

CASE REPORT

Endovascular management of post PCNL vascular injuries

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Key Clinical Message

Although percutaneous nephrolithotomy (PCNL) is a gold standard treatment of large kidney stones, vascular injuries like pseudoaneurysm (PA) and arteriovenous fistula (AVF) may occur due to renal punctures. These endovascular complications need urgent intervention to be diagnosed and managed early. In this case series, 14 patients who had hematuria after PCNL were managed by using angiography to identify the vascular pathology. Among them, we identified 10 patients with PA and 4 patients with AVF, 1 patient with both subscapular hematoma and PA. Angiographic embolization was done successfully in all patients. Based on our results, in cases with peripheral parenchymal damage, PA was common and in cases with hilar damage, AVF was common. No other complication and rebleeding was detected after embolization. Based on our study, angiography can be used as a safe and effective method to detect and treat vascular injuries immediately and successfully.

KEYWORDS

angiography, arteriovenous fistula, coil embolization, PCNL, pseudoaneurysm

1 | INTRODUCTION

Percutaneous nephrolithotomy (PCNL) is a common treatment for large kidney stones.¹ However, it is reported that renal hemorrhage and vascular injury is the most complicated after PCNL with incidence rate of 11.2%–17.5%.^{2,3} Vascular injuries occur due to renal punctures that can be resolved by its own or lead to pseudoaneurysm (PA) and arteriovenous fistula (AVF) that needs to be detected and managed early.^{1,4,5}

Based on previous studies, diagnosis of vascular injuries is based on CT angiogram.⁵ On the other hand, it is shown that transcatheter arterial embolization is a safe and effective treatment that is used after detection

of vascular injury with CT angiogram.^{6,7} However, urgent diagnosis and treatment of these vascular injuries are still necessary.⁶ Therefore, in this study, patients underwent angiography without CT to both detect and treat vascular injury due to PCNL immediately at one time.

2 | CASE REPORT

In this case series, 14 patients who had post-PCNL hemorrhage referred to at our center between years 2019 and 2021 were managed by using Digital Subtraction Angiography (DSA).

The authors are employed at an academic institution where research or education is the primary function of the entity.

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Of 14 patients in our study, one patient had past medical history of hypertension and none of them had diabetes.

After local anesthesia, arteriography of the renal artery was performed for all patients via common femoral artery. At first, we injected in aortic artery by using pig-tail catheter.

Then diagnostic GR4 French catheter and microcatheter was placed via renal artery and by using guide wire and 0.035 hydrophilic catheter site of AVF or PA localized.

Then embolization agent, coil (three or more), was used. After this procedure, control angiography was performed to confirm vascular stasis.

Angiographic embolization treatment with coil was done for all of them in the same session that was successful in all patients (Figure 1).

Among all patients, we identified 10 patients with PA and four patients with AVF by using DSA technique. A combination of PA and AVF was not found in any patient (Figure 2). One of our patients had both subscapular hematoma and PA.

Based on our study, nine of the lesions were found in the right kidney and five in the left kidney.

In cases that parenchymal damage were in peripheral region, the common complication was PA and when the damage was in the hilar region, complication was AVF.

After the embolization, follow-up included clinical findings especially rebleeding were done to evaluate complications. None of the patients had rebleeding.

3 | DISCUSSION

Angiography has advantages over CT angiogram as it can detect vascular lesions and immediately treated them

once they are detected, as we used in all of our patients.¹ Therefore, in this study, based on severity and continuity of bleeding, due to lack of response to conservative treatment, we used angiography without CT to manage post PCNL vascular injuries.

In 2020, Roca et al. evaluated hemorrhagic complications after PCNL and the results of their endovascular treatment. All patients with hemorrhagic complications managed with arteriography and selective embolization. Based on their findings, 54% of their patients had PA, 14% had AVF, 7% had extravasations, and 25% had combined PA and AVF. Mean interval time between PCNL and arteriography and selective embolization was 7 days. They concluded that rapid detection and treatment of post PCNL vascular injuries with arteriography and selective embolization is an effective and minimally invasive method.¹

In another study, Anand et al. evaluate hematuria causes after PCNL and their best treatment. In their study, 8.3% of patients had AVF. They concluded that early detection and treatment of hematuria causes warranted postoperative outcome.⁵

Poyraz et al. retrospectively evaluated endovascular treatment of bleeding after PCNL. Based on their study, 19 patients underwent angiography and embolization to control bleeding. The mean time between PCNL and hemorrhage was 7.2 days. Based on angiographic findings, 14 patients had PA, five patients had AVF, and three patients had PA plus AVF.

