
GLUE EMBOLIZATION FOR TREATMENT OF RENAL INJURY

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ABSTRACT

PURPOSE : To evaluate the outcome of glue embolization in two patients with renal AVF with and without pseudoaneurysm, one caused by percutaneous stone removal from the kidney and another one by trauma.

MATERIALS AND METHODS : History taking, physical examination and laboratory investigation were reviewed for patient evaluation. Then angiography of the pathologic kidneys were performed. It showed outpouching of contrast media and rapid draining vein which was connected to adjacent artery. Afterthat embolization was done with optimal mixture of glue and lipiodol.

RESULTS : Successful glue embolization of renal AVF and renal AVF with pseudoaneurysm of the kidneys with total occlusion of the affected vessels. Some degree of renal parenchyma infarction were seen without late complication.

CONCLUSION : Endovascular treatment is still useful in the treatment of renal AVF and pseudoaneurysm. Because it is a kidney-conservative therapy and provides less drastic, less invasive, less expenses and short hospitalization. Alternative embolized material is glue although coil is recommended to be the material of choice. The result of treatment is excellent when it is held in experienced hand.

INTRODUCTION

Vascular complications such as arteriovenous shunt (AVF) and pseudoaneurysm (PA) after surgical procedures and trauma can occurred especially post renal biopsy.¹⁻⁹ Biopsy is often performed in transplanted kidney to get a correct histological diagnosis of renal allograft rejection.¹⁻² AVF has been reported in 0-15%⁹ and most AVF remain asymptomatic and resolve spontaneously.¹⁻⁴ Although these two cases report of renal AVF with and without PA caused by previous stone removal from the kidney which is account for 0.5-1% complication and prior assault.

The treatment of choice is still endovascular procedures for both renal AVF and PA of the affected kidneys. Result of the treatment is

excellent without late complication.

MATERIALS AND METHODS

History taking, physical examination and laboratory investigation were reviewed from the medical records. The 1st patient was a 56 year-old Thai man with a history of right RC came to Siriraj hospital to performed percutaneous nephrolithoplexy during August 2001. After the unevenful operation, he developed persistent gross hematuria for 12 days. So he went to the same hospital and for the initial impression for his hematuria, the provisional diagnosis was renal arteriovenous malformation (AVM). On physical examination, general appearance was moderately

pale and no jaundice. Vital signs and other examination were normal. Laboratory studies disclosed the following value: hematocrit 21%, white blood count 15,000 cells/uL, platelets 755,000 cells/uL, blood urea nitrogen (BUN) 9 mg/dl (7-20) and creatinine 1.0 mg/dl (0.5-1.5). Cystoscopy was performed. Active bleeding from the right ureteric orifice was discovered. The foley's catheter was retained and bladder irrigation was initiated together with 4 units of blood transfusion in 2 days, but the last hematocrit was raised to only 25%. He was then sent to consult for embolization of the AVM of the kidney.

Selective renal angiography was performed with diagnostic subtraction angiographic unit (Advantax, GE Medical Systems, Milwaukee, USA) via an ipsilateral retrograde femoral approach using 5 Fr. Cobra catheter curve 2 (Terumo, Tokyo, Japan). Right renal artery was selected. RA angiogram was done and it showed AVF which was diagnosed by rapid high flow connection between branch of renal artery and adjacent vein. (fig 1a and 1b) There were no evidence of nidus, abnormal dilation of an artery or extravasation of contrast medium into the renal pelvis.

Three Fr. SP catheter (Radiofocus, Tokyo, Japan) was used as superselective catheterization by its coaxial system to confirm the diagnosis and search for optimal position for embolization. (fig 2)

Embolization was performed with appropriate proportion mixture of glue (Histoacryl, Braun, Melsungen, Germany) and ethiodized poppy-seed oil (Lipiodol, Guerbet, Paris, France)

The embolizing solution was infused via coaxial system into the optimal site of the right renal artery (fig 3a) but accidental reflux of the solution into the other branches of RA was seen (fig 3b). So the procedure was discontinued.

