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Preoperative Evaluation of the Ophthalmology Patient

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Abstract

Ophthalmologic surgeries, particularly cataract surgeries, are amongst the most frequently performed procedures in the United States and worldwide. These procedures are generally associated with a low risk of major adverse complications and are well-tolerated. Traditional scoring systems used to calculate the risk of perioperative complications are not applicable to ophthalmologic surgeries and may overestimate risk, potentially leading to unnecessary development of worsened vision or vision loss. Conversely, while these surgeries are generally associated with a low risk, outcomes are improved when comorbid conditions are identified, communicated to the ophthalmologist, and effectively managed. Additionally, routine preoperative testing is frequently ordered, but rarely indicated. A reduction in unnecessary preoperative testing has substantial potential to reduce the economic impact on healthcare costs in this patient population.

Of particular note, the perioperative management of antiplatelet therapy and anticoagulation in the patient undergoing ophthalmologic surgery can be confusing. Internists may not have an adequate understanding of the bleeding risks associated with common ophthalmologic surgeries, and ophthalmologists may not have an adequate understanding of which patient populations are at highest risk of adverse events from an interruption of therapy. A better understanding of the bleeding risks associated with common ophthalmologic surgeries can help the internists provide more accurate recommendations to the ophthalmologist to allow for a more appropriate treatment plan in the perioperative setting and help determine optimal timing of surgical intervention.

Keywords: Preoperative evaluation; Ophthalmology

Introduction

The pre-operative evaluation and management of patients undergoing ophthalmologic surgery presents a unique challenge to the internist. Cataract surgery alone is the most frequently performed surgery in the United States, with at least 3 million procedures performed each year [1]. Additionally, these surgeries are frequently performed on elderly patients and those with comorbid conditions. Using cataracts again as an example, 78 percent are performed in patients greater than 70 years of age, and 57 percent are performed in patients with at least one medical issue [2]. As our patient population becomes older and with an increasing number of medical conditions the number of these procedures is expected to continue to grow [3].

It is often the job of the internist to refer patients to the ophthalmologist, when appropriate, for possible surgical interventions. Additionally, it is the role of the internist to properly optimize the management of comorbid conditions and communicate the existence of such conditions, as surgical complications can be avoided when this occurs [4]. Not only can a review of the pre-operative approach to the ophthalmologic patient help identify surgical candidates who may have otherwise been considered too sick for surgery, a thorough understanding of this topic can help avoid the over-utilization of unnecessary pre-operative testing, a particularly important topic given the frequency of ophthalmologic surgeries.

General

As with any type of surgery, a comprehensive history and physical exam remains the first and most essential step in the assessment of the ophthalmologic patient. Additionally, the general approach to the pre-operative evaluation of cardiac risk, pulmonary risk and functional status, as well as the contextual applicability to the ophthalmologic patient, is worth reviewing here.

Cardiac Risk Evaluation

Several risk models exist to estimate perioperative cardiovascular risk, the most well-known of which are the Revised Cardiac Risk Index (RCRI) and the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) risk model calculator [5,6].

The RCRI is a popular model and has been shown to be moderately good at distinguishing low versus high cardiac risk, with the exception of patients undergoing vascular non-cardiac surgery [7]. Additionally, the RCRI is available online and is easy to utilize. However, critics argue the RCRI over-estimates the risk of cardiac complications for low-risk procedures, defined as an incidence of Major Adverse Cardiac Events (MACE) less than 1 percent, and it has been advised that the RCRI should not be used for such procedures [8]. As most ophthalmologic procedures are ambulatory and considered low risk, the utility of the RCRI in such patients is questionable.

The ACS NSQIP provides MACE risk estimates on a surgery-specific basis and also provides risk estimation on several other outcomes, such as post-operative pneumonia. While less easy to use than the RCRI, the ACS NSQIP has the benefit of undergoing constant recalibration to improve its predictive ability, and it performs well at predicting all-cause mortality, morbidity and pneumonia. It must also be noted that the ACS NSQIP currently has poor predictive ability

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with regards to surgical site infection, urinary tract infection and venous thromboembolism. The most notable downside to utilizing the ACS NSQIP for the ophthalmologic patient is that endoscopic and ophthalmologic procedures are specifically excluded from the database, making the direct application of this risk score to the ophthalmologic patient challenging [9].

Though the absence of a validated scoring system to predict cardiac outcomes in ophthalmologic surgeries may seem to hinder an effective evaluation, these procedures are well-tolerated overall, and associated with a MACE risk less than 1 percent [10]. However, the low-risk nature of these procedures does not preclude the need for a clinical evaluation to identify high-risk candidates, particularly those with a myocardial infarction within 60 days, symptoms to suggest acute coronary syndrome (to include unstable angina), decompensated heart failure, uncontrolled arrhythmias or hemodynamically significant valvular heart disease, as these patients are at much higher risk for MACE, and elective procedures should be deferred until adequate control has been obtained [11]. A referral to a cardiologist may be necessary to assist with this. As stated elsewhere by Adler, "the fact that the majority of eye surgery is elective is not justification for bringing the patient to surgery in less than optimal condition" [12].

