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Contents

Semimonthly Volume 8 Number 22 November 26, 2020

EDITORIAL

MINIREVIEWS

ORIGINAL ARTICLE

Case Control Study

Retrospective Study

Clinical Trials Study

World Journal of Clinical Cases

Semimonthly Volume 8 Number 22 November 26, 2020

Contents

World Journal of Clinical Cases

Semimonthly Volume 8 Number 22 November 26, 2020

Contents

World Journal of Clinical Cases

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Contents

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CASE REPORT

Bleeding of two lumbar arteries caused by one puncture following percutaneous nephrolithotomy: A case report

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Author contributions: Liu Q and Yang D were the patient's bedside clinicians, analyzed and interpreted the imaging findings, reviewed the literature and contributed to manuscript drafting; Yang C performed the angiographic image acquisition and interpretation and contributed to manuscript drafting; Liu Q and Lin K performed the renal angiography and embolization; All authors issued final approval for the version to be submitted.

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Abstract

BACKGROUND

Lumbar artery bleeding is an uncommon complication of percutaneous nephrolithotomy (PCNL). This report presents a rare complication where two lumbar arteries were injured by a single puncture following PCNL. Only scarce reports of this complication have been reported.

CASE SUMMARY

A 24-year-old man presented with a 2.2 cm right renal calculus, which was managed by PCNL. During nephrostomy tube removal on the 6th postoperative day, intense bleeding was observed in the fistula and the catheter. Renal angiography was undertaken immediately; however, an initial selective renal angiogram revealed no evidence of renal vascular injury. One of these injuries involved a pseudoaneurysm from a peripheral branch in the first right lumbar artery, while the other involved an arteriovenous fistula from a peripheral branch in the second right lumbar artery. Subsequently, coil embolization was performed successfully.

CONCLUSION

This case is being reported to inform clinicians that lumbar artery damage is one of the causes of severe bleeding after PCNL and could involve damage of more than one artery.

Key Words: Percutaneous nephrolithotomy; Lumbar artery; Pseudoaneurysm; Arteriovenous fistula; Embolization; Case report

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Core Tip: Lumbar artery bleeding is an uncommon complication of percutaneous nephrolithotomy (PCNL). This report presents a case where the bleeding of two lumbar arteries was caused by one puncture following PCNL. Radiological imaging revealed pseudoaneurysm and arteriovenous fistula as the two injuries. This case is being reported to inform clinicians and interventional radiologists that lumbar artery damage is one of the causes of severe bleeding after PCNL, and could involve damage of more than one artery. Angiography and embolization should be performed patiently and carefully to avoid underdiagnosis or missed diagnosis.

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INTRODUCTION

Percutaneous nephrolithotomy (PCNL) is a common treatment option for upper urinary tract calculi. However, severe vascular complications [pseudoaneurysm, arteriovenous fistula (AVF) and arterial laceration] are reported in 0.3%-4.7% of the cases[1], and most complications generally affect the kidneys. Lumbar artery bleeding following PCNL is uncommon. This report presents a rare complication where two lumbar arteries were injured; one affected by pseudoaneurysm and the other by arteriovenous fistula. These injuries were caused by a single puncture following PCNL. To the best of the authors' knowledge, this is the first report on this complication. Institutional review board approval is not needed for case reports at the authors' institution.

CASE PRESENTATION

Chief complaints

A 24-year-old man presented with a 2.2 cm right renal calculus, which was managed by PCNL. During nephrostomy tube removal on the 6th postoperative day, intense bleeding was observed in the fistula and the catheter.

History of present illness

A 24-year-old man presented with a 2.2 cm right renal calculus, which was managed by PCNL. A 6-F ureteric catheter was introduced transurethrally under general anesthesia. A three-way Foley catheter was then inserted into the bladder. The patient was placed in a prone position, and the middle calyx was punctured under sonographic guidance. Using a guidewire, dilatation was performed with 8-F and 11-F dilators. Finally, a 20-F sheath was positioned, and a holmium laser lithotriptor with continuous irrigation was inserted into the sheath. After the completion of PCNL, a 20-F nephrostomy tube was inserted.

