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# Retrobulbar hematoma: A systematic review of factors related to outcomes

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Lateral canthotomy

**Summary** *Introduction:* Retrobulbar hematoma (RBH), a rare but serious condition, can result in permanent vision loss. Although it is a known complication following trauma or facial fracture reduction, sinus surgery, or blepharoplasty, factors related to patient outcomes are not well-defined. A systematic review was performed to determine the relation of patient/treatment factors to outcomes.

*Methods:* Articles retrieved from a PubMed search (1989–2017) were reviewed. Demographic information, etiology, symptoms, and final vision outcomes were analyzed using Fisher's exact tests, single and multiple predictor logistic regression.

*Results:* Of 429 articles identified, 16 were included in the study. 93 cases of retrobulbar hematoma were included. 74% occurred after trauma, while 26% occurred postoperatively. Onset of symptoms occurred after approximately 24 hours. 28% received treatment within 1 hour, 54% within 1–24 hours, and 18% after 24 hours. 51% had complete visual recovery, while 27% had partial recovery, and 22% developed blindness. Older patients and patients who sustained trauma were less likely to have a full recovery ( $p = 0.029$ ,  $p = 0.023$ ). Increasing number of symptoms trended towards a prediction of blindness ( $p = 0.092$ ). Surgical decompression and shorter time to treatment were each highly predictive of full recovery ( $p = 0.024$ ,  $p = 0.003$ ) and decreased likelihood of blindness ( $p = 0.037$ ,  $p = 0.045$ ); use of steroids was not found to be significant.

*Discussion:* Retrobulbar hematoma is a diagnostic and therapeutic emergency. Factors associated with improved outcomes include younger age, decreased number of total symptoms, surgical decompression, and shorter time to treatment. If recognized and treated early with surgical decompression, recovery of vision is possible.

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## Introduction

Retrolbulbar hematoma (RBH) is a rare but serious condition that can result in permanent vision loss. It is a known surgical complication following facial fracture reduction (0.3%), endoscopic sinus surgery (0.43%), blepharoplasty (0.055%), and retrobulbar injection of anesthesia (0.44%).<sup>1-3</sup> It is also a common cause of post-traumatic blindness, especially in the setting of orbital fracture.<sup>1,2,4,5</sup> The incidence of RBH in patients with orbital fractures is estimated to be 0.45–0.6%.<sup>2,5,6</sup>

The pathophysiology of retrobulbar hematoma relates to bleeding and compression within the enclosed retrobulbar space. As bleeding occurs within the fixed space, pressure increases and the globe is displaced anteriorly. This process leads to an increase in intraorbital pressure, stretching of the optic nerve and optic vessels, and results in venous compression, compromising outflow and increasing intraorbital pressure.<sup>1,2,4,6,7</sup> Further increase in intraorbital pressure leads to central retinal artery occlusion and decreased perfusion pressures, ultimately causing an ischemic optic neuropathy that manifests as loss of vision.<sup>1,2,4,6-9</sup>

Retrolbulbar hematoma is a diagnostic and therapeutic emergency and must be treated urgently to prevent permanent blindness. Factors related to patient outcomes, however, are unknown. The purpose of this study was to perform a systematic review of published articles in order to determine which patient and treatment factors are related to outcomes. It was our hypothesis that improved outcomes in cases of retrobulbar hematoma are directly related to shorter time to treatment, and treatment with surgical decompression as opposed to nonoperative treatment.

## Methods

### Search methodology

A PubMed search (1989–2017) was performed using Medical Subject Headings search terms for the following: (retrolbulbar OR retroorbital) AND (hemorrhage OR haemorrhage OR hematoma OR haematoma OR bleeding). Results included all ages and sexes, and were limited to the English language and studies involving humans.

Exclusion criteria included case reports with fewer than 2 patients, studies with incomplete patient data, and studies with no retrobulbar hematoma reported. Case reports on subperiosteal hematoma were excluded as well.

### Data extraction

The following variables were extracted into an Excel (Microsoft Corp., Redmond, Wash.) sheet template developed before the query: lead author, publication year, age of patients, etiology of retrobulbar hematoma, type of fracture if traumatic etiology, presenting symptoms, time of onset (hours), method of diagnosis (radiological or clinical), time to treatment from symptom onset (hours), method of treatment, and final vision outcome (full recovery, partial recovery, or blindness). Blindness was classified using the legal definition of blindness: visual acuity of 20/200 or worse.

## Statistical analysis

Two binary outcome contrasts were formed for the statistical analyses, in order to avoid multiple comparisons<sup>1</sup>: full recovery versus partial recovery / blindness<sup>2</sup>; blindness versus full / partial recovery. For each outcome contrast, Fisher's exact test was used to evaluate the association between each categorical factor and the distribution of the two outcome groups in the contrast. Single predictor and stepwise multiple predictor logistic regression analyses were applied to test the prediction from the factors to the likelihood of an outcome compared to the other outcome group in the contrast. All statistical analyses were performed using SAS statistical software program version 9.4 (SAS Institute, Cary, NC). A cutoff p-value of 0.05 was used for statistical significance.

## Results

### Article selection

As shown in Figure 1, a total of 429 articles were identified utilizing the initial query. Of these, 236 were excluded on the basis of title, and 156 articles were excluded on the basis of abstract content (Figure 1). Full review of article content excluded an additional 21 articles based on absence of individual patient data ( $n = 10$ ), survey articles ( $n = 4$ ), absence of reported retrobulbar hematoma ( $n = 3$ ), incomplete data ( $n = 2$ ), and fewer than 2 patients ( $n = 2$ ). Sixteen studies were thus identified and used for analysis (Table 1).

### Patient demographics

There were a total of 93 cases of retrobulbar hematoma in the 16 articles reviewed. Mean age of patients was 46 (range 10–92 years). There were 56 males (60%) and 37 females (40%). Etiology was post-traumatic in 69 (74%)<sup>1-6,8-13</sup> and post-operative in 24 (26%).<sup>2,3,5,7,8,11,12,14-16</sup> 12 studies included information about 49 facial fractures.<sup>1-4,6,8,11,13</sup> Of the 69 post-traumatic cases of RBH, 17 (25%) were due to motor vehicle

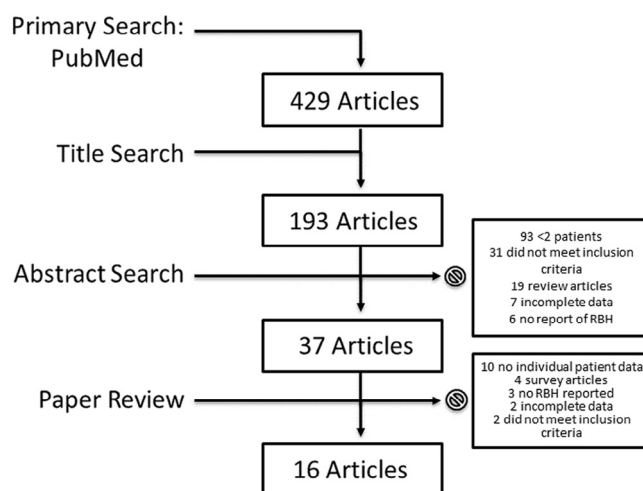


Figure 1 Search Methodology.

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