Renal Artery Embolism : Therapy with Intra - Arterial Streptokinase Infusion

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Abstract

Two patients with acute renal artery embolism were reported. One patient had a history of rheumatic valvular heart disease and the other patient had hereditary cardiomyopathy. Both patients had atrial fibrillation on physical examination. Both patients presented with acute back pain and one patient had hematuria. The final diagnosis of acute renal artery embolism was made after one to three days of hospitalization and renal angiography was finally done documenting complete occlusion of the main branch of the renal artery on one side. Intra-arterial streptokinase infusion 5,000 unit per hour was given to both patients using an arterial pump for 17 hours to 30 hours with complete recanalization of the intrarenal branches and complete recovery of signs and symptoms of renal artery embolism although the renal scan still showed diminished renal function.

Key word : Renal Artery, Embolism, Streptokinase

Renal artery embolism is not a rare disease. It is common in patients with rheumatic heart disease and left atrial thrombus(1) or with myocardial infarction and left ventricular thrombi(1). Atrial fibrillation is the factor most commonly found(2). Successful embolectomy has been reported(3-6) but surgery is likely to be a hazard in these patients due to preexisting heart disease. The present article presents two reported cases with acute renal embolism who underwent treatment with percutaneous transarterial renal artery infusion with streptokinase 5,000 unit per hour which was recommended for treatment of acute lower extremity arterial embolism by Katzen(7), also using the modified method to treat acute renal artery embolism by Rudy D.C.(8). The results of the procedure including the important factors for improvement of renal function are discussed.

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CASE REPORT

Case 1

A 47 year old male admitted on August 30 1997 with the chief complaint of abdominal and right flank pain one hour prior to admission.

He was rather heavy, an alcoholic and a smoker with a known history of chronic cirrhosis and peptic ulcer. He was also known to have hereditary cardiomyopathy since birth and was treated regularly for heart disease as an outpatient.

On admission, he was found to be obese, afebrile, BP 120/40 mm/Hg. Pulse 12/min and irregular, irregularity of pulsation representing atrial fibrillation, liver and spleen were non palpable. The laboratory examination on admission showed SGOT 54 U/L , SGPT 39 U/L, BUN 13.6 mg/dl, creatinine 1 mg/dl. He was treated symptomatically. The urinalysis on admission was normal but one day after admission, he complained of mild gross hematuria and on subsequent urinalysis was found to have bloody urine with proteinurea, RBC = 25-30, WBC = 20-25 specific gravity of urine was 1.043. A repeat laboratory showed rising BUN to 31.5 mg/dl, creatinine to 2.4 mg/dl. CT scan of the upper abdomen (Fig. 1) with contrast media was obtained followed by intravenous pyelogram, which showed poor blood flow to the right kidney with no excretory function and slightly enlarged right kidney. (Fig. 2.)

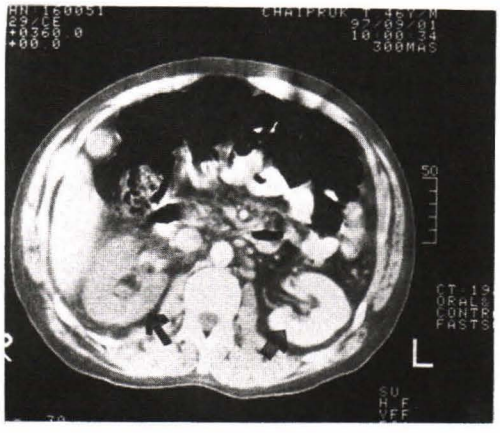

Fig. 1. Case 1
CT scan of upper abdomen after bolus intravenous administration of contrast media shows normal function of left kidney (arrow head). The right kidney shows no nephrogram and no excretory function (arrow).

