



Still no reliable consensus in management of blow-out fracture

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ABSTRACT

Background: Management of blow-out fractures (BOF) is addressed by different specialties. The general agreement is that patients with the potential for late enophthalmus development require early surgical intervention. In this study we wanted to: (i) evaluate the differences in opinions between the specialties that manage BOF and also whether there was a difference between surgeons from different countries, (ii) evaluate if surgeons handle these cases based upon their own individual criteria,¹ (iii) evaluate the correlation between the management of patients with orbital floor fractures and any late sequelae detected upon eye examination.

Materials and methods: Eleven patients with BOF were selected from the records of the Department of ENT and Head & Neck Surgery, Karolinska University Hospital between 2003 and 2008. The cases were presented with a case history and CT scans to 46 surgeons from different countries and specialties and they were asked to give their opinions regarding the need for surgery, timing of surgery and the risk for late enophthalmus. We considered a group of surgeons to be in agreement if there was $\geq 75\%$ agreement on whether or not to operate, when to operate and on the risk for late enophthalmus.

Result: The surgeons agreed on the choice of management for the patients (whether or not to operate) in only 5 of the 11 cases. Similarly, in only 5 of the 11 cases did the surgeons agree upon the risk for late enophthalmus. There was a greater difference between specialties than between physicians from the participating countries.

Conclusion: There are considerable differences in opinions regarding the management of BOF due to a lack of a reliable consensus. The management of BOF appears to be based on both individual and local traditions. Guidelines based on a randomized prospective study in BOF are required.

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Introduction

Isolated orbital floor fractures, also called blow-out fractures (BOF),² are a common injury from blunt facial traumas. Patients with BOF may suffer substantial sequelae both from the fracture per se, as well as from any surgical treatment. After many years of debate, there is still no reliable consensus regarding the optimal management of BOF.^{1,3,4} This is mainly due to a lack of evidence, something that is very common in the surgical field. While recent studies have mostly focused on how to restore the orbital volume and rebuild the fractured orbital walls with high accuracy,^{5,6} there is still no reliable evidence regarding surgical versus non-surgical treatment. The lack of evidence based guidelines creates difficulties for surgeons in deciding upon appropriate treatment, as well as being confusing for the patient.

Management of BOF is germane to a number of surgical specialties, including ENT surgeons, plastic surgeons, facial plastic

surgeons, ocular plastic surgeons and oral maxillofacial surgeons.^{1,3,8} Posttraumatic enophthalmus is a well-known sequela to BOF and is considered to be related to changes in orbital volume.^{9–11} Early surgical intervention (24 h)^{8,12} is imperative when other injuries threaten the eye such as nerve incarceration,⁷ acute enophthalmus or hypoglobus,¹³ and limitation of gaze caused by extra ocular muscle or periorbital tissue entrapment.^{8,12,15,16} Late surgical intervention (1–4 weeks) is performed to prevent enophthalmus and hypoglobus, which can cause diplopia and cosmetic disturbances.^{4,9,10} Furthermore, there seems to be a consensus that fractures where the orbital floor fragments are not displaced and the orbital volume remains unchanged can be left without surgical intervention.⁷ However, the clinically problematic cases are those with a sufficient fracture size to permit the herniation of orbital fat and muscle as well as orbital volume change. In these cases the risk of possible surgical sequelae^{17–22,26} has to be calculated against the risk for posttraumatic enophthalmus if left without surgical reconstruction.^{9,10,23,29–31} Only a few papers have been published that address the surgical indications for exploration and reconstruction of BOF and there is no evidence as to which types of BOF have a potential for late enophthalmus.^{4,7,9,16} Some of the dividing lines between surgical and

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non-surgical management that have been considered in the literature are: >1.5 ml volume of herniated orbital content into maxillary sinus,⁹ a bony orbital volume expansion of 18% compared to the contra lateral orbit,⁹ an orbital floor fracture >1 cm²,^{24,30} >50% fractured orbital floor,²⁹ diplopia 2 weeks after the trauma,⁴ or an enophthalmus greater than 2 mm acute or after 6 weeks.²⁴ The “ideal” time to intervene surgically in BOF is also debated.^{4,25} There are also surgeons who advocate a “wait and see” approach.^{4,7,27,28}

In this study we wanted to: (i) evaluate the differences in opinion between the specialties that manage BOF and also whether there was a difference between surgeons from different countries, (ii) evaluate if surgeons handle these cases based on their own individual criteria,¹ (iii) evaluate the correlation between the management of patients with orbital floor fractures and any late sequelae detected upon eye examination.

