Transarterial Embolization for Renal Hemorrhage after Percutaneous Nephrolithotomy

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Authors’ contributions
This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Percutaneous nephrolithotripsy (PNL) is a safe and effective treatment modality for the management of renal stones. This technique is associated with high success rates and few complications. The most important complication is hemorrhage. Delayed hemorrhage following PNL is rare complication and usually occurs due to development of the pseudoaneurysm or Arteriovenous fistula which can be successfully managed with arterial embolization. Here we are reporting a case of delayed post-PNL bleeding that occurred in a 41-year-old male operated on for renal stone. Multi Detector Computed Tomography scan revealed a presence of the pseudoaneurysm and Arteriovenous fistula in the inferior segmental branch of the left renal artery, which was successfully managed with amplatz vascular plug.

Keywords: Arterial embolization; bleeding; percutaneous nephrolithotomy.
1. INTRODUCTION

Percutaneous intervention for the renal collecting system was first described in the 1950s, but it wasn’t until the mid-1970s that percutaneous access to the renal collecting system was routinely utilized for the removal of nephrolithiasis [1,2].

PNL is currently an effective therapeutic method. The rate of successful treatment in renal calculi about 95%, however, the rate of minor and major complications is as high as 83% [3]. The most common complication is hemorrhage (5.8%). Hemorrhage due to PNL may be either venous or arterial. Arterial complications are classified as arteriovenous fistula, arteriocalyceal fistula, pseudoaneurysm, or perinephric hematoma [4].

Percutaneous nephrolithotomy (PNL) is considered the standard treatment for staghorn and large-volume renal calculi, as well as upper tract calculi refractory to other modalities, difficult lower pole stones, cystine nephrolithiasis, and calculi in anatomically abnormal kidneys. PNL is typically a very safe and well-tolerated procedure, but as with any surgical intervention, PNL is associated with a specific set of complications [5,6].

Arteriovenous fistula (AVF) and pseudoaneurysm are the most serious reason of renal hemorrhages after PNL. Delayed bleeding from an AVF or a ruptured pseudoaneurysm occurs in less than 1% of patients undergoing PNL [7].

Renal angiography and embolization play an important role in the early diagnosis and treatment of significant post-PNL hemorrhage.

2. CASE REPORT

A 41-year-old male patient was referred to the urology service in our hospital because of macroscopic hematuria. The patient underwent percutaneous nephrolithotomy at Military hospital before 1 week.

The patient was noted to have a slowly falling hematocrit on postoperative days due to macroscopic hematuria which need further evaluation with a multi detector computed tomography (MDCT) scan. The arterial phase of angiography suggested early filling left renal vein with renal artery, indicating an arteriovenous fistula and a pseudoaneurysm (Figs. 1, 2).

Fig. 1. Multi Detector Computed Tomography (MDCT) scan. The arterial phase of angiography suggested early filling left renal vein with renal artery, indicating an arteriovenous fistula.

Fig. 2. Multi Detector Computed Tomography (MDCT) scan. The arterial phase of angiography suggested early filling left renal vein with renal artery, indicating an arteriovenous fistula and a pseudoaneurysm.

Transfemoral arteriography was performed under local anesthesia. After obtaining a vascular access by placing a 6 French sheath, selective catheterization and angiography of the left renal artery using 6 French Renal Double Curve (Boston Scientific, RDC) catheter was performed. Interlobar arteries causing bleeding was detected. Selective left renal artery injection during the arterial phase showing a pseudoaneurysm and an AVF arising from the inferior interlobar artery.
The feeding artery was embolized using amplatzer vascular plug II, 9 mm (Boston Scientific) to occlude flow into the arterial lesion. Control angiogram after vascular plug II embolization showing complete obliteration of the pseudoaneurysm and AVF (Figs. 3,4).

Fig. 3. Left renal artery injection during the arterial phase showing a pseudoaneurysm and an AVF arising from the inferior interlobar artery

Fig. 4. Control angiogram after vascular plug II embolization showing complete obliteration of the pseudoaneurysm and AVF

3. DISCUSSION

Recently, a survey of urologists in Europe revealed that percutaneous procedures are performed by 69.6% of the respondents with a mean of 16.8 PNL procedures a month [8]. PNL is generally a safe treatment option and associated with a low but specific complication rate [6].

Hemorrhage is most common complication after PNL. The renal hemorrhage requiring angiographic intervention about 0.3% [9].

The angiographic intervention were performed using different sclerotic agents such as N-butyl-2-cyanoacrylate, Onyx, gel foam particles, polyvinyl alcohol (PVA), embospheres, detachable balloons, and coils [10-12]. The major limitations of arterial embolization with N-butyl-2-cyanoacrylate, Onyx, gel foam, PVA, and embospheres include the reflux of the embolic agent to the normal artery, which leads to unwanted regional embolization passing to the venous system from AVF, which leads to pulmonary embolism.

Richstone et al. [7] reported that 57 out of 4695 patients (1.2%) required selective endovascular embolization following percutaneous renal interventions (PNL was the etiology for 44 of 57 patients). Srivastava et al. [13] reported embolization after PNL in 24 out of 1854 patients and found a combination of PA and AVF in four cases.

Serkan et al. [14] reported that, between March 2003 and December 2013, A total of 55 patients with iatrogenic renal arterial lesions, who underwent endovascular embolization were included, in this series 26 patients underwent embolization after PNL, and a combination of PA and AVF was present in five of these 26.

In our case the patient had high-flow fistulae and pseudoaneurysm in lower lob on the left renal after PNL. Because of migration risk, we prefer to use Amplatzer vascular plug that permitted endovascular treatment in a more controlled manner than coils. To best of our knowledge this is the first case was reported to use vascular plug II with complete obliteration of the pseudoaneurysm and AVF after PNL.

4. CONCLUSIONS

In conclusion, renal iatrogenic arterial lesions after PNL lesions should be considered in patients with macroscopic hematuria or flank pain following PNL. CT angiography are usually performed for diagnosis of these lesions. Transarterial embolization can be safely and effectively procedure with high rate of success and immediate benefits.
CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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