RETROBULBAR HEMORRHAGE AFTER ORBIT TRAUMA: CASE REPORT

HEMATOMA RETROBULBAR APÓS TRAUMA DE ÓRBITA: RELATO DE CASO

HENRIQUE **TONELLI**[1*], GABRIELA DE OLIVEIRA **PEDROSO**[2], GIULIA QUARENTEI BARROS **BRANCHER**[3], LUCAS CAVALIERI **PEREIRA**[4]

1. Cirurgião-Dentista formado pela Faculdade de Odontologia de Piracicaba – FOP UNICAMP; Residente de Cirurgia e Traumatologia Buco-Maxilo-Facial do Hospital dos Defeitos da Face - Cruz Vermelha; **2.** Cirurgiã-Dentista formado pela Faculdade de Odontologia de Piracicaba – FOP UNICAMP; Especialista em Cirurgia e Traumatologia Buco-Maxilo-Facial pelo Hospital dos Fornecedores de Cana; **3.** Cirurgiã-Dentista formado pela Faculdade de Odontologia de Piracicaba – FOP UNICAMP; Especialista em Cirurgia e Traumatologia Buco-Maxilo-Facial pelo Hospital dos Fornecedores de Cana; **4.** Cirurgião-Dentista formado pela faculdade de Odontologia de Araraquara; Especialista em Cirurgia e Traumatologia Buco-Maxilo-Facial pela Associação Hospitalar de Bauru; Coordenador da Residência de Cirurgia e Traumatologia Buco-Maxilo-Facial.

* Rua Brás Sangiovanni, 23, São Paulo, São Paulo, Brasil. CEP: 04304-070. henrique.tonelli@hotmail.com

Recebido em 12/08/2021. **Aceito** para publicação em 09/09/2021

ABSTRACT

Retrobulbar hemorrhage is a very rare ophthalmic emergency, observed after blunt eye trauma and characterized by an arterial hemorrhage, which can compromise the function of the optic nerve and ocular motor nerves, generating amaurosis and ophthalmoplegia, if not detected prematurely. The recommended treatment for this complication is through lateral canthotomy and cantholysis, which allows the orbit to be decompressed. Patient A.J.P., male, 73 years old, leucoderma, with facial trauma, was admitted to the Service with the condition of left eyeball proptosis, periorbital hematoma, hyposphagma, left pupil mydriasis, and severe algesia. In his medical history was reported the continuous use of acetylsalicylic acid (ASA), but had not taken it for a month, with no other comorbidities. A skull computed tomography (CT) scan without contrast was performed and detected the forward protrusion of the left eyeball and probably the fracture of the medial orbit wall. Surgical intervention was prescribed. Therefore, drains were inserted through lateral canthotomy and lateral cantholysis, allowing orbital hematoma decompression. The patient developed a definitive amaurosis in a late post-surgery of 155 days. However, by the condition presented, the prognostic was favorable.

KEYWORDS: Retrobulbar hemorrhage, proptosis, lateral canthotomy, lateral cantholysis.

RESUMO

O hematoma retrobulbar é uma rara emergência oftalmológica, observada após trauma ocular contuso e caracterizada por hemorragia arterial, a qual pode comprometer a função do nervo óptico e nervos oculares motores, gerando amaurose e oftalmoplegia, se não detectada precocemente. O tratamento preconizado para esta complicação é a cantotomia lateral imediata e cantólise, permitindo a descompressão orbitária. Paciente A.J.P., gênero masculino, 73 anos, leucoderma, vítima de trauma em face, admitido no Serviço apresentando quadro de proptose de globo ocular esquerdo, hematoma periorbitário, hiposfagma pronunciado, pupila esquerda midriática e severa algesia. Na anamnese, paciente relatou fazer uso contínuo de ácido acetilsalicílico (AAS), mas suspendeu seu uso havia um mês, não havendo demais comorbidades. Realizou-se Tomografia Computadorizada de crânio sem contraste, na qual identificou-se projeção anterior do globo ocular esquerdo e suspeita de fratura da parede medial da órbita. Foi constatada a necessidade de intervenção cirúrgica. Realizou-se, portanto, cantotomia lateral e cantólise lateral com instalação de drenos, permitindo descompressão do hematoma orbitário. Paciente evolui com amaurose definitiva em P.O tardio de 155 dias. No entanto, diante do quadro clínico apresentado, o prognóstico foi considerado favorável.

