

Case report

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Severe renal bleeding caused by a ruptured renal sheath: case report of a rare complication of percutaneous nephrolithotomy

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Abstract

Background: Percutaneous nephrolithotomy is a minimally invasive intervention for renal stone disease. Complications, which are rare and usually presented as case reports, are diversified as the utilization of the procedure is expanded. The procedure causes less blood loss and less morbidity when compared to open surgical procedures. Yet, there are some reports involving severe bleeding and relevant morbidity during surgery. These are usually related with the surgical technique or experience of the surgeon.

Renal sheaths are designed to cause minimal trauma inside the kidney and, to our knowledge, there are no reports presenting the rupture of a sheath causing severe bleeding during the procedure.

Case report: We present an adult patient who had severe bleeding during percutaneous nephrolithotomy due to parenchymal injury caused by a ruptured renal sheath. During retrieval, due probably to rough handling of the equipment, a piece of stone with serrated edges ruptured the tip of the sheath, and this tip caused damage inside the kidney. The operation was terminated and measures were taken to control bleeding. The patient was transfused with a total of 1600 ml of blood, and the stones were cleared in a second look operation.

Conclusion: Although considered to be a minimally invasive procedure, some unexpected complications may arise during percutaneous nephrolithotomy. After being fragmented, stone pieces may damage surgical equipment, causing acute and severe harm to the kidney. Surgeons must manipulate the equipment with fine and careful movements in order to prevent this situation.

Background

Percutaneous nephrolithotomy (PNL) is a minimally invasive treatment modality for renal stone disease. Since its introduction for routine clinical use in 1981[1], many reports have been published concerning the nature, outcomes and complications of this procedure. With the advent of knowledge and experience, larger series became available with more benefits and less troubles. Yet, some reports about major complications encountered during or

after PNL are still being published, including bleeding of clinical significance[2,3].

Bleeding of this type may be dependent on complications like arteriovenous fistulas or pseudo aneurysm[3], stone composition and combination therapies [4], the technique applied for tract creation [5] or manipulative complications[6]. Management in a conservative manner may sometimes be difficult, and embolization or open surgery

may be the only choice [7]. To our knowledge, there is no data in the literature concerning renal bleeding caused by a renal sheath which is damaged inside the kidney.

Renal sheath that we use in PNL is Amplatz type, made of radioopaque polytetrafluoroethylene and is for single-use. None of the equipment used in this case was resterilized or reused material.

Our nephroscope is rigid (KarlStorz), having a 26 Fr metal sheath and one canal used for both irrigation and working.

Normal saline at 37°C is used for irrigation, delivered to the metal sheath by means of a Y set, one leg being closed unless there exists a need for excessive irrigation.

A 16 Fr Nelaton tube attached to an aspirator system is used for aspiration purposes. Stone fragments are grasped with grasping forceps (KarlStorz) having two and three jaws. If the stone needs to be fragmented, we use a pneumatic lithotripter with 2–10 atm of pressure applied to the probe with a frequency of 100–400 pulse/min. We routinely use 6 atm and 200 pulse/min as default setting.

Case report

A 48 year-old-male applied to the urology clinic with left flank pain in January 2002. He has a stone disease history of 15 years. On ultrasonography, he had multiple stones, the largest being 27 × 12 millimeters and moderate dilation in the left kidney with normal echogenicity and 9–13 millimeters of cortical thickness. He also had small stones in the right kidney, which were silent clinically. An intravenous urogram revealed several stones, normal filtration function at 5 minutes and marked pelvicalyceal ectasia in the left kidney. Two stones located at the lower pole of the right were also encountered. There was no abnormality in blood biochemistry, urine analysis and urine culture. In complete blood cell count, his hemoglobin and platelet counts were 16.9 g/dl and 224000/ml, respectively. Decision for therapy was to perform PNL and written consent of the patient was obtained for both the operation and publishing of the outcomes.

After placing a 6 Fr ureteral stent to the kidney under general anesthesia, the patient was positioned in prone and a puncture was made to the lower-calyx on the posterior axillary line below 11th rib by fluoroscopic guidance. Dilation to 30 Fr with Amplatz dilators was achieved, and the renal sheath was placed uneventfully. After passing an antegrade safety guidewire to the ureter, the stones were visualized by the nephroscope, two of which were grasped without need for lithotripsy.

A large stone of approximately 20 × 15 millimeters was visualised than, and pneumatic lithotripsy was applied with the default setting for 150 pulses, the stone being fragmented with no bleeding at all. Two fragments of five and seven millimeters were grasped without difficulty and an attempt was made to grasp a fragment of 12 × 7 millimeters with serrated and sharpened edges (Figure 1). The surgeon was not able to introduce that stone into the renal sheath with the angle of catching so he left it inside the kidney, draw the forceps back and manipulated the sheath for a better angle of visualization and grasping. The sheath was drawn half centimeter back and under clear vision, rotated clockwise to settle the stone to the tip. There was some resistance to the movement, which was attributed to the stone fragments around, and the rotation was forced by the surgeon till the stone was settled appropriately. At that moment, the surgeon noticed sudden massive bleeding, blurring the vision and clotting in and outside the renal sheath. The anesthesiologist was alerted, excess irrigation was delivered to the system and some aspiration was made to clear the clots, but the blood was still obscuring vision. The nephroscope was withdrawn and a clamped 24 Fr Foley catheter was introduced to the kidney inflating the balloon with 3 cc of saline for compression. The inflation volume was decided according to the visual estimation of the space at the bleeding kidney site. After five minutes, the bleeding has ceased and the surgeon decided to have a look at the collecting system, aspirated the clot inside the sheath and kidney and introduced the nephroscope. The stone fragment was still located at the tip and there was a deep rupture at the sidewall of the sheath (Figure 2). The fragment was caught by a grasping forceps, but it was buried tightly to the wall and the surgeon was again unable to grasp it. With some gentle manipulation, the fragment was pushed back into the collecting system, causing some bleeding. The Foley catheter was introduced again, settled in place for another five minutes and after cessation of the bleeding, the renal sheath was withdrawn with counterclockwise twisting motion, leaving the Foley in place. The stop-valve inflation limb of the Foley catheter was cut from its stem to remove it through the sheath, deflating the balloon. The tube was clamped for 20 minutes and there appeared no sign of bleeding afterwards.