Materials and methods

From the patient records of the Department of ENT and Head & Neck Surgery, Karolinska University Hospital, 11 cases with CT-scan verified, unilateral isolated orbital floor fractures between 2003 and 2008, were randomly selected. At the Karolinska University Hospital approximately 20–30% of the isolated orbital floor fracture patients are treated with orbital floor reconstruction based on the herniated orbital content of >1–1.5 ml. Patients were contacted and invited to a clinical eye examination where they reported the presence of double vision or symptoms related to their eyes and vision. The clinical examination included an examination of diplopia and measurement of enophthalmus according to Hertel.¹⁴

Eleven cases with isolated orbital floor fracture were included. There were 7 men and 4 women. Eight patients had been treated non-surgically and three patients surgically. At the time of injury the patients had a mean age of 30 years (13–62). At the first visit after the injury two patients (cases 6 and 9) had diplopia, eight patients (cases 1, 2, 4, 5, 7, 8, 10, and 11) had no diplopia. In case 3, who had undergone strabismus surgery in childhood, it was unclear if the patient had diplopia or not. A power point presentation of each patient was prepared, based on summaries of the patients' first visit to the hospital including history and symptoms, findings on examination, the result of ophthalmologic examination and CT-scan slices of the fracture area, both in coronal and sagittal projections. The 11 cases were presented to a total of 46 surgeons involved in orbital floor fracture management. Surgeons from different specialties and countries were recruited randomly from centers of excellence in trauma care. The specialties and countries of origin are presented in Fig. 1.

The surgeons were asked to give their opinions as to whether surgery was necessary or not, the timing of the surgery and the risk for late enophthalmus. For subgroup analysis the participating

surgeons were subdivided according to speciality and country of origin. The responses from the subgroups were compared. We considered the surgeons in a group to be “in agreement” if there was ≥75% agreement on whether or not to operate, when to operate or on the risk for enophthalmus. In analyses including all eleven patients, percent of overall agreement over all pairs of raters and kappa (κ) measure of agreement are provided. A rule of thumb is that a κ of 0.70 or above indicates adequate interrater agreement. Randolph, J.J. (2008). Online Kappa Calculator. Retrieved from <http://justus.randolph.name/kappa> (June 7, 2012).

See Appendix for each case's history, examination, CT-scan and Ophthalmologic examination. This study was approved by the Local Ethics Committee at the Karolinska Institute.

Result

The mean time from injury to the examination was 33 months (6–54). Three patients (cases 1, 9 and 11) developed 2 mm late enophthalmus and one patient (case 10) 4 mm late enophthalmus. At the follow up, 2 patients (cases 10 and 11) experienced intermittent diplopia, but no patient suffered from persisting diplopia. For details please see Table 1.

The experience level of the participating surgeons in BOF reconstruction was as follows: 3 surgeons (7%) had experience of 10 cases, 4 surgeons (9%) of 20 cases, 6 surgeons (13%) of 30 cases, 1 surgeon (2%) of 40 cases and 32 surgeons (70%) >40 cases of BOF reconstructions, see Fig. 2.

As to the question whether surgery was needed or not, all the surgeons were in agreement (≥75% agreed) in 5 of the 11 cases, and the overall agreement between all pairs of surgeons was 64%, $\kappa = 0.29$. In the subgroup analyses for different specialties, the ocular plastic surgeons were in agreement in 3 cases (overall agreement 49%, $\kappa = -0.02$), facial plastic surgeons in 5 cases (overall agreement 63%, $\kappa = 0.26$), ENT surgeons (overall agreement 68%, $\kappa = 0.37$) and oral maxillofacial surgeons in 6 cases (overall agreement 65%, $\kappa = 0.31$), and the plastic surgeons in 10 cases (overall agreement 84%, $\kappa = 0.67$). When looking at country of origin, we found that surgeons from USA and Sweden were in agreement in 5 (overall agreement 62%, $\kappa = 0.24$), and 6 cases (overall agreement 68%, $\kappa = 0.35$) respectively, while surgeons from Switzerland–Germany agreed on 9 cases (overall agreement 84%, $\kappa = 0.67$). For details please see Fig. 3.

In the question regarding the risk for late enophthalmus, all the surgeons as a group were in agreement in 5 cases (overall agreement 62%, $\kappa = 0.23$). Regarding the subgroups the facial plastic surgeons were in agreement in 4 cases (overall agreement 57%, $\kappa = 0.13$), ocular plastic surgeons in 6 cases (overall agreement 62%, $\kappa = 0.24$), ENT surgeons in 6 cases (overall agreement 67%, $\kappa = 0.32$), and oral maxillofacial surgeons in 6 cases (overall agreement 60%, $\kappa = 0.20$). Regarding country of origin, surgeons from the USA agreed in 6 cases (overall agreement 61%, $\kappa = 0.22$),

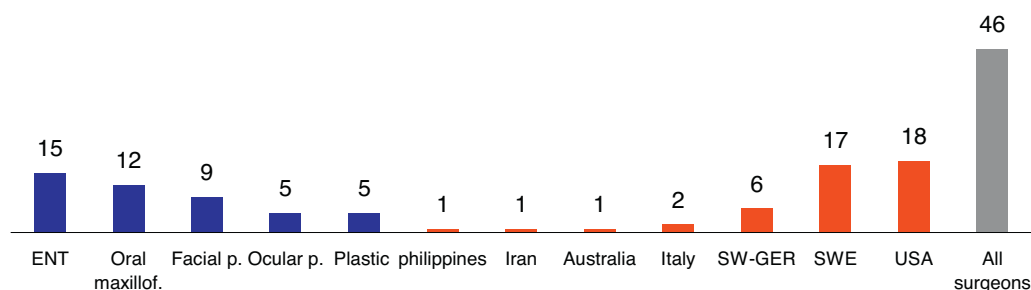


Fig. 1. The surgeons' speciality and country of origin.

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