PALAVRAS-CHAVE: Hematoma retrobulbar, Proptose; Cantotomia lateral; Cantólise lateral.

1. INTRODUCTION

Retrobulbar hemorrhage (RH) is a rare complication observed due to a trauma in the ocular region, which is an ophthalmic emergency as well as an emergency surgery. This occurrence can cause both vision and ocular motility gradual loss if it is not diagnosed rapidly and effectively[1]. Thus, visual examination assistance must be done in patients who developed proptosis after the trauma[2].

The clinical features of RH are pain, proptosis, ocular tension with dilated pupils, ophthalmoplegia, visual acuity loss, and optic disc pallor. The cause of retrobulbar hemorrhage can occur due to rupture of the infraorbital artery, as well as the posterior ethmoidal and ciliary arteries[3].

Despite the debate on surgical decompression and intensive systemic administration with anti-inflammatory drugs in the treatment of orbital trauma, these interventions have no proof to be more effective

when compared to conservative treatment, in addition to their use being associated with a variety of effects, such as possible hepatotoxicity. In contrast, the lateral canthotomy technique plus the lower cantholysis has proved to be an effective treatment in cases of retrobulbar hemorrhage[4].

Controlling this condition in the early stages is extremely important, this way the visual loss becomes reversible with early treatment. Although several ophthalmologists choose conservative treatments, surgical treatment is necessary to decrease the chances of proptosis and amaurosis[5]. A complete retinal occlusion can lead to permanent blindness within 1 to 2 hours[6]. As the initial and correct approach is essential in the RH treatment, the medical staff must recognize the signs of such an emergency, with a sufficient level of training for a correct diagnosis and adequate clinical surgical progress[7].

2. CASE REPORT

Patient., male, 73 years old, leucoderma, face trauma victim, was admitted to the Service of Oral and Maxillofacial Trauma at Sugarcane Suppliers Hospital with left eyeball proptosis, periorbital hematoma, hyposphagma, mydriatic left pupil, and severe algesia (Figure 1). A skull computed tomography (CT) without contrast was performed, in which a left eyeball anterior projection was identified and a suspected fracture of the medial wall orbit through axial and coronal sections (Figure 2 and 3).

Figure 1. Preoperative facial appearance.

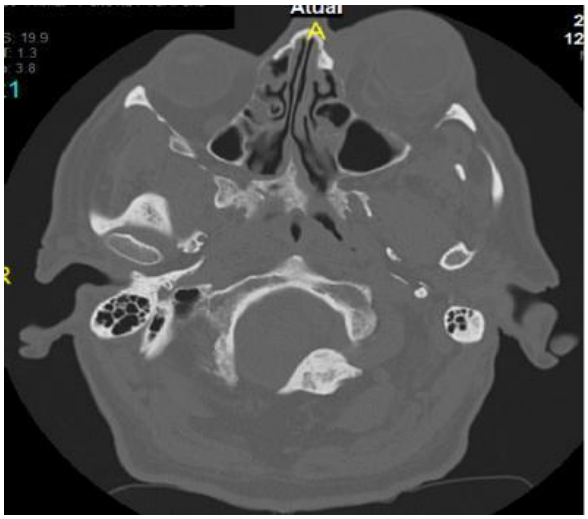

Figure 2. Axial section showing proptosis of the left eyeball.

