



Abstract

Background: Tonsillectomy, with its unique risk of primary and secondary hemorrhage, is rarely performed in patients on long-term warfarin anticoagulation. The objectives of this study are to review the literature regarding management of perioperative anticoagulation therapy and to present an outpatient strategy of perioperative anticoagulation bridging for tonsillectomy using low molecular weight heparin (LMWH).

Methods: A literature search regarding guidelines for perioperative anticoagulation was performed. A case report is presented of a 29-year-old male on chronic warfarin for a mechanical mitral valve who underwent tonsillectomy. The patient has a history of mitral valve replacement due to endocarditis after an episode of Streptococcal tonsillitis. The patient's perioperative anticoagulation plan utilized LMWH therapy. He stopped warfarin and began LMWH five days prior to surgery, holding this 24 hours prior to surgery. He resumed LMWH postoperative day 3 and warfarin postoperative day 7, continuing both until reaching herapeutic INR

Results: Tonsillectomy in an anticoagulated patient has previously been described once, and there are no guidelines for perioperative anticoagulation for this procedure. This patient managed his anticoagulation from home and successfully underwent surgery. He did not experience adverse events, did not require an extended inpatient stay, and is doing well 3 months postoperatively

Conclusion: Tonsillectomy can be performed successfully in an anticoagulated patient with outpatient LMWH bridging. A strategy for perioperative anticoagulation that accounts for the risk of secondary bleeding after tonsillectomy should be utilized. A larger cohort of patients would help elucidate the risk of adverse events with tonsillectomy in this patient population

Introduction

Patients who have undergone cardiac valve replacement surgery using mechanical heart valves (MHV) are committed to lifelong anticoagulation therapy. According to guidelines published by the American College of Chest Physicians (ACCP), there is level 1A evidence to support chronic anticoagulation using vitamin K antagonists (VKA) such as warfarin to prevent life-threatening thromboembolic events^[1] with a target INR of either 2.0 to 3.0 or 2.5 to 3.5, depending on the type of valve implanted. In the absence of clinical concern for post-operative bleeding, adjunctive early post-operative heparinbased anticoagulation has been recommended following valve implantation until INR becomes therapeutic. VKA therapy is not without risk, hemorrhage in particular. A study by McMahan, et al, showed patients had a 7% risk of major hemorrhage during the first year of outpatient VKA therapy.^[2]

Due to the high risk of thromboembolic events in MHV patients, perioperative anticoagulation for non-cardiac surgery is necessary, but the strategies are evolving. Due to the long and widely variable pharmacokinetics of VKA's, bridging techniques were developed to allow temporary administration of heparin, which can be stopped and started within hours of the surgery. Standard recommendations called for inpatient unfractionated heparin (UFH) therapy while VKA effect resolves, cessation of therapy four to six hours prior to operation, and reinitiation of heparin expeditiously when clinical concern for hemorrhage is minimized and until VKA levels are therapeutic.^[3] This can result in extended hospital stays for surgeries that would ordinarily be performed on an outpatient basis. Over the past decade, movement has been made toward usage of low molecular weight heparin (LMWH) perioperative therapy, which can be safely managed in an outpatient setting.^[4, 5]

Tonsillectomy, has a reported post-procedural hemorrhage rate between 0.1-8.1%. The occurrence rate has a unique biphasic distribution; primary hemorrhage, occurring within 24 hours

of the procedure, or secondary hemorrhage, occurring 7-10 days later as the tonsillar fossae eschar is displaced. Bleeding mortality is rare, around 0.002% of patients, and usually occurs within the first 24 hour.^[6] Secondary postoperative hemorrhage, though very rarely fatal, can significantly increase morbidity as it may require additional surgical intervention, hospitalization, and is associated with prolonged recovery. Management of perioperative anticoagulation to account for the risk of secondary hemorrhage presents a dilemma in the chronically anticoagulated patient: either hold anticoagulation for 7-10 days postoperatively, increasing the risk of a lifethreatening thromboembolic event (15% mortality in MHV patients), or resume anticoagulation earlier, increasing the risk of postoperative hemorrhage and its associated morbidity. This poster presents a case report and proposes a protocol for safe outpatient bridging of anticoagulation with LMWH for tonsillectomy.

