Clin Oral Invest (2012) 16:1297–1303
DOI 10.1007/s00784-011-0609-9

ORIGINAL ARTICLE

Functional outcome after surgical treatment of orbital floor fractures

Paul W. Poeschl · Arnulf Baumann · Guido Dorner · Guenter Russmueller · Rudolf Seemann · Ferenc Fabian · Rolf Ewers

Received: 30 January 2011 / Accepted: 10 August 2011 / Published online: 20 August 2011

Abstract In the present article, the authors want to present the results of a retrospectively evaluated consecutive series of patients with surgically treated isolated orbital floor fractures (OFF; "blow-out fractures") concerning the functional outcome after OFF and give detailed recommendations based on the clinical and radiological findings. A series of 60 patients with isolated OFF over a 5-year period needing surgically repair at the same institution were evaluated. Patient data were analysed in terms of preoperative and postoperative clinical parameters and radiological findings. The analysed parameters were type of fracture, diplopia, gaze restriction, enophthalmos, materials used for repair, surgical approach and timing of the surgical intervention. Burst type fractures were more often found than punched-out fractures. The most frequently used surgical approach was a preseptal transconjunctival approach. An overall decrease of gaze restriction (93%), diplopia (89%) and enophthalmos (86%) was observed. According to the fracture size, we used Ethisorb® patches in smaller fractures and resorbable or titanium meshes or autologous bone in larger fractures in most cases. Patients who underwent surgery more than 7 days after the trauma showed better results with regard to an improvement of diplopia and motility disturbances than patients who were treated immediately. In indicated cases, the surgical repair of OFF leads to very good results if the anatomical and functional properties of the orbit and its contents are respected. The applied strategy and means presented in our study proved of value and can therefore be recommended.

Keywords Orbital floor fracture · Blow out fracture · Enophthalmos · Diplopia · Transconjunctival approach

P. W. Poeschl (✉) · A. Baumann · G. Russmueller · R. Seemann · F. Fabian · R. Ewers
University Hospital for Cranio-Maxillofacial and Oral Surgery,
Medical University of Vienna,
Vienna, Austria
e-mail: wolfgang.poeschl@meduniwien.ac.at

G. Dorner
Department of Ophthalmology and Optometrics,
Medical University of Vienna,
Waehringer Guertel 18-20,
1090 Vienna, Austria

Introduction

Orbital floor fractures (OFF) can occur as isolated fractures as well as combined fractures in the context of complex midfacial fractures and zygomaticoorbital fractures. They are the most common fractures of the orbit and therefore represent an everyday situation for the ophthalmologist and maxillofacial surgeon [1, 2]. Because of the big variability within isolated OFF concerning fracture type, fractured area and accompanying soft tissue injuries, there exists some controversy in the literature regarding its proper treatment [3, 4]. Therefore, the management of OFF varies widely and depends rather on the individual decision and experience of the surgeon responsible for the patient than on any accepted consensus [4, 5]. The main reason for this situation may be the complexity of the trauma leading to an OFF affecting bone and soft tissues of the orbit including the eye. The clinical symptoms and the impairment of the patient after an OFF vary widely and enophthalmos as well as diplopia are often difficult to evaluate in the acute posttraumatic situation. Furthermore, the surgical approach for the repair of OFF and the materials used for floor reconstruction are often discussed, too, and many surgical techniques and materials have been introduced[6–8]. The potential risk of damaging the eye ball, permanent gaze

restriction and ectropion or entropion due to severe scaring after a surgical intervention have to be carefully balanced and avoided. In the present article, we want to present our results regarding functional outcome and experience in the surgical treatment of isolated OFF and give recommendations based on the evaluated data.

