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Case report

Duodenal perforation during percutaneous nephrolithotomy (PCNL) in a pediatric patient: A case report



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KEYWORDS

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Abstract

Introduction: Colonic perforations are known complications of percutaneous nephrolithotomy (PCNL). However, to the best of our knowledge, small bowel perforation has rarely been reported.
Observation: We report the case of a 7-year-old girl who presented with a duodenal perforation in the early postoperative period after undergoing PCNL for a calculus sized 2.5 cm in the right renal pelvis. She was successfully managed conservatively. The diagnostic workup and management are discussed.

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Introduction

Percutaneous nephrolithotomy (PCNL) is a treatment of choice for large, complex or multiple renal stones. The most common complications are minor, like for instance postoperative fever. Major complications are rare and include hematuria and pleural injury [1]. Colonic or liver injuries are extremely rare [2,3]. Only 2 cases each of duodenal injury [4,5], one of jejunal injury [6] and one of ileal injury [7] have been reported. To the best of our knowledge, this

is the first case report of a duodenal injury which occurred during PCNL in a pediatric patient from the Indian subcontinent.

Case report

A 7-year-old girl presented with bilateral flank pain. Intravenous pyelography revealed a stone sized 2.5 cm in her right renal pelvis, a stone sized 2 cm with multiple small inferior calyceal calculi in her left renal pelvis and a bladder stone sized 2.5 cm (Fig. 1). She underwent laser cystolithotomy in the first sitting followed by right-sided PCNL one week later. PCNL was performed in the prone position. A 4-Fr. ureteral catheter was placed and a retrograde pyelogram was done. Percutaneous access was obtained through the infra-costal middle-posterior calyx under fluoroscopic guidance using a

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Figure 1 (IVP) – Stone sized 2.5 cm in the right renal pelvis, stone sized 2 cm with multiple small inferior calyceal calculi in the left renal pelvis and a bladder stone sized 2.5 cm with bilateral normal contrast excretion.

multidirectional C arm. The tract was dilated up to 20 Fr. using Alken's coaxial dilators. Then a 24 Fr. Amplatz sheath was inserted. The stone was fragmented using the lithoclast. At the end of the procedure, stone clearance was found to be incomplete, leaving a small residual calculus. A nephrostomy tube was placed. On the second post-operative day, the output from the nephrostomy tube was bilious in color. A nephrostogram was performed and demonstrated that the tip of the nephrostomy tube had entered the second part of the duodenum (Fig. 2). So, a double-J stent (4 Fr) was inserted

into the renal pelvis in a retrograde fashion, and the nephrostomy tube was relocated into the renal pelvis under fluoroscopic guidance. Postoperatively, the patient exhibited no peritoneal signs and remained afebrile. She was kept on nil per os regimen. Broad spectrum antibiotics were administered, and bowel rest was achieved by draining the gastric contents with a nasogastric tube, and by parenteral hyperalimentation. The patient was followed up with serial measurements of the abdominal girth and ultrasonography, which revealed no retroperitoneal collection. A repeat nephrostogram was done one week later showed free drainage of contrast into the bladder with no contrast extravasation (Fig. 3). The patient was allowed



Figure 2 Nephrostogram – The tip of the nephrostomy tube is located beyond the midline. The nephrostogram shows that the tip of the nephrostomy tube has entered the second part of the duodenum.