The 2nd patient had a history of gross hematuria for 1 month after previous trauma. He obtained 6 units of blood transfusion but the hematocrit was not increased satisfactorily. Ultrasonography of the kidneys demonstrated normal left kidney and intrarenal collection of blood in the right kidney. Cystoscopy disclosed active bleeding per right ureteric orifice. He was, then, sent to the interventional radiology division to perform angiography for diagnosis and endovascular treatment.

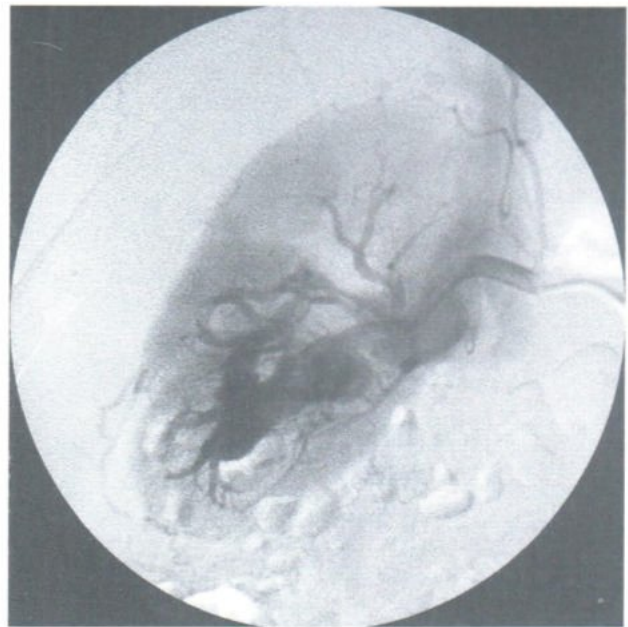
Aortogram (fig 4 and 5) and selective right renal artery angiogram (fig 6 and 7) showed a large rounded outpouching of contrast media from its branch with early draining vein. Superselection into optimal position was done with coaxial system to look for dynamic flow. This provided decision making in appropriate proportion and amount of mixture between glue and Lipiodol (fig 8 and 9).

RESULTS

After superselective angiogram via coaxial system was performed with infusion of glue mixture. It revealed 30% and 15% of renal parenchymal infarction in the 1st patient and 2nd patient respectively. Disappearance of renal AVF and PA were occurred (fig 10 and 11). Both patients had normal renal function in both pre and post embolization after 1 month follow up.



1a

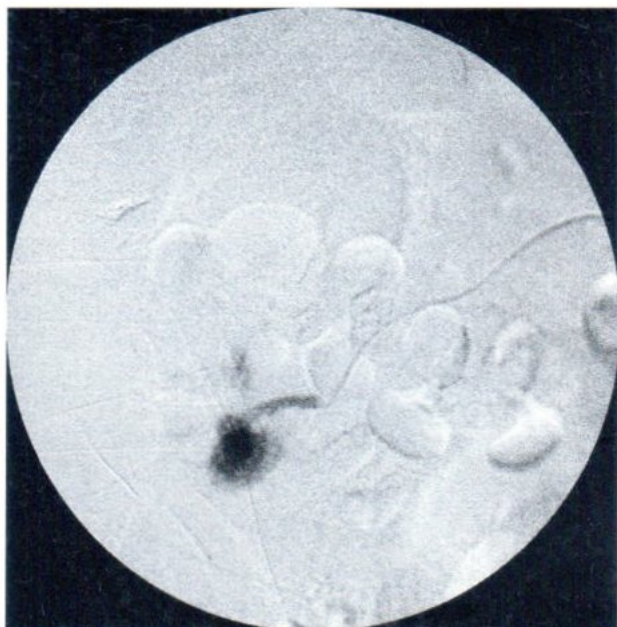


1b

Fig. 1a and 1b. Selective renal angiogram in arterial phase showed rapid draining renal vein into IVC.



Fig. 2. Superselctive angiogram by coaxial system was performed to find out the optimal position for embolization.



