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RENAL ARTERY ANGIOEMBOLIZATION PROCEDURE - A SINGLE CENTRE EXPERIENCE

ANEES PUTHAWALA[1], MOHAMMED FAROOQ[1]*, GRIFFIN M[1], MUTHULATHA N[1]

[1] DEPARTMENT OF UROLOGY, SAVEETHA MEDICAL COLLEGE AND HOSPITAL, SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES (SIMATS), SAVEETHA UNIVERSITY, CHENNAI, IND

* CORRESPONDING AUTHOR:
DR. MOHAMMED FAROOQ

Abstract

Renal hemorrhage following urological procedures, due to Arteriovenous malformations or renal tumors is a critical complication that can lead to significant morbidity. While surgical exploration was once the standard, it often resulted in nephrectomy. Today, renal artery angioembolization offers a minimally invasive and highly effective alternative, preserving renal function. This case series presents four instances of uncontrolled hematuria following percutaneous nephrolithotomy (PCNL), Arteriovenous malformation and Angiomyolipoma that were successfully managed with superselective angioembolization. The cases include the formation of a pseudoaneurysm and an arteriovenous fistula post PCNL, treated with coil and iodized oil embolization, respectively. These cases highlight the efficacy and safety of angioembolization as a first-line treatment for managing hemorrhagic complications in urological emergencies, thereby avoiding more invasive surgical interventions and preserving renal parenchyma.

INTRODUCTION

Renal hemorrhage is a life-threatening emergency that can arise from various urological interventions. Conservative management through endovascular therapy is now the preferred approach for most cases, as surgical exploration carries a high risk of nephrectomy. First introduced in 1969, renal transarterial angioembolization has become a well-established endovascular technique for managing these complications.
Minimally invasive urological procedures such as PCNL, while offering "nephron-sparing" benefits, still carry an unpreventable risk of vascular injury, leading to active bleeding, pseudoaneurysm formation, or arteriovenous fistulas. Angioembolization provides a safe, minimally invasive, and effective solution for these hemorrhagic emergencies. Advances in imaging and embolic agents have made superselective embolization a precise and effective method for both diagnosis and treatment of renal hemorrhage, offering rapid recovery, shorter hospital stays, and low complication rates. This technique has largely replaced open surgery, positioning it as the primary choice for renal preservation in critical patients where feasible.

Case Presentations

Case 1

A 44-year-old male presented with a two-month history of right flank pain. He had no fever, hematuria, or other urinary symptoms and no known comorbidities, although he had a history of left hip surgery 10 years prior. A CT scan revealed a 2 x 1.5 cm right renal pelvic calculus. The patient underwent a right percutaneous nephrolithotomy (PCNL), and the stone was successfully cleared.

Post-operatively, the patient developed frank hematuria. A cystoscopy with clot evacuation was performed. A subsequent CECT urogram with renal angiogram revealed a pseudoaneurysm in the interpolar cortex. The patient underwent superselective angioembolization with coiling of the pseudoaneurysm, which successfully resolved the bleeding.