Renal artery embolism or renal vein thrombosis was suggested and renal angiography was then performed on September 2, 1997 or 3 days after the sign and symptom of back pain or 2 days after symptom of hematuria. It disclosed a complete occlusion of the right main renal artery (Fig. 3) with no collateral arterial supply and no nephrogram. A 5F cobra head

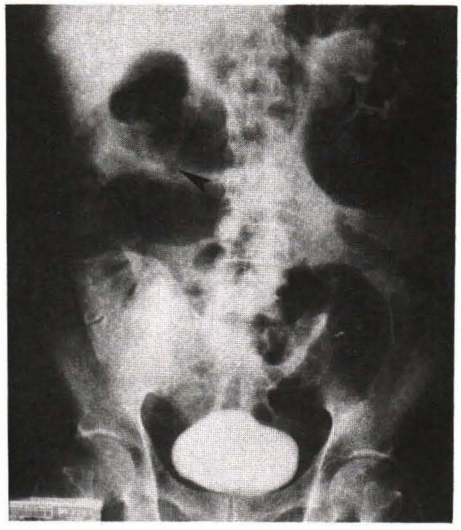

Fig. 2. Case 1
Intravenous pyelogram shows good excretory function of left kidney (small arrow head) but no excretory function of right kidney (Big arrow head).

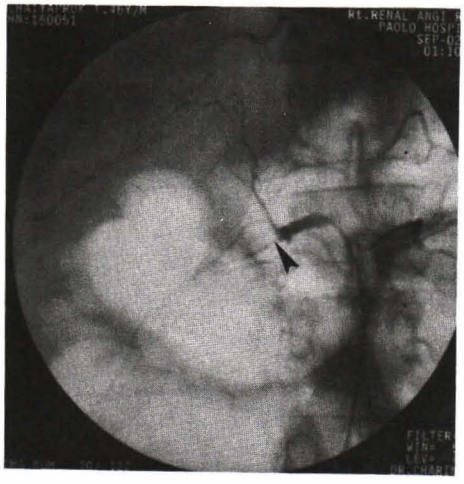

Fig. 3. Case 1
Selective right renal angiogram reveals complete occlusion of right main renal artery due to renal artery embolism (arrow).

catheter was then advanced into the distal end of the right main renal artery just proximal to the occlusion, then streptokinase 5,000 unit/hour was slowly infused in the renal artery using sigma infusion unit for 17 hours. During infusion, the patient was admitted to the intensive care unit, for careful monitoring of coagulogram every 4 hours, fibrinogen degradation product was also obtained every 4 hours, The patient was conscious and vital signs were carefully monitored. Renal function was reexamined the next morning and revealed further rising of BUN (45.8 mg/dl) and creatinine (4.6 mg/dl). A repeat renal angiogram showed recanalisation of the intrarenal branches (Fig. 4). The renal vein also appeared patent (Fig. 5). The patient's signs and symptoms of flank pain and abdominal pain were completely abolished with no gross or microscopic hematuria confirmed by urinalysis. The catheter was then selectively advanced into the recanalised renal artery and infused with heparin 400 unit/hours instead of streptokinase infusion in order to avoid complications that may occur from streptokinase infusion. Angiogram of the renal artery was done the following day and showed further recanalisation of intrarenal branches with some appearance of renal pelviocalyceal systems. However, the follow-up study showed further progression of azothemia of which BUN was 62.6 mg/dl and creatinine was 6 mg/dl. The angiogram was terminated and the catheter was removed. Four days after the last angiogram the BUN and creatinine had gradually returned to near normal, BUN was 25.5 mg/dl and creatinine was 1.9 mg/dl. The patient was discharged 12 days after admission and continues to do well with no sings or symptoms of abdominal and flank pain or hematuria. However, the renal scan taken 4 months after the last angiogram still showed diminished renal function on the affected side (Fig. 6). The

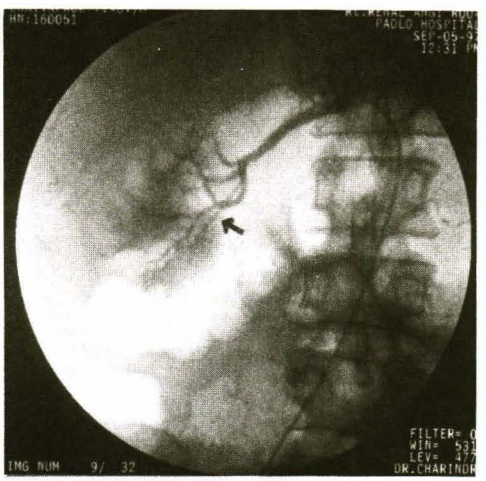

Fig. 4. Case 1
Repeat selective right renal angiogram after 17 hours 5000 unit per hour drip infusion of streptokinase shows good recanalization of right intrarenal branches (arrow).