Pulmonary Risk Evaluation

Several procedure-related and patient-related factors are thought to have a detrimental impact on the incidence of post-operative pulmonary complications (PCCs). Procedure-related risk factors include surgical site, duration of surgery, type of anesthesia used and the use of neuromuscular blockade [13].

Abdominal surgical sites, particularly those near the diaphragm are associated with the highest incidence of PPC risk, with an inverse relationship between distance from the abdomen and the risk of PPCs [14]. As such, ophthalmologic surgeries would not be considered a high PPC risk on the basis of their location alone. Additionally, duration of surgery is typically beyond the control of the internist.

Data evaluating the effect of neuraxial versus general anesthesia on the risk of PPCs have been conflicting, though it is more frequently believed that serious PPCs are reduced when using neuraxial/regional approach [15]. With regard to ophthalmologic surgery, most procedures are done under regional anesthesia, and the PPC risk is generally considered to be low. One old, prospective study evaluated outcomes in general versus regional anesthesia in patients undergoing cataract surgery and found an increased incidence of intra- and post-operative hypoxia in the general anesthesia group (19% versus 0%), though only one of these instances lasted for greater than 1 minute. There were no differences in morbidity or mortality [16]. When endotracheal intubation is required with the assistance of neuromuscular blockade, data supports the use of shorter acting agents (e.g., atracurium and vecuronium) as compared to longer-lasting agents (e.g., pancuronium) [17].

Perhaps more relevant to the internist, are the patient-related risk factors that affect the risk of PPCs. Most notably, these include age, Chronic Obstructive Pulmonary Disease (COPD), pulmonary hypertension, heart failure, tobacco use, Obstructive Sleep Apnea (OSA) and the presence of a viral URI [15].

It must be noted that though these conditions have been identified as increasing the risk for PPC, there is generally no absolute level beyond which these risks are considered a contraindication prior to proceeding with ophthalmologic surgery. As noted previously, the majority of patients undergoing ophthalmologic surgery are of an advanced age, particularly those receiving cataract surgery. Correspondingly, there does not appear to be a stage of either COPD, heart failure or pulmonary hypertension that precludes a patient from undergoing surgical intervention, though it remains generally accepted that patient's should be at their baseline status with optimal control before proceeding with elective surgery [15]. Along these lines, the presence of an upper respiratory infection has also been associated with a small increase in the risk of PPCs, and deferring elective procedures until this is resolved is a reasonable consideration. As such, the evaluation of the internist is crucial in identifying and controlling these conditions.

Smoking cessation remains a good target to reduce the risk of PPCs, and also may also reduce the need for ophthalmologic surgical intervention. Data suggests the risk of PPCs is most optimally reduced if patients are able to quit smoking at least four weeks before surgery [18]. The previous belief that smoking cessation close to the time of surgery raised the risk of complications has not been supported in subsequent studies.

OSA is increasing in incidence, particularly as the incidence of obesity rises in the overall population, and should also be included in the preoperative evaluation. A validated screening tool, the STOP-Bang score is widely available and easy to perform [19]. Patients with a high STOP-Bang score should receive more formal testing for OSA, with subsequent treatment as appropriate.

As with cardiac evaluation, several scoring systems exists that attempt to predict the risk of PPCs, most prominently, the ARISCAT risk index, Gupta Calculator for postoperative respiratory failure, Gupta Calculator for Posoperative pneumonia and Arozullah Respiratory Failure Index [20-23]. The ARISCAT risk index is relatively easy to use, but notably has been found in studies to underestimate risk for low and intermediate risk groups [24]. Additionally, different results have been obtained on a geographic basis. As such, it should be used with caution until further data is obtained. The Gupta calculators and Arozullah index are based on the ACP NSQIP population which, mentioned previously, excluded patients undergoing ophthalmologic surgery. An overview of the typical pre-operative evaluation is outlined in Figure 1.

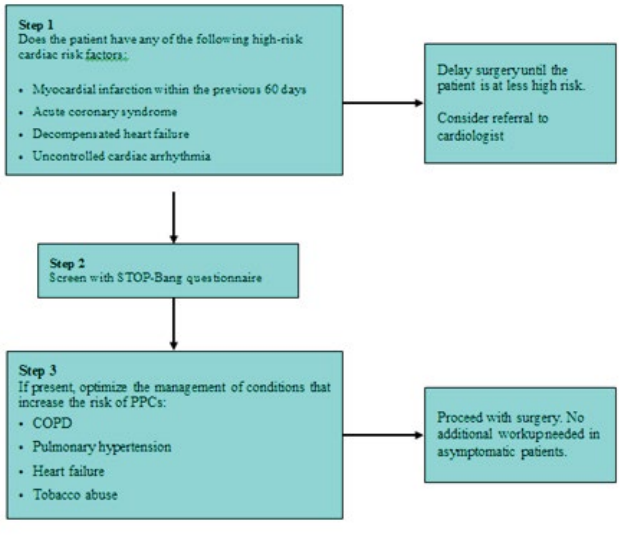

Figure 1: Preoperative evaluation for non-urgent ophthalmologic surgical procedure.

