

Lumbar Artery Embolization for Control of Bleeding after Percutaneous Renal Biopsy

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Introduction

Renal biopsy is an important investigation for suspected renal parenchymal disease and is frequently required in clinical practice. Use of ultrasound and automated spring loaded device has reduced the rate of complications associated with the procedure. However, occasionally dramatic situations of hemodynamic instability arise due to bleeding after renal biopsy. Only four cases of lumbar artery injury following renal biopsy have been reported in literature. We report a case of severe hemorrhage due to first lumbar artery injury after native renal biopsy in a patient with functional platelet disorder which was managed with embolization and subsequent surgical exploration.

Case history

A 55 year old male with history of type 2 diabetes mellitus and peripheral sensory neuropathy was admitted with anorexia, swelling of feet, reduced urine output and exertional dyspnea since 1 month. He denied history of fever, diarrhea, arthralgia, abdominal pain, hematuria and had not received NSAIDs, ACE inhibitors or ARBs. Three months ago the sr. creatinine level was 1.1 mg%. Laboratory data on admission was as follows: Hb 7.9 g%, leukocyte count 12,800/mm³, platelet count 1,80,000/mm³, sr. creatinine 4.8 mg%, INR 1.1, urine protein 2+, 10-12 RBCs/hpf and 20-30 WBCs/hpf. Urine protein to creatinine ratio was 2.6 and urine culture was negative. Abdominal Ultrasound (USG) revealed normal morphology of the kidneys and urinary tract. Autoimmune markers were negative. Echocardiography revealed mild diastolic dysfunction. Fundoscopy showed silver wiring and a few soft exudates. During the hospital course, the renal function worsened further and hemodialysis was initiated. Subsequently, USG guided percutaneous right sided renal biopsy was done to rule out non-diabetic renal disease. Biopsy was done with 18G (16 cm length, Biopsy - Cut® Coaxial) needle and an automated spring loaded device (Bard® Biopsy-Cut® Reusable Core Biopsy Instrument), after administration of desmopressin nasal spray (0.4 mcg/kg, 3 hr before biopsy). Eight hours after the procedure, the patient experienced severe abdominal pain, and was noted to have hypotension, tachycardia, a tender palpable swelling in the right lumbar region and a drop in hemoglobin level by 3 gm%. He was shifted to ICU, vasopressor support was started after initial volume expansion and blood and frozen plasma were transfused. Ultrasound revealed a large retroperitoneal collection of 15.5×15.5×7.9 cm (~1000cc) with dense echo contrast. Abdominal aortography via trans-femoral route, followed by selective right renal angiography showed no signs of extravasation. A 4F catheter was then inserted into the right first lumbar artery for selective angiography which revealed extravasation of contrast solution from the middle part of the anterior branch of lumbar artery, with a latero-caudal extension (Figure 1). The anterior

branch of lumbar artery was selectively cannulated and embolized using 20% N-butyl Cyanoacrylate (NBCA) with iopamidol. Extravasation was also noted from a small capsular artery which was cannulated with a 2.9 F microcatheter, and embolized. The following angiography showed complete occlusion of the anterior branch of the first right lumbar artery and no further extravasation (Figure 2).

Over the next 48 hours, patient improved hemodynamically and required no blood products, although he had a large retroperitoneal hematoma, severe abdominal pain, respiratory distress and paralytic ileus. A plain CT abdomen revealed 24×19×16 cm perinephric collection extending into pelvis and pushing right kidney medially (Figure 3). In addition, there was risk of secondary infection of the hematoma. Therefore, surgical exploration was done and the hematoma was evacuated. A platelet aggregation study was abnormal; platelet aggregation in response to ADP, collagen and arachidonic acid was poor, whereas ristocetin assay was normal, findings consistent with Glanzmann thrombasthenia. He was treated with intranasal desmopressin and platelet transfusions peri-operatively.

Following embolization and evacuation of hematoma, the general condition stabilized, vasopressor support was tapered off and the hematocrit remained stable. The biopsy revealed diabetic kidney disease and he required regular hemodialysis. However, 2 months later he developed sepsis associated with pneumonia, multi-organ failure and died.



Figure 1: Angiography showing extravasation from middle part of anterior branch of right first lumbar artery.