Material and methods

A total of 60 patients were treated surgically because of an isolated OFF at the Clinic for Cranio-, Maxillofacial- and Oral Surgery and the Department of Ophthalmology and Optometrics of Medical University of Vienna over a 5-year period. The criteria for the inclusion in this retrospective report were the diagnosis of an isolated OFF and its surgical treatment. OFF associated with midfacial or zygomaticoorbital fractures, medial wall fractures and conservatively treated OFF were excluded. Patient data were obtained from the electronic hospital information system of Vienna General Hospital including reports of the outpatient department, operation protocols and operation records, medical records on the ward and reports of the ophthalmologic examinations. Approval of the local ethics committee was obtained. The evaluated parameters comprised the type of OFF, the way of the surgical approach, the used material for floor reconstruction, any postoperative complaints about the cosmetic or functional result and preoperative as well as postoperative ophthalmologic reports including visual acuity, diplopia, motility disturbances of the eyeball, enophthalmos and the influence of the timing of the surgical intervention. The mean follow-up period was 3 months (1–14 months) in uncomplicated cases, and patients were dismissed from the follow-up programme at this time if all examinations showed normal function in everyday life and satisfying aesthetics. Patients who still had limitations or impairments were kept in the follow-up until complete resolution of all postoperative problems or until a further improvement was very unlikely. Patients who were treated with polylactid meshes usually remained in the follow-up for 12 months.

The preoperative management was the same in all cases. Coronal and axial sections of CT scans were performed to classify the fracture type and determine the need for surgical repair. An immediate ophthalmologic examination including visual acuity, fundoscopy, pupillary response, any direct injuries to the structures of the eyeball and any signs for gaze restrictions was conducted in the course of the diagnostic procedure (Fig. 1). If no acute ophthalmologic intervention was necessary, the patients were routinely treated as inpatients and received a prophylactic preoperative antibiotic and analgetic medication until surgery in order to prevent an ascending infection of the orbital contents via the maxillary sinus. A gross daily control of the visual acuity during the ward round was conducted. After complete resolution of the swelling, usually after 1 week, a detailed ophthalmologic examination was carried out to confirm the indication for the surgical intervention according to the CT scans (Fig. 2). Whenever persisting diplopia with positive forced duction test and/or enophthalmos of more than 2 mm in combination with a radiologically verified OFF with dislocation or herniation of orbital contents into the maxillary sinus was present after complete resolution of the swelling and emphysema, we indicated the surgical procedure according to the literature [3, 4, 9–11]. Patients were dismissed from the hospital usually after 5 days if healing was uneventful, and the perioperative antibiotic prophylaxis was terminated usually on the second or third postoperative day.

Fig. 1 OFF, situation a few hours after the trauma with hematoma, chemosis, hyposphagma and skin lesions

For simplicity's sake, the fracture type was classified according to the coronal sections of the CT scan as described by Yano et al. [11]. We differentiated between punched-out and burst type fractures. Punched-out fractures involved less than half of the orbital floor and burst type fractures more than half of the orbital floor.

Fig. 2 Coronal CT scan with burst type fracture without muscle or tissue strangulation

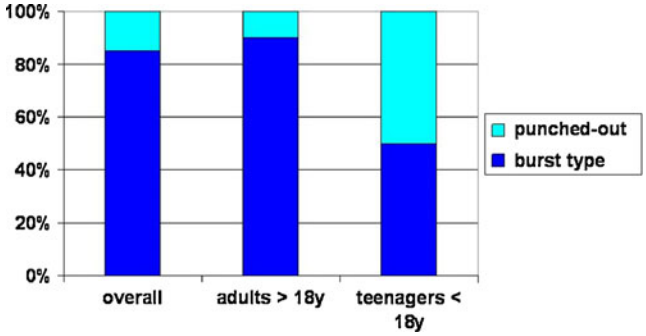

Fig. 3 Distribution of fracture types (percentage)

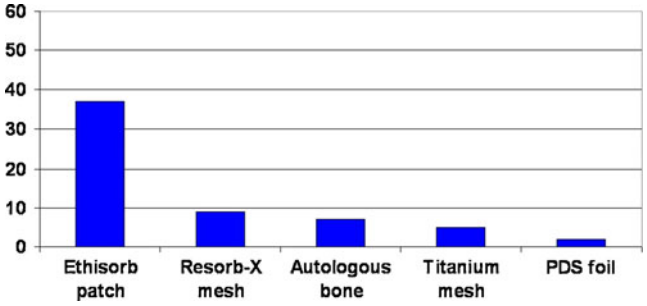

Fig. 5 Materials used for orbital floor reconstruction (absolute numbers), $n=60$

