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Research Article

EXPERIENCE OF ENDOVASCULAR MANAGEMENT IN RENOVASCULAR BLEEDS IN A TERTIARY CARE HOSPITAL OF NORTH-EASTERN INDIA

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ABSTRACT

Renovascular bleeding is a cause of morbidity and mortality resulting from vascular lesions occurring spontaneously or following traumatic injuries. Most of the renal vascular bleed are self-limiting and do not need any intervention, however haemorrhage or gross haematuria may necessitate therapy. Treatment of renovascular bleed can be achieved either by surgery or minimally invasive endovascular therapy. In this article, we have studied the role and effectiveness of endovascular treatment in renovascular bleeds in ten patients whose intervention was done between May 2008 and January 2017 in our department. The Pre- and post-embolization angiographic findings and post procedure results were reviewed for success and efficacy. The lesions included six pseudo aneurysms and five AVF which were secondary to iatrogenic trauma in 70 % patients (four biopsy, three PCNL) and spontaneous in 30% patients. In most of patients, coil embolization was done. There was 100% success rate with no demonstrable complications.

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INTRODUCTION

Reno vascular bleeding is an important cause of morbidity and mortality resulting from diverse vascular lesions such as arteriovenous malformation (AVM), pseudo aneurysm etc. These lesions can occur spontaneously or following traumatic injuries which includes blunt or penetrating trauma and iatrogenic trauma during procedure like biopsy or percutaneous nephrolithotomy (PCNL). Most of the renal vascular bleed are self-limiting and do not need any intervention. Presence of massive haemorrhage or continuous hematuria may necessitate therapy which can be achieved either by surgical procedures or minimally invasive endovascular management.

Superselective embolization may be used for effective, minimally invasive control of active renovascular bleeding (Dinkel HP et al, 2002). In this study, we evaluated the effectiveness of minimally invasive endovascular management for the treatment of reno-vascular bleeding.

MATERIALS AND METHODS

We did a retrospective study on ten patients who had undergone endovascular management for renal vascular lesions

between May 2008 and January 2017 as a part of in-patient basis in the department of Radio-Diagnosis. The patients (6 males and 4 females) were in the age group between 26 year to 75 year. The digital subtraction angiography (DSA) was performed by C-arm (BV Endura, Philips, Holland) in patients who had gross haematuria, recurrent gross Haematuria or hemodynamic instability due to renal parenchymal or extra parenchymal haemorrhage. The vascular access was performed by through right transfemoral route by use of 6F arterial sheath. Following this, abdominal aortography and selective renal catheterization were performed by 5F and 4F angiographic catheters over 0.035-inch guide wire.

Embolization was performed whenever there were free extravasation, aneurysm, pseudoaneurysm, arterio-calyceal fistula (ACF) or arteriovenous fistula (AVF). The embolization of the lesions was performed by injecting embolizing agent at or near a segmental branch. Most common embolizing agents used were vascular occlusion coils, Glue, Gel foam and Onyx. After embolization, check angiography was done to see the residual vascular lesions. On pre- and post-embolization angiography, lesions were reviewed in the term of type,

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number and site of vascular lesions and the success of the embolization procedures.

RESULTS

In our study, the vascular lesions are mostly seen among male (60%) with the majority of the patients in middle age group. Seventy one percent of lesions were secondary to iatrogenic trauma (40% biopsy, 30% PCNL). In rest of 30% cases including one tuberous sclerosis complex patient, the exact cause of renal injury was unknown and thought to be spontaneous. The lesions included six pseudoaneurysms (54.54%) and five AVF (45.45%). 50% patients had only pseudoaneurysm and 30% had only arteriovenous fistula. Twenty percent patients had both pseudoaneurysm and AVF. In 80% patients, coil embolization was performed by using embolizing coil (Cook, US). Other embolizing agents like 33% N-acetyl N-butyl cyanoacrylate (NBCA) Glue, polyvinyl alcohol (PVA) particle and Gel foam were used in rest of patients (20%). The success in controlling bleed was 100% and no post procedure complications were noticed.