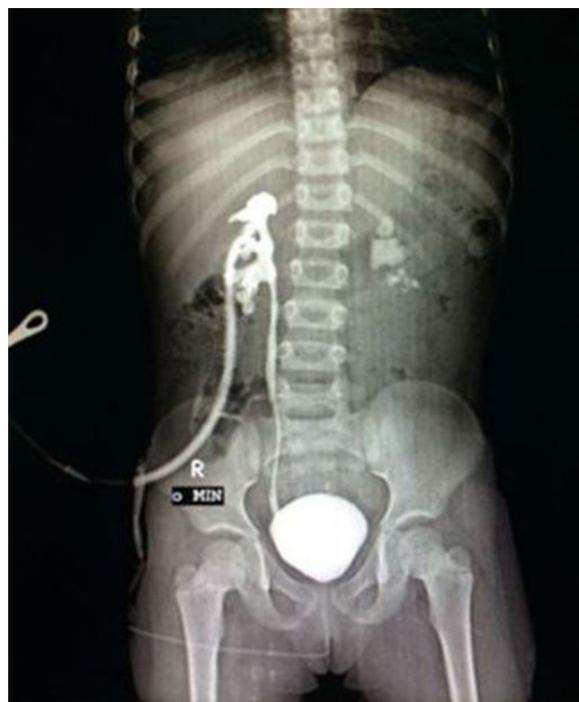


Figure 3 Nephrostogram – Free flow of contrast from the renal pelvis into the bladder with no extravasation.

to start oral food intake which she tolerated well. Eventually, her diet was switched to a low-residue diet. The nephrostomy tube was removed and the patient was discharged in good health with a double-J stent in situ on post-operative day 10. According to the modified Clavien-Dindo grading system, the grade of injury of our patient was IIIa [1].

Discussion

Bowel injury may occur as a complication of PCNL due to anatomic variations. The reported incidence of colon injury in the prone position is less than 1% [8]. There is a higher risk of colonic injury in a retrorenal colon found in 3–19% of the general population. The management of colonic injury depends on its severity. The patient can be managed conservatively by inserting a double-J stent and pulling back the nephrostomy tube into the colon, provided the penetration is retroperitoneal and the patient does not have peritonitis or sepsis. Surgical repair is indicated when there is an intraperitoneal perforation with signs of peritonitis.

Being intraperitoneal, the small bowel is located at a certain distance from the kidney. Therefore, the risk of small bowel injury during PCNL is very low. However, second and third portions of the duodenum lie in the retroperitoneal space and are positioned antero-medially to the right kidney, so an injury during PCNL is possible. This usually occurs when the renal pelvis is perforated during dilation of the tract, during placement of an Amplatz sheath, during stone removal or if a needle or an instrument is advanced too deeply. In 1985, Culkin et al. [4] reported one case of a nephro-duodenal fistula complicating PCNL; in this case, the fistula was managed conservatively.

Injury should be suspected when intestinal mucosa or contents are visualized or when a communication with the small bowel is demonstrated on a nephrostogram. Urgent surgical intervention is required when the patient is unstable or when there is a large perforation. However, when the injury is small and there are no signs of peritonitis or sepsis, non-operative management may be attempted. In our case, the second part of the duodenum was injured, probably due to an over advancement of Alken's coaxial dilators or the Amplatz sheath. The injury was diagnosed early when performing an antegrade contrast study through a nephrostomy tube. A repeat nephrostogram was done one week later to check whether there was contrast extravasation into the bowel. When there is no contrast extravasation, the patient can be allowed to start oral food intake observing a low-residue diet, and the nephrostomy tube can be removed [9]. An immediate surgical exploration is necessary when the patient shows signs of peritonitis or increasing retroperitoneal collection/abdominal girth charting.

There are various techniques to prevent bowel injury during PCNL, including ultrasound-guided puncture [10], observation of the intestinal gas shadow posterior to the kidney, careful fluoroscopic monitoring during access, tract dilation, working sheath placement and proper endoscopic manipulations.

Conclusion

Injury of the duodenum during PCNL is an extremely rare complication. Conservative management with serial monitoring is a

safe and feasible approach; however, this should be guided by the hemodynamic status of the patient.

Informed consent

Written informed consent was obtained from the patient's parent who participated in this case.

Ethical committee approval

This study was approved by the Institutional Ethical Committee.

Conflict of interest

No conflict of interest was declared by the authors.

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None.

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