

# Retrobulbar Hematoma After Third Molar Extraction: Case Report and Review

*Parviz Goshtasby, MD,\* Reza Miremadi, DDS, MD,† and  
Ronald Warwar, MD‡*

## Report of a Case

A 19-year-old man was evaluated for extraction of third molar teeth. He was healthy with no history of medical problems or bleeding disorders, and he was not taking any medications. The preoperative panoramic radiograph was unremarkable (Fig 1). He underwent uneventful extraction of all 4 impacted third molar teeth under local and deep conscious sedation.

In the immediate postoperative period, while still in the surgical suite, the patient was noted to have increasing right periorbital swelling and ecchymosis with evidence of proptosis and moderate swelling of the right cheek (Figs 2, 3). In addition, there was a right subconjunctival hemorrhage. Ballottement of the globes showed slight increased resistance to retropulsion on the right. Vision and range of motion were grossly intact. Given the high clinical suspicion of a retrobulbar hematoma, the decision was made to perform surgical exploration and drainage of any hematoma. The patient was given a 12-mg dose of intravenous dexamethasone before exploration.

Upon opening and extending the incision made for extraction of the right maxillary third molar, a moderate amount of blood and hematoma was evacuated. A bleeding vessel was identified at the base, which was controlled with electrocautery followed by packing with HemCon dental dressing (HemCon Medical Technologies, Portland, OR) and gauze. Once it was confirmed that the bleeding was controlled, a Penrose drain was placed to allow dependent drainage, and the patient was taken to the recovery room.

Close monitoring and observation were performed. The patient's head was kept elevated, and ice was applied to the right periorbital region. Aside from mild periorbital swelling and ecchymosis, there were no residual deficits. The patient then underwent an urgent computed tomography (CT)

scan, which showed a small retrobulbar hematoma confined to the extraconal space with minimal impression on the right lateral rectus muscle (Figs 4, 5). There was no impingement of the optic nerve. Of note, there were no signs of fractures. The patient then underwent an emergent evaluation by an ophthalmologist.

The ophthalmologist noted a visual acuity of 20/20 in each eye. Pupils, ocular motility, slit lamp, and funduscopy examinations were all normal, other than a right subconjunctival hemorrhage. There were no signs of entrapment, diplopia, or strabismus. Intraocular pressures were normal at 13 mm Hg (right) and 15 mm Hg (left). There was no measurable relative proptosis as indicated by symmetric exophthalmometric measurements of 18 mm bilaterally. The patient was given oral clindamycin and a methylprednisolone taper for 1 week for postoperative medical management.

The patient was seen the next day for drain removal and weekly thereafter for 4 weeks. No visual deficits were noted, and gradual resolution of the right periorbital edema and ecchymosis occurred. The oral wounds healed without complications.

## Discussion

Retrobulbar hematomas are medical emergencies that require prompt diagnosis and management to prevent optic nerve ischemia and blindness. The enclosed bony orbital space has little room to accommodate bleeding, making the optic nerve and central retinal artery vulnerable to direct compression. The most common causes reported in the literature are trauma, reduction of orbital fractures and other periorbital surgeries, labor induction, arteriovenous malformations, venous anomalies, ophthalmic artery aneurysm, tumors, hypertension, and blood dyscrasias, such as hemophilia, von Willebrand disease, and leukemia.<sup>1-16</sup> Among nontraumatic cases, 1 retrospective study of 115 patients noted a 90% incidence of orbital vascular malformations.<sup>17</sup> Subperiosteal hematoma has also been described with a lesser frequency after a forceful Valsalva maneuver and migraine headaches.<sup>18-20</sup> Late onset of retrobulbar hematoma with proptosis has been described 13 to 20 years after orbital floor fracture repair with alloplastic implants due to hemorrhage of capillaries surrounding the fibrous implant capsule.<sup>21,22</sup> There has been 1 case report occurring after a dental procedure compli-

Received from the Boonshoft School of Medicine, Wright State University, Dayton, OH.

