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Original article

Conservative management of colonic injury during percutaneous nephrolithotomy

M. Elghoneimy , M. Abdel-Rassoul , H. Elfayoumy , A. Mosharafa *

Department of Urology, Cairo University, Cairo, Egypt

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Abstract
Objectives: Colonic injury is a rare but serious complication of percutaneous renal surgery. Its clinical course may be elusive and an awareness of the various presentations is of great importance. We describe how early diagnosis and a diligent conservative approach have resulted in a favorable outcome in our series.
Patients and methods: From 2005 to 2015, 2150 percutaneous nephrolithotomy (PNL) procedures were performed in our center. Patients' records were searched for the occurrence of colonic injury. Records were reviewed and we report on the preoperative data, the clinical presentation and the management approach in these cases.
Results: Three patients (0.14%) were identified with colonic injury following PNL, the three injuries were in male patients with a median age of 36.6 (range 28–45 years). Two injuries were on the left side and one on the right. Two of our patients had a low BMI. The renal puncture was in the lower posterior calyx in two and in the middle calyx in one. The diagnosis was established postoperatively in all and confirmed using antegrade or retrograde pyelography. All patients were managed conservatively with a favorable outcome.
Conclusion: An approach combining a high degree of suspicion for early diagnosis and a diligent conservative management results in a favorable outcome in patients with colonic injury during PNL.

Introduction

Percutaneous nephrolithotomy is an established procedure for the management of renal stones [1]. Inadvertent colonic injury during the procedure is a rare, but grave complication with quite serious possible consequences varying from nephro-colonic or colo-cutaneous fistula to abscess formation and up to peritonitis, sepsis and death [2]. Many studies have attributed such injuries either to the presence of a retro-renal colon, renal anomalies (such as horseshoe

* Corresponding author.
E-mail addresses: mghon@hotmail.com (M. Elghoneimy), mdabdou@gmail.com (M. Abdel-Rassoul), hany.elfayoumy@kasralainy.edu.eg (H. Elfayoumy), ashraf.mosharafa@kasralainy.edu.eg (A. Mosharafa).

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kidneys), chronic colonic distension in patients with prior intestinal bypass surgery, prior renal surgery or sometimes lateral origin of percutaneous renal punctures [3]. We reviewed our series of PNL in our tertiary care center and we report on the occurrence of colonic injury, possible risk factors and management.

Patients and methods

From 2005 to 2015, a total of 2150 percutaneous nephrolithotomy procedures were performed. All procedures were performed by the authors, who had an experience of not less than 5 years in endourology at start of study. The procedure was performed under general anesthesia in the prone position with chest support, but with no bolsters under the upper abdomen, as we believe that this might push the colon into a more retroperitoneal position, especially in thin patients. A ureteric catheter was placed in the lithotomy position to opacify the system and the percutaneous renal access was established using biplane C-arm fluoroscopic guidance, through the appropriate calyx, medial to the posterior axillary line. A guide wire was then passed into the system and the tract dilated using first fascial then co-axial telescopic dilators. We identified three cases that were complicated with colonic injuries (0.14%). These patients' records were reviewed and a detailed description of the preoperative data, the clinical presentation and the mode of management are reported.

Results

All of our patients with colonic injuries were males with a median age of 36.6 (range 28–45 yrs). Two injuries were on the left side and one on the right. Two of our patients had a low BMI. The renal puncture was in the lower posterior calyx in two and in the middle calyx in one. The diagnosis was established early postoperatively in all and confirmed using antegrade or retrograde pyelography. Table 1 details the characteristics and perioperative features of these cases.

Management following confirmation of a transcolonic access was conservative and relied mainly on ensuring adequate drainage of the pelvicalyceal system, retracting the nephrostomy tube to act as a colonic tube when possible, intravenous broad spectrum antibiotics (with possible addition of coverage against anaerobic bacteria) and close monitoring (vital signs, repeat abdominal examinations and labs) for possible retroperitoneal leak or abscess formation that may necessitate surgical intervention.

In our first case with a supracostal transcolonic tube (Fig. 1), the tube was withdrawn into the colon and the second lower calyceal tube was left to decompress the system and drain the urine. Fever and tachycardia (maximum temperature 38.4 °C; pulse 102; BP 130/85) developed later that afternoon (second postoperative day) with mild elevation of total leucocytic count (TLC 15,000/mcL). Abdominal examination revealed a lax abdomen, but with localized tenderness in the right hypochondrium. A retroperitoneal collection was suspected, an artery forceps was used to dilate the track around the transcolonic tube and a penrose drain was placed by the side of the tube to drain the retroperitoneum. An abdominal ultrasonography revealed absence of any retroperitoneal collection. Clinical improvement occurred with resolution of tachycardia and TLC elevation, but hectic fever continued for 48 h (up to 38.2 °C). A repeat nephrostogram on the fifth postoperative day revealed resolution of reno-colic fistula and fever had subsided completely. The transcolonic tube was then downsized on alternate days to 18 F and then

Figure 1 Antegrade pyelogram showing leakage of contrast filling the colon.

14 F and then removed. The colonic fistula resolved completely 48 h later. The patient was allowed to eat freely all through the postoperative period, apart from the initial 24-h after diagnosis of the fistula when the patient was unstable.

In our second patient, following confirmation of a transcolonic access on the second postoperative day, the nephrostomy tube was withdrawn into the colon and the ureteric catheter left in place to drain the pelvicayceal system. An antidiarrheal agent was given to solidify the stools in the left colon and hence minimize the leakage of fluid stools from the colon to the kidney. The patient was kept on a regular diet and encouraged to eat bulky food. On the fourth postoperative day, the urine drained by the ureteric catheter changed from the light brown color secondary to fecal soiling to a clear color and a day later, a retrograde study confirmed resolution of the reno-colic fistula with an intact pelvicayceal system. The colonic tube was then downsized on alternate days from 26 F to 20 F to16 F and then finally removed. The patient did develop two bouts of fever up to 37.9 °C, but they were never persistent and resolved spontaneously. The rest of his vital signs (pulse 84, BP 120/70) and his TLC (8700/mcL) were within normal. A sonogram confirmed the absence of any retroperitoneal collection. The colonic fistula closed spontaneously two days after removal of the last tube and the patient was discharged 12 days postoperatively.

The diagnosis in our third patient was suspected due to the development of watery diarrhea following the removal of the nephrostomy tube and was confirmed by a retrograde study revealing a tiny fistulous tract between the lower calyx and the colon. The ureteric catheter was positioned in the renal pelvis for drainage and the patient was encouraged to eat bulky diet together with an antidiarrheal agent and with slight limitation of oral fluids to thirst. Ambulation was encouraged. The abdomen remained lax and non-tender and the patient was afebrile with stable vital signs and TLC of 9800/mcL. Gradual resolution of diarrhea was noticed over the following 3 days till complete stoppage and a repeat retrograde confirmed an intact pelvicalyceal system.

Discussion

The number of reported cases in the literature regarding colonic injury during PNL is very small. Many series have tried to identify