

TRANS-ARTERIAL EMBOLIZATION WITH N-BUTYL CYANOACRYLATE GLUE FOR RENAL BLEEDING: Case Report

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Background: The objectivity in management of renal bleeding is to preserve a significant renal parenchyma tissue and prevent associated morbidities like anemic shock or renal impairment from substantial nephron demise or obstructed uropathy. Trans-arterial embolization therapy by interventional radiology offers a high success rate with potential of reserving normal renal tissue. The selection material for renal arterial embolization largely depends on vasculature anatomy and end-point of procedure. N-butyl cyanoacrylate glue in our experience is applied in lesion supplied by small size of end-artery.

Keywords: renal artery embolization, N-butyl cyanoacrylate glue, renal bleeding

INTRODUCTION

Renal bleeding can be due to various etiologies comprise of trauma, iatrogenic like post biopsy, percutaneous nephrolithotomy, nephron sparing nephrectomy, vascular malformation and tumor. Symptomatic bleeding cases require immediate diagnostic and aggressive therapy. Trans-arterial embolization has been accepted as primary option for management of acute renal bleeding. Apart of its minimal invasive techniques, renal artery embolization allows significant renal parenchymal preservation as compared with nephrectomy. These benefits are absolutely good for patient with renal insufficiency, solitary kidney or congenital renal abnormality.¹

Several embolic materials are reported effective in renal artery embolization. N-Butyl cyanoacrylate glue or shortly called glue has hemostasis's mechanical of action by forming cast from polymerization process once it contacts with ionic body fluid, for example blood. Property of glue for arterial occlusion is mostly seen in lesions supplied by end-artery (arteriolar). In this point, some intra-parenchymal renal or vascular lesions

with inherent end-artery feeder are suitable for glue application. Injection of glue material is expected to incite sclerosis of the lesion and devascularize the regional vascular bed.²

The other advantages of glue liquid are cheap and easy to use. Onyx and absolute alcohols are other known liquid embolic materials. But, Onyx is significantly more costly and absolute alcohols associated with high potential risk of cardiopulmonary collapse when it escaped into systemic circulation. Potential of recanalization of lesion post glue embolization is limitation in glue. For this reason, clinical and occasionally imaging follow up is mandatory.^{4,5} We reported our experiences in using glue for various lesions accounted for massive renal bleeding with good technical and clinical success.

CASE REPORTS

Bleeding Renal Angiomyolipoma

A 28-year-old male with underlying left renal angiomyolipoma admitted to our hospital with sudden onset of painless hematuria and left flank pain. General examination showed he was pallor and in pre-hypovolemic shock. His pulse was 110/min and blood pressure was 100/90 mmHg. Frank red urine with occasional blood clots was observed from the urinary bladder's catheter. He was resuscitated with intravenous fluids and blood transfusion. A bleeding from rupture angiomyolipoma was suspected and he was immediately sent to angiographic unit for diagnostic angiogram check with embolization planning. Left renal artery catheterization revealed a densely enhancing exophytic angiomyolipoma

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(Figure 1) supplied by distal segmental branch of mid pole.

