

## 신손상 후 발생한 신장동맥 거짓동맥류

분당제생병원 비뇨기과, 응급의학과<sup>1</sup>

정은홍 · 김은석 · 박형철 · 문근배 · 장석훈 · 김재일 · 손정환 · 하영록<sup>1</sup>

— Abstract —

### Renal Artery Pseudoaneurysm after Blunt Renal Trauma

Eun-Hong Jung, Eun-Suk Kim, Hyung-Chul Park, Geun-Bae Mun,  
Seok-Heun Jang, Jae-II Kim, Jung-Hwan Son, and Yeong-Rok Ha<sup>1</sup>

*Department of Urology and Emergency Medicine<sup>1</sup>,  
Bun Dang Jesaeng General Hospital, Sung Nam, Korea*

Renal artery pseudoaneurysm after blunt renal trauma is an uncommon complication of delayed hemorrhage, and diagnostic difficulties are experienced due to its rarity. Delayed hemorrhage after renal trauma is a life-threatening complication. Angiography is considered the gold standard to diagnose a traumatic renal artery pseudoaneurysm. We report here a case of delayed bleeding from a renal artery pseudoaneurysm that was diagnosed at 17 days after the injury and that was managed successfully with selective renal artery embolization without medical complication. (J Korean Soc Traumatol 2009;22:260-263)

**Key Words:** Trauma, Pseudoaneurysm, Kidney, Embolization

The majority of renal injuries are grade I to III and can be successfully managed nonoperatively with excellent functional preservation.(1) For high-grade (IV/V) renal injuries, the best approach to management, primarily non-operative or operative exploration and repair, is being argued. Isolated grade IV renal injuries can be successfully managed nonoperatively, with persistent bleeding representing the major indication for renal exploration.(2) Delayed hemorrhage after renal trauma is a life-threatening complication.(3) A renal artery pseudoaneurysm is one of the

causes of delayed hemorrhage, but is rarely developed after blunt abdominal trauma. We report a case of renal artery pseudoaneurysm that caused delayed hemorrhage after a blunt trauma injury.

#### I. Case Report

A 56-year-old man was admitted to the emergency room for left upper quadrant abdominal pain and chest wall pain. He was hit by a building wood material form.

\* Address for Correspondence : **Eun-Hong Jung, M.D.**

Department of urology, Bun Dang Jesaeng General Hospital  
#255-2, Seohyeon-dong, Bundang-gu, Seongnam-si, Gyeonggi-do 463-774, Korea  
Tel : 82-31-779-0165, Fax : 82-31-779-0169, E-mail : eunhong2@gmail.com

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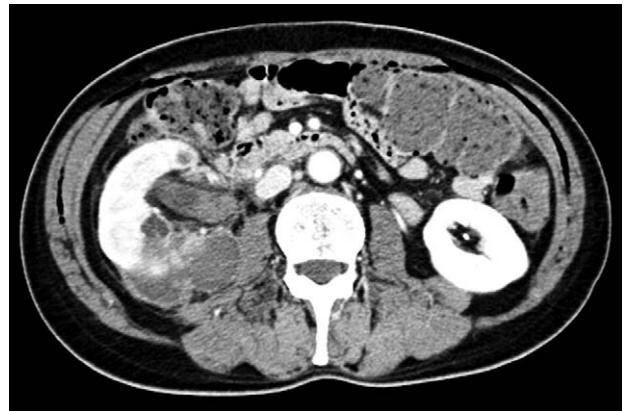
The patient had no significant medical history. Patient was hemodynamically stable on arrival. On physical examination, he had bilateral costovertebral angle tenderness. Foley catheter placement revealed gross hematuria. His initial hemoglobin level was 13.3 g/dL. Gross hematuria was seen, urinalysis showed many red blood cells and many white blood cells per high-power field microscopic examination. Initial contrast-enhanced computed tomography (CT) scan revealed a right grade IV renal injury involving lower pole and large perirenal hematoma (Fig. 1). There was evidence of contrast extravasation in right posterior perirenal space suggesting active bleeding. Chest X-ray showed left 4<sup>th</sup> to 7<sup>th</sup> rib fracture with scanty amount pneumothorax. The remainder of his laboratory and radiographic tests were within normal limits.



**Fig. 1.** Initial contrast-enhanced CT demonstrated right grade 4 renal injuries involving the lower pole and large perirenal hematoma.

He remained hemodynamically stable and was managed conservatively with absolute bed rest. Gross hematuria was subsided after 24 hours, but postinjury day (PID) 3 complaining abdominal distention with decreased urine output. Large amount blood clot was evacuated by manual bladder irrigation. After the procedure, the patient's gross hematuria resolved and he had no bladder discomfort.