Results

Sixty patients were treated surgically for the repair of OFF at our clinic. The mean age was 36 years (4–84 years) and the male/female ratio was 38:22 (nearly 2:1). The distribution of the two different fracture types is shown in Fig. 3. Interestingly, the punched-out fractures dominated in young patients under 18 years whereas burst type fractures are more often found in adult patients. The different surgical approaches used can be seen in Fig. 4. We routinely used the preseptal transconjunctival approach in most cases [8]. Only in cases of large OFF an additional transantral approach or a single subciliary approach was utilized in order to gain more sight and space for the insertion of bigger mesh plates. Various materials for floor reconstruction were used. In most cases (62%), the application of an Ethisorb® patch (Ethicon Inc., USA) was performed followed by the use of a resorbable polylactid mesh plate (Resorb-X®, KLS Martin Inc., USA), autologous bone and titanium meshes (Fig. 5, 6 and 7). The rationale for choosing the proper material for reconstruction is further explained in the discussion.

The detailed results for the ophthalmologic examinations with postoperative improvement or worsening are demonstrated in Figs. 8 and 9 and Tables 1, 2, 3, 4 and 5. Due to missing data, the number of included patients may vary in the tables (explanation in the tables). If more than one postoperative ophthalmologic examination was done, usually the last examination was used for comparison with the preoperative results. The extent of gaze restriction due to disturbance of the eyeballs motility was divided into four degrees (Table 1 with explanation) according to the particular ophthalmologists report. The postoperative shift within the different groups is depicted in Table 2. Only in one case (1.6%) an impairment of gaze restriction from degree 0 to degree II was noticed. All other patients showed an improved or unchanged motility.

The amount of diplopia was divided into four degrees, too (Table 3 with explanation). Only in two cases (3.2%) a postoperative impairment of diplopia was described, in all other patients diplopia improved or remained unchanged (Table 4).

The degree of enophthalmos was determined by the Hertel exophthalmometer with bilateral comparison, and the results for this parameter are shown in Table 5. Five groups were established according to the measured difference. Only in three patients (4.8%) an increased deviation of the Hertel values was seen, and the postoperative shift is also displayed in Table 5. All three patients had small burst type fractures treated with Ethisorb® patches, and one of these patients (1.6%) needed a second operation due to a Hertel difference of more than 2 mm.

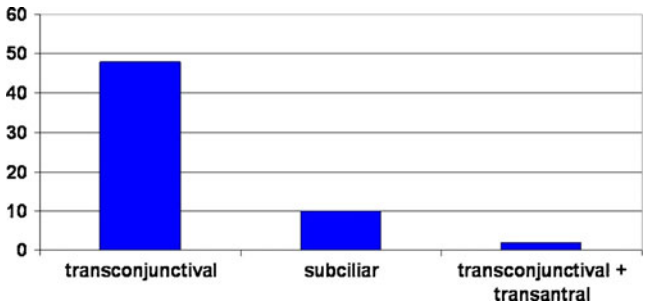

Fig. 4 Type of surgical approach (absolute numbers), $n=60$

Fig. 6 Coronal CT scan after orbital floor repair with a titanium mesh

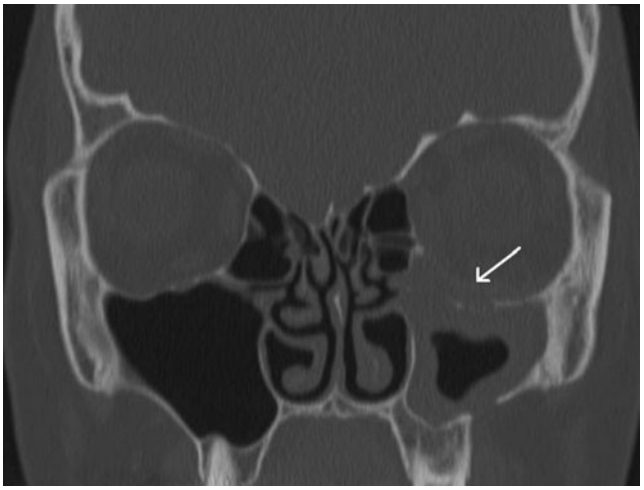

Fig. 7 Coronal CT scan after orbital floor repair with a resorbable mesh (*arrow points* at mesh)

Only one patient (1.6%) complained about the postoperative aesthetic result with mild scleral show after a transconjunctival approach, ectropion after subciliary approach, or persistent diplopia respectively. In two patients (3.2%) with normal preoperative nerve function, persistent postoperative hypaesthesia of the infraorbital nerve was disturbing (end of follow-up at 14 months). All other patients were free of any complications, and no further complaints were reported. Fortunately no case of retrobulbar hematoma or blindness occurred. Therefore, the overall postoperative complication rate was 10% (6 out of 60 patients; Fig. 9).