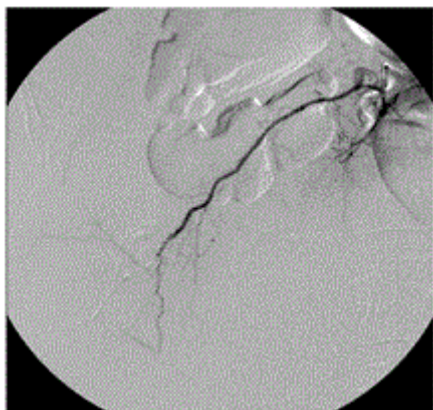


Figure 2: Closure of the anterior branch of the lumbar artery after embolization.

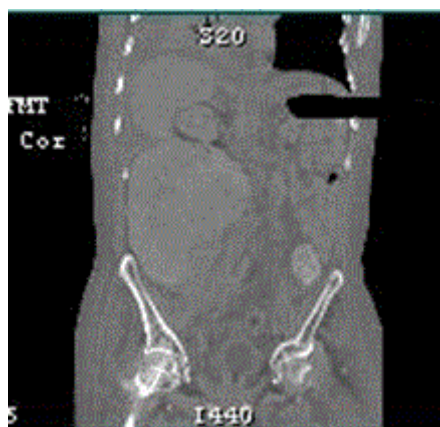


Figure 3: CT scan of abdomen showing large right perinephric hematoma.

running dorsally to the kidney, seem to be quite vulnerable during kidney biopsy.

A recent meta-analysis of 34 studies including 9,474 renal biopsies found the complication rate as follows: Perinephric hematoma 11.6%, macroscopic hematuria 3.5%, blood transfusion requirement 0.9%, angiographic intervention 0.6% and death 0.02%. Under-reporting of complications, with centers having high complication rates to be less likely to publish their results, is an important fact. Three risk factors identified for complications include larger needle size, older age, hypertension, acute kidney injury, elevated serum creatinine level, low pre-biopsy hemoglobin level, female gender and presence of coagulopathy [3,12]. For patients with uncorrectable coagulopathy, two potential solutions exist for preventing severe hemorrhage after renal biopsy: a trans-jugular approach, [13] in which any bleeding that occurs, extends into the vessels directly and a laparoscopic renal biopsy [14] with direct coagulation of the bleeding site.

When compared with surgical intervention, angiographic procedures facilitate not only a fast and minimally invasive diagnosis, but also an immediate therapeutic effect, that of embolization. The overall technical and clinical success of angiographic intervention ranges from 85%-100% and 61%-100%, respectively [15]. Authors of one study reported that out of 26 patients receiving initial embolization therapy, 12% later required open surgical repair, 10% required nephrectomy, and 2% required partial nephrectomy [15]. The lumbar angiography also carries a risk of spinal cord injury if the catheter tip has been directed into the radicular medullary artery, which supplies the regional part of the spinal cord; forceful injection of a larger amount of contrast solution in this artery can lead to an ischaemic lesion of the spinal cord segments [7].

In conclusion, bleeding from a lumbar artery after percutaneous biopsy is a rare but potentially lethal complication. Arterial embolization is an effective method of control of hemorrhage. Embolization followed by surgical exploration is required in a significant proportion of cases for control of bleeding. Coagulopathy, including platelet disorders must be ruled out in all at-risk biopsy candidates. Alternate methods of renal biopsy like trans-jugular or laparoscopic biopsy should be considered for patients with uncorrectable coagulopathy.

Discussion

A number of complications have been reported with renal biopsy procedure, although the introduction of USG and automated spring loaded device have reduced the rate of complications after renal biopsy [1,2]. The primary complication of kidney biopsy is hemorrhage [3]. Injuries of extra-renal arteries by biopsy needles are very rare. We found only four cases of lumbar artery injury following renal biopsy that have been reported in literature [4-7]. Injury to mesenteric artery, [8] intercostal artery [9] and abdominal aorta [10] are the other solitary case reports of biopsy related complications. Lumbar artery injury has also been described with percutaneous nephrostomy [11].

After arising from the aorta, the lumbar artery encircles the vertebral bodies and divides into branches to the psoas muscle and to the radicular medullary artery. Further, it divides into anterior and posterior branches. The posterior branch supplies the sacrospinalis muscle and skin of the back. The anterior branch passes under the quadratus lumborum dorsal to the kidney and supplies it, the sacrospinalis muscles and skin of the flank. These muscular branches,

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