MANAGEMENT OF A CASE OF MASSIVE ORBITAL FRACTURE ASSOCIATED WITH INTRACRANIAL INJURY

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ABSTRACT

Blowout fractures occur when direct blunt force is applied to the globe and orbit. The patient in this case had extensive fractures of the medial wall, lateral wall, floor and roof of the right orbit following a road traffic accident with extensive damage to the globe and right frontal lobe. The management of this patient and the technique of reconstruction of the defect with autologus split calvarial graft are discussed. Though the eyeball was not salvageable, the roof was reconstructed with a split calvarial graft as it can be harvested easily without extra cost to the patient.

Key words: orbital fracture, orbital injury, brain injury

INTRODUCTION

Blowout fractures occur when direct blunt force is applied to the globe and orbit. Disruption of the bony orbital wall allows for decompression, typically sparing the orbital rim (pure blowout fracture).[1] Blowout fractures occur when an object which is slightly larger than the orbit itself strikes the orbit, causing diffuse transmission of the increased pressure through the globe and orbital structures that is relieved by a fracture of one of the orbital walls, typically sparing the orbital rim. [1,2] Our patient had extensive fractures involving the medial wall, lateral wall, floor and roof of the right orbit with extensive damage to the globe and right frontal lobe. We discuss the management of this patient and discuss the technique of reconstruction of the defect with autologus split calvarial graft.

CASE REPORT

The patient is a twenty-year-old gentleman, who was involved in a high-speed motor vehicle accident a month before and sustained extensive trauma to the head on the right side. He was unconscious for three days and had left-sided hemiparesis. He was managed conservatively due to financial constraints and lack of facilities at a peripheral hospital. The patient had an open, depressed skull fracture with injury to the right eyeball (figure 1). No clinical evidence of entrapment or CSF leak was noted on examination. The left eye was normal. A CT scan of the head showed massive soft-tissue injuries to the face with multiple fractures and complex trauma to the brain (figure 2). Axial CT scans through the right orbit also revealed severe disruption of the orbital anatomy with fractures of the superior, lateral, medial and inferior orbital walls, obliteration of the normal orbital fat, and diffuse haemorrhage mixed with air and bony fragments. There was also fracture of the superior orbital rim. The patient had delayed surgical repair of the cranio-facial and ophthalmic injuries. Wide exposure was obtained through bicoronal skin flap and bifrontal craniotomy (figure 3). At the time of surgery, there was laceration of the upper eyelid and disruption of the right eyeball. The right globe was shattered and removed piece meal. There were fractures of the superior orbital rim with fractures of the right orbital roof (figure 4A). The contused right frontal lobe was removed and the orbital roof was reconstructed with a split calvarial graft (figure 4B and D). A pericranium was placed over the defect to ensure successful fixation and stabilization of the orbital roof (figure 4C). The bone flap was replaced and secured (figure 5). The patient was doing well when he reported for follow up.

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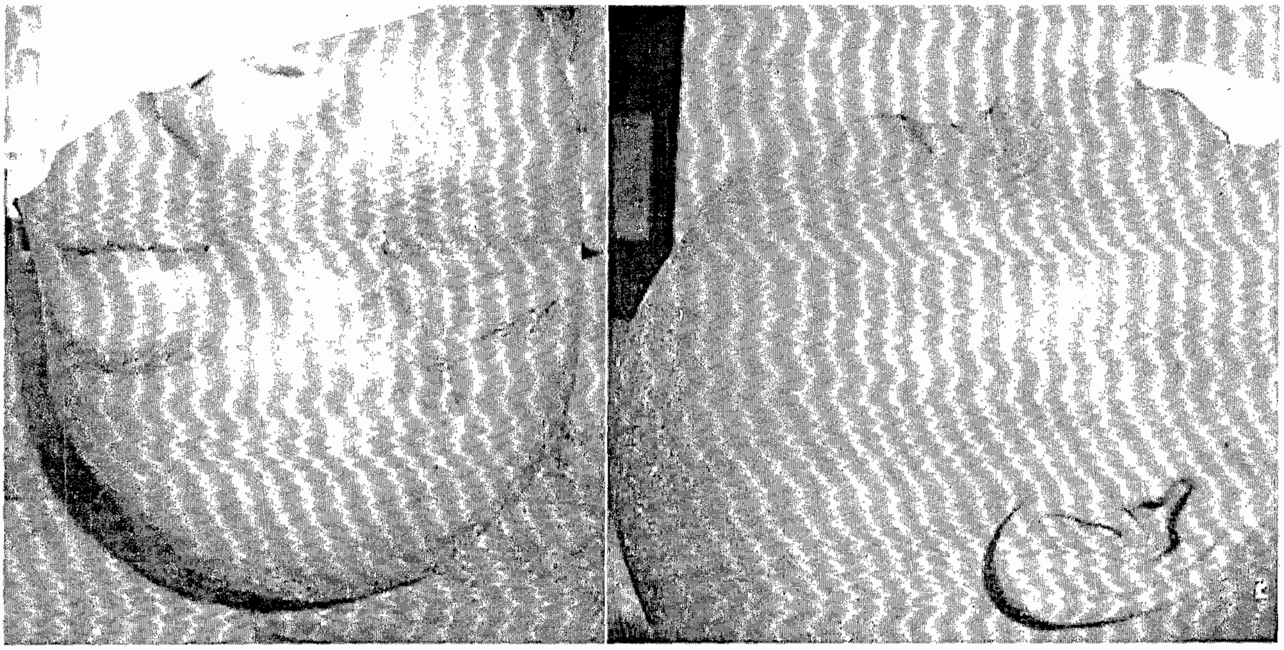