Discussion

Orbital floor fractures always represent severe injuries and therefore need proper treatment. Some controversy exists in the literature about the ideal treatment of OFF because of the complexity of the trauma involving not only bony structures but also soft tissues comprising the eyeball, muscles, orbital fat and different nerves [12]. The decision process resulting in an eventual surgical procedure therefore is often difficult and challenging [4]. The prevention of any

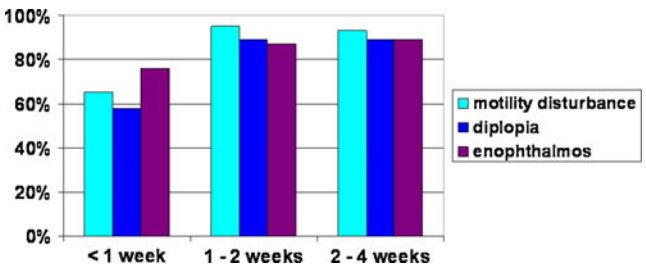

Fig. 8 Improvement of motility disturbance, diplopia and enophthalmos depending on the timing of surgery after the trauma (percentage)

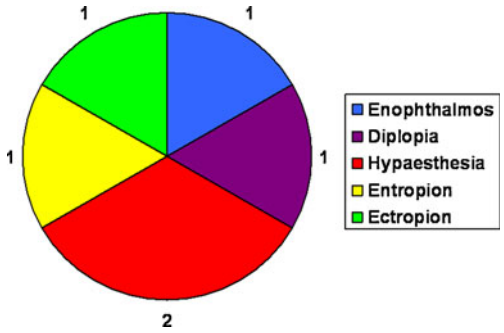

Fig. 9 Distribution of postoperative complications, n=6 (out of 60 patients, 10%)

further damage to the eye and its adjacent structures has to be the most important goal because it is known that inaccurate surgical technique may worsen existing eye injuries or potentially cause additional trauma to the orbital apex [13]. According to reports and recommendations in the literature, we performed a surgical repair of the orbital floor whenever persisting diplopia with positive forced duction test and/or enophthalmos of more than 2 mm in combination with a radiologically verified OFF with dislocation or herniation of orbital contents into the maxillary sinus was present after complete resolution of the swelling and emphysema [3, 4, 9–11]. Only in cases of trap door fractures in children or young adolescents ("white eyed blowout") the surgical procedure was done immediately [4, 14]. In all other cases, we waited until the swelling and/or hematoma and emphysema had decreased.

Due to some missing data from the preoperative or postoperative ophthalmologic reports, our data have to be carefully read. In our series, we observed an overall decrease of gaze restriction in 42 (out of 45) symptomatic patients (93%). Fourteen patients (out of 45 symptomatic patients, 31%) showed severe (degree III) impairment of ocular motility preoperatively. This number could be reduced to one (1.6%) patient postoperatively. These results support findings in the literature concerning the percentage of severe postoperative gaze restriction (5%) by Dal Canto and Linberg [15].

Similar results were seen concerning diplopia. Thirty-six patients had diplopia of certain degrees prior to surgery. In

Table 1 Degree of motility disturbance and clinical descriptions are summarized to four groups

Degree	Clinical findings (in words)
Degree 0	NAD, inconspicuous, normal
Degree I	Minor impairment, marginal impairment, slightly limited
Degree II	Impaired, limited
Degree III	Major impairment, strong limitation, severely limited

NAD no abnormality detected

Table 2 Degree of motility disturbance and postoperative shift between the different groups

			Postoperative motility				
			Degree 0	Degree I	Degree II	Degree III	Total
Preoperative motility	Degree 0	*n*	**14**	0	***1***	0	15
		Percentage	**23**	0	***1.6***	0	25
	Degree I	*n*	*11*	0	0	0	11
		Percentage	*18*	0	0	0	18
	Degree II	*n*	*16*	*2*	**2**	0	20
		Percentage	*27*	*3*	**3**	0	33
	Degree III	*n*	*7*	*3*	*3*	**1**	14
		Percentage	*12*	*5*	*5*	**1.6**	23
Total		*n*	48	5	6	1	60
		Percentage	80	8	10	1.6	100.0