On PID 9, he complained abdominal distention again. Despite manual bladder irrigation, the hematuria did not resolve, and the patient developed hypotension, tachycardia, and a decrease in hematocrit level 35.3%. Abdominal ultrasound showed a large hematoma in bladder. An emergency cystoscopic hematoma removal was undertaken based on these findings. While cystoscopic hematoma removal, iatrogenic bladder perforation was seen, and so,



**Fig. 2.** Postinjury day 14, a CT scan revealed a decreased perirenal hematoma but active bleeding was seen from the lower pole of the right kidney.



**Fig. 3.** Postinjury day 17, renal angiography showed a pseudoaneurysm of the arcuate artery from right kidney lower pole (A) and After embolization, renal angiography revealed complete obstruction of arcuate artery and pseudoaneurysm was not seen (B)

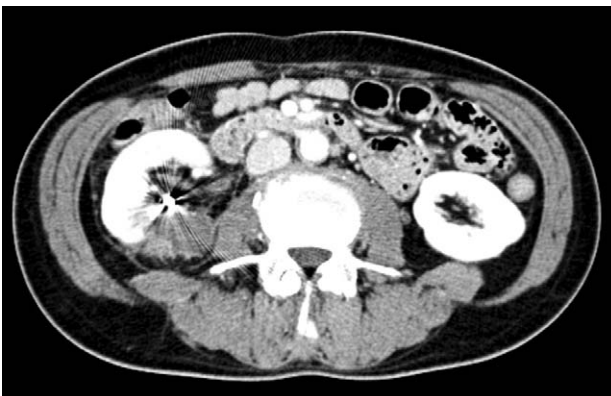
emergency exploratory laparotomy was performed. Bladder perforation was sutured in two layer and suprapubic percutaneous cystostomy was done.

PID 14, the patient was hemodynamically stable with persistent gross hematuria. A CT scan revealed a decreased perirenal hematoma but active bleeding was seen from the lower pole of the right kidney (Fig. 2). We planned to renal angiography.

PID 17, renal angiography showed a pseudoaneurysm of the arcuate artery from right kidney lower pole. At the same time, a selective embolization of aneurismal sac was performed by using microcoils. After embolization, renal angiography revealed complete obstruction of arcuate artery and pseudoaneurysm was not seen (Fig. 3). After embolization, negligible gross hematuria was observed for several days. The rest of his hospital course was uneventful. A follow-up contrast-enhanced CT on PID 32 showed no evidence of renal artery pseudoaneurysm and nearly resolved perirenal hematoma around right kidney lower pole (Fig. 4).

## II. Discussion

Delayed hemorrhage after renal trauma is a life-threatening complication.(3) The interval between the injury and the onset of secondary hemorrhage is 2~36 days.(4) It is most often a result of an arteriovenous fistula or pseudoaneurysm.(1) Penetrating trauma causes a direct arterial injury, but in blunt trauma, strong deceleration forces may cause the arterial injury. After artery is completely or partially injured, surrounding tissues such as vascular adventitia, renal parenchyma, or Gerota's fascia may contain the



**Fig. 4.** Postinjury day 32, a follow-up contrast-enhanced CT showed no evidence of renal artery pseudoaneurysm and decreased size of perirenal hematoma collection around right kidney lower pole.

hemorrhage. After initial renal injury, a combination of hypotension and coagulation results in the temporary cessation of the bleeding. The degradation of the clot and surrounding necrotic tissue results in recanalization between the intravascular and extra vascular space and, subsequently, the formation of a pseudoaneurysm. With restoration of normal hemodynamics, the pseudoaneurysm can grow and eventually rupture into pelvocalyceal system or the perirenal space.(3,5) This can result in very rapid and severe blood loss, with gross hematuria and even clot retention.(1)

In literature review, most patients presented with one or more of the following symptoms: gross hematuria, flank pain, mass, abdominal bruit or hypotension.(7) In our case, on PID 9, we were faced by serious bladder hematoma and unexpected bladder rupture in course of hematoma evacuation. After bladder rupture repair, we decided abdomen CT and renal angiography to detect renal vascular injury with respect to persistent gross hematuria.

Ricard S. Lee et al. reported the mean time to presentation was 17 days and Heyns and van Vollenhoven reported 11.5 days. Renal artery pseudoaneurysm review, there was great variability in time to presentation, range from 9 days to 15 years and our case diagnosed after 17 days. Presentation variability was associated with grade of injury, mechanism of blunt trauma, age, gender or initial management.

Management of renal artery pseudoaneurysm varied between open exploration and angiographic embolization.(7) Angiography is considered the gold standard to diagnose traumatic renal artery pseudoaneurysm. Multiple non-invasive tests ranging from renal ultra sound, intra venous pyelograms, contrast-enhanced CT scanning, magnetic resonance imaging and renal scintigraphy have not been successful in diagnosing renal artery pseudoaneurysm.(3) And angiographic approach is available to therapeutic intervention. Our case was managed successfully with selective embolization without medical complication. Typically gross hematuria after blunt renal trauma, improving with absolute bed rest and conservative treatment until hemodynamically stable state. But if there was persistent hematuria or delayed hematuria, we should check for possibility of damage renal vascular injury including renal artery pseudoaneurysm formation.

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