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## Blow out fracture A Novel Management Modality

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### Abstract:

Blow out fracture of orbit involves fracture of orbital floor without fracture of infraorbital rim. This injury is common from frontal blow to orbit. Frontal blow to orbit causes increased intraorbital tension causing fracture of floor of the orbit (weak point) with prolapse of orbital content into the maxillary sinus cavity. This causes enophthalmos and diplopia. Infraorbital rim is not involved in pure blow out fracture, it is also involved then it should be considered as an impure blow out fracture [3]. Entrapment of inferior rectus muscle between the fracture fragments will cause diplopia in these patients. This article discusses a novel endoscopic internal reduction of fractured fragments. Main advantage of endoscopic approach is the lack of facial skin incision. It is cosmetically acceptable.

### Introduction:

Orbital floor fractures were first described by MacKenzie in Paris in 1884 [1]. Smith was the first to describe entrapment of inferior rectus between the fracture fragments. He was also the first to coin the term "Blow out fracture" [2]. Blow out fracture causes an increase in the intraorbital volume, this causes enophthalmos. Entrapment of inferior rectus muscle causes diplopia. These patients usually report to an ophthalmologist since orbital signs and symptoms are predominant. Shere et al in their study conclude that nearly 14% of blow out fractures are caused by contact sports in a military population [4].

### Case report:

30 years old male patient came with complaints of:

1. Swelling right eye – 1 day duration
2. Double vision – 1 day duration
3. Bleeding from right nose – 1 day duration

History of injury on being struck by a cricket ball +  
He gave no history of loss of consciousness.

### On examination:

Swelling over upper and lower eyelids on the right side +  
Enophthalmos right eye +  
Ocular movements restricted on right gaze  
Diplopia +

Forced duction test +

**CT scan nose and paranasal sinuses:**

Showed evidence of blow out fracture right orbit. Tear drop sign could be seen.

**Management:**

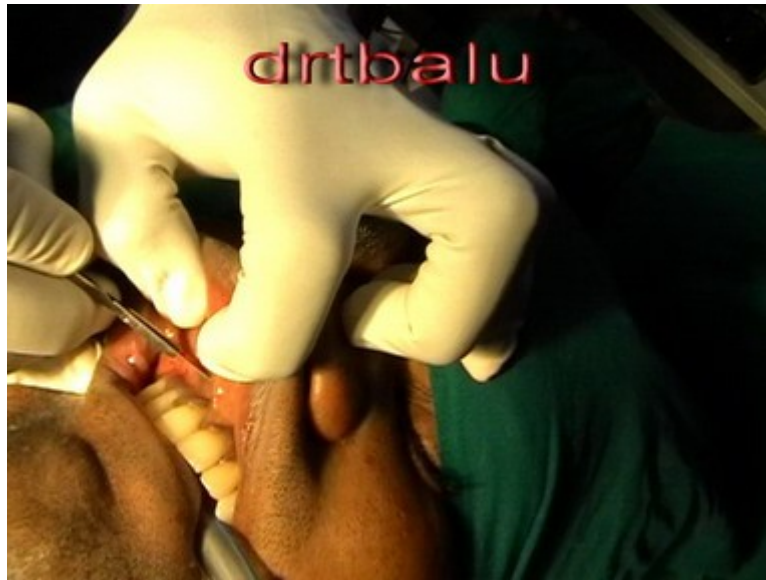
Reduction was performed via Caldwell Luc approach under endoscopic guidance. 4 mm 30 degree nasal endoscope was used for this purpose. Trap door fractures can usually be reduced without resorting to prosthesis. Since this patient had a trap door fracture it could be easily reduced under endoscopic guidance. The reduced fracture fragment was stabilized by inflating the balloon of foley's catheter introduced into the maxillary sinus via inferior meatal antrostomy. Foley's catheter is left in place for a period of 2 weeks for union to occur.



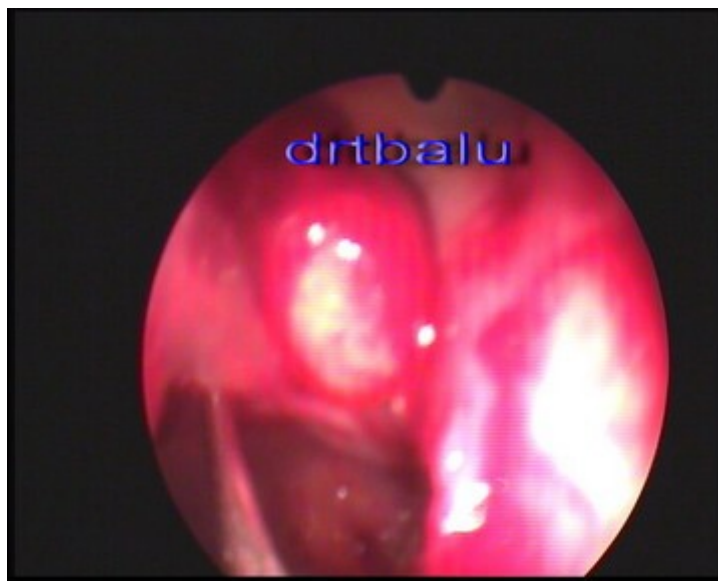
Clinical photograph of a patient with blow out fracture right orbit