A soft tissue window CT scan evaluated the possibility of posterior ethmoidal artery rupture (Figure 4). Although the retrobulbar hemorrhage diagnosis evaluation was confirmed, due to the severe condition, it was not possible to assess the affected eye extrinsic movements.

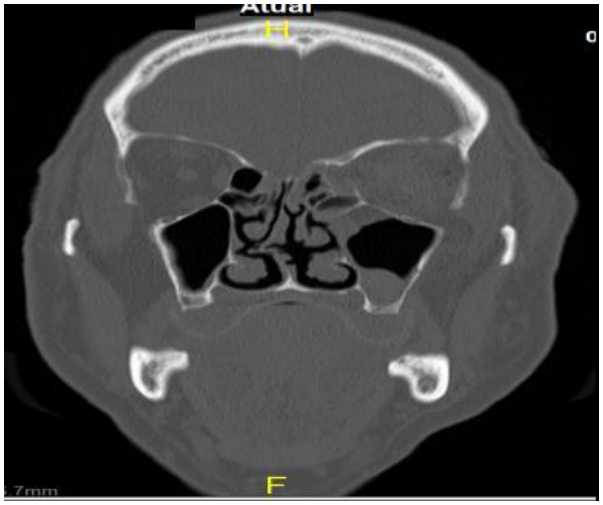

Figure 3. Coronal section showing fracture of the medial wall on the left orbit.

Figure 4. CT with soft tissue window showing left ocular proptosis with the possibility of rupture of the posterior ethmoidal artery.

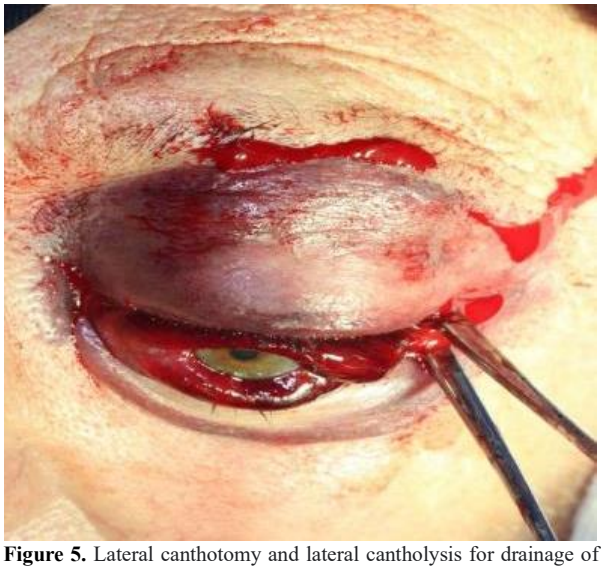

Figure 5. Lateral canthotomy and lateral cantholysis for drainage of the hematoma.

Figure 6. Placement of Penrose Drains.

The patient was conducted to emergency surgery with general anesthesia to drain the hematoma through lateral canthotomy and lateral cantholysis (Figure 5), with subsequent Penrose drain insertion (Figure 6), remaining for three days and allowing continuous drainage. To control the bleeding during the operation, in addition to mechanical decompression, intravenous anti-hemorrhagic medication (tranexamic acid - Transamin®) was controlled, not being clear whether such bleeding was due only to arterial rupture or if the chronic use – however, ceased - of ASA had influence. In the postoperative period, the Oral and Maxillofacial Surgery team worked together with the vascular Surgery, requesting an angiotomography for control, where posterior ethmoidal artery involvement was found in this hemorrhagic episode.

The patient remained hospitalized for 7 days, with intravenous medication administration for pain control, corticosteroid therapy to reduce edema, and antibiotic therapy, gradually improving his condition. Upon returning to the ambulatory clinic after 15 days, an improvement from the initial condition was observed, yet edema and periorbital ecchymosis were present, as well as total upper eyelid occlusion (Figure 7).

Figure 7. Profile and frontal photos in P.O. of 15 days of drainage - periorbital edema on the left, infraorbital ecchymosis and total left eyelid occlusion are observed.