Anticoagulation Management

An area of continued uncertainty is the perioperative management of antiplatelet and anticoagulation medications in the ophthalmologic patient. These medications are primarily used in the setting of atrial fibrillation, mechanical heart valves, treatment or prevention of venous thromboembolism and atherosclerotic vascular conditions such as coronary artery disease and cerebrovascular accident (CVA). Studies have shown heterogeneity with regard to the decision to hold or continue these medications in the perioperative setting [25].

Patients at the highest risk for adverse complications of an interruption in anticoagulation therapy include those with a mechanical mitral valve, atrial fibrillation with high risk of stroke (prior stroke or markedly elevated CHA2DS2-Vasc score), venous thromboembolism within three months of therapy, coronary bare metal stent placement within one month or drug-eluting stent placement within 6-12 months [26,27]. On the other hand, while ophthalmologic surgeries are typically associated with low rates of bleeding, compression of bleeding sites is not possible due to the risk of ocular ischemia, and retrobulbar hemorrhage may be vision-threatening, an even worse outcome in patients with only one eye who require ophthalmologic surgery. Options to consider include continuing medication, de-escalating therapy, and stopping anticoagulation with or without a bridging agent or deferring surgery until medications can be safely de-escalated or discontinued.

Once again, the greatest source of data is in patients with cataract surgery on aspirin, clopidogrel or warfarin. Despite the high frequency of these procedures being performed in the United Stated, randomized prospective trials are lacking. Several retrospective studies have been performed which seem to suggest no significant outcomes of VTA or ischemic events in people whose medications were held, nor significantly increased bleeding episodes in patients whose therapy was continued [28,29]. While it is reasonable to suspect similar outcomes may be seen in patients taking direct oral thrombin inhibitors, further studies would be helpful in confirming this.

While much of the data on pre-operative evaluation and testing for the ophthalmologic patient can be based on studies of patients specifically undergoing cataract surgery, the same principle is unable to be applied with regard to the management of anticoagulation, as bleeding rates of cataract surgery are not the same as other ophthalmologic procedures such as oculoplastic surgery. It has been advised that the internist and ophthalmologist work together to appropriately assess the patient's risk of perioperative bleeding and vision loss if antiplatelet/anticoagulation therapy is continued and weigh the risks and benefits against holding therapy [26].

Ophthalmologic procedures that are generally considered to h a low risk of bleeding include intravitreal injections, cataract surg corneal surgery and simple strabismus surgery [30]. These proced may generally be performed without interruption of antiplatelet ther (to include dual antiplatelet therapy), and can often also be perfor without interruption of anticoagulation therapy.

Procedures with a moderate risk of bleeding include vitreoretinal surgery and pre-septal eyelid surgery. Recommendations for continuing or holding antiplatelet and anticoagulation therapy should be tailored on a case-by-case basis.

Procedures considered high risk include lacrimal surgery, orbital surgery and post-septal eyelid surgery [30]. These surgeries carry a significantly higher risk of vision-threatening retrobulbar hemorrhage. The decision to hold or continue antiplatelet therapy should be tailored to each case, and anticoagulation therapy should generally be held. Of note, while enucleation is associated with a high risk of bleeding and would ideally be performed in the absence of antiplatelet/anticoagulation therapy, the nature of this surgery typically allows for cauterization and compression of bleeding sites if therapy is unable to be discontinued.

Summary

The lack of direct applicability of commonly used scoring systems in the preoperative determination of cardiac and pulmonary risk underlies the need for a careful evaluation by the internist. Generally, a history and physical should be performed on patients, with care to identify high-risk cardiac risk factors. Patients with COPD, pulmonary hypertension or heart failure should have their care optimized, and tobacco cessation should be encouraged as applicable. Patients with evidence of a viral URI should consider delaying surgery if symptoms are not expected to resolve before their planned procedure. Patients should also be screened with a STOP-Bang questionnaire with additional workup and treatment as necessary.

No additional routine testing is needed in asymptomatic patient undergoing ophthalmologic surgery, and additional pre-operative lab and imaging testing in patients who would not otherwise receive it is superfluous. Studies have shown that the majority of clinicians do order pre-operative testing despite feeling that such testing is unnecessary themselves, believing other clinicians desire such workup [31]. Studies also show that routine testing does not affect outcomes in ophthalmologic surgery [32]. Given the frequency of eye surgery in the United States, the elimination unnecessary testing could have a significant reduction in unnecessary cost.

Conclusion

Fortunately, studies show that the risk of overall mortality in patients undergoing eye surgery is low, even amongst the sickest patients [33]. However, this fact should not negate the need for careful evaluation, given that outcomes are improved when pertinent risk factors are identified and addressed prior to receiving ophthalmologic surgery. Delays in necessary surgical treatment should be avoided as vision loss can severely impact a patient's quality of life. Given the large volume of these surgeries performed even year, even a small percentage of complications can represent a significant medical and economic burden. The internist plays a crucial role in conjunction with the ophthalmologist in ensuring patient's undergoing ophthalmologic surgery are medically optimized to do so, and that unnecessary preoperative testing is limited.

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