The procedure lasted for 120 minutes, hemoglobin level dropped to 9.1 g/l and blood pressure to 80/55 mmHg at the time of bleeding and a total of 1600 ml of blood was transfused to the patient. Hemoglobin level and blood pressure at the end of the procedure were 12.4 g/l and 110/60 mmHg respectively, so no need to intensive care was encountered.

There was no major bleeding for the first two days postoperatively, so the ureteral stent was removed on day three.



Figure 1
Stone fragments grasped from left kidney. Arrow indicates the fragment that caused tearing and rupture of the sheath.

The patient was taken to a second look PNL on day six and using the same nephrostomy tract for access, all the stone burden was removed uneventfully. After proving the patency of ureter by means of an antegrade pyeloureterography, the nephrostomy tube was removed on fourth day postoperatively

Postoperative ultrasonography did not reveal any perirenal collection.

Conclusions

Although it is a minimally invasive surgical procedure, severe bleeding requiring transfusion may sometimes arise during PNL. There may be different causes for this complication, and new ones are to be added to the literature as they appear.

With forced movements, especially while in contact with the sharpened edges of a fragmented stone, renal sheaths may be ruptured. Rough or careless movements of the equipment inside the kidney may also be the cause of this situation and should always be avoided in order not to cause such problems. Stone pieces that are not suitable for grasping in one diameter should not be forced or even manipulated to twist to a more suitable angle but rather be fragmented further. Although time consuming, grasping of little fragments is safer. Lithotripters with aspiration systems may facilitate the procedure. Once torn, cutting edges of the sheath may cause damage and bleeding inside the kidney. Surgeon should be aware of this complication and should check the edges of the tube if there

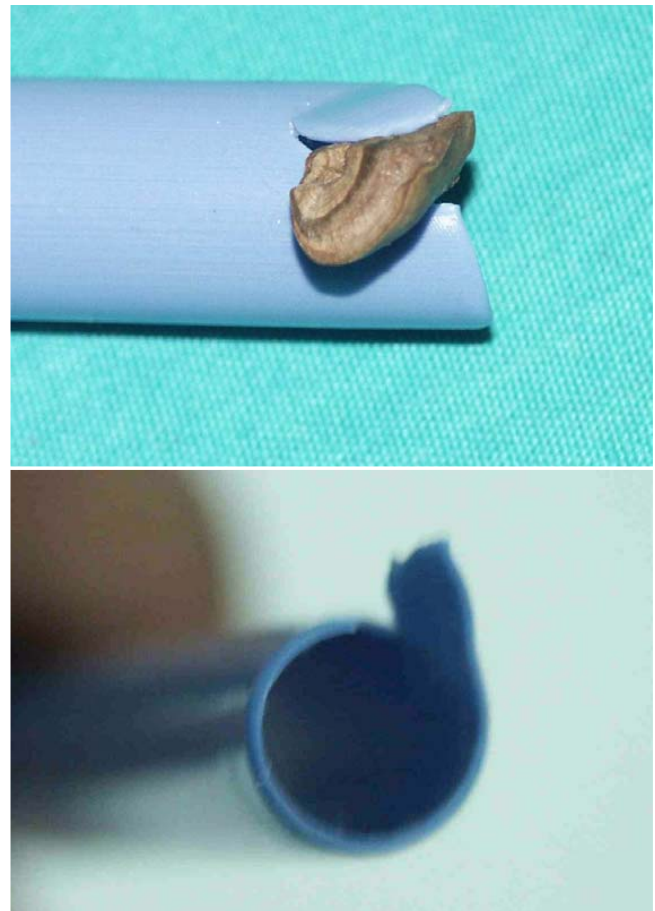


Figure 2
Animation of the appearance of the sheath and stone fragment (upper); tearing and rupture of the sheath tip (lower).

exists an unexpected bleeding, especially while manipulating the sheath around fragmented stones. It is best to handle and manipulate the equipment delicately and with great care to avoid such a problem.

Competing interests

None

Authors' contributions

Murat Ugras MD: Diagnosed the disease, performed the operation, conceived of the study and drafted the manuscript.

Ali Gunes MD: Discussed treatment options, guided in the operation.

Can Baydinc MD: Participated in manuscript design and coordination.

All authors read and approved the final manuscript.

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Written consent was obtained from the patient or their relative for publication of the patient's details.

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