Case Report

A 29-year old man presented to the Otolaryngology clinic of an academic tertiary care center with symptoms of sleep disordered breathing, recurrent episodes of Streptococcal tonsillitis, difficulty swallowing, and muffled voice. His medical history was significant for an episode of Group B Streptococcal tonsillitis that lead to endocarditis necessitating mitral valve replacement with a MHV three years prior to presentation. He is now committed to lifelong anticoagulation with warfarin therapy (INR goal range of 2.5 to 3.5). He also complained of baseline difficulty swallowing due to the sensation that food becomes stuck in his tonsils as well as baseline muffled ("hot potato") voice. Physical exam was notable for 4+ palatine tonsils that were very bulky and obviously partially obstructed the oropharyngeal airway. The remainder of his physical exam revealed no other major contributing factors to upper airway obstruction or dysphagia. After extensive literature search and consultation with the patient's cardiologist and anticoagulation clinic staff, a protocol was adapted from the current literature accounting for the biphasic bleeding risk of tonsillectomy and the safety of outpatient LMWH therapy in patients with MHV.

The patient held his warfarin beginning six days prior to surgery, and initiated LMWH subcutaneous injections at home (80 mg twice daily). The final dose of LMWH was administered the morning prior to surgery. The patient underwent uncomplicated tonsillectomy using monopolar electrocautery. There was intraoperative estimated blood loss of thirty milliliters. He was observed overnight and discharged the following morning. LMWH therapy resumed on postoperative day three. Warfarin was resumed on postoperative day seven at the same preoperative dose. LMWH and warfarin were then continued simultaneously, with daily INR checks. LMWH was ceased on the second consecutive day of therapeutic INR. The patient did not experience any bleeding or other complications.

Outpatient Bridging of Anticoagulation for Tonsillectomy

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Discussion

A PubMed MeSH search using the terms "anticoagulant" and "tonsillectomy" produced only one pertinent report of perioperative bridging of long-term anticoagulation for tonsillectomy. In 2007, Cole, et al,^[7] reported on a 28-year-old female with antiphospholipid syndrome on chronic VKA therapy, who underwent uncomplicated tonsillectomy after preoperative outpatient LMWH bridging, followed by seven days of inpatient IV UFH therapy, and discharge on postoperative day seven taking warfarin and LMWH until INR was therapeutic. She did not experience post-operative hemorrhage. A PubMed search was also performed to collect literature from the past ten years pertinent to the development of LMWH as an acceptable outpatient bridging therapy for MHV patients undergoing noncardiac surgery. The rationale for our proposed protocol is discussed below.

LMWH vs. UFH: Anticoagulation with IV drip UFH requires inpatient admission for frequent monitoring of activated partial thromboplastin time (PTT) and titration of dosing to maintain the patient's PTT within the therapeutic window of 1.5 to 2.5 times control. For patients without renal dysfunction, LMWH at a standard dose of 1-1.5 mg/kg given every 12 hours has been shown to reliably maintain a patient's anticoagulation within the therapeutic window, as measured by anti-Xa activity. Thus, LMWH can be safely used on an outpatient basis without frequent lab draws. Montelescot in 2000 reported that LMWH kept patients following MHV replacement surgery more reliably therapeutic than UFH (87% vs. 8% on day two of therapy), with a similar or better rate of complication.^[4] The multicenter REGIMEN registry compared adverse outcomes between MHV patients undergoing surgeries bridged with either LMWH or UFH. and showed no statistical difference in adverse outcomes. but large difference in length of hospital stay (1.3+/-0.28 and 9.9+/- 0.8 days respectively) and percentage of patients with hospital stay less than 24 hours (69% and 7% respectively). ^[8] Others have reported similar results.^[4, 9-13] Other adverse events, such as bleeding, osteoporosis, and heparin-induced thrombocytopenia (HIT), are reported to be less common with LMWH [14] than with UFH. The ACCP recommends LMWH perioperative bridging over UFH when possible, despite the shorter action of UFH.^[16]