During the examination it was possible to examine extrinsic eye movements, where there were changes in supraversion and levoversion (Figure 8), demonstrating cranial pairs III (oculomotor), IV (trochlear), and VI (abducent) damage, which is responsible for such movements. Together with ophthalmology, it was analyzed through MRI 45 days after the surgical intervention, the resolution of the hematoma as well as the complete improvement of the exophthalmos (Figure 9).

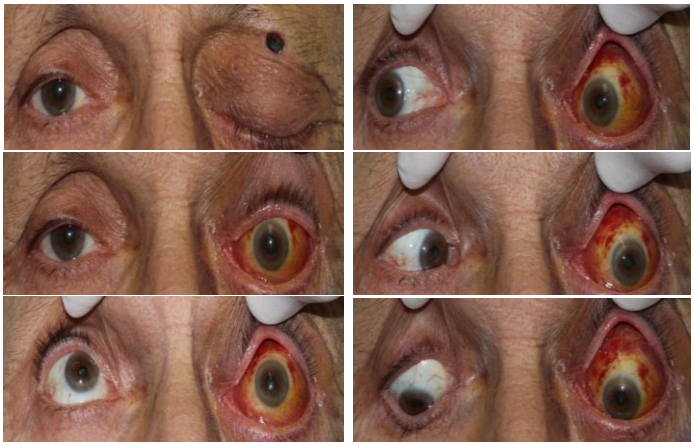

Figure 8. In P.O. of 15 days of drainage, extrinsic movements of the altered eyes are observed, in supra and levoversion of the left eye.

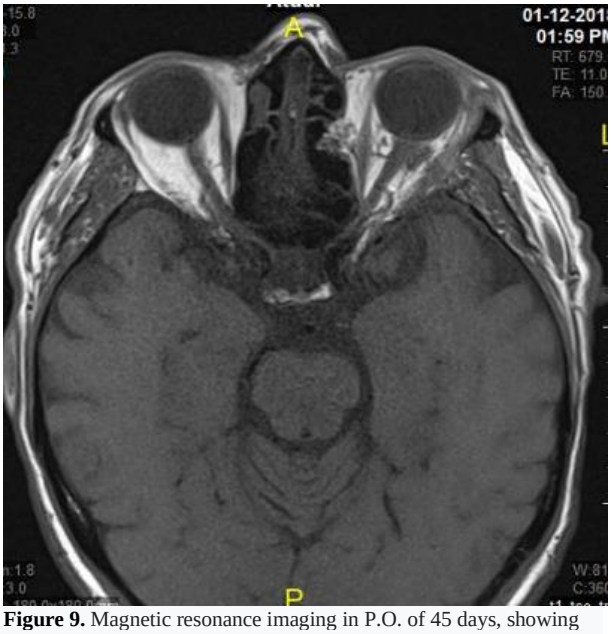

Figure 9. Magnetic resonance imaging in P.O. of 45 days, showing improvement of proptosis of the eyeball.

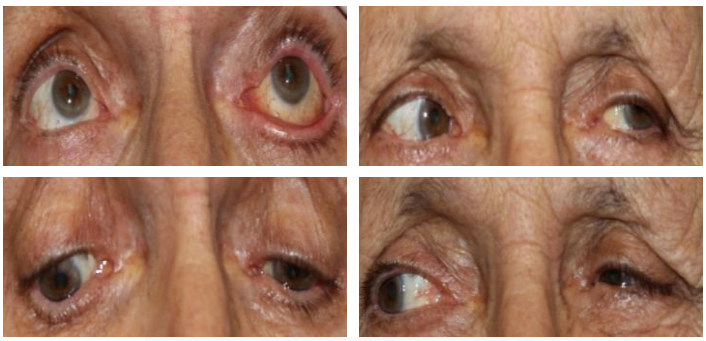

Figure 10. Extrinsic movements preserved in P.O. evaluation of 155 days of drainage.