Figure 1. Clinical image showing extent of external injury and conjunctival chemosis

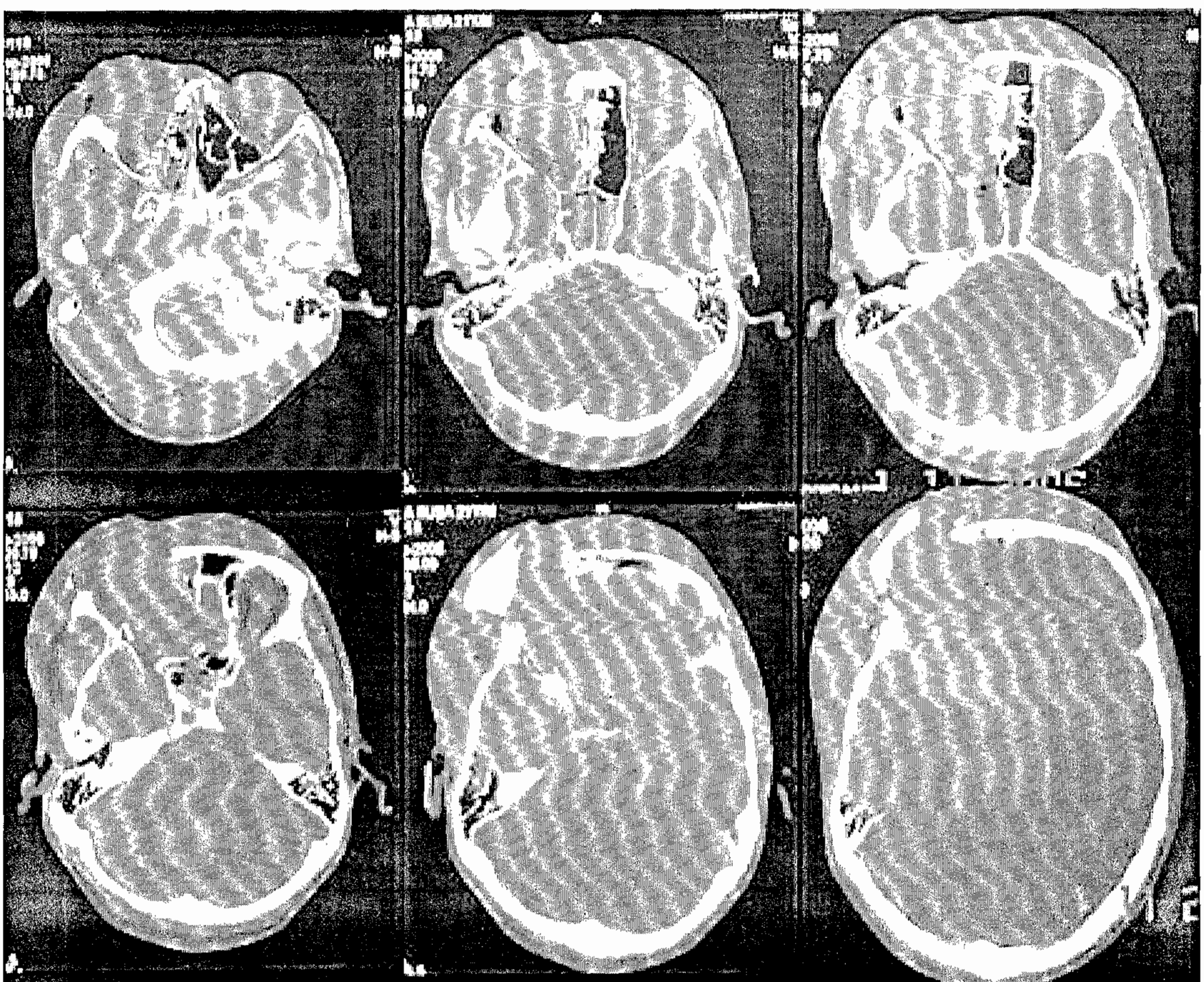

Figure 2. Axial CT scan (bone window) showing multiple fractures involving all orbit and right frontal bone