3a

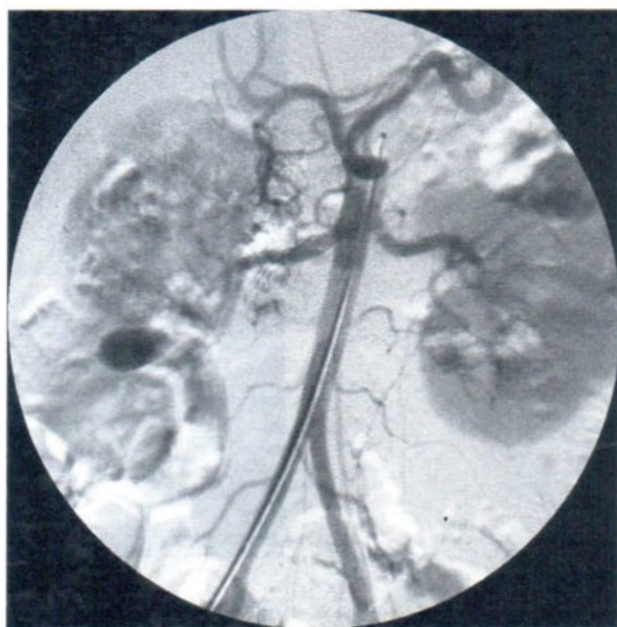


3b

Fig 3a and 3b. During glue embolization, the glue mixture was reflux into another branches of renal artery so the procedure was discontinued.

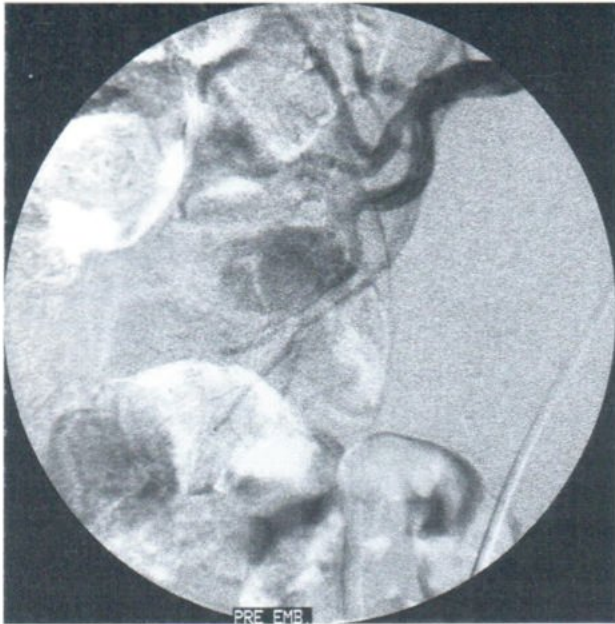


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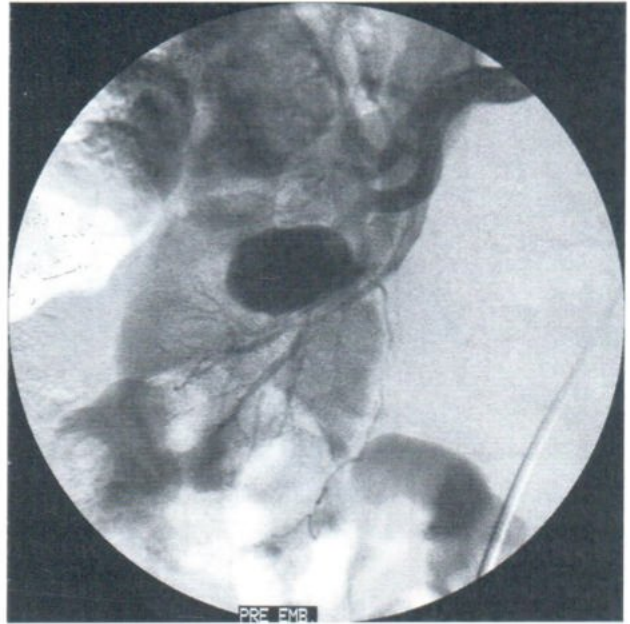


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Fig. 4 and 5. Aortogram in early arterial and parenchymal phases demonstrated an ovoid contrast collection of RK at the interpolar region.

