

Stone Management for the Patient on Anticoagulation

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Abstract Use of chronic anticoagulation has increased recently, leading to more surgical intervention on patients taking chronic anticoagulation. This review discusses anticoagulation and the management of urolithiasis.

Keywords Nephrolithiasis · Ureterscopy · Nephrostolithotomy · Anticoagulation · Clopidogrel · Shock wave lithotripsy · SWL

Introduction

Recently, the use of anticoagulation has increased among the general population, which has been related to increased use of drug-eluting cardiac stents, increased survival of those with atrial fibrillation and coagulation disorders, and more successful valve replacements [1, 2]. Subsequently, more surgery on patients taking anticoagulation has been performed. Evidence exists to show that cessation of anticoagulation increases a patients' risk of cardiac events, particularly after cardiac stenting. The risk of death from a cardiac event following cessation of clopidogrel prior to 1 year after placement of drug-eluting stent is as high as 7% [3]. Given these risks, the American College of Cardiology (ACC) with the American Heart Association (AHA) published guidelines for cardiac stenting and the use of antiplatelet therapy. The 2007 updated guidelines recommend aspirin and clopidogrel for a minimum of 1 month after bare metal stents. For patients receiving drug-eluting stents, the guidelines recommend at least 12 months of

clopidogrel and between 3 and 6 months of aspirin depending on the type of stent used [4]. This has prompted surgeons to consider surgical intervention while the patient remains on chronic anticoagulation [5]. For those patients with cardiac risk factors, low-dose aspirin has been proven beneficial in the perioperative period without increased risk of bleeding [6, 7].

This review is designed to update readers on surgical management of urolithiasis in those patients with chronic anticoagulation by considering the recent literature.

Percutaneous Nephrolithotomy

There are limited studies evaluating percutaneous surgery with the use of anticoagulation. Bleeding remains a major concern for percutaneous nephrolithotomy (PCNL) with transfusion rates between 7% and 27% [8–10]. It remains contraindicated in those patients with uncorrected bleeding disorders [11]. All current studies require patients to stop anticoagulation before the procedure. Kefer et al. [12•] demonstrates a systematic approach to those patients on chronic anticoagulation and appropriate bridging therapies. They demonstrate that those on chronic warfarin stop 5 days before and resume 5 days after the procedure with bridging enoxaparin. For patients on clopidogrel or cilostazol, they are to stop medication 10 days before and resume 5 days after PCNL with no bridging therapy. The overall bleeding complications occurred in 7% with 1 requiring angioembolization. One patient had deep vein thrombosis (DVT) and pulmonary embolism after the procedure. Gross and Bach [13] recently reviewed the use of anticoagulation and PCNL. They concluded that PCNL could be done safely if anticoagulation was stopped preoperatively; a multidisciplinary approach was taken to involve urologist,

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anesthesiologist, and hematologist in the care; and alternative options were explored. Van Cangh et al. [14] stratified patients taking warfarin undergoing PCNL according to risk. Those who were high risk and intermediate risk were to stop warfarin 4 days before surgery and use bridging low molecular weight heparin (LMWH) at therapeutic doses starting 3 days before the surgery. The bridging LMWH is stopped 12–24 h before surgery and resumed 12–24 h following surgery along with resumption of warfarin. For high-risk patients, the LMWH postoperatively remains therapeutic (1 mg/kg twice daily) while the intermediate risk is at a prophylactic dose (40 mg daily or 30 mg twice daily) only. High-risk patients were defined as mechanical valve with atrial fibrillation, ball-cage aortic valve, DVT within the past 1 month, or hypercoagulable state with life-threatening thrombosis. Intermediate-risk patients were defined as those with mechanical valve with sinus rhythm, DVT in the past 1–3 months, or atrial fibrillation with coronary risk factors. Low-risk patients, defined as those with remote DVT, atrial fibrillation without other coronary risk factors, or a hypercoagulable state without a history of life-threatening thrombosis, were to stop warfarin 4 days before and had the option of prophylactic dose of LMWH and to resume warfarin on the day of surgery. This is similar to the study of Kefer et al. [12•] with the exception that the warfarin was started immediately after surgery and stopped only 4 days before rather than 5 days before surgery. No studies support the use of therapeutic oral anticoagulation in the perioperative period.

The ACC/AHA guidelines [15] recommend continuing antiplatelet therapy during the perioperative period only in those procedures with minimal bleeding risk such as select ophthalmic and dermatologic procedures. In surgeries with a higher risk of bleeding, which would include PCNL, temporary cessation of antiplatelet therapy is recommended. This would include low-dose aspirin, but no studies evaluate this specifically.