As we mentioned earlier, it is very important to detect and immediately treat endovascular complication like PA and AVF. Therefore, using angiography gives us the opportunity to do this immediately. Also patients receive fewer contrast and less radiation if they underwent angiography

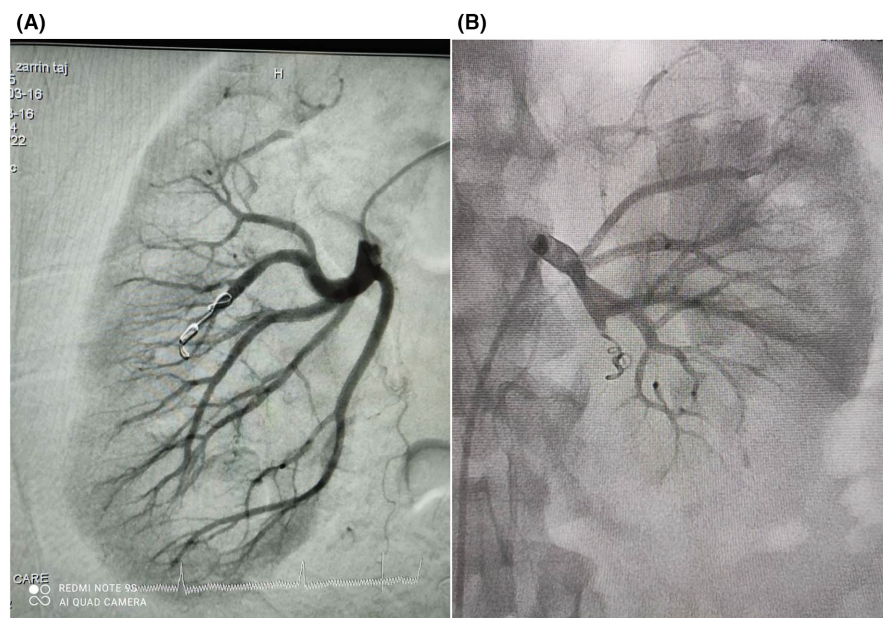
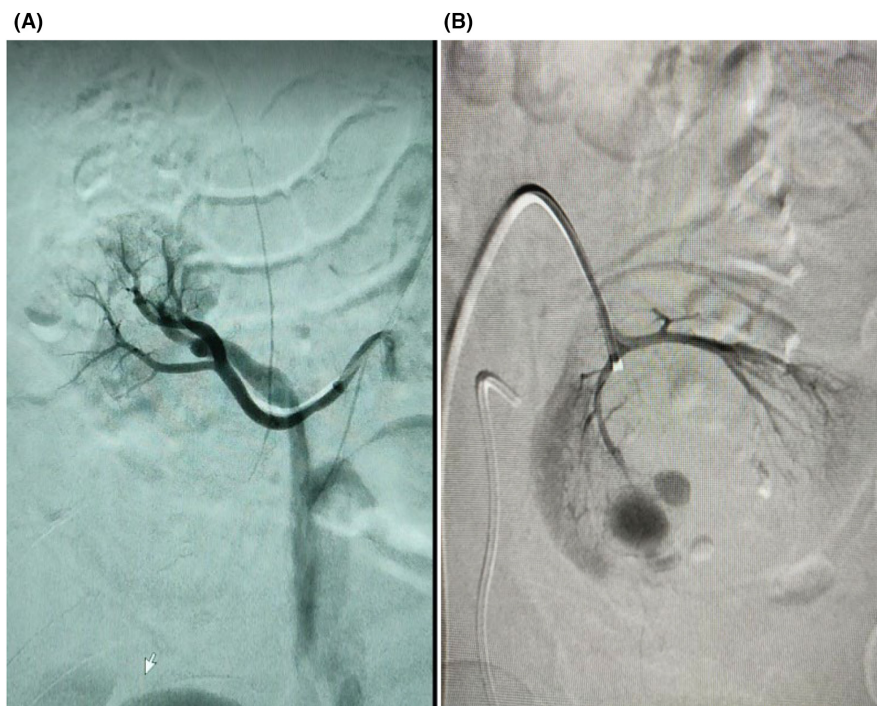


FIGURE 1 Successful angiographic embolization of arteriovenous fistula (A) and pseudoaneurysm (B).

FIGURE 2 Angiographic images of arteriovenous fistula (A) and pseudoaneurysm (B).



at first place, in contrast to use CT angiography for the detection and then angiography for the treatment.

In opposition of other studies who used coil for treatment of AV fistula and butyl cyanoacrylate for pseudoaneurysm,⁸ in current study we used coil for all of the patients and it has 100% of success and no complications were seen.

It should be mentioned that small number of cases, lack of data regarding PCNL approach such as route of access and sheath size and stone type of patients are limitations of our study.

4 | CONCLUSION

Vascular injuries like PA and AVF are frequent complications after PCNL that need to be detected and managed early. Based on our study, angiography can be used as a safe and effective method to detect and treat these vascular injuries immediately and successfully.

AUTHOR CONTRIBUTIONS

Javad Salimi: Conceptualization; data curation; investigation; methodology; project administration; resources; supervision; validation; writing – original draft; writing – review and editing. **Mohammad Rasekhi Siahkalmahalleh:** Data curation; formal analysis; investigation; methodology; validation; visualization; writing – original draft; writing – review and editing. **Seyed Amir Miratashi Yazdi:** Data curation; formal analysis; investigation; methodology; resources; validation;

visualization; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

Authors declare there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, upon request.


ETHICS STATEMENT

This study is in accordance with Helsinki ethical principles.

CONSENT

Written informed consent was obtained from patients to publish this report in accordance with the journal's patient consent policy.

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