Evaluation of control of bleeding by electro cauterization of bleeding points of amplatz-sheath tract after percutaneous nephrolithotomy (PCNL) in Jahrom Peymanieh hospital during year 2015-2016

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Abstract

Introduction: Complications frequently related to percutaneous renal surgery include renal hemorrhage, perforation of the collecting system, urinary tract infection, and injury to adjacent organs. Renal hemorrhage is the most common and worrisome complication after PCNL. In an effort to reduce postoperative hemorrhage after completion of percutaneous renal surgery, we cauterized the bleeding points over the access tract.

Material & Methods: This cross sectional study was carried out on the 85 patients who underwent PCNL between March 2015 and March 2016 in Jahrom Peymanie hospital using census sampling method. Electro cauterization of bleeding points after operation was performed for the participants. Patient’s data was collected with a research made questionnaire including clinical and diagnosis characteristics. Data was recorded by Statistics Software (SPSS, Edition 14) using chi-square test and Student’s t-test.

Results: From 85 patients 58 patients (68.2%) were male and 27 patients (31.8%) were female. The patients age ranged from 20 to 82 years old. The stone size range was from 10 to 35mm. 15 patients had stones located in upper pole, 20 patients had stones located in pelvis and midpole of the kidney, 13 patients had stones located in the lower pole and 37 patients had multiple staghorn stone. The mean hemoglobin (Hb) concentration before operation was 14±0.5 mg/dL while it was 14±0.2 mg/dL after operation. There was no statistically significant correlation between hemoglobin level before and after operation (P>0.05).

Conclusion: Electro cauterization of bleeding points with an electrode probe after percutaneous surgery decreased morbidity. It is an effective and safe procedure and should be considered an option in percutaneous renal surgery.

Key words: bleeding, electro cauterization, percutaneous nephrolithotomy

**Introduction**

Nephrolithiasis is a common clinical disorder affecting up to 5% of the general population in the USA (1). The prevalence of renal stone disease has been rising in both sexes, being estimated that about 5% of American women and 12% of men will develop a kidney stone at some time in their life (2). Nevertheless, in certain areas of the world, as in the Middle East, the lifetime risk appears to be even higher (3). There has been heightened awareness of renal stone disease in children as well (4). Recurrence rates of 50% after 10 years and 75% after 20 years have been reported (5, 6). Clinical manifestations are characterized by lumbar pain of sudden onset (the location of pain depends on the location of stone in the urinary tract) that may be accompanied by nausea and vomiting, gross or microscopic hematuria. Diagnosis of renal stone in the acute setting is beyond the scope of the present update but in brief, is represented by urinalysis and imaging. Urinalysis often reveals hematuria but the latter is absent in approximately 9% of cases (7). Crystaluria is occasional and the presence of urocyturia may suggest associated urinary tract infection. Unenhanced helical computed tomography (CT) scan, the most sensitive and specific radiographic test (8, 9), is becoming the diagnostic procedure of choice to confirm the presence of kidney stone and especially of ureteral stones (10). However, high doses of radiation and elevated costs must be considered (11). Since renal ultrasound (US) provides information about obstruction (12) but may miss ureteral stones, the association of US with conventional abdominal X-ray may help (13). Renal colic must be differentiated from musculoskeletal pain, herpes zoster, pyelonephritis, appendicitis, diverticulitis, acute cholecystitis, gynecologic disease, ureteral stricture or obstruction due to blood clot, polycystic kidney disease. Stone formation usually results from an imbalance between factors that promote urinary crystallization, and those that inhibit crystal formation and growth (14). The main determinants of calcium oxalate (CaOx) super saturation are oxalate and calcium concentration, while the latter associated to urinary pH determines calcium phosphate super saturation. Urinary pH itself is the main determinant of uric acid super saturation (14).

**Material and Methods**

**Sampling & data collection & statistical analysis:** In a cross sectional study we reviewed the old charts of all patients in whom catherization of bleeding points of access tract was performed after percutaneous nephrolithotomy (PCNL). We prepared a questionnaire including questions about age, sex, size and location of stone, mean hemoglobin level before and after operation, hemoglobin drop after operation, stone free rate, operating time, length of postoperative hospital stay, postoperative urinary tract infection rate, and blood transfusion rate, presence of per renal hematoma or urinoma. Per renal hematoma or urinoma was detected by KUB sonography the day after PCNL. Stone free patient was defined as those who had no stone or stone smaller than 4mm one week after PCNL. All patients who underwent PCNL between March 2015 and March 2016 in Jahrom Peymanie hospital and who had Electro catherization of bleeding points after operation was performed participated in this study using census sampling method. Finally 85 patients were elected to participate in this study. Data was recorded by SPSS program using chi-square test and Student’s t-test. The most important difficulty in this study especially in data collection is that sometimes the charts of the patients were not complete and we needed to call them.