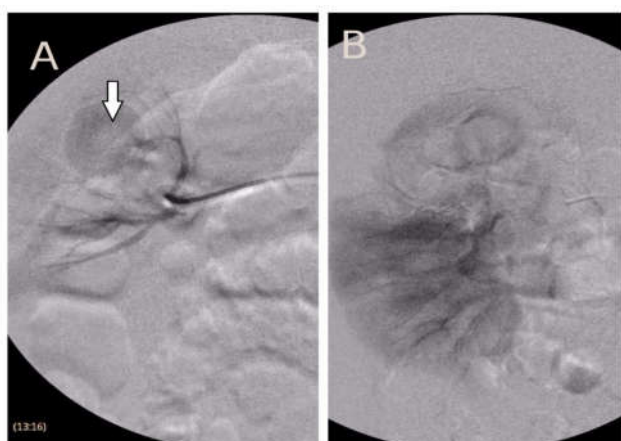


Figure 1 38years male patient, post biopsy status presenting with gross haematuria

(A).Pre-embolization DSA shows large pseudoaneurysm (arrow) of upper pole segmental artery in left kidney.
(B). Post-embolisation angiography shows complete obliteration of lesion.

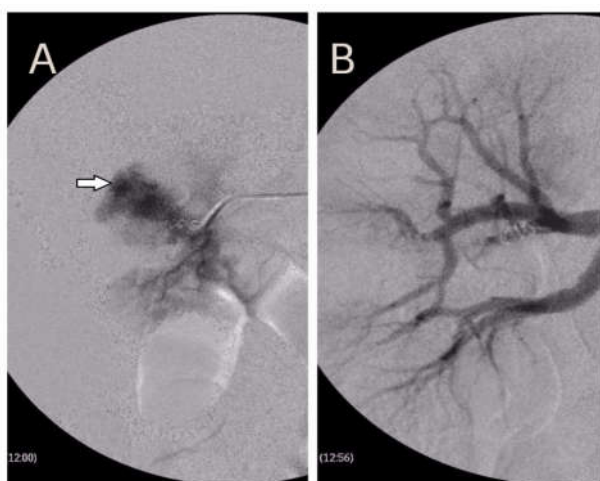


Figure 2 31years male patient, post PCNL status presenting with haematuria.

(A). Pre-embolization DSA shows AVF (arrow) seen in mid pole segmental artery of right kidney and also feeder seen in lower pole.
(B).Post-embolization angiography shows complete obliteration of lesion.

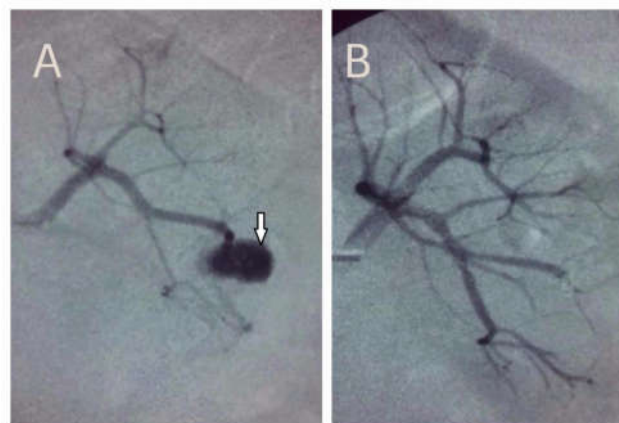


Figure 3 26years male patient, post PCNL status presenting with recurrent haematuria.

(A). Pre-embolization DSA shows large pseudoaneurysm (arrow) of lower pole segmental artery in left kidney.
(B). Post-embolisation Angiography shows complete obliteration of lesion.

