The Effect of Continued Low Dose Aspirin Therapy in Patients Undergoing Percutaneous Nephrolithotomy

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Purpose: Aspirin is often stopped prior to percutaneous nephrolithotomy due to concern about the surgical bleeding risk. There is evidence that discontinuing aspirin perioperatively increases thromboembolic events and continuing it may be safe. We assessed the effect of continuing low dose aspirin through percutaneous nephrolithotomy and its effect on surgical and safety outcomes.

Materials and Methods: We retrospectively reviewed the records of 285 consecutive percutaneous nephrolithotomies performed between 2012 and 2015 at our institution. We compared outcomes and complications in patients who continued 81 mg aspirin daily to those in patients not receiving aspirin.

Results: A total of 67 patients (24.5%) were maintained on low dose aspirin and 207 (75.5%) were not on aspirin. The aspirin group was older (66 vs 52 years), included more tobacco users (58.2% vs 31.4%) and had a higher ASA® (American Society of Anesthesiologists®) score (2.9 vs 2.5, all $p < 0.001$). There was no difference in mean S.T.O.N.E. (size, topography [stone location], obstruction, number of stones and evaluation of HU) score (7.6 vs 7.7, $p = 0.71$) or blood loss (44 vs 54 ml, $p = 0.151$). There was no difference in residual stone fragment size, including 0 to 2 mm in 65.3% vs 61.4% of aspirin vs no aspirin cases, 3 to 4 mm in 19.4% vs 16.2% and greater than 4 mm in 15.3% vs 22.4% ($p = 0.407$). Length of stay and the change in hemoglobin, hematocrit and creatinine were similar. There was no difference in the readmission rate (14.9% vs 12.6%, $p = 0.618$) or the total complication rate (34.4% vs 26.6%, $p = 0.221$). There was also no difference in the number of major complications (10.4% vs 5.8%, $p = 0.193$), bleeding complications (3.0% vs 2.9%, $p = 0.971$) and the transfusion rate (1.5% vs 1.0%, $p = 0.57$).

Conclusions: Percutaneous nephrolithotomy appears effective and safe in patients who continue low dose aspirin perioperatively.

Key Words: kidney; nephrolithiasis; nephrostomy, percutaneous; aspirin; complications

Abbreviations and Acronyms

CMI = case mix index

CT = computerized tomography

PCNL = percutaneous nephrolithotomy

S.T.O.N.E. = size, topography (stone location), obstruction, number of stones and evaluation of HU

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PERCUTANEOUS nephrolithotomy is commonly performed to treat large. complex renal calculi and stones otherwise not amenable to other minimally invasive options. This procedure is considered the gold standard for large renal stones and it is recommended in guidelines to treat urinary lithiasis.[1–3] Although it is efficacious, this procedure is not without risk. Commonly cited procedure related risks include bleeding with a potential risk of blood transfusion, infection and less commonly

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transgression of the thoracic cavity resulting in pneumothorax, hemothorax or hydrothorax, which may require chest tube drainage.[4]

Many surgical candidates for PCNL have associated medical comorbidities, which further add to the overall procedure related risk. Cardiovascular disease, which has specifically been associated with urinary lithiasis, comprises 1 such associated medical risk.[5,6] Patients with known cardiovascular disease who are determined to be at some increased degree of risk for adverse cardiovascular events are often given antiplatelet agents to mitigate the development of such events.[7] Due to the highly vascularized nature of the renal parenchyma historically such agents have often been discontinued for percutaneous renal procedures due to concern for an increased risk of bleeding and a potential need for blood transfusion.

