

Blow-out fractures

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SUMMARY

Twenty-one cases of blow-out fractures were treated at Osaka University Hospital between June 1979 and February 1982. 52% of the patients were teenagers. The most important cause of a blow-out fracture was a fist-fight (48%). Most of the patients had diplopia caused by the disturbance of the eyeball movement, mainly in the upward or downward rotations. 19 of 21 patients were surgically treated. The prognosis was much more related to the severity of the fracture than the period between the injury and the surgical treatment.

INTRODUCTION

A blow-out fracture was first reported by King and Samual in 1944. This fracture was caused by a sudden increase in the intraorbital pressure, resulting from a traumatic force to the soft tissue of the orbit. The force transmitted to the orbital contents tends to fracture the orbital floor at its weakest point, and may be nature's way of decompressing the orbit and protecting the ocular globe from rupture (Smith, 1957; Converse, 1977). A blow-out fracture is often followed by diplopia, disturbance of eyeball movement, enophthalmos, vision disturbance, nasal bleeding, and nasal obstruction.

PATIENT POPULATION

Twenty-one cases (20 males and 1 female) of blow-out fractures were diagnosed and treated at Osaka University Hospital between June 1979 and February 1982. Radiologic examinations, occipitofrontal polymography and CT-scanning were used for the diagnosis of blow-out fractures. Especially we could get very important signs of fractures by CT-scanning (Figures 1 and 2).

Blow-out fractures were seen on the right side in 12 patients and on the left side in 9. The ages of the patients ranged between 4 and 53 years (Figure 3). Twelve patients (52%) were teenagers. These patients were classified into 6 groups: fist-fight, sports, falling down, dropping, automobile accident and work accident (Table 1). Ten cases (about 48% of the total) were fist-fight related, which is the

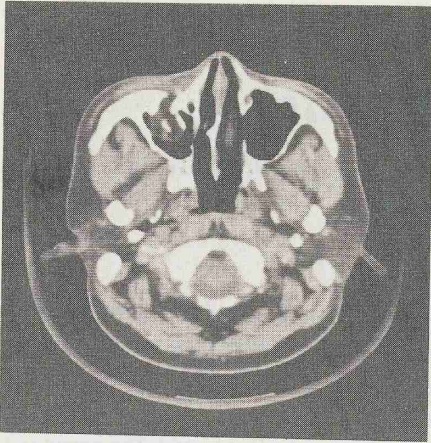


Figure 1. CT-scanning.
Fractures of the orbital floor and maxilla and the orbital soft tissue are seen in the right maxillary sinus.

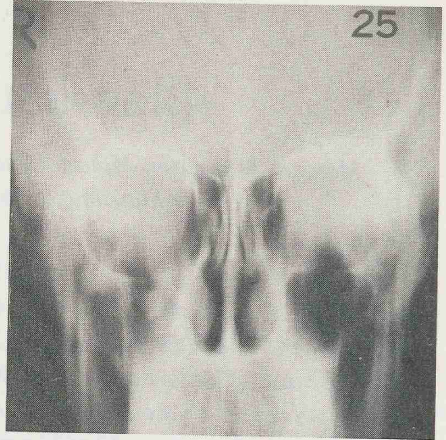


Figure 2. Occipito-frontal tomography.
Fractures of the right orbital floor and medial wall are seen.

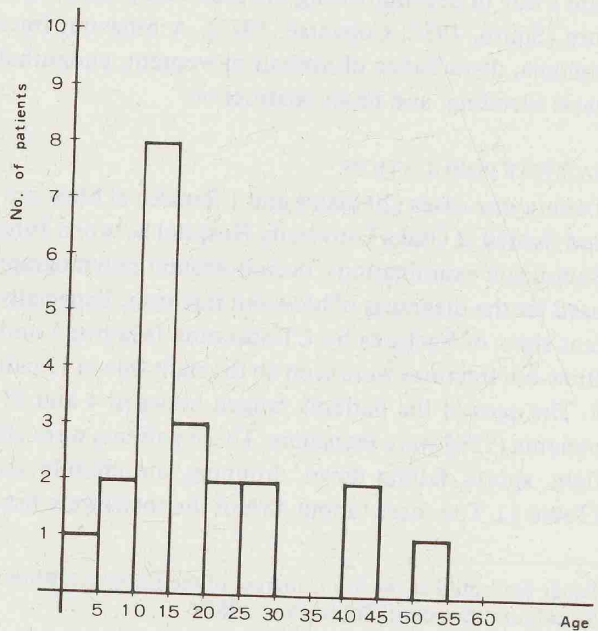


Figure 3.
Distribution of age of patients with blow-out fracture.