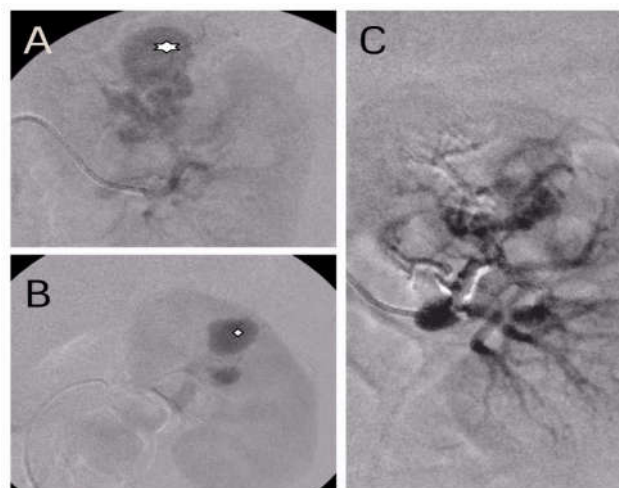


Fig 4 35years female patient with unknown cause presenting with gross haematuria.

(A). Pre-embolization DSA: Large AVF (star) in upper pole of left kidney.
(B). Pre-embolization DSA: A large venous sac (diamond) in mid pole.
(C). Post-embolization DSA: obliteration of lesion.

DISCUSSION

The iatrogenic injuries are the most common cause of renal vascular lesions and mostly presented as pseudoaneurysm or AVF (Poulakis V *et al*, 2006). ACF, aneurysm and perinephric hematoma are other renovascular lesions. These lesions can present with intermittent or persistent gross haematuria, perirenal haemorrhage, urinary obstruction, palpable thrill, reduced renal function and severe secondary hypertension. In our study, 70% of the lesions were secondary to Iatrogenic causes (post PCNL and post biopsy). Persistent or recurrent gross haematuria, perinephric haematoma and reduced renal function were the presenting findings. An early and accurate diagnosis is the key to the control of bleeding and prevents morbidity and mortality. There is also reduced incidence of unnecessary nephrectomy.

Computed tomography, ultrasound and magnetic resonance angiography (MRA) may be helpful for the detection of renal vascular lesions, but DSA is the diagnostic standard (Sullivan RR *et al*, 1991; Dong Q *et al*, 1999; Ganpule AP *et al*, 2013). DSA demonstrates the characteristics of vascular lesions and

also provides the opportunity for endovascular treatment of bleeding lesions in same sittings. In our study, all patients were evaluated with DSA because they were referred patients and needed emergent intervention as soon as possible.

Most renal vascular injuries heal spontaneously without any interventions therefore; most patients are followed up with conservative treatment. Transarterial embolization of vascular lesions has been recommended when there is massive bleeding, recurrent haemorrhage or progressively deteriorating renal functions (Huppert PE *et al*, 1993).

The success of percutaneous transcatheter embolization procedure depends on the lesion characteristics, the embolization materials, and experience of interventionist. Various embolic agents including gel-foam, coils, NBCA, Onyx and PVA particles are available for embolization of lesions. Super selective embolization using micro coils is an effective, safe treatment of renal vascular lesions (Huppert PE *et al*, 1993). The main disadvantage of coils is requirement of multiple microcoils for complete embolization which increases the cost and procedure time.

In our study, 80% embolization was achieved by nitinol or stainless steel microcoils. PVA particles are biocompatible materials and acts by adhering to vessel walls, temporarily reducing blood flow. In the long term it is incorporated into vessel walls, and blood flow is partly restored by revascularization through old thrombi (Davidson GS *et al*, 1995). NBCA is a permanent embolizing agent. Embolization with NBCA is a feasible and useful treatment for ruptured pseudoaneurysm, which is difficult to control by coil embolization alone (Yamakado K *et al*, 2000). We used NBCA mixture in one patient.

Complications related to interventional embolization procedures includes post-embolization syndrome due to inadvertent embolization of the main renal artery or occlusion of more than one branch of the renal artery, systemic hypertension and functional impairment. We did not encounter all these complications due to selective catheterization.

In conclusion, iatrogenic injury is most common pattern of renal vascular injury and pseudoaneurysm is the most common type. Transarterial endovascular management is a reasonable, safe and effective therapeutic technique avoiding highly invasive surgical procedures and their consequences. Selective catheterization and embolization of the lesions are critical for the success of treatment. Coil embolization is most preferred among the embolizing agents even though high costs.

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