Figure 1

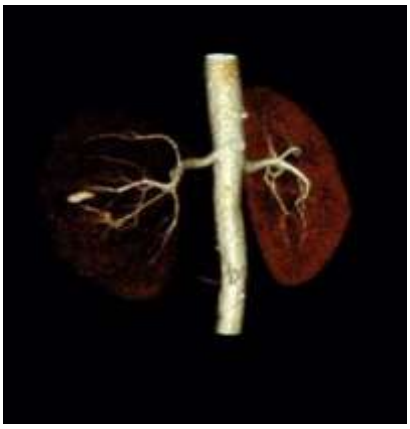


Figure 2

PSEUDOANEURYSM

Figure 3

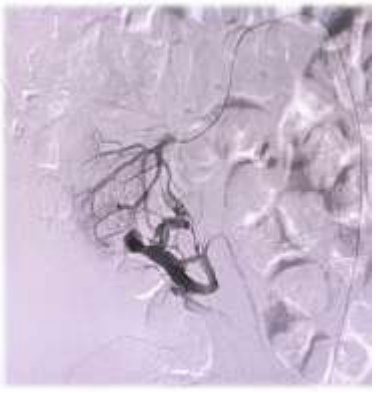
POST COILING

Case 2

A 55-year-old male, who had undergone a right PCNL at an outside hospital eight days prior, presented with hematuria and clots for seven days. He had no other symptoms and no known comorbidities. His initial procedure was for a 2.25 x 1.5 cm pelvic calculus in a duplicated right kidney collecting system.
A CECT urogram with renal angiogram showed a pseudoaneurysm arising from an aberrant right renal artery, associated with early filling of the right renal vein, indicating an arteriovenous (AV) fistula. The patient was treated with superselective lipiodol embolization of the AV fistula, which stopped the hemorrhage.

Figure 4

Figure 5



AV MALFORMATION

Figure 6

POST LIPIODOL INJECTION

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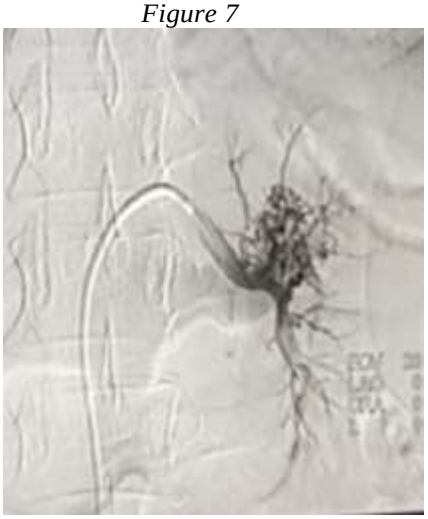
Case 3

A 34-year-old female with a history of spontaneous hematuria with passage of multiple clots with fever for 1 week, presented to our hospital after being transfused with 3 units of packed blood cells and after cystoscopy and bladder clot evacuation after being stabilized. On CECT Urogram, she was diagnosed as having Left renal upper pole Arteriovenous malformation. The patient was treated with superselective lipiodol embolization of the AV malformation, which stopped the hemorrhage.

Figure 7



AV MALFORMATION

Figure 8

POST LIPIODOL INJECTION

Case 4

A 68-year-old female presented to our hospital with chronic dull aching left loin pain for 1 year duration. On evaluation, she was diagnosed to have a 20cm Left renal Angiomyolipoma. This case was managed by superselective angioembolization of the feeding vessels of Angiomyolipoma in order to reduce vascularity of the lesion followed by a nephrectomy for the huge Angiomyolipoma.

Figure 9

LEFT RENAL ANGIOMYOLIPOMA

Figure 10

Figure 11

LEFT NEPHRECTOMY SPECIMEN

DISCUSSION

The management of renal vascular lesions depends on their cause and clinical severity. For hemorrhagic complications arising from urological procedures, endovascular treatment has been the preferred method.
Angioembolization is a minimally invasive and safe technique with proven effectiveness in controlling urgent urological bleeding. Its applicability even in critically ill patients makes it a first-line option for renal preservation. The continuous advancements in interventional radiology, including improved imaging and more precise embolic materials, have enhanced the success of superselective renal artery embolization as a diagnostic and therapeutic tool.
This approach typically involves a short hospital stay, allows for a quick recovery, and can often be performed without general anesthesia. It has low rates of both early and late complications, which has limited the use of traditional open surgery and nephrectomy to only the most exceptional cases.

CONCLUSION

Superselective renal angioembolization is a highly effective and safe procedure for managing uncontrolled hematuria arising from kidney post minimally invasive endourological surgeries, or due to other causes such as Arteriovenous malformations or renal tumors. It provides immediate and lasting resolution of symptoms while maximizing the preservation of renal tissue. As demonstrated in our case series, this minimally invasive technique should be the standard of care for post operative renal bleeding for maximal renal preservation.

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