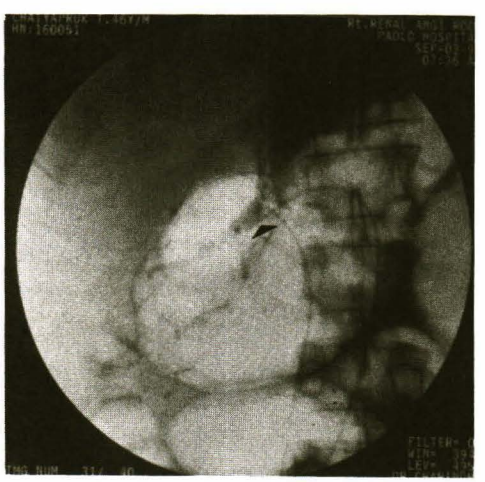

Fig. 5. Case 1
Selective right renal venogram shows patency of right renal vein (arrow).

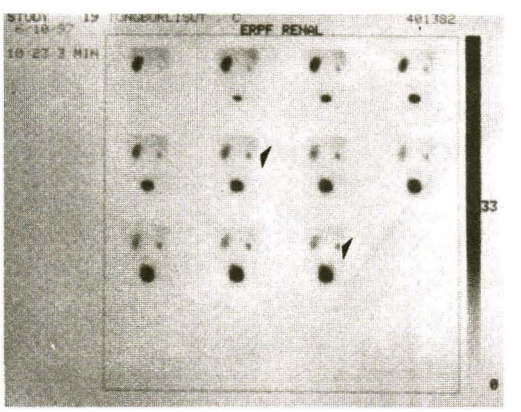

Fig. 6. Case 1
Bilateral renal scan using ^{9mm} Tc DTPA 3 mCi intravenous administration taken 4 months after last angiogram shows shrunken right kidney with diminied function of right kidney (arrow).

patient's creatinine level was 1.9 mg/dl at the last examination taken one year after.

Case 2

A 35 year old male was admitted with the chief complaint of right lower abdominal and right flank pain for half an hour prior to admission.

The patient was a known case of mitral valvular disease from rheumatic fever with atrial fibrillation on regular medication with Isoptin, Lanoxin and Moduretic for years. He presented with sudden onset of constant right lower abdominal and flank pain with referred pain to the right loin, No nausea, vomitting, or hematuria had occurred.

On admission he was found to be alert, afebrile, blood pressure was 110/80 mmHg, respiration 20/min, pulse rate 80/min, the cardio-vascular system revealed atrial fibrillation, with systolic murmur grade 3 at mid sternum.

There was no abnormality on physical examination except for tenderness around the right loin and right flank. Laboratory findings showed Hb 15.5 gram per cent, WBC of 18,300 with Neutrophil 90 per cent, and adequate platelets. Urinalysis was normal, BUN 10 mg/dl, creatinine 1.4 mg/dl. Plain KUB suggested right distal ureteric stone but upper abdominal sonogram was normal. Intravenous pyelogram showed no nephrogram and no excretory function of the right kidney. A right retrograde pyelogram showed no obstructive uropathy and no stone in the right ureter.

Right renal artery embolism was suspected and right renal angiography was done the next day. Abdominal aortogram showed almost complete occlusion of the main right renal artery (Fig. 7), no collateral circulation, no nephrographic phase and no renal excretory function was seen. A 5 French cobra head catheter was then advanced into the distal end of the right main renal artery and streptokinase 5,000 unit/hour was infused for 12 hours using an arterial pump. A repeat renal angiogram showed recanalisation of right intrarenal branches (Fig. 8). The cobra head catheter was further advanced into the right intrarenal artery and further infusion with 5,000 unit/hour streptokinase for the next 17 hours. A repeat renal angiogram at the end of therapy showed complete recanalisation of the right intrarenal arteries (Fig. 9). The catheter then was removed and the study was discontinued. The patient's pain subsided after 12 hours infusion of streptokinase and there was no further complaint of abdominal pain. Renal scan obtained one week after the thrombolytic treatment, showed diminished function of the right kidney. A follow-up renal scan 6 months later still showed diminished right renal function (not submitted). The patient had no symptom of pain during the 2 year follow-up study as an out patient.