\*Chief Plastic Surgery Resident, Postgraduate Year 9 (PGY-9), Department of Plastic and Reconstructive Surgery.

†Clinical Assistant Professor of Oral & Maxillofacial Surgery.

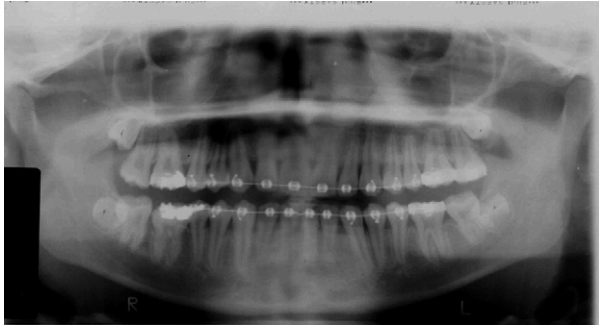
‡Clinical Assistant Professor of Ophthalmology.

Address correspondence and reprint requests to Dr Goshtasby: Department of Plastic and Reconstructive Surgery, Miami Valley Hospital, 30 East Apple Street, Suite 2200, Dayton, OH 45409; e-mail: parvizmd75@yahoo.com

© 2010 American Association of Oral and Maxillofacial Surgeons

0278-2391/10/6802-0036\$36.00/0

doi:10.1016/j.joms.2009.07.027



**FIGURE 1.** Preoperative panoramic radiograph.

*Gosbtasby, Miremadi, and Warwar. Retrobulbar Hematoma. J Oral Maxillofac Surg 2010.*

cated by postoperative nausea and vomiting with tonic seizures.<sup>23</sup> To our knowledge, this is the first reported case of retrobulbar hematoma occurring after uncomplicated third molar tooth extraction.

Anatomically, retrobulbar hematomas are classified based on their location of occurrence in the intracanal, extraconal, or subperiosteal space. The intracanal space is defined as the compartment roughly bound by the 4 rectus muscles, from the anulus of Zinn at the orbital apex to their penetration through the Tenon capsule. Injury to the vortex veins, ophthalmic artery, superior and inferior ophthalmic veins, or muscular arteries can lead to intracanal hemorrhage. Extraconal and subperiosteal hematomas are due to extraorbital or orbital bleeding from a number of sources. Our patient illustrates a case of extraconal retrobulbar hematoma, which is supported by the fact that there was maintenance of vision.

The mechanism of the retrobulbar hematoma in this case is debatable. One possible explanation would be trauma to the maxillary bone incurred during the initial



**FIGURE 2.** Frontal view of patient after third molar extraction showing right periorbital swelling and ecchymosis.

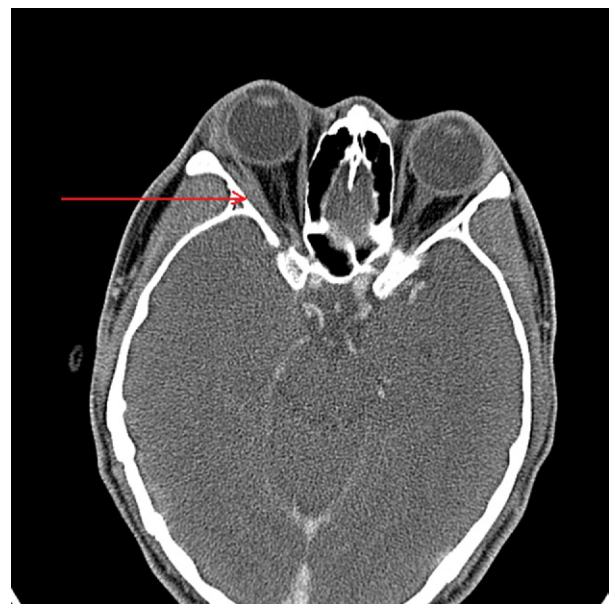
*Gosbtasby, Miremadi, and Warwar. Retrobulbar Hematoma. J Oral Maxillofac Surg 2010.*