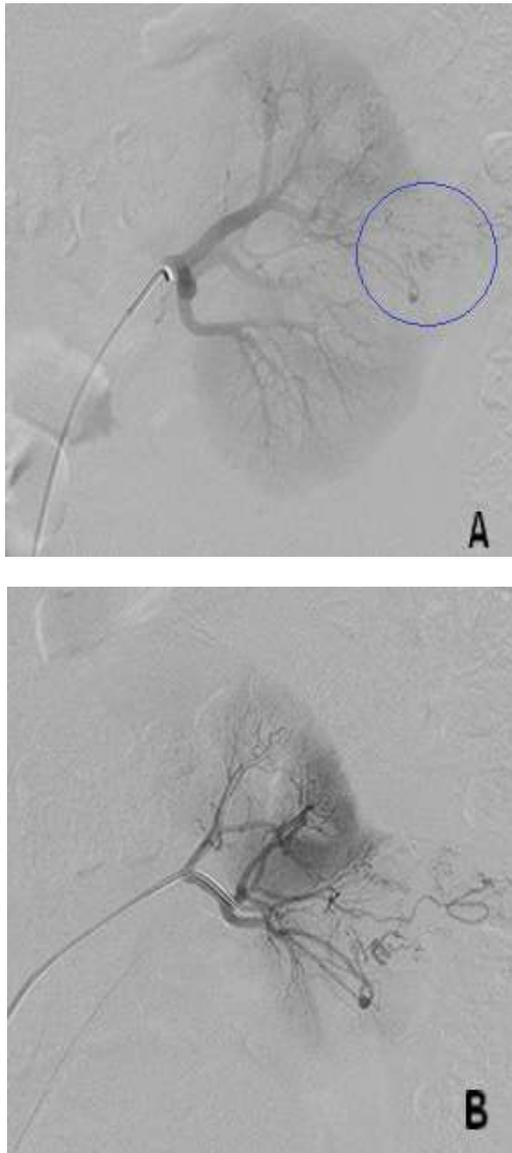


Figure 1

Left renal artery catheterization

A. An exophytic angiomyolipoma mass (blue circle) at the mid pole of left kidney demonstrated from left renal catheter arteriogram. **B.** With a catheter advanced in the mid pole artery, the vasculature of the mass can be clearly depicted.

This pertinent feeder artery (Figure 2) was super selectively reached by using 2.2 F micro catheter. A 0.5 ml of 25% glue with ethiodol mixture delivered to embolize this end-artery supplying the mass.

Post embolization, a wedge-shape area of angiomyolipoma's avascularization (Figure 3) with approximately > 90% preserved renal parenchymal demonstrated. His urine was gradually clear the next day after trans-arterial

embolization with stable vital signs without support. The patient was discharged well on the third post embolization day.

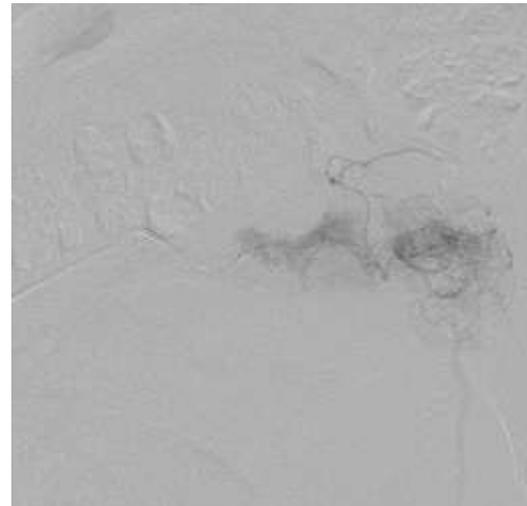


Figure 2

A micro catheter placed inside the distal segmental branch of mid pole showed tumor's blush. Subsequently, this arterial feeder and tumor's bed were embolized using small amount of glue.

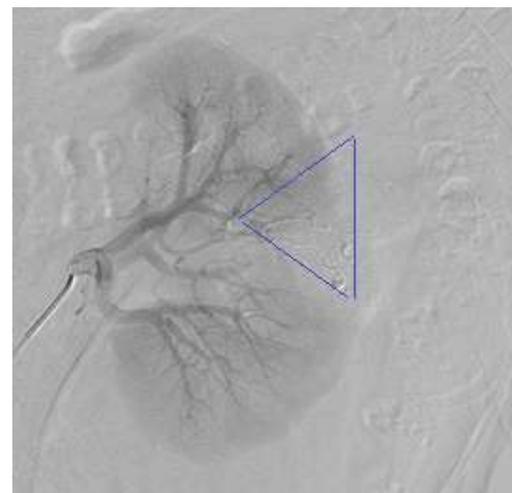


Figure 3

Post embolization angiographic, wedge area of mass's avascularization (blue pie) with internal glue cast and significant renal parenchyma reservation.

Pseudoaneurysm Lesion post Percutaneous Nephrolithotomy

A 63 years old gentleman developed massive hematuria at day six post percutaneous nephrolithotomy (PCNL) of left kidney. On examination, he had marked pallor, tachycardia (96 beats/min) and hypotension (blood pressure 80/60 mmHg). Blood parameter revealed hemoglobin of 7.6 g/dl, normal total and differential white cell counts, blood urea 62mg% and creatinine 2.9 mg%.

