal morbidity for orbital floor reconstruction. The contour as well as the size of the graft available from symphysis region best suits for orbital floor reconstruction.

Keywords Orbital floor reconstruction · Mandibular symphysis · Graft · Diplopia

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Introduction

Orbital floor reconstruction is usually carried out in patients with defects caused by facial trauma or tumor ablation. The orbital defect may be of isolated blowout type fracture or associated with other facial bony injuries.

Reconstruction of the bony wall or floor of the orbit will avoid the herniation of orbital fat or entrapment of ocular muscles. The final form, shape and volume of bony orbit can also be restored, thus leading to acceptable functional aesthetic outcome [2]. Implant material used for reconstruction of orbital floor should be biocompatible, noncarcinogenic, easy to place in position and free of any potential

for disease transmission [3]. Variety of materials like autologous bone and synthetic materials [2,3] like hydroxyapatite, nylon, marlex mesh, porous polythene [4] have been used for floor reconstruction.

But still autogenous bone grafting has been the gold standard to provide framework for the facial skeleton. The advantages of autogenous bone graft are its relative resistance to infection, lack of host response against graft and lack of concern for late extrusion.

Multiple sites are used for bone grafting for orbital floor reconstruction like anterior iliac crest, clavicular graft, coronoid process, ramus of mandible, body of mandible [4,5], lingual cortex [4], and

mandibular symphysis [4,5] region. An intraoral bone graft from mandibular symphysis area serves as a good treatment modality for long span augmentation upto complete jaw augmentation, extensive reconstruction of maxillary alveolar ridges [6]. In the repair of localized alveolar defects bone grafts from symphysis and ramus offer advantages of conventional access, proximity of donor site and recipient site, reduced operative and anesthesia time [7]. Intraoral graft from mandibular symphysis region is one of the best option for facial bones reconstruction, but the role of symphysis graft is well documented only for ridge augmentation, ridge reconstruction procedures and very little has been mentioned for its use in orbital

floor reconstruction. But a surgeon can consider mandibular symphysis region as a option for orbital floor reconstruction because of the contour of the graft [4], dimensions [4,5], local site with minimum morbidity [4] and very slow rate of resorption [5].

Aims and objectives

This study was aimed to evaluate and analyze postoperative results of use of autogenous mandibular symphysis graft material for the orbital floor reconstruction. The following postoperative results were evaluated:

- Optimum restoration of orbital floor
- Any evidence of enophthalmos or diplopia
- Extraocular movements after floor reconstruction
- Any evidence of infection
- Any evidence of paresthesia or anesthesia

Materials and methods

This study was conducted in Department of Oral and Maxillofacial Surgery, Rural Dental College, Loni, during the period of 2 years from 2005 – 2007. Eleven patients who presented with isolated blowout fractures (n=4) or orbital floor defects associated with other facial fractures (n=7), were reconstructed with autogenous mandibular symphysis graft. The selection criterion for orbital floor reconstruction was that the gap between the fractured segments of orbital floor should be more than 1.5 cm. (Table 1) Follow up was done for each patient for a period of about 1.5 years by regular recall visits.

Patients were examined for any limitations of extraocular movements, diplopia or enophthalmos, infection etc. Paranasal sinus view was taken after every 4 months to find out any radiographic changes.

The surgical sites were examined for the following:

- Any extrusion of bone graft at infraorbital rim,
- Any loss of contour at the symphysis region and
- For any evidence of infection, sensory deficit at both donor site as well as recipient site.

With the help of clinical and radiographical evaluation above criteria's were checked. Radiographs helped in detecting

Fig. 1 Exposed parasymphysis region for grafting

Fig. 2 Labial aspect of harvested parasymphysis graft

Fig. 3 Lingual aspect of harvested parasymphysis graft

Fig. 4 Harvested parasymphysis graft placed at explored site

Table 1 Criteria for orbital floor reconstruction

Criteria for orbital floor reconstruction	Gap of more than 1.5 cms
Total number of patients	11
Isolated blowout fractures	4
Associated with other facial defects	7

Table 2 Results

Total number of patients	11
Extrusion of bone graft at recipient site	0
Loss of contour at donor site	0
Sensory deficit at donor site	0
Sensory deficit at recipient site	0
Evidence of infection at donor site	0
Evidence of infection at recipient site	1

rejection of graft, loosening of screws, radiolucency around graft and implant.