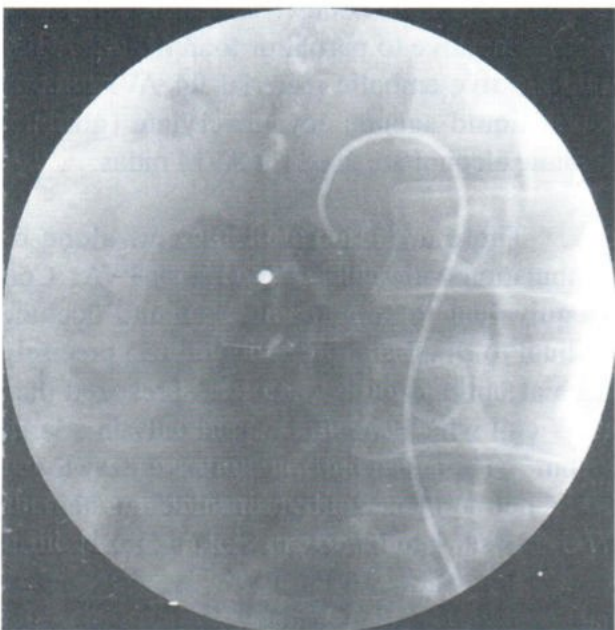


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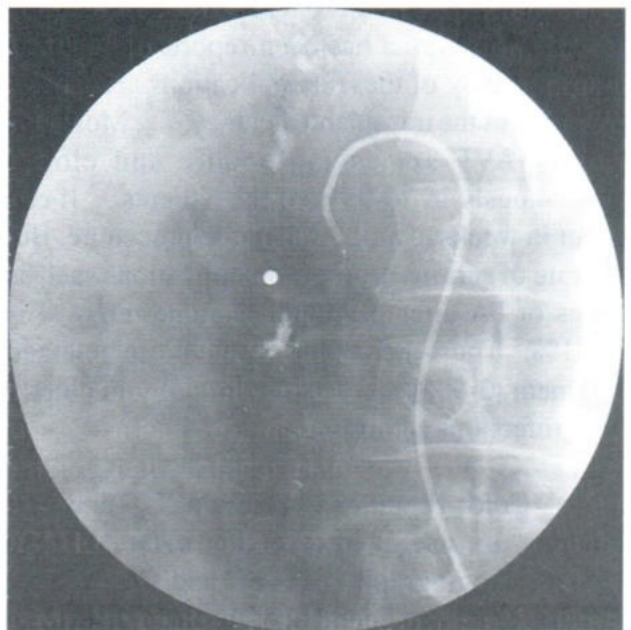


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Fig. 6 and 7. Selective renal angiogram showed obvious pseudoaneurysm and additional rapid draining vein into IVC. So all findings were renal AVF with pseudoaneurysm. During glue embolization, the glue mixture was filled in the pseudoaneurysm.



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Fig. 8 and 9. The glue mixture is infused via coaxial system.

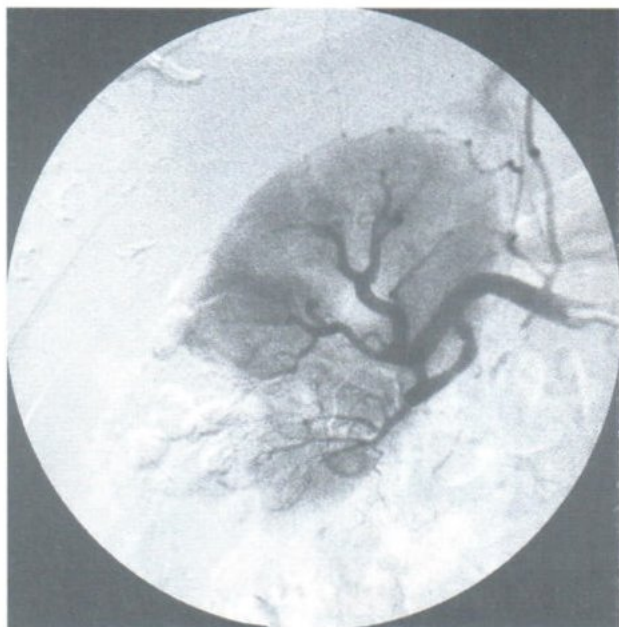


Fig. 10. Post embolization in the 1st patient revealed 30% renal infarction.