Preoperative Management: The pharmacokinetics of VKA therapy can be widely variable between different patients, but studies have shown that holding VKA for five days should allow decrease in INR to a level safe for surgery for the vast majority of patients.^[15] The ACCP has recommended this time period in its guidelines. Traditional heparin bridging requires several days of preoperative inpatient UFH therapy. By using home bridging with LMWH at the standard dose, the expense, risk, and inconvenience of preoperative hospitalization is no longer an influence, which is one reason the ACCP recommends this route when possible. There is level 1C evidence to recommend giving the final dose at half the normal strength 24 hours prior to the surgery.^[16]

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Postoperative Management: The evidence and guidelines for when to resume anticoagulation postoperatively are not universal, as the ACCP recommends considering the anticipated bleeding risk on a per patient and procedure basis rather than recommending a set postoperative day to resume. ^[16] Tonsillectomy, while a common procedure that is considered to have low risk of major complication, does have a prolonged postoperative window during which bleeding can occur. While the risk of a mortal hemorrhage is exceedingly low, incidence of postoperative hemorrhage, especially secondary hemorrhage, is relatively high. Tonsillectomy could thus be considered a moderate to high-bleeding risk surgery. In high-risk for bleeding surgeries, the ACCP recommendations report level 1C evidence that favors waiting 48-72 hours after surgery to initiate LMWH. Even with this wait, however, anticoagulant therapy is still resumed within the secondary bleeding risk period for tonsillectomy.

Mitral MHV replacement places our patient in the highrisk category for thromboembolism. Waiting to resume anticoagulation therapy until after the bleeding risk from surgery has past would mean holding all anticoagulant therapy for up to 10 days after surgery. This would put the patient at unacceptably higher risk for a fatal thromboembolic event. This risk was felt to outweigh the risk of postoperative bleeding in our tonsillectomy patient. Therefore, we resumed LMWH anticoagulation on postoperative day three. After resuming VKA therapy, the patient's INR may be expected to become therapeutic in approximately 3 days. We felt that resuming VKA on day seven allowed the bleeding window to pass while subtherapeutic. ACCP guidelines say LMWH be safely suspended after two consecutive days of therapeutic INR measurements.^[16]

Hospitalization: LMWH bridging protocols generally suggest that a patient can be discharged on home therapy after the bleeding risk is minimized and therapy has been established, often within 24 hours of surgery for many procedures. The risk of bleeding in tonsillectomy is high within 24 hours, declines to a minimal risk, and then increases significantly again at 7-10 days, with the majority of postoperative hemorrhages occurring during this secondary bleeding risk time frame. One could argue the most conservative plan would be to extend the hospitalization until after this risk has passed, ten days postoperatively. In the one previous case report cited earlier,^[16] the patient was hospitalized on IV UFH until postoperative day seven, when VKA therapy was resumed and UFH was switched to LMWH. However, studies have not shown worsening of bleeding outcomes with LMWH over UFH in other procedures, and UFH drips can be associated with wide variation in PTT and difficulty in maintaining therapeutic dosing. Despite its shorter action and easier reversibility, we opted to use LMWH on an outpatient basis, determining that hospitalization with IV UFH postoperatively would add great expense and inconvenience for our patient without improving his safety. Our protocol hospitalizes the patient through the primary bleeding risk phase and discharges on post-operative day one with LMWH starting



48-72 hours post-operatively, accepting the risk of secondary hemorrhage while the patient is home given the low rate of mortality from secondary bleeding, while trying to avoid the high risk of thromboembolic event in a MHV patient.

Conclusions

This report documents the successful application of a perioperative anticoagulation protocol in one patient who is high-risk for life-threatening thromboembolic event when not anticoagulated. The protocol described above provides a hybrid of the accepted guidelines for perioperative bridging of anticoagulation for surgery in MHV patients with intuitive adaptations for tonsillectomy and avoids lengthy hospitalization. Little evidence is available for this special scenario. While a larger cohort of patients would be useful to test the safety of this protocol (or others), the paucity of reported evidence suggests this procedure is often avoided when possible in anticoagulated patients. When necessary, however, successful outpatient bridging for tonsillectomy may be undertaken.

Protocol

- Hold warfarin 6 days prior to surgery
- Begin LMWH 5 days prior to surgery
- Hold LMWH 24 hrs prior to surgery
- Tonsillectomy
- Discharge 24 hrs after surgery
- Begin LMWH 48-72 hrs after surgery
- Begin warfarin 7 days after surgery
- End LMWH 2nd day of goal INR

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