Table 1. Causes of blow-out fracture.

	no. of patients
fist-fight	10 (47.6%)
sports	3 (14.3%)
falling down	3 (14.3%)
dropping	3 (14.3%)
automobile accident	1 (4.8%)
work accident	1 (4.8%)
total	21 (100%)

Table 2. Orbital complications of blow-out fracture.

	no. of patients
diplopia	20 (99%)
disturbance of eyeball movement	21 (100%)
disturbance of vision	18 (86%)

most important cause of blow-out fractures. Orbital complications included diplopia, disturbance of eyeball movement, and vision disturbance (Table 2). 20 of 21 patients experienced diplopia. One patient had orbital edema. All cases showed disturbances of the eyeball movement, mainly disturbance in the upward or the downward rotations.

TREATMENT

Nineteen patients underwent surgical treatment. In one case the orbital function was regained without surgery. In another case, an operation was not recommended because the patient had trigeminal neuralgia, facial paralysis, and severe general condition. The period between the injury and the surgical treatment was 12 to 351 days (Table 3). Two patients were operated upon within two weeks of injury. Another 12 cases (63%) received their operations within one month. After the surgery, diplopia disappeared in 9 cases, however, particular changes were seen in 10 cases. One case showed worsened after the surgery (Table 4). A

Table 3. The period between injury and operation of blow-out fracture.

days	no. of patients
~ 14	2
15 ~ 30	10
31 ~ 100	4
101 ~	3
total	19

Table 4. Prognosis of diplopia of blow-out fracture after operation.

	no. of patients
no diplopia	8 (* 9)
no change	10
worsened	1
total	19 (*20)

* One case had disappearance of diplopia again without surgery.

soft silicon plate was usually placed on the fractured orbital floor and supported by a gauze tampon in the maxillary sinus. When the silicon plate was securely implanted, the gauze tampon was removed.

DISCUSSION

Blow-out fractures mainly occur on the orbital floor, but sometimes were accompanied by other fractures (Lerman, 1970; Greenwald, 1974). As a diagnostic tool, CT-scanning offers very important information concerning blow-out fractures. Twelve cases had blow-out fractures on the orbital floor only. The other 9 cases were complicated by fractures of the medial orbital wall, maxilla, or both (Table 5).

The prognosis was related much more to the severity of the fracture than the period between the injury and the surgical treatment. The prognosis of the younger patients was better than the older ones. This is probably because the bone of the younger patient is soft, and such a sudden increase in the intraorbital pressure causes a fracture only at the weakest portion. But in the older ones, the bone is so hard that complicated fractures may occur.

The approach to the orbital floor is through the eyelids or through the canine fossa and the maxillary sinus. The combined approach is the best, because it gives a wider operative orientation for the treatment of the fractures of the maxilla and the midfacial bone. It is easily to place the silicon plate on the fractured orbital floor with the cooperation of an ophthalmologist.

Table 5. The portions of blow-out fracture.

	no. of patients
the orbital floor only	12 (57.1%)
the floor and medial wall of the orbit	4 (19.1%)
the orbital floor and maxilla	2 (9.5%)
the floor and medial wall of the orbit and maxilla	3 (14.3%)
total	21 (100%)

RÉSUMÉ

Vingt-et-un cas de fractures orbito-sinusiennes furent traités à l'Hôpital Universitaire d'Osaka entre Juin 1979 et Février 1982. 52% des patients étaient des adolescents. Dans la majorité des cas les combats à coups de poing étaient la cause des fractures orbito-sinusiennes. La plupart des patients avaient une diplopie causée par un dérèglement du mouvement du globe oculaire, surtout dans le cas des mouvements rotatoires vers le haut ou vers le bas. 19 des 21 patients furent traités chirurgicalement.

Le pronostic était rattaché au caractère dangereux de la fracture, bien plutôt qu'à la période écoulée entre la blessure et le traitement chirurgical.

REFERENCES

1. Converse, J. M., 1977: *Reconstructive plastic surgery*. W. B. Saunders Company, 2, 748-793.
2. Greenwald, J. H., Keeney, A. and Shannon, G., 1974: A review of 128 patients with orbital fractures. *Am. J. Ophth.* 78, 655-664.
3. King, E. F. and Samuel, E., 1944: Fractures of the orbit. *Trans. Ophthalmol. Soc. U.K.* 64, 134.
4. Lerman, S., 1970: Blow-out fracture of the orbit. *Brit. J. Ophthal.* 54, 90-98.
5. Smith, B. and Regan, W. F. jr., 1957: Blow-out fracture of the orbit. Mechanism and correction of internal orbital fracture. *Am. J. Ophth.* 44, 733-739.

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