There are no specific studies in regards to the use of nephrostomy tubes following PCNL in patients on anticoagulation. The study by Kefer et al. [12•] used nephrostomy tubes on all patients. At this time, the recommendation would be to leave a nephrostomy tube given the risk of postoperative bleeding.

Another concern that remains is the use of anticoagulation in the setting of renal impairment. Enoxaparin routinely used in bridging therapies can accumulate in those with severe renal impairment (creatinine clearance < 30 mL/min). For prophylactic doses, no dose adjustment is needed in those with mild or moderate renal impairment (> 30 mL/min); however, for those with severe impairment, the dose should be decreased to 30 mg daily. There is less proven evidence for dosing therapeutic enoxaparin in renal insufficiency. There is evidence to support reduced dosing of 0.5–0.7 mg/kg twice

daily or 1.5 mg twice daily or the use of dalteparin or tinzaparin [16]. When surgeons are considering intervention on patients requiring bridging therapy, particularly those with renal insufficiency, consulting specialists familiar with anticoagulation would be recommended. Other groups in which dosing adjustments may be considered are obese and elderly patients.

Given that PCNL is an invasive procedure, avoiding anticoagulation would be preferred. Anecdotally, an inferior vena cava filter has been used for patients to discontinue warfarin when used for DVT prevention. However, there is no literature to support this at the current time. In addition, this does not address those on anticoagulation for other purposes. An alternative to any procedure would be to place a ureteral stent if the patient is obstructed and wait to perform definitive treatment after anticoagulation can be stopped (ie, 1 year after placement of a drug-eluting stent). However, there is no literature to make any recommendations regarding management of the stent at this time.

Ureteroscopy

Ureteroscopy remains the one stone procedure that has documented safety with anticoagulation therapy. Turna et al. [17•] reported that the use of holmium:YAG laser in the setting of ureteroscopy for kidney stones is safe. This was a population of 37 patients on anticoagulation that included clopidogrel, 81-mg or 325-mg aspirin, or warfarin. This group was compared to a control arm not on anticoagulation. It was demonstrated that the anticoagulation group had similar stone-free rates, complications, and postoperative embolic and hemorrhagic events compared to the control group. None of the procedures were terminated due to bleeding. The median stone size was 12 mm and 43% of patients had multiple stones. Access sheaths were used in nearly a quarter of the patients and one patient on anticoagulation had balloon dilatation. Overall stone-free rate for the anticoagulation group was 81.1% compared to 78.4% in the control group. A review article by Skolarikos et al. [18] confirms the use of ureteroscopy in patients on chronic anticoagulation. Erbeli et al. [19] also reviewed anticoagulation in regards to urologic surgery and demonstrated safety with ureteroscopy. All of these articles discussed only renal stone management. Further research is needed to determine risk of treating ureteral stones while on anticoagulation. However, it is reasonable to continue aspirin therapy for ureteroscopy for urolithiasis. In addition, the authors would recommend postoperative ureteral stenting following ureteroscopy given the theoretical increased risk of bleeding in the postoperative period. However, no studies have been performed to evaluate specifically the utility of postoperative stenting in this select population.

Extracorporeal Shock Wave Lithotripsy

There are significant case reports of peri-renal hematomas related to shock wave lithotripsy (SWL) and anticoagulation therapy. Many demonstrate life-threatening hemorrhage. Currently all literature supports cessation of anticoagulation before SWL therapy [20, 21]. Under ACC/AHA guidelines, antiplatelet therapy should be stopped at least 5 days before and resumed at least 24 h after surgery and after the risk of bleeding has ceased to exist [15]. However, caution must be exercised in the SWL population because there are reports of massive hemorrhage after resuming anticoagulation therapy 5 days after the procedure [20]. Currently, other modalities of stone treatment should be considered for those patients on chronic anticoagulation.

Conclusions

The rate of patients requiring anticoagulation that present with stones is likely to continue to increase. Urologists will be faced with determining the appropriate treatment for this special population of patients. Current literature supports the use of ureteroscopy for those patients when anticoagulation cannot be safely discontinued. For those patients with larger stones not amenable to ureteroscopy, a percutaneous approach is only an option if patients have bridging therapy with cessation of oral agents. SWL remains a poor option in those patients on anticoagulation. Armed with this information, careful consideration for the appropriate treatment option needs to be weighed.

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