Surgical procedure

For exploration of the fracture site i.e. orbital floor, subciliary approach was taken, because of imperceptible scar that it creates. After orbital floor exploration bone graft was harvested. 2–3ml of 2% xylocaine with adrenaline was infiltrated in the mandibular labial vestibule and a vestibular

incision was made from the first premolar of one side to first premolar of contralateral side. The mandible was then exposed anterior to the mental foramen and from the roots of the anterior teeth to the inferior border of the mandible.

Using round bur the bony part to be used as a graft was outlined. The graft can be taken from either side of symphysis or both sides crossing midline depending on the size of defect. The maximum diameter of bone graft which can be obtained from symphysis region

is approximately 45 x 10 mm and the average thickness of 9.63 mm [5].

The superior bur cut was beveled at 45° to avoid damage to the roots of anterior teeth and at least 5 mm below the root apices in order to prevent damage to nerves of mandibular incisors and their subsequent loss of sensation. The osteotomies were performed only through the outer cortical plate of the mandible. With the help of curved osteotomes bone graft was removed.

Harvested graft was contoured and reduced to accurate required thickness. A titanium bone plate was used for fixation and it was first attached to the graft on the side table and then the bone graft was placed in the orbital floor with concave surface against the periorbital and fixed to the orbital floor or the infraorbital rim with other end of titanium plate.

Results

In the present study patients having orbital floor fracture, with a gap of more than 1.5 cm, was reconstructed with autogenous parasymphysis graft, as it can be used in defects up to 2 cm [4,5].

Out of eleven only one patient reported with signs and symptoms of infection at the recipient site at a follow up period of 9 months (Table 2). These symptoms of infection subsided after removal of the titanium bone plate which was used for stabilization of graft. None of the patient had complaint of paresthesia/anesthesia in mental region or infraorbital region. There was no alteration in the chin contour. Chin was without any evidence of step deformities or chin ptosis.

Discussion

In the reconstruction of orbital floor fractures, different types of materials like alloplastic, allogenic [8], autogenous bone can be used and now it is well documented that autogenous bone grafting is superior to other sources; it is the most physiologic of various materials. Autogenous bone grafts from the antral wall, ileum, calvarium, rib and mandible have been used in orbital floor repair. But we believe that amongst all these, mandibular graft from symphysis region is best because of its low morbidity [4], more accessibility [5], optimum contour [4] and dimension of the graft for reconstruction [4,5]. The cortical plate of the mandible is thickest at the lower border and is maximal as one approaches

the midline. Sufficient bone can be harvested at the lower border [9] from symphysis region.

In a study by Vijayan Krishnan et al. orbital floor was reconstructed with autogenous symphysis graft in 16 patients. None of patients reported any postoperative complaints, and there was no evidence of enophthalmos or diplopia; extraocular movements were intact. There was no instance of any infection at the grafted site, no sensory deficits of the infraorbital nerve or mental nerve region.

Our study results were also satisfactory and acceptable, with only one patient having postoperative infection. Our experience and review of literature shows that autogenous mandibular symphysis [4,5] is a good alternative for the orbital floor reconstruction. Although other parts of mandible can also be used for the same procedure, symphysis region is preferred because:

- Contour of the symphysis region almost matches to that of the orbital floor and symphysis graft dimensions are adequate for repair of majority of orbital floor defects
- It is more accessible in comparison with the lingual plate, lateral ramus, and coronoid process.

Conclusion

The mandibular symphysis has been used as a source of bone graft for alveolar cleft repair, alveolar ridge augmentation [2] and orbital floor reconstruction [4]. Mandibular symphysis bone graft has been used widely for alveolar repair to allow implant placement with extremely favorable results [10,11,12] and the same is also used for maxillary sinus floor augmentation [13,14]. This source is, however, often overlooked when an autogenous bone graft is needed for orbital floor reconstruction. This bone graft can be harvested with relative ease and low morbidity such bone grafts can be used to repair defects measuring up to 2 cm in diameter. Our experience has shown that the mandibular symphysis is an excellent source of bone for reconstruction of orbital floor. As the inferior border of the symphysis region was left intact and osteotomy cut was made above inferior border for harvesting graft, so chin contour was unaffected. The maxillofacial surgeon should therefore consider this readily available source of bone while reconstructing the orbital floor.

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