**FIGURE 3.** Lateral view of patient after third molar extraction showing right periorbital swelling and ecchymosis.

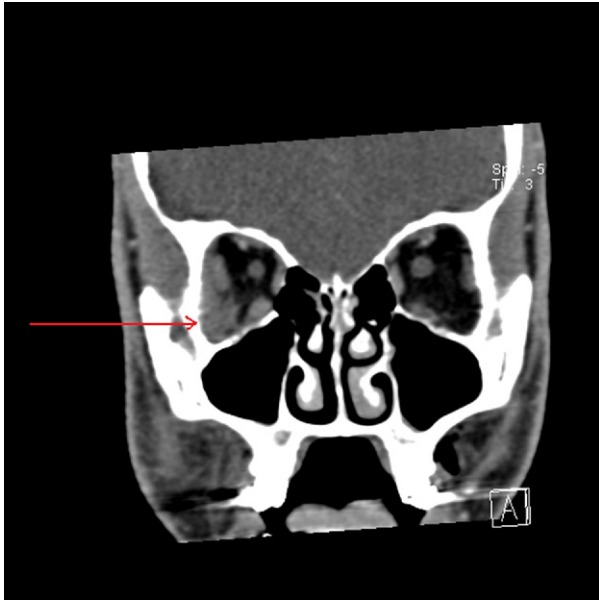
*Gosbtasby, Miremadi, and Warwar. Retrobulbar Hematoma. J Oral Maxillofac Surg 2010.*

procedure. However, the third molar extractions had been uneventful without maxillomandibular fractures or significant time spent on retained root removal. The CT scan confirmed that there was no evidence of fractures. Another possibility is straining with the Valsalva maneuver, which has been linked to increased intrathoracic and intra-abdominal pressures, increased jugular venous pressure transmitted to the orbit via the valveless venous system, and rupture of periorbital bridging vessels. However, this also seems unlikely, given that our patient was comfortable, with stable blood pressure throughout the



**FIGURE 4.** Axial CT scan showing right retrobulbar hematoma (arrow).

*Gosbtasby, Miremadi, and Warwar. Retrobulbar Hematoma. J Oral Maxillofac Surg 2010.*



**FIGURE 5.** Coronal CT scan showing right retrobulbar hematoma (arrow).

*Goshtasby, Miremadi, and Warwar. Retrobulbar Hematoma. J Oral Maxillofac Surg 2010.*

procedure and postoperatively. Presuming that there was no trauma to the maxillomandibular region allowing passage of intraoral blood to the periorbital space, as well as no abnormal congenital vascular malformations or bleeding disorders, the other possibility would be hemorrhage draining through a previously unidentified tract between these 2 spaces.

We hypothesize that uncontrolled bleeding from branches of the posterior superior alveolar artery after upper third molar removal may track up through the pterygomaxillary fissure into the pterygopalatine fossa and eventually drain into the retro-orbital space via the inferior orbital fissure (Fig 6). The CT scan finding of hematoma mostly localized to the inferolateral extraconal space near the location of the inferior orbital fissure would support this mechanism. Another possible source of hemorrhage would be injury to the pterygoid plexus of veins during dental extraction, which could track blood through this same pathway, leading to a retrobulbar hematoma.

Prompt diagnosis and management of this medical emergency are necessary to prevent optic nerve ischemia and blindness. Studies suggest that visual loss due to optic nerve ischemia may be irreversible after 90 to 120 minutes.<sup>24,25</sup> The diagnosis is primarily a clinical one, with significant findings including periorbital edema, ecchymosis, crepitus, pain, and subconjunctival hemorrhage. Other signs include a tense, hard globe; proptosis; ophthalmoplegia; diplopia; afferent pupillary defect; and increased resistance to retro-pulsion. Because cadaveric studies of orbital hemor-

rhages have shown that intraocular pressure closely parallels orbital pressure, intraocular tonometry can be a reliable indicator of elevated orbital pressure.<sup>26</sup> Funduscopy examination may show a pale optic disc or disc edema. Decreased visual acuity and loss of visual field are ominous signs that may indicate impending irreversible blindness. The diagnosis can be confirmed with ultrasound, CT imaging, or magnetic resonance imaging.<sup>18</sup> However, imaging studies should not delay the timely treatment of this emergency.