After 155 days, the patient returned to the

ambulatory clinic, showing extrinsic eye movement preservation in the late postoperative period, however, the development of permanent amaurosis occurred (Figure 10).

3. DISCUSSION

Retrobulbar hemorrhage (RH) is an emergency that can lead to surgery, ophthalmologic procedures, trauma, and even anesthesia in the ocular region, which can generate severe exophthalmos, followed by visual acuity pain and reduction - or loss - and it requires an emergency tomography and decompression surgery, when appropriate[8]. The RH development rate through peribulbar anesthesia is less than 2%, and 0.3% after a zygomatic fracture reduction[9].

Eyeball algesia and proptosis are caused by an increase in intraorbital pressure due to arterial blood spillage in the region, which can compress the optical and ocular motor nerves, leading to amaurosis and ophthalmoplegia, if not diagnosed early. As the intraorbital pressure increases, the interstitial pressure increases, and the blood perfusion decreases. The eyeball, pushed posteriorly by the upper eyelids, is simultaneously pushed anteriorly by the effect of increased orbital pressure. With this pressure increase, the posterior ciliary artery takes more damage than the central retinal artery (CRA). Therefore, there is a visual loss due to retinal occlusion as well as an optic anterior ischemic neuropathy[10].

After venous damage triggers a retrobulbar hemorrhage, a continuous increase in intraorbital pressure is observed. As the pressures in the tissues increase, the arterial flow ceases. If a nerve branch is affected, harmful optical involvement is expected. When the orbital pressure exceeds the central retinal artery pressure, there is damage in the area. Basically, as the orbital pressure increases and the perfusion decreases, the damage takes place, and the pathology stabilizes. Furthermore, the optic nerve may have been damaged due to compression and tension with visual loss development because of CRA occlusion, optic nerve, or blood vessels compression, which supplies the same nerve[11]. When the retrobulbar pressure increases to a critical level, optic nerve, and retina ischemia develop in 40 minutes, followed by visual loss[12].

Anderson et al. (1982)[13], in his article "Damage to the Optic Nerve followed by Frontal Trauma", illustrates the surgical time for optic nerve decompression associated with the superdose of corticosteroid therapy. The eye exam results dictate the appropriate repair time if proper treatment is established uniquely. The correct time for the ophthalmologic examination, according to these authors, is at the beginning of the neurological condition documentation and assessment, and not when the patient is under general anesthesia. Even with noted preoperative findings, corneal translucency and pupillary reaction size are monitored throughout the surgical procedure. It is possible to occur an RH after ethmoid complex fracture reduction or after orbital floor fracture reduction. The injection of local anesthetics or around the ciliary region can cause third cranial palsy or abnormalities due to solute infiltration through the disorganized tissue. Besides, Anderson reports that test of forced duction and intraocular pressure measurement should be performed at the end of fracture reductions, and postoperative ophthalmic monitoring should be performed for as long as the edema persists.

Originally, the visual loss was caused by the anterior displacement of the globe due to the hematoma with vessels and nerves compression and elongation, which could cause spasms in the central retinal artery (CRA). In a systematic review by Heinze & Hueston (1978)[14] in case studies of blepharoplasty, CRA occlusion was diagnosed during an RH. In contrast, Hayreh (1974)[15] said that instead of central artery occlusion lead to visual loss, optic nerve ischemia has been suggested as the cause. An intraorbital pressure increase leads to posterior ciliary artery occlusion. The same author showed that with such a pressure increase, the first obliterated arteries are those in the anterior lamina cribrosa, and the ones affected next are the central retina, that is, they are affected secondarily, not causing the visual loss at first. Also, anterior ischemic optic neuropathy (AION) can occur with or without an effect on the arterial circulation.