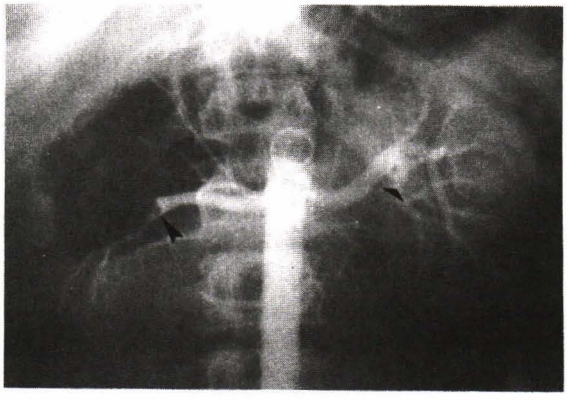

Fig. 7. Case 2
Abdominal aortogram shows normal left kidney and left renal artery (small arrowhead). There is almost complete occlusion of main right renal artery due to embolism (Big arrow head) lower pole intra renal branch seen.

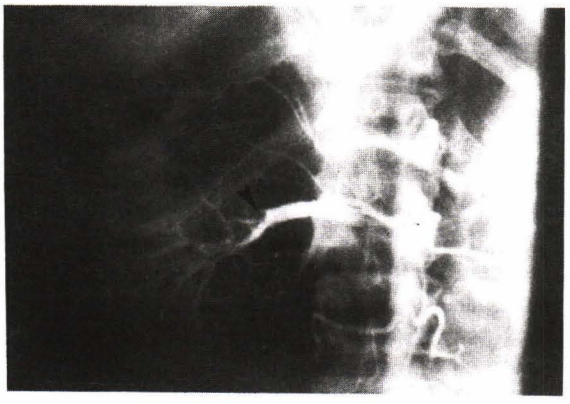

Fig. 8. Case 2
Selective right renal angiogram after 12 hours infusion of 5000 unit per hour of streptokinase shows partial recanalization of right renal artery embolism with residual clot seen (arrow).

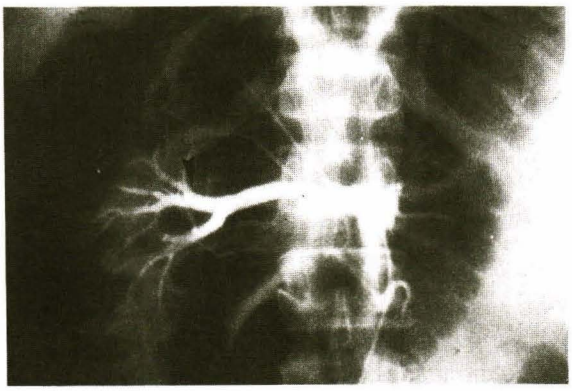

Fig. 9. Case 2
A repeat renal angiogram after second dose of streptokinase infusion 5000 unit per hour being given for another 17 hours shows complete recanalization of right renal artery embolism with no residual clot seen and good intrarenal branches demonstrated (arrow).

DISCUSSION

Streptokinase, a water soluble nonenzymatic protein produced by Group C B-hemolytic streptococci has been used widely for the systemic treatment of pulmonary embolus and deep venous thrombosis during the last twenty years. Its dose - related complications are well documented. The most common complication is active bleeding either from or near the catheter site or intracranial hemorrhage [9,10]. Recently, many articles regarding successful treatment of acute arterial occlusion have been published using low dose streptokinase infusion therapy, the recommended dose of which is 5,000 unit/hours infusion with arterial pump[7,10]. The bleeding crisis from the low dose regimens are greatly reduced. The dose of streptokinase in the present paper is low and considered to be safe with 2 short period of time intervals of infusion, as in case 1, and an even longer period of infusion, as in case 2, still showed no bleeding crisis from streptokinase infusion therapy.

