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Case Report

Endovascular Embolization of Spontaneously Ruptured Renal Artery Pseudoaneurysm in a Post-Partum Woman: A Case Report

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Abstract

Renal artery pseudoaneurysm (RAP) is a rare but potentially life-threatening condition that is often challenging to diagnose. While commonly associated with procedures or trauma, spontaneous cases are exceedingly rare. We present a case of a post-partum woman with a spontaneously ruptured segmental renal artery pseudoaneurysm.

We report a 19-year-old post-partum woman presented with an enlarged kidney and rising serum creatinine levels following a caesarean section. Imaging revealed a ruptured renal artery pseudoaneurysm, and endovascular glue embolization was performed successfully.

Renal artery pseudoaneurysms pose diagnostic challenges, and angiography remains a gold standard. In our case, the pseudoaneurysm was larger, necessitating intervention. Selective glue angioembolization effectively treated the ruptured pseudoaneurysm, preserving renal function.

This case highlights the importance of considering renal artery pseudoaneurysms, even without a history of major trauma or surgery. Renal artery embolization emerges as a minimally invasive and effective diagnostic and therapeutic approach for RAPs, showcasing its utility in life threatening scenarios. Our experience underscores the efficacy of this technique in managing such complex cases.

BACKGROUND

Renal artery pseudoaneurysm (RAP) is an uncommon but potentially life-threatening condition that is often difficult to diagnose. Typically, RAPs are seen in patients after renal biopsy, percutaneous nephrolithotomy, partial nephrectomy, or trauma. The incidence of renal artery pseudoaneurysm is unknown, given that it is often asymptomatic. Most of the time, small pseudoaneurysms are asymptomatic and thrombose spontaneously [1].

However, when they are symptomatic, patient can present with a pulsatile mass in the pelvis, flank pain, renal dysfunction secondary to compression of artery branches or shunting of blood, or hemorrhage from rupture. Although these lesions can be managed surgically, renal artery embolization is preferred if they are amenable to embolization to minimize the loss of normal renal parenchyma. Spontaneous pseudoaneurysm of segmental renal artery is also a rare entity [2-4].

Here we present a case of spontaneous rupture of a segmental renal artery pseudoaneurysm in a post-partum woman. To whom subsequently glue embolization was performed.

CASE PRESENTATION

A 19-year-old pregnant woman presented with labour pain at 37 weeks and 1 day of period of gestation. Having already been diagnosed with anaemia in the third trimester with an Hb of 8.9 g/dL and breech presentation, in this admission fetal distress was identified during labour, and subsequently she underwent emergency lower segment caesarean section.

On post operative day 2 she was presented with persistent severe abdominal pain and on examination patient was afebrile, mildly pale, had blood pressure in the upper margins and low urine output with no evidence of hematuria. Post-operative Hb was 6.9 g/dL and she was transfused 2 pints of blood, correcting Hb to 9.0 g/dL. Serum creatinine levels were normal but slowly

rising, from 68 to 98 µmol/L. Urine full report negative and inflammatory markers were not elevated. Ultrasound Scan of the abdomen was performed to find the cause for her symptoms [5-9].

Ultrasound Scan of the abdomen depicted large intra-capsular haematoma with a small aneurysm in the inter polar region of right kidney (Figure 1, 2). Ultrasound excluded any uterine bleeding or focus of infection.

Subsequently, CT angiogram confirmed a ruptured pseudo aneurysm with intra renal and intra- capsular haematoma (Figure 3).

Renal artery DSA was performed which diagnosed a ruptured pseudoaneurysm in the anterior inferior segment artery of the right kidney, measuring 1.6 x 1.3cm in size (Figure 4). Glue (n-butyl-2- cyanoacrylate) and lipiodol combination were used for embolization (Figure 5). Embolization successfully performed and post procedure period was uneventful.