Slight postoperative bleeding, lasting for 5 d, was observed in the nephrostomy tube. No significant change in the hemoglobin level was observed during re-examination. During nephrostomy tube removal on the 6th postoperative day, intense bleeding was observed in the fistula and the catheter; a Vaseline gauze was packed into the fistula. Bladder irrigation was performed immediately. The patient was laid on the bed, and about five minutes later, the bleeding stopped. After about 24 h, extensive bleeding occurred through the catheter again.

History of past illness

The patient had a free previous medical history.

Personal and family history

The patient had a free personal and family medical history.

Physical examination

After bleeding, the patient's temperature was 36.6 °C, heart rate was 92 bpm, respiratory rate was 19 breaths per minute, blood pressure was 130/88 mmHg and oxygen saturation in room air was 98%. Extensive bleeding flowed through the catheter.

Laboratory examinations

Blood analysis revealed a 1.3 g/dL drop in the hemoglobin level after the first intense bleeding.

Imaging examinations

Renal angiography was undertaken immediately; however, an initial selective renal angiogram revealed no evidence of renal vascular injury (Figure 1). Thereafter, upon reviewing the aortogram and previous literature, lumbar arterial branch injury was suspected. After adjusting the catheter's position several times, a lumbar arteriogram revealed pseudoaneurysm from a peripheral branch in the first right lumbar artery located along the nephrostomy tract (Figure 2A). Embolization was then performed using a 4 mm × 14 mm coil. A subsequent angiogram confirmed the successful exclusion of the pseudoaneurysm with a preserved flow in the main trunk of the lumbar artery (Figure 2B).

To avoid any missed diagnoses, the second right lumbar arteries were examined by angiography. Surprisingly, an arteriovenous fistula was detected from a peripheral branch in the second right lumbar artery located along the nephrostomy tract (Figure 2C). Subsequently, coil embolization was performed with two 4 mm × 14 cm coils. The final angiogram demonstrated successful exclusion of the arteriovenous fistula (Figure 2D).

FINAL DIAGNOSIS

The final diagnosis of the presented case is lumbar artery hemorrhage following PCNL.

TREATMENT

Coil embolization was performed successfully for both lumbar arterial branches.

OUTCOME AND FOLLOW-UP

Post-embolization, the patient had no further episodes of bleeding and was discharged in a stable state. Two weeks after the surgery, the double J stent was removed during cystoscopy in the outpatient setting. One month after the procedure, the patient was advised to undergo a routine inspection to confirm the absence of after-effects and adverse reactions.

DISCUSSION

Severe hemorrhage following PCNL remains a rare but troublesome problem faced by urologists. Renal arteriography is a highly effective way of detecting the bleeding points with pseudoaneurysm, AVF and arterial laceration being the most common findings. Superselective renal artery embolization (SRAE) has been proven to be an effective and a life-saving procedure in more than 90% of such cases[2]. However, in rare cases, the procedure fails, requiring repetitive SRAE sessions or an open operation[3]. When the need for either arises, it is likely to present a challenge for urologists, interventional radiologists and healthcare providers.

When SRAE reveals no positive findings, we should suspect injury of the other arteries that are located along the nephrostomy tract. Bleeding of the lumbar artery

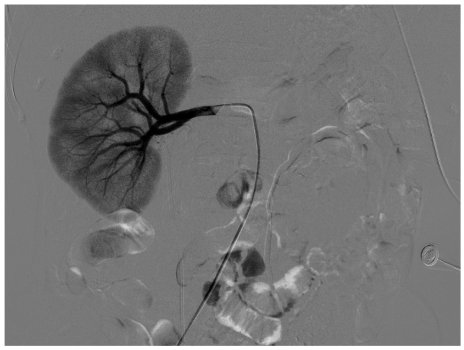

Figure 1 Selective right renal angiogram shows no obvious bleeding from the intrarenal vessel.