**Operation method:** All the patients underwent regional spinal anesthesia. Renal access was obtained under Fluoroscope guidance with an 18-guage needle and a 0.038 J-tip guide wire after retrograde placement of a SF or 6F ureteral occlusion balloon catheter cystoscopically. The access tract was dilated with metal coaxial dilators to allow for the passage of a 30F-working sheath. The pneumatic lithotripter was used for lithotripsy. After completion of stone extraction, a 6F double-J catheter was inserted in ante grade fashion after withdrawal of the occlusion balloon catheter. The bleeding points were catherized with an elongated electrode probe connected to the hand piece of a conventional electric catherizing device. The probe touched the bleeding points gently and catherized them for a few seconds, as one would in transurethral surgery.

The bleeding points were usually located just beneath the collecting system torn by manipulation of instruments and beneath the urothelium where the access tract entered the collecting system. Most bleeding ceased after catherization but some did not. To avoid adjacent organ or renal pedicle injury, we never catherized the bleeding point for too long or too deep, especially for those located over the renal pelvis or ureter.

**Results**

Totally 85 patients who underwent PCNL and Electro catherization of bleeding points after their operation participated in this study. From 85 patients, 56 patients (68.2%) were male and 27 patients (31.8%) were female. The patients age ranged from 20 to 82 years old. The stone size ranged from 10 to 35mm.

All the patients underwent regional (spinal or epidural) anesthesia for the operation. From 85 patients; 15 patients (17.6%) had stones located in upper pole, 20 patients (23.5%) had stones located in pelvis of the kidney, 13 patients (15.2%) had stones located in lower pole and 37 patients (43.5%) had multiple staghorn stone.

The mean hemoglobin (Hb) concentration before operation was 14±0.5 mg/dL while it was 14± 0.2 mg/dL after operation. There was no statistically significant correlation between hemoglobin level before and after operation (P>0.05).
Figure 1: Percentage of patients with renal stone in each sex

Figure 2: Stone location

Figure 3: Mean hemoglobin level before and after PCNL
### Discussion

Percutaneous renal surgery is a common urologic procedure. It has been widely used for the removal of renal and upper ureteral stones and also for the treatment of pelvi-ureteral stricture and management of tumor of the upper urinary tract. Improvements in instrumentation and technology in recent years have decreased the complication rate of percutaneous renal surgery dramatically. However, complications do occur. Renal hemorrhage after percutaneous renal surgery is one of the most common complications. Bleeding may occur during any point of the procedure. Venous bleeding is the most common type and can be controlled by clamping the nephrostomy tube. Excessive bleeding during percutaneous renal surgery may result from renal vessel injury, such as to a segmental branch. For excessive bleeding during percutaneous renal surgery, in addition to nephrostomy tube clamping, several techniques can be used to minimize bleeding. Intravenous administration of mannitol with hydration leads to forced diuresis, dilation of renal tubules, swelling of the renal capsule, and increased intra renal pressure, which may enhance the effect of tamponed. Application of the Kaye tamponade balloon catheter is an alternative to minimize postoperative hemorrhage, and the device can be placed and inflated to control bleeding in the access tract (4). Angiography and embolization is required in persistent and active bleeding, in addition to the above-mentioned conservative treatment. Despite these efforts, percutaneous renal surgery still has a greater transfusion rate than other common urologic procedures. Because of the potential risks associated with blood transfusion, including transfusion reactions and transmission of the human immunodeficiency virus, hepatitis, and other infectious diseases, it is important to develop a procedure to minimize renal hemorrhage after percutaneous renal surgery.

Serial reports about tubeless percutaneous renal surgery for selected patients have recently been published. After draining with a double-J catheter or externalized ureteral catheter on removal of the nephroscope with a Working sheath and completion of the percutaneous renal procedure, the guidewire over the nephrostomy site was still in place. The guidewire was removed, and the wound was closed if no bleeding was evident at the nephrostomy site. The advantages of tubeless percutaneous renal surgery include earlier discharge, lower analgesic requirement, faster recovery to resume normal activities, and greater cost benefits. In literature and Medline there is only one article performed by Yeong-Chin J Ou et al in Chiayi Christian Hospital, Chiayi, Taiwan (1). In their study Electro cauterization of bleeding points with an elongated electrode probe after percutaneous surgery decreased the transfusion rate without causing any increase in surgical morbidity. This procedure is safe and effective and may make more patients suitable for tubeless modification (1).

### Conclusions

Electro cauterization of bleeding points with an elongated electrode probe after percutaneous surgery decreased the transfusion rate without causing any increase in surgical morbidity. The procedure also made more patients undergoing percutaneous renal surgery suitable for a tubeless modification. It is an effective and safe procedure and should be considered an option in percutaneous renal surgery.

### References