Figure 3. Intra-operative photograph showing fracture fragments (left) and extensive dural tear and protruding brain tissue (right)

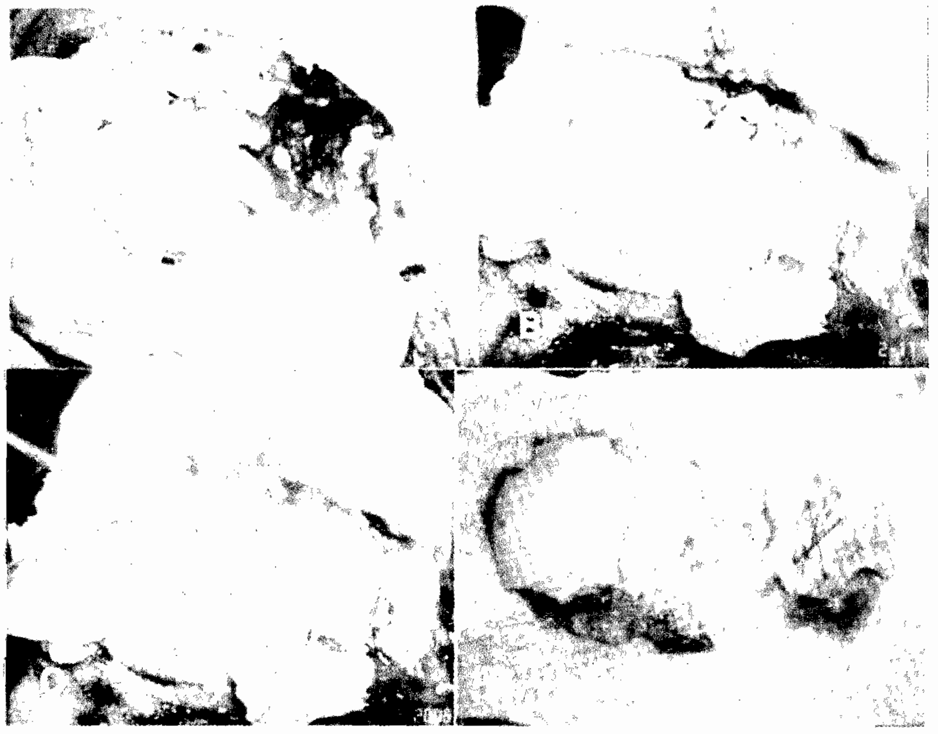

Figure 4. Defect in the orbital roof (A), bridged with split calvarial graft (B), and covered by pedicled pericranial graft (C). Spilt calvarial harvested from frontal bone

Figure 5. Bone fragments were replaced to from the contour

DISCUSSION

Blowout fractures of the orbit may be associated with herniation of intraorbital contents into the cranial vault and/or the sinuses.[3,4] As in the present case, the extent of this soft-tissue damage can be estimated from coronal CT scans and should be considered in the treatment plan.[4] Sometimes, the herniation of intraorbital contents cannot be appreciated on the CT scan of the brain owing to the relatively thick (10-mm) sections and the resultant partial volume averaging of the herniated fat, super-jacent brain, and bony orbital roof.[3] The use of thin-section direct coronal CT to examine the orbits prior to planned surgical intervention allows for separation and correct identification of the herniated fat and better delineation of the site, location, and size of the displaced fracture fragment as well as of the concurrent fractures.[3] Although the management of orbital blow-out fractures was controversial for many years, refined imaging with computed tomography (CT) has helped to narrow the poles of the debate.[5] The degree of soft-tissue displacement relative to bone fragment distraction, as depicted in preoperative CT scans, should be considered in the timing of surgery. Incisions, soft-tissue handling, and implant material, thickness, and positioning can all affect the functional and aesthetic outcomes.[5] Different materials such as iliac bone,[6] titanium mesh implants[7,8] have been used for bone reconstruction. Soft tissue damage in the form of contusions — shearing, laceration, crush and attenuation — can lead to intrinsic fibrosis and tethered movement, despite successful surgical reduction of the entrapped fibrofatty-muscular complex.[4] In general, greater degrees of soft tissue incarceration or displacement, with presumably greater intrinsic damage and subsequent fibrosis, appear to result in poorer outcomes.[5]

CONCLUSION

The patient in this case had extensive injury of the soft tissue of the right orbit as well as bony structures. Though the eyeball was not salvageable the roof was reconstructed with a split calvarial graft as it was possible to harvest it easily without any extra cost to the patient.

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