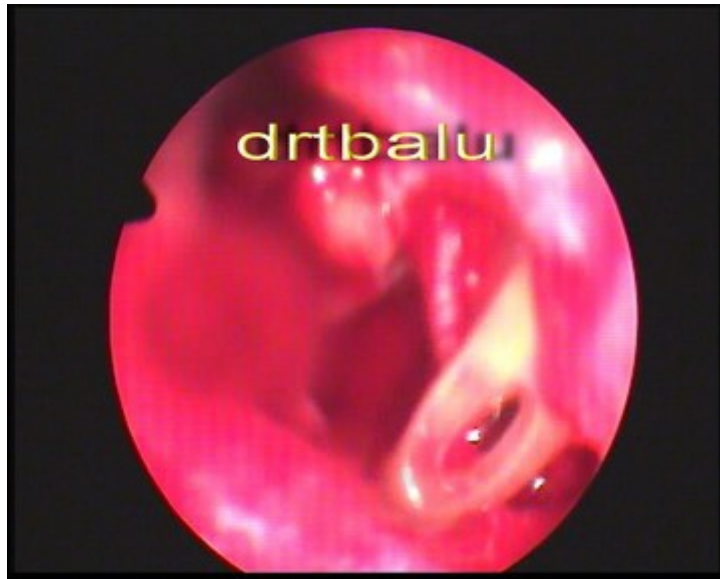
CT scan paranasal sinuses showing blow out fracture and the classical tear drop sign



Picture showing sublabial incision for caldwel luc surgery



Blow out fracture is seen being reduced via the opening made over the canine fossa area under endoscopic guidance.



Foley's catheter seen inside the antrum



Balloon of foley's catheter seen inflated inside the antrum

## Discussion:

Orbital blow out fracture is commonly caused by blunt trauma to the orbit. This is commonly seen in persons involved in contact sports like boxing, foot ball, rugby etc [5].

Two theories attempt to explain this injury phenomenon:

1. Buckling theory
2. Hydraulic theory

### **Buckling theory:**

This theory proposed that if a force strikes at any part of the orbital rim, these forces gets tranferred to the paper thin weak walls of the orbit (i.e. floor and medial wall) via rippling effect causing them to distort and eventually to fracture. This mechanism was first described by Lefort [3].

### **Hydraulic theory [6]:**

This theory was proposed by Pfeiffer in 1943. This theory believes that for blow out fracture to occur the blow should be received by the eye ball and the force should be transmitted to the walls of the orbit via hydraulic effect. So according to this theory for blow out fracture to occur the eye ball should sustain direct blow pushing it into the orbit.

Water House [7] in 1999 did a detailed study of these two mechanisms by applying force to the cadaveric orbit. He infact used fresh unfixed cadavers for the investigation. He described two types of fractures:

**Type I:** A small fracture confined to the floor of the orbit (actually mid medial floor) with herniation of orbital contents in to the maxillary sinus. This fracture was produced when force was applied directly to the globe (Hydraulic theory).

**Type II:** A large fracture involving the floor and medial wall with herniation of orbital contents. This type of fracture was caused by force applied to the orbital rim (Buckling theory).

### **Initial signs and symptoms of blow out fracture include:**

1. Immediate swelling of the eye
2. Tenderness over involved orbit
3. Pain and difficulty with eye movements
4. Double vision
5. Enophthalmos
6. Numbness / tingling over lower eyelid, nose, upper lip [8]

### **Complications of blow out fracture:**

1. Herniation of orbital fat into maxillary sinus [9]
2. Orbital emphysema [10]
3. Bleeding into maxillary sinus
4. Entrapment / rupture of ocular muscles
5. Ischaemic muscle contractures [11]
6. Cellulitis
7. Diplopia

### **Timing for surgical intervention:**

This is highly controversial. Some of the authors prefer a waiting period of atleast 2 weeks for the oedema to resolve before proceeding with surgical reduction of the fracture. Early intervention is indicated only in white eyed blow out fracture which is common in children. In children the bones are flexible and does not break easily but bends. Significant amounts of orbital tissue may get

entrapped in between the fractured fragments causing a compromise in their blood supply. This condition is known as the white eyed blow out fracture. These patients should under go immediate reduction. Surgery is indicated if the eye has recessed by more than 2 mm into the orbit, ocular movements restricted, persistence of diplopia.

**Advantages of endoscopic approach:[12]**

1. Accurate fracture visualization
2. Incisions are small
3. Facial incisions can be avoided
4. Minimal soft tissue dissection
5. Hospital stay minimized
6. Cosmetically acceptable

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