Holt & Holt (1983)[16] surveyed of the facial trauma incidence with eye injuries, and the occurrence of visual loss from this trauma. In other words, the impact site was analyzed and whether it had a connection - or not - to vision loss. From a total of 727 cases, 89% had orbital trauma with frontal fracture, 29% with mandibular fractures, and 59% with nasal and middle third fractures. From these fractures, it was analyzed eye injury concerning the trauma site, the injury gravity, and whether there was a visual loss. From a total of 487 patients with some eye damage, 382 (79%) reported temporary vision loss, 90 (18%) serious damage but without visual loss and 15 (3%) with total blindness. More than 90% of ocular injuries are the resulting middle third, supraorbital, or frontal sinus fractures.

As the secondary complications, due to both trauma and surgical techniques, according to the survey by Steidler et Al. (1982)[17] reported from 240 cases analyzed, 20% of patients developed total amaurosis. Gwyn et aI, from a review of 1517 patients, 3,4% reported serious eye damage including total vision loss. Turvey et al. have showed more specific data, in a series of 593 patients, 4% also reported serious eye damage, including vitreous hemorrhage, lacerations, optic nerve disturbance, and corneal abrasions. Schultz reported, out of 400 patients from car accidents trauma, 9% of them with eye injuries. Finally, Luce et aI. presented from 1000 cases analyzed, a percentage of 2.7% of eye damage incidence. It is difficult to obtain significant and specific data on ophthalmic injuries and their secondary consequences from these studies due to the small number of patients examined and reported in the articles, however, it is observed that visual and motor complications trauma, whether direct or indirect, in the ocular region, occurs relatively in a large scale of case

analysis, including the case reported in this article.

Based on Custer & Trinkaus et.al (2015)[18] study, the effect of antiplatelet and anticoagulant drugs on hemorrhagic complications during and after ophthalmic surgery was evaluated. In their retrospective and non-randomized study, from 1584 consecutive procedures, it was observed that there was no significant increase in intraoperative hemorrhage or postoperative hematoma in patients using anticoagulant drugs, including Warfarin. Although severe bleeding during surgery is rare (0.4%), prolonged bleeding occurred in 9.2% of cases. However, in their study, they considered discontinuing medication intake for at least 5 days before surgery. The patient´s most common antiplatelet medication in the study was ASA, which alters platelet function throughout its life cycle, ranging from 7 to 10 days. Many patients, even with this drug intake discontinuity, had aspirin effects during surgery, which is in agreement with the clinical case of this article. In any case, severe bleeding, even in the presence of underlying antiplatelet therapy, is uncommon[19].

The most appropriate surgical access to treat such an emergency is through lateral canthotomy with cantholysis, which allows access to the posterolateral eye cavity region and thus cauterize the ruptured artery. Such bloodshed can come from the anterior ethmoidal, posterior ethmoidal, infraorbital artery, and central retinal artery. Because the orbital cavity is not greatly expanded due to rigid limits in bone structures, any requirement for its expansion may follow only an anterior path[20]. When bleeding occurs, the globe moves anteriorly to its anterior anatomical limit. As the bleeding continues, the orbital cavity expands to accommodate this volume, thereby increasing internal pressure. Such a phenomenon is responsible for reverse visual loss[21].

4. CONCLUSION

Retrobulbar hemorrhage can occur due to several situations, from facial fractures, orbital surgeries, and even retrobulbar anesthesia. Our clinical case illustrates the motor optic and ocular nerve damage, which through the lateral canthotomy and cantholysis techniques for decompression, recommended from the literature, it was possible the conservation in the late postoperative period, despite the definitive amaurosis development. Although the visual loss mechanism is not definitively clear in the literature, recovery after decompression suggests that blood reperfusion can overcome the pathology condition[22]. According to the patient´s clinical case, the prognosis was considered favorable.