Improvement (better degree postoperatively) is indicated in italics, same degree is indicated in bold and impairment (worse degree postoperatively) is indicated in bold italics

31 patients (out of 35 symptomatic patients, 89%, one patient missing postoperatively), the degree of diplopia improved postoperatively. Eleven patients had diplopia of certain degrees postoperatively (no degree III), but none of these patients showed diplopia in primary gaze or reading position and diplopia did not represent a significant impairment in everyday life or work. No strabismus surgery had to be performed, and only one patient complained about a slight disturbance.

Thirty-eight patients had enophthalmos of some degree preoperatively. Enophthalmos decreased in 30 out of 35 patients (86%, three patients missing postoperatively). Groups I and II increased whereas groups III, IV and V decreased. Only one patient showed more than 2-mm difference in the bilateral comparison (group IV). A second surgical procedure to correct this problem was performed.

The timing of the surgical procedure seems to play a role in terms of a better functional outcome. Patients who underwent surgery more than 7 days after the trauma showed better results with regard to an improvement of diplopia and motility disturbances but hardly of enophthalmos (Fig. 8). This finding is supported by other authors [4, 15]. This fact may be due to the complete resolution of the posttraumatic swelling and hematoma which facilitates the surgical procedure and allows the surgeon for a better evaluation of the situation and the type of repair needed. On the other hand, an immediate intervention is of course recommended for young patients suffering from "white-eyed blowout fractures," who are at a higher risk for permanent tissue damage due to strangulation and ischaemia [14].

A lot of different materials for orbital floor reconstruction are known and used [6, 16, 17]. But still the ideal material has not been found yet. The ideal material should fully cover and bridge the defect and be in close contact with the bone plates of the surrounding orbital floor. It should provide for the needed stability until the defect has healed and should not cause any adverse reactions in the adjacent soft tissue. Currently, widely used materials are autologous bone, titanium meshes, and high-density porous polyethylene (MEDPOR®) [18]. The most commonly used material for orbital floor reconstruction in our series was Ethisorb® as patch (Fig. 5). Whenever the fracture size does not widely exceed half of the orbital floor (i.e. in punched-out fractures and small burst type fractures without severe bone loss or comminution), it is the material of first choice. It is resorbable (nondyed polyglactid 910/polydioxanon), can be trimmed in the desired shape and size and is easy to place over the defect. We did not notice any adverse reaction to this material, and no case of wound infection was seen. In larger defects (i.e. big burst type fractures with severe bone loss or comminution), autologous bone, resorbable or titanium meshes

Table 3 Degree of diplopia and clinical descriptions are summarized to four groups

Degree	Clinical findings (in words)
Degree 0	NAD, no diplopia
Degree I	Minor diplopia, in extreme directions, mild diplopia
Degree II	In several directions, diplopia present, vertical or horizontal diplopia
Degree III	Major diplopia, in all directions, in primary gaze or reading position

NAD no abnormality detected

Table 4 Degree of diplopia and postoperative shift between the different groups

			Postoperative diplopia					
			Degree 0	Degree I	Degree II	Degree III	Missing	Total
Preoperative diplopia	Degree 0	*n*	**16**	0	***2***	0	1	19
		Percentage	**27**	0	***3***	0	1.6	32
	Degree I	*n*	*5*	**1**	0	0	0	6
		Percentage	*8*	**1.6**	0	0	0	10
	Degree II	*n*	*17*	*5*	**3**	0	0	25
		Percentage	*28*	*8*	**5**	0	0	42
	Degree III	*n*	*4*	0	0	0	1	5
		Percentage	*7*	0	0	0	1.6	8
	Missing	*n*	2	1	0	0	2	5
		Percentage	3	1.6	0	0	3	8
	Total	*n*	44	7	5	0	4	60
		Percentage	73%	12%	8%	0%	7%	100.0

