A Rare, but Life-Threatening Complication of Percutaneous Nephrolithotomy

Massive Intra-Abdominal Extravasation of Irrigation Fluid

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INTRODUCTION

Nowadays, percutaneous nephrolithotomy (PCNL) is treatment of choice for large or multiple kidney stones and stones in the inferior calyx.(1) Percutaneous nephrolithotomy is generally safe and associates with low, but indisputable complication rate.(2) Despite rarity, intra-abdominal irrigation fluid extravasation and absorption may occur during PCNL resulting in serious outcome. We present a case of massive intra-abdominal fluid extravasation in an otherwise healthy man who underwent PCNL.

CASE REPORT

A 46-year-old man presented with symptomatic multiple left renal stones in a chronic pyelonephritic kidney and was candidate for PCNL (Figure). Pre-operative laboratory studies were normal. Left renal differential function on dimercaptosuccinic acid renal scan was 30%. He had a history of right PCNL two months earlier without any complication.

Percutaneous nephrolithotomy was performed using standard method. At the end of the procedure, the abdomen was markedly distended.

Immediate diagnostic peritoneal tap revealed clear fluid. Thereafter, a drain was placed, through which 3500 cc was evacuated. Portable chest X-ray and left pleural tap revealed no thoracic accumulation. Mild acidosis and dilutional hyponatremia occurred, which were managed accordingly.

The patient was transferred to the intensive care unit. Bloody fluid continued to flow from drains

Left kidney with numerous stones.

and blood pressure dropped steadily. Serial lab tests confirmed severe coagulopathy, but there was no evidence to support disseminated intravascular coagulation. Multiple units of blood products, packed red blood cells, and fresh frozen plasma were administered to maintain homeostasis. After 4 hours, the patient's systolic blood pressure dropped to 60 mmHg despite conservative management. The patient was taken to the operating room for open exploration.

Laparotomy revealed intact intraperitoneal viscera and no vascular injury. In retroperitoneal exploration, the kidney's thin and atrophic parenchyma had been ruptured at both poles. However, the extent of bleeding was not significant and less than 300 cc of blood was found in the field, which could not explain the patient's condition. Due to continuous oozing despite adequate suturing, nephrectomy was performed.

Fifteen hours after the surgery, the patient developed respiratory distress, hypotension, continuous bleeding via drains, and metabolic acidosis. His chest X-ray showed bilateral pleural effusion, clinically significant on the left side. A chest tube was inserted producing 700 cc of pink fluid testing negative for urine based on creatinine content. His coagulation, activated partial thromboplastin, and prothrombin times as well as the platelet count were within normal limits.

A very significantly prolonged bleeding time responded to the administration of cryoprecipitate. Having stabilized the hemodynamic state and curbed the bleeding, we began parenteral nutrition. Nonoliguric transient renal failure was managed with a few sessions of hemodialysis.

He was improving rapidly until four days later, then, the patient developed abdominal distension and vomiting. X-rays consistent with the small bowel obstruction led to abdominal exploration for early adhesion bands. The patient was ultimately discharged on the 15th postoperative day with serum creatinine of 1.6 mg/dL. The serum creatinine level decreased to 1.18 mg/dL within 3 weeks.

DISCUSSION

Extravasation is a common incident during PCNL, which can potentially lead to untoward consequences depending on the rate, volume, and nature of fluid absorbed.[3] The sterile water, used routinely for irrigation, can cause intravascular hemolysis, when absorbed in high volume.[4]

There are few reports of such a complication in percutaneous stone surgery.[5,6] Pugach and colleagues reported fluid extravasation in a 4-year-old boy who underwent PCNL. Elevated ventilation pressure was the first sign of his complication.[7] The intrathoracic collection of fluid in our patient was secondary to redistribution of the abdominal fluid as proven by negative chest radiography and negative pleural tap at the onset in the operating room.

Peterson and associates reported two cases of extravasation of irrigant fluid. One of them died a few hours after surgery due to disseminated intravascular coagulation.[8] Platelet function was seriously impaired in our patient as well, but it was not accompanied with diagnostic criteria supporting disseminated intravascular coagulation, and responded rapidly to the administration of cryoprecipitate to correct platelet dysfunction. In our patient, the kidney with thinned cortex has been ruptured easily with resulting hemorrhage.

Ghai and coworkers reported intra-abdominal extravasation

in PCNL. Their patient suffered from severe anemia, prolonged hyponatremia, hypokalemia, and abdominal pain persisted for 45 days.[9] In our patient, hyponatremia, hypokalemia, metabolic acidosis, continuous oozing, and blood loss responded well to the interventions and the transient renal failure resolved within 2 weeks.

CONCLUSION

Irrigation fluid extravasation during PCNL can be life-threatening if left untreated.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Wong MY. An update on percutaneous nephrolithotomy in the management of urinary calculi. Curr Opin Urol. 2001;11:367-72.
2. Rudnick DM, Stoller ML. Complications of percutaneous nephrostolithotomy. Can J Urol. 1999;6:872-5.
3. Hahn RG. Fluid absorption in endoscopic surgery. Br J Anaesth. 2006;96:8-20.
4. Grundy PL, Budd DW, England R. A randomized controlled trial evaluating the use of sterile water as an irrigation fluid during transurethral electrovaporization of the prostate. Br J Urol. 1997;80:894-7.
5. Rao PN. Fluid absorption during urological endoscopy. Br J Urol. 1987;60:93-9.
6. Dunnick NR, Carson CC, 3rd, Moore AV, Jr., et al. Percutaneous approach to nephrolithiasis. AJR Am J Roentgenol. 1985;144:451-5.
7. Pugach JL, Moore RG, Parra RO, Steinhardt GF. Massive hydrothorax and hydro-abdomen complicating percutaneous nephrolithotomy. J Urol. 1999;162:2110; discussion -1.
8. Peterson G, Krieger J, Glauber D. Anaesthetic experience with percutaneous lithotripsy. Anaesthesia. 1985;40:460-4.
9. Ghai B, Dureja GP, Arvind P. Massive intraabdominal extravasation of fluid: a life threatening complication following percutaneous nephrolithotomy. Int Urol Nephrol. 2003;35:315-8.