5. REFERÊNCIAS

[1] Hislop WS, Dutton GN, Douglas PS: Treatment of retrobulbar haemorrhage in accident and emergency departments. Br J Oral Maxillofac Surg 34:289–92, 1996

[2] Holt GR, Holt JE. Incidence of eye injuries in facial fractures: an analysis of 727 cases. Otolaryngol Head Neck Surg 91:276–9, 1983

[3] Shek KC, Chung KL, Kam CW, Yau HH: Acute retrobulbar haemorrhage: na ophthalmic emergency. Emerg Med Australas 18(3):299-301, 2006

[4] Dahn I, Lassen NA, Westling H: Blood flow in human muscles during external pressure or venous stasis. Clin Sci 32:467–73, 1967

[5] Kratky V, Hurwitz JJ, Avram DR: Orbital compartment syndrome: Direct measurement of orbital tissue pressure technique. Can J Ophthalmol 25:293–7, 1990

[6] McClenaghan FC, Ezra DG, Holmes SB: Mechanisms and management of vision loss following orbital and facial trauma. Curr Opin Ophthalmology 22(5):426-31, 2011

[7] Lee KY, Tow S, Fong KS: Visual recovery following emergent orbital decompression in traumatic retrobulbar haemorrhage. Ann Acad Med Singapore 35(11):831-2, 2006

[8] Vanessa Lima; Benjamin Burt; Igal Leibovitch; Venkatesh Prabhakaran; Robert A. Goldberg; Dinesh Selva: Orbital Compartment Syndrome: The Ophthalmic Surgical Emergency 54(4), 0–449, 2006

[9] Burkat CN, Lemke BN. Retrobulbar hemorrhage: inferolateral anterior orbitotomy for emergent management. Arch Ophthalmology 123:1260–2, 2005

[10] Vassallo S, Hartstein M, Howard D, Stetz J: Traumatic retrobulbar hemorrhage: emergent decompression by lateral canthotomy and cantholysis. J Emerg Med 22:251–6, 2002

[11] Mootha VV, Cowden TP, Sires BS, Dortzbach RK: Subperiosteal orbital hemorrhage from retrobulbar injection resulting in blindness. Arch Ophthalmology 115:123–4, 1997

[12] Saussez S, Choufani G, Brutus JP, Cordonnier M, Hassid S. Lateral canthotomy: a simple and safe procedure for orbital haemorrhage secondary to endoscopic sinus surgery. Rhinology 36(1):37-9, 1998

[13] Anderson, Richard L., William R. Panje, and Cordell E. Gross: Optic nerve blindness following blunt forehead trauma. Arch Ophthalmology 445-455, 1982

[14] Heinze JB, Hueston JT. Blindness after blepharoplasty: mechanism and early reversal. Plast Reconstr Surg 61(3):347-54, 1978

[15] Hayreh SS. Anatomy and physiology of the optic nerve head: Trans Am Acad Ophthalmol Otolaryngol 78:240-54, 1974

[16] Holt GR, Holt JE: Incidence of eye injuries in facial fractures: an analysis of 727 cases. Otolaryngol Head Neck Surg 91:276–9, 1983

[17] Gerbino G, Ramieri GA, Nasi A: Diagnosis and treatment of retrobulbar haematomas following blunt orbital trauma: a description of eight cases. Int J Oral Maxillofac Surg. 34(2):127-31, 2005

[18] Custer PL & Trinkaus KM. Porous implant exposure: incidence, management, and morbidity. Ophthal Plast Reconstr Surg 23: 1–7, 2015

[19] Han JK, Caughey RJ, Gross CW, Newman S: Management of retrobulbar hematoma. 22(5):522-4, 2008

[20] Craig D. Lewis; Julian D. Perry: Retrobulbar Hemorrhage Disclosures 2(04):557-570, 2007

[21] Can Pamukcu, M.D., Mahmut Odabaşı, M.D: Acute retrobulbar haemorrhage: An ophthalmologic emergency 21(4):309–314, 2015

[22] Barrett Katz, Jonathan Herschler, and Dean C. Brick: Orbital haemorrhage and prolonged blindness: a treatable posterior optic neuropathy. British Journal of Ophthalmology 67, 549-553, 1983.