In terms of improvement of symptoms of the patients, streptokinase infusion therapy as described greatly improved and resolved the signs and symptoms of flank and loin pain in both cases with complete resolution of hematuria in case 1 which correlates with reports from other articles[11,12].

In terms of improvement of renal function, as shown in case 2, suggested delay of nephrographic appearance in the angiogram (not submitted) with complete recanalised main and intrarenal branches in both cases but finally more definite examination by renal scan still showed incomplete recovery of the diseased kidney (Fig. 6) in both cases. There are many factors for the incomplete recovery, 1: streptokinase therapy was instituted between 1 day (as in case 2) and 3 days (as in case 1) after the onset of symptoms compatible with renal artery emboli which is different from the work of Sanfelippo[13] in dogs who started treatment in the canine's artery only 30 minutes after the symptoms with complete recovery of renal artery occlusion. 2: Total embolic occlusion without any distal collateral circulation of the renal artery often results in rapid irreversible loss of renal function due to renal ischemia which progresses to renal infarction and so the kidney may shrink[14] or deteriorated in function shown by the renal scan in our cases.

One other interesting finding in case 1 was the rapid rise in creatinine during the repeat renal angiographic procedure and subsequent decrease in creatine level to normal after cessation of treatment which is most likely attributed to ischemia that induced acute tubular necrosis and possibly compounded by the radiographic contrast administration which was stated by Rudy D.C.[8]. It is a temporary effect and can be resolved by termination of the study.

In summary, renal artery embolism should be diagnosed as early as possible within a few hours or an hour, with the clinical history of heart disease and atrial fibrillation together with non functioning kidney in an intravenous pyelogram. This should alert the clinician to start the angiographic procedure immediately within a few hours of clinical diagnosis and streptokinase infusion in a low dose should be given as soon as possible in order to salvage the renal parenchymal function with good recovery of renal function. In this study, the use of a low dose of streptokinase infusion (5,000 unit/hours) over a short period (not more than 30 hours) is less expensive (compared to urokinase or *t* PA) and the described regimen is considered to be a safe procedure.

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ภาวะหลอดเลือดแดงของไตอุดตันเฉียบพลัน รักษาด้วยยาสเตปโตไคเนสเข้าหลอดเลือดไตด้วยวิธีรังสีร่วมรักษา

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ภาวะหลอดเลือดแดงของไตอุดตันแบบเฉียบพลันมักเกิดในผู้ป่วยที่เป็นโรคหัวใจ โดยเฉพาะโรครูมาติคที่เกิดที่ลิ้นหัวใจไมเติล หรือผู้ป่วยหัวใจขาดเลือดไปเลี้ยงทำให้กล้ามเนื้อหัวใจตายไป ผู้ป่วยพวกนี้มักมีการเต้นของหัวใจผิดปกติไม่สม่ำเสมอหรือภาวะการเต้นผิดปกติของหัวใจช่องแอเตรียม ทำให้มีลิ่มเลือดไปที่หลอดเลือดแดงของไต ถ้าไม่รับการรักษาอาจมีอันตรายอาจถึงชีวิตได้ การรักษาด้วยการผ่าตัดอาจยุ่งยาก เนื่องจากผู้ป่วยมีโรคหัวใจอยู่ก่อน ได้รายงานผู้ป่วย 2 ราย โดยให้การรักษาด้วยการใส่หลอดสวนเข้าหลอดเลือดแดงของไตที่ถูกอุดด้วยลิ่มเลือดโดยปล่อยสารสเตปโตไคเนส โดยอาศัยเครื่องปั๊ม ช่วยชั้มยานี้เข้าไปในหลอดเลือดแดงของไต ซึ่งได้ทำในผู้ป่วย 2 รายที่มีหลอดเลือดไตที่เกิดภาวะนี้ข้างเดียว และได้ผลเป็นที่น่าพอใจคือผู้ป่วยหายจากอาการปวดและเจ็บ สืบเนื่องจากภาวะหลอดเลือดแดงของไตอุดตันเฉียบพลันและไม่มีเลือดออกทางไตอีกเลยหลังรักษาด้วยวิธีนี้

คำสำคัญ : หลอดเลือดแดงของไต, ภาวะอุดตันหลอดเลือด, การรักษา

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