In fact, in a 2014 ICUD (International Consultation on Urological Diseases)/AUA (American Urological Association) review paper Culkin et al recommended that "oral anticoagulant and antiplatelet medications should be discontinued prior to PCNL."[8] However, the evidence on which this recommendation was based did not specifically track thromboembolic events and is of low quality. The investigators additionally acknowledged that at the time of writing no study had yet been done to evaluate the continuation of low dose aspirin during PCNL. This concern for increased perioperative bleeding must be balanced against the risk of cardiovascular events, which may be associated with withdrawal of antiplatelet agents, and the known medical conditions of the patient.[9,10]

Recent reports describe PCNL during continued aspirin therapy in patients who require such therapy and demonstrate that PCNL may be safely performed in this patient group.[11–14] Based on these early reports we changed our PCNL protocol in 2012 to enable patients to continue low dose aspirin therapy throughout the entire course of the treatment episode. Our tertiary care institution is a large stone treatment referral center where PCNL is frequently performed and it also has a high associated CMI.[15] As such, a relatively high proportion of our referred patients regularly receive antiplatelet agents, including low dose aspirin, for related medical comorbidities and associated risk factors.

Based on our early positive experience performing PCNL in patients continuing on aspirin we hypothesized that continuing aspirin therapy through the PCNL perioperative period likely would not adversely affect surgical or safety outcomes. The current study was designed to retrospectively assess that question. To our knowledge we report the largest cohort to date of patients undergoing PCNL while continuing low dose aspirin therapy.

MATERIALS AND METHODS

After receiving institutional review board approval we retrospectively reviewed the charts of all patients who underwent PCNL performed by a single surgeon at our institution between February 2012 and December 2015. February 2012 was the date at which we revised our preoperative protocol for PCNL to include aspirin continuation in patients who were on low dose aspirin (81 mg once daily). Aspirin treatment was done for primary or secondary prevention of cardiovascular events as directed by the primary physician. Aspirin was not held or started by our team in any patient.

The continuation of aspirin therapy was coordinated with our preoperative and perioperative anesthesia services. Compliance was verified during the medication history update, which is part of our standardized preoperative check in process. Aspirin therapy was continued on postoperative day 1 in all patients who were receiving it preoperatively. Patients on aspirin at a dose higher than 81 mg once daily, another blood thinner such as clopidogrel or warfarin, or any drug from the novel oral anticoagulant class were excluded from analysis.

The parameters collected were patient demographic information, including age, gender, body mass index, smoking history, comorbidities and ASA® (American Society of Anesthesiologists®) score, stone related parameters using the S.T.O.N.E. score,[16] operative details, including operative time, estimated blood loss, the number of tracts and the tract dilation method, and postoperative details, including residual stone size and changes in hemoglobin in gm/dl, percent hematocrit and creatinine as well as the 30-day complication and readmission rates. For patients on low dose aspirin we recorded whether the indication was for primary or secondary prevention of cardiovascular events.

Complications were recorded and classified based on the modified Clavien-Dindo system. Major complications were defined as Clavien-Dindo grade IIIa or higher. Bleeding complications were deemed to be significant according to the judgement of the primary surgeon and included the need for transfusion or angioembolization.

Our technique of traditional prone PCNL has been described previously.[17] It involves percutaneous access by an interventional radiologist at the time of the procedure, tract dilation to 30Fr with a balloon catheter or an Amplatz rigid dilation kit, stone removal by rigid and flexible nephroscopy using a ultrasonic lithotripter and holmium laser lithotripsy as necessary and the creation of multiple tracts as necessary. Ureteral stent and 16Fr to 18Fr nephrostomy tube placement is done at the conclusion of the case. Flexible nephroscopy is used liberally made to avoid applying excessive torque with the rigid scope and minimize the necessity of multiple tract creation. Antegrade ureteroscopy is routinely performed to clear the ureter.

Chest x-rays are routinely obtained in the recovery room to rule out pneumothorax, hemothorax and hydrothorax. We check complete blood counts and metabolic panels immediately postoperatively as well as on each postoperative day in the hospital. All patients undergo noncontrast CT postoperatively, most commonly on postoperative day 1. The total residual stone burden after