Improvement (better degree postoperatively) is indicated in italics, same degree is indicated in bold and impairment (worse degree postoperatively) is indicated in bold italics

were used in our patients. Autologous bone is of course the best material from the biological point of view but has several drawbacks including donor site morbidity, increased operating time and unpredictable resorption [19]. Titanium meshes can safely cover large defects and can easily be adapted and affixed. Their exact position can clearly be visualized in postoperative CT scans which can be an advantage (Figs. 6 and 7). When using resorbable meshes, care has to be taken not to damage the periosteum of the orbital rim and the periorbita in order to prevent scaring due to the resorption process with accompanying inflammation [20]. The same is true for thick PDS® (polydioxanon) sheets which can also lead to severe functional problems potentially necessitating a second operation [21]. The use of a single Ethisorb patch alone in large defects can lead to a secondary prolaps of orbital contents into the maxillary sinus due to the weakness of the material, which occurred in one patient. In our series, we could not find any difference between the different used materials in terms of the postoperative ophthalmo-

Table 5 Degree of enophthalmos and postoperative shift between the different groups

			Postoperative Enophthalmos (Hertel difference in mm)						
			No difference Group I	0.01–1.00 mm Group II	1.01–2.00 mm Group III	2.01–3.00 mm Group IV	>3.00 mm Group V	Missing	Total
Preoperative enophthalmos (Hertel difference in mm)	No difference (group I)	*n*	**7**	***1***	***1***	***1***	0	4	14
		Percentage	**12**	***1.6***	***1.6***	***1.6***	0	7	23
	0.01–1.00 mm (group II)	*n*	*6*	**4**	0	0	0	2	12
		Percentage	*10*	**7**	0	0	0	3	20
	1.01–2.00 mm (group III)	*n*	*5*	*4*	**1**	0	0	1	11
		Percentage	*8*	*7*	**1.6**	0	0	1.6	18
	2.01–3.00 mm (group IV)	*n*	*5*	*4*	*1*	0	0	0	10
		Percentage	*8*	*7*	*1.6*	0	0	0	17
	>3.00 mm (group V)	*n*	*2*	*2*	*1*	0	0	0	5
		Percentage	*3*	*3*	*1.6*	0	0	0	8
	Missing	*n*	4	3	0	0	0	1	8
		Percentage	7	5	0	0	0	1.6	13
	Total	*n*	29	18	4	1	0	8	60
		Percentage	48	30	7	1.6	0	13	100

Improvement (better degree postoperatively) is indicated in italics, same degree is indicated in bold and impairment (worse degree postoperatively) is indicated in bold italics

logic results. These results support our above-mentioned strategy concerning fracture size and can therefore be recommended.

The most commonly used approach was a preseptal transconjunctival approach either "sutureless" or "sutured" [8, 22] depending on the surgeons preference. In our hands, this approach combines the advantages of good surgical view with a non-visible scar and low morbidity if performed exactly [18]. There was no difference in respect of wound healing between the "sutureless" or "sutured" approach. We only observed one case of entropion combined with scleral show which was due an incision placed far too close to the tarsal plate. In this case, the entropion resolved almost completely after digital massage. According to the literature, there is an increased risk of developing an ectropion when using a subciliary incision [23, 24]. In our series, we fortunately did not encounter any serious problems when using a subciliary approach, except for one case with mild ectropion, but of course the scar was slightly visible in some patients and therefore we want to emphasize the preseptal transconjunctival approach.

Conclusions

When summarizing the data of our study in regard to the clinical relevance, it is obvious and interesting that the rate of reported complications which had to be addressed (10%) is much lower than the raw data of the ophthalmologic findings might show (Tables 2, 4 and 5). That means that the clinical impact of the evaluated parameters, especially gaze restriction, diplopia and enophthalmos, has to be carefully interpreted for every individual patient in order to achieve a satisfying postoperative outcome. The results of our study prove that the successful surgical repair of OFF with good functional outcome can be achieved by the applied means and criteria outlined in this paper provided that the surgical procedure was indicated and performed correctly.