If there is evidence of loss of vision, severe proptosis, limited ocular motility, or an afferent pupillary defect in the setting of a suspected retrobulbar hematoma, immediate formal operative drainage of the retro-orbital space would be indicated. Several approaches have been described that serve to effectively lower orbital pressure.<sup>13</sup> In situations of a postoperative retrobulbar hematoma, such as in our patient, the existing incision should be opened and explored to drain and control any hemorrhage. Otherwise, a lateral canthotomy and cantholysis afford good exposure to the retro-orbital space with minimal risk of injury to periocular structures.<sup>7,27</sup> In brief, the lateral canthal region is infiltrated with lidocaine with epinephrine. A straight clamp is used to compress the tissue horizontally across the lateral canthus. The clamp is removed and the skin incised laterally for approximately 1 cm. The incision dissects through skin, orbicularis muscle, orbital septum, palpebral conjunctiva, and the Eisler fat pocket. The inferior limb of the lateral canthal tendon is palpated and transected with the scissors pointed in the inferoposterior direction. The endpoint is confirmed when the lower lid can be easily retracted away from the globe

**FIGURE 6.** Skull model outlining proposed pathway of hemorrhage tracking from pterygomaxillary fissure to inferior orbital fissure via pterygopalatine fossa.

*Goshtasby, Miremadi, and Warwar. Retrobulbar Hematoma. J Oral Maxillofac Surg 2010.*



and lateral orbital rim. If these maneuvers do not adequately alleviate orbital and intraocular pressure, then an additional inferolateral anterior orbitotomy can be used to aid with decompression.<sup>28</sup> This technique entails inferotemporal dissection through the orbital fat compartments and fibrous septa between the inferior and lateral rectus muscles. The goal is to reach the retro-orbital space using gentle spreading movements with a curved, blunt scissor aimed posteromedially behind the globe. Superiorly directed dissection should be avoided to minimize risk of injury to the lacrimal gland apparatus and levator palpebrae muscle and aponeurosis.<sup>7</sup> The lateral canthal incision can be repaired at a later date once signs and symptoms have resolved or left open to heal by secondary intention.

In cases of a small retrobulbar hematoma without evidence of impending visual loss, certain maneuvers can be used in lieu of or in addition to surgical decompression. Medical management includes head-of-bed elevation and topical ice bags to decrease swelling. Steroids such as hydrocortisone and dexamethasone can be beneficial through their anti-inflammatory effects as well as antioxidant effects that decrease production of oxygen free radical metabolites.<sup>29</sup> In addition, the hyperosmolar agent mannitol or dextran can be infused to reduce vitreous humor volume and decrease intraocular pressure, leading to improved ocular perfusion. The carbonic anhydrase inhibitor acetazolamide has also been shown to help decrease intraocular pressure by reducing production of aqueous humor.<sup>30</sup> Furthermore, it decreases systolic blood pressure, which can help control hemorrhage.

In conclusion, retrobulbar hematomas are medical emergencies that may result from a number of different causes. We report a unique case that followed the uneventful extraction of third molar teeth. Though an uncommon occurrence, it is important to be aware of retrobulbar hemorrhage to allow prompt recognition, management, and prevention of visual loss.