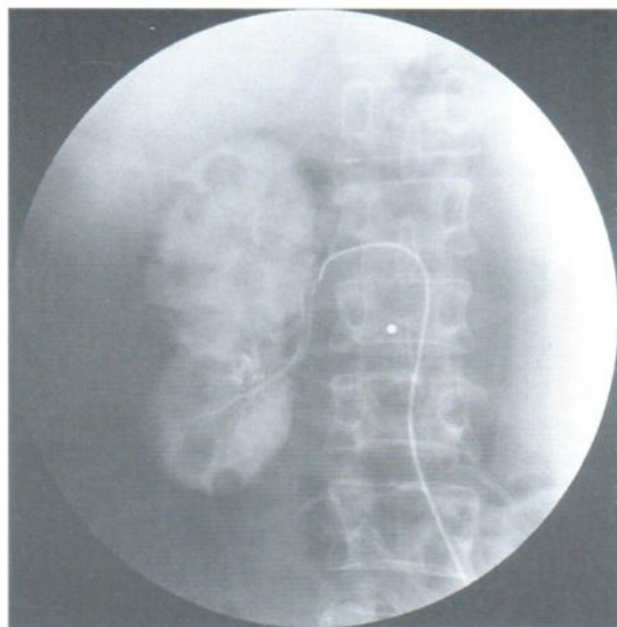


Fig. 11. Post embolization in the 2nd patient demonstrated 15% of renal infarction.

DISCUSSIONS

Incidence of AVF, PA and arterioalical fistula after trauma has been reported to be 0.9-18%.^{1,4} Many of these complications are related to biopsy of the transplanted kidney.^{1,2,4,9} Most post biopsy AVF are asymptomatic and closed spontaneously in 70-95% of the patients.¹⁻⁴ It can occur in weeks to months after the procedure. But the rate of serious urologic complications such as AVFs or PA after percutaneous stone removal is 0.5-1%.⁸ The other complications are retained fragment (3-9%) and sepsis especially in elderly with infectious stones.

Color dropper ultrasound, CT and MR imaging are useful in detecting some of these lesions.⁵ Angiography of AVF and PA produce dilatation of the feeders with early filling of draining veins and outpouching of contrast media.

Transcatheter embolization is the best

treatment for most lesions.¹⁻⁹ Because it can serve as an alternative to partial or total nephrectomy. The effective embolic material for AVF is coil. About liquid agents, acyanoacrylate (glue) or absolute alcohol are used for AVM nidus.

There are reports using coil alone or combination with gelfoam or glue or PVA.¹ Coil is equivalent to surgical ligation and occlude medium to small artery. Microcoil can precisely place at optimal position so it is preferred than GAW coil which should be used only in a large lesion.^{1,7} The advantage of gelfoam is easy to use and is not permanent. Glue occludes at arteriolar and capillary bed levels.^{1,7} So it might be used only in high-flow AVFs. PVA also occludes at arteriolar and capillary bed levels. This makes the risk of tissue necrosis increased.^{1,7}

The 1st patient developed renal AVF after the procedure. Hematuria treated by blood trans-

fusion with inappropriately increased hematocrit and persistent symptoms. All events also occurred in the 2nd patient. Angiography was done for embolization. AVF with and without PA were demonstrated. The embolic material of choice is still coil but the interventional radiologist is familiar with glue. After superselective angiography by coaxial system, the obvious position and dynamic flow of AVF and PA are precisely seen. So the optimal mixture of glue and lipiodol is used. Embolic solution is infused via microcatheter which is placed at optimal position. Post embolization demonstrates totally occlusion of AVF and PA. Some degree of renal infarction is noted. Followed up renal function is still normal.

Our results demonstrates that catheter embolization of AVF and PA can be performed successfully by glue. The several embolic materials can be used by preference of interventionists although the material of choice is coil. But this report includes only two patients, further study with various type of embolic materials in respect of single or combination with post embolization evaluation of the patients about renal function. Long term results should be followed up to find out the best embolic materials for treatment.

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