He was resuscitated with crystalloid fluids and blood transfusion. Catheter angiography was performed, which showed a pseudo aneurysm 3x5 mm in size originated from segmental branch of left upper lobar artery. Micro catheter (2.7 F) was placed inside this arterial feeder with a close distance as possible to the pseudo aneurysm. We occluded this pseudo aneurysm by embolizing 0.3 ml of 25% liquid glue with ethiodol mixture into the distal part of arterial feeder. Subsequently, post procedure arteriogram demonstrated disappearance of the left upper pole kidney's pseudo aneurysm. The hematuria ceased and urine became clear within 12 hours. The patient did not experience any further bouts of hematuria and was discharged three days after procedure (Figure 4a,b and 5).



Figure 4

A, Catheterization of left renal artery detects a pseudo aneurysm (thin arrow) at upper pole of left kidney. **B**. The pseudo aneurysm's small arterial feeder can be reached by micro catheter cannulation. This close distance of micro catheter to the lesion and distal arterial feeder enables a precise embolization with little risk of reflux into normal renal

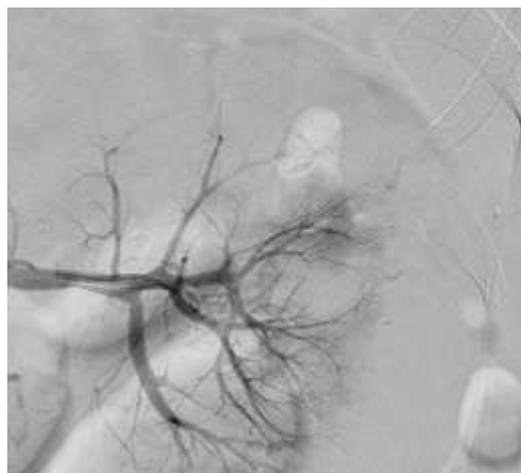


Figure 5

Noted the disappearance of upper pole pseudo aneurysm after glue embolization with trivial area of renal tissue infarction.

DISCUSSION

Renal artery embolization has been widely performed and accepted as effective minimal invasive treatment for symptomatic renal bleeding. Apart from bleeding treatment, renal artery embolization is applied in pre-nephrectomy surgery or ablation of renal tumor, palliative for unresectable renal malignancy and pain control in polycystic kidney disease.^{1,3,5}

Significant preservation of renal tissue is the utmost benefit of renal artery embolization, with less than 10% of non-targeted renal parenchyma infarction occurred if super selective embolization is performed. In patients with renal impairment, solitary kidney or congenital kidney abnormality, selective renal artery embolization is best method to preclude them from nephrectomy. The success rate of renal artery embolization for mass reduction in angiomyolipomas reported significance in short follow up period and comparable between short and long follow up period. For management of life threatening renal bleed, the efficacy of catheter delivered embolization is substantial high, around 95%.^{1,3}

The choice of embolic material is influenced by vascular anatomy and endpoint desired. In lesion originated from end-artery (arteriolar) with embolization's aim to obliterate or sclerosis vascular bed, liquid agents can be used.^{4,7} As illustrated in our cases, liquid glue is exclusively useful for small size artery. For flow obliteration in large vessel, suitable embolic agents are either coils or detachable balloon.^{5,8} In cost aspect, glue is the cheapest among all embolic materials and thus can be afforded by interventional radiology units.

Utilizing liquid glue for embolization requires a proper concentration mixture with ethiodol, which is oil-based contrast media. Ethiodol has properties of allowing glue to be opaquely visible

under fluoroscopy and delaying polymerization time of glue. For low flow lesion, like our presented cases, a 25% of glue and ethiodol mixture or a ratio of 1 part of glue to 3 part of ethiodol is sufficient to achieve the appropriate embolization's time and depth of penetration.⁶

In conclusion, trans-arterial embolization is safe and effective method for renal bleeding. Glue embolic material is useful in lesions supplied by end-artery (arteriolar) with target embolization to occlude its distal vascular flow. From the cost aspect, this minimal invasive embolization procedure with glue utilization definitely relieves the burden of medical expenses affecting many developing regions.

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