## References

- Jacobsen DM, Itani K, Digre K, et al: Maternal orbital hematoma associated with labor. *Am J Ophthalmol* 105:547, 1988
- Oruc S, Sener EC, Akman A, et al: Bilateral orbital hemorrhage induced by labor. *Eur J Ophthalmol* 11:77, 2001
- Krohel GB, Wright JE: Orbital hemorrhage. *Am J Ophthalmol* 88:254, 1979
- Law FW: Spontaneous orbital hemorrhage. *Br J Ophthalmol* 55:556, 1971
- Geyer O, Wasserman D, Rothkoff L, et al: Orbital haemorrhage induced by labor. *Br J Ophthalmol* 74:242, 1990
- Shimura M, Kiyosawa M, Aikawa H, et al: Spontaneous orbital hemorrhage in adult females. *Ophthalmologica* 205:149, 1992
- Vassallo S, Hartstein M, Howard D, et al: Traumatic retrobulbar hemorrhage: Emergent decompression by lateral canthotomy and cantholysis. *J Emerg Med* 22:251, 2002
- Myerson L, Lazar SJ: Intraorbital aneurysm of the ophthalmic artery. *Br J Ophthalmol* 55:199, 1971
- Rubenstein RA, Albert DM, Scheie HG: Ocular complications of hemophilia. *Arch Ophthalmol* 76:230, 1966
- Zimmerman A, Merigan TC: Retrobulbar hemorrhage in a hemophilic with irreversible loss of vision. *Arch Ophthalmol* 64:949, 1960
- Reese AB, Guy L: Exophthalmos in leukemia. *Am J Ophthalmol* 16:718, 1933
- Kubik J: Spontaneous hemorrhage into the orbit in hypertension. *Cesk Oftalmol* 19:267, 1963
- Ord RA, El Attar A: Acute retrobulbar hemorrhage complicating a malar fracture. *J Oral Maxillofac Surg* 40:234, 1982
- Rosdeutscher JD, Stadelmann WK: Diagnosis and treatment of retrobulbar hematoma resulting from blunt periorbital trauma. *Ann Plast Surg* 41:618, 1998
- Ares C, Superstein R: Retrobulbar hemorrhage following strabismus surgery. *J AAPOS* 10:594, 2006
- Moin M, Kersten RC, Bernardini F, et al: Spontaneous hemorrhage in an intraorbital arteriovenous malformation. *Ophthalmology* 107:2215, 2000
- Sullivan TJ, Wright JE: Non-traumatic orbital hemorrhage. *Clin Exp Ophthalmol* 28:26, 2000
- Boyer MM, Lucarelli MJ: Valsalva-induced subperiosteal hemorrhage during migraine. *Arch Ophthalmol* 116:106, 1998
- Katz B, Carmody R: Subperiosteal orbital hematoma induced by the Valsalva maneuver. *Am J Ophthalmol* 100:617, 1985
- Katz RS, Abrams G: Orbital subperiosteal hematoma (epidural hematoma of the orbit). *J Clin Neuro Ophthalmol* 1:45, 1981
- Mauriello JA Jr, Flanagan JC, Peyster RG: An unusual late complication of orbital floor fracture repair. *Ophthalmology* 91:102, 1984
- Gilhotra JS, McNab AA, McKelvie P, et al: Late orbital hemorrhage around alloplastic orbital floor implants: A case series and review. *Clin Exp Ophthalmol* 30:352, 2002
- Kue R, Renzi F: Retrobulbar hemorrhage resulting from syncope seizures after a dental procedure. *Am J Emerg Med* 25:228, 2007
- Soll DB: Management of Complications in Ophthalmic Plastic Surgery. Birmingham, AL, Aesculapius Publishing, 1976, p 261
- Hayreh SS, Kilder HE, Wiengest TA: Central retinal artery occlusion and retinal tolerance. *Ophthalmology* 87:75, 1980
- Zoumalan CI, Bullock JD, Warwar RE, et al: Evaluation of intraocular and orbital pressure in the management of orbital hemorrhage. *Arch Ophthalmol* 126:1257, 2008
- Winterton JV, Patel K, Mizzen K: Review of management options for a retrobulbar hemorrhage. *J Oral Maxillofac Surg* 65:296, 2007
- Burkat CN, Lemke BN: Retrobulbar hemorrhage: Inferolateral anterior orbitotomy for emergent management. *Arch Ophthalmol* 123:1260, 2005
- Braugher JM, Hall ED: Effects of multi-dose methylprednisolone sodium succinate administration on injured cat spinal cord neurofilament degradation and energy metabolism. *J Neurosurg* 61:290, 1984
- Castillo GD: Management of blindness in the practice of cosmetic surgery. *Otolaryngol Head Neck Surg* 100:559, 1989