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Courtney DJ, Thomas S, Whitfield PH (2000) Isolated orbital blowout fractures: survey and review. Br J Oral Maxillofac Surg 38:496–504
2. Fan X, Li J, Zhu J et al (2003) Computer-assisted orbital volume measurement in the surgical correction of late enophthalmos caused by blowout fractures. Ophthal Plast Reconstr Surg 19:207–211
3. Brady SM, McMann MA, Mazzoli RA et al (2001) The diagnosis and management of orbital blowout fractures: update. Am J Emerg Med 19:147–154
4. Burnstine MA (2002) Clinical recommendations for repair of isolated orbital floor fractures: an evidence-based analysis. Ophthalmology 109:1207–1210, discussion 1210–1; quiz 1212–3. Review
5. Harris GJ (2006) Orbital blow-out fractures: surgical timing and technique. Eye 20:1207–1212
6. Al-Sukhun J, Lindquist Ch (2006) A comparative study of 2 implants used to repair inferior orbital wall bony defects: autogenous bone graft versus bioresorbable poly-L/DL-lactide [P (L/DL)LA 70/30] plate. J Oral Maxillofac Surg 64:1038–1048
7. Appling WD, Patrinely JR, Salzer TA (1993) Transconjunctival approach vs subciliary skin-muscle flap approach for orbital fracture repair. Arch Otolaryngol Head Neck Surg 119:1000–1007
8. Baumann A, Ewers R (2001) Use of the preseptal transconjunctival approach in orbit reconstruction surgery. J Oral Maxillofac Surg 59:287–291, discussion 291–2
9. Friesenecker J, Dammer R, Moritz M et al (1995) Long-term results after primary restoration of the orbital floor. J Craniomaxillofac Surg 23:31–33
10. Ploder O, Klug C, Backfrieder W et al (2002) 2D- and 3D-based measurements of orbital floor fractures from CT scans. J Craniomaxillofac Surg 30:153–159
11. Yano H, Nakano M, Anraku K et al (2009) A consecutive case review of orbital blowout fractures and recommendations for comprehensive management. Plast Reconstr Surg 124:602–611
12. Shere JL, Boole JR, Holtel MR, Amoroso PJ (2004) An analysis of 3599 midfacial and 1141 orbital blowout fractures among 4426 United States Army Soldiers, 1980–2000. Otolaryngol Head Neck Surg 130:164–170
13. Chang EL, Bernardino CR, Watkins LM, Rubin PA (2003) Rebleed of traumatic hyphaema after closed reduction of nasal fracture. J Craniomaxillofac Surg 31:191–192
14. Jordan DR, Allen LH, White J et al (1998) Intervention within days for some orbital floor fractures: the white-eyed blowout. Ophthal Plast Reconstr Surg 14:379–390
15. Dal Canto AJ, Linberg JV (2008) Comparison of orbital fracture repair performed within 14 days versus 15 to 29 days after trauma. Ophthal Plast Reconstr Surg 24:437–443
16. Sakakibara S, Hashikawa K, Terashi H et al (2009) Reconstruction of the orbital floor with sheets of autogenous iliac cancellous bone. J Oral Maxillofac Surg 67:957–961
17. Uygur S, Cukurluoglu O, Ozmen S et al (2009) Resorbable mesh plate in the treatment of blow-out fracture might cause gaze restriction. J Craniofac Surg 20:71–72
18. Cole P, Boyd V, Banerji S et al (2007) Comprehensive management of orbital fractures. Plast Reconstr Surg 120:57–63
19. Wang S, Xiao J, Liu L et al (2008) Orbital floor reconstruction: a retrospective study of 21 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 106:324–330
20. Hollier LH, Rogers N, Berzin E et al (2001) Resorbable mesh in the treatment of orbital floor fractures. J Craniofac Surg 12:242–246
21. Baumann A, Burggasser G, Gauss N et al (2002) Orbital floor reconstruction with an alloplastic resorbable polydioxanone sheet. Int J Oral Maxillofac Surg 31:367–373
22. Lane KA, Bilyk JR, Taub D, Pribitkin EA (2009) "Sutureless" repair of orbital floor and rim fractures. Ophthalmology 116:135–138
23. Ben Simon GJ, Molina M, Schwarcz RM et al (2005) External (subciliary) vs internal (transconjunctival) involutional entropion repair. Am J Ophthalmol 139:482–487
24. Gosau M, Schöneich M, Draenert FG, Ettl T, Driemel O, Reichert TE (2010) Retrospective analysis of orbital floor fractures—complications, outcome, and review of literature. Clin Oral Investig 15:305–313