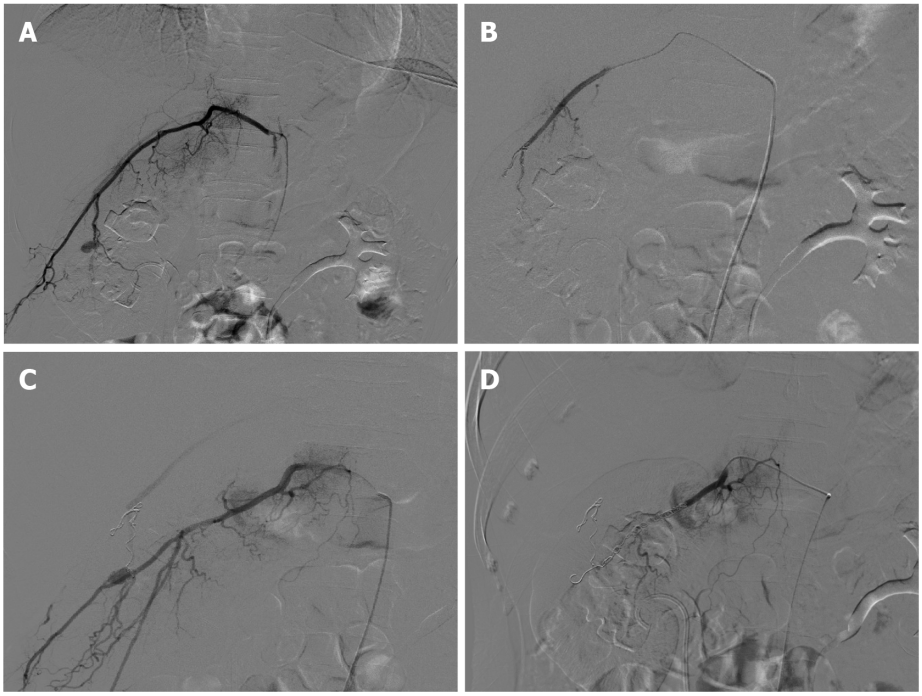

Figure 2 Lumbar arteriogram images. A: Selective first right lumbar arteriogram showing the pseudoaneurysm from a branch vessel; B: Successful post-coiling of the pseudoaneurysm; C: Selective second right lumbar arteriogram showing the arteriovenous fistula (AVF) from a branch vessel; D: Successful post-coiling of the AVF.

due to PCNL is a rare occurrence and may be missed on renal arteriography. El Tayeb *et al*[4] reported that there were no cases of lumbar artery injury among the 0.48% (16/3338) of the kidneys requiring angioembolization. Srivastava *et al*[5] retrospectively analyzed 1854 patients who underwent PCNL and reported that 27 (1.4%) of these required angiography and/or embolization for bleeding control; among these, only one had a lumbar artery injury.

We report the present case where two lumbar arteries were injured by one puncture following PCNL resulting in significant bleeding. One of these injuries involved a pseudoaneurysm from a peripheral branch in the first right lumbar artery, while the other involved an AVF from a peripheral branch in the second right lumbar artery. A review of literature did not reveal any related articles. Previous research[4] has shown that arterial pseudoaneurysm causes intermittent bleeding and is more common than AVF. Clot formation at variable intervals and intermittent ruptures when an artery is injured are characteristic of arterial pseudoaneurysm. Unlike pseudoaneurysm, AVF occurs when a paired set of artery and vein is injured, leading to the passage of blood from the injured artery to the adjacent injured vein. It presents with continuous bleeding because the vein is ruptured due to the unbearable pressure exerted by the direct entry of the arterial system into the venous system[6]. In the present case, there was no significant bleeding within the first 5 d after the surgery. Probably, the injured

arteries were oppressed by the nephrostomy tube.

CONCLUSION

The findings indicated that all arteries on the access tract can be injured. This case is being reported to inform clinicians that lumbar artery damage is one of the causes of severe bleeding after PCNL and could involve damage of more than one artery. Therefore, angiography/embolization should be performed carefully and patiently to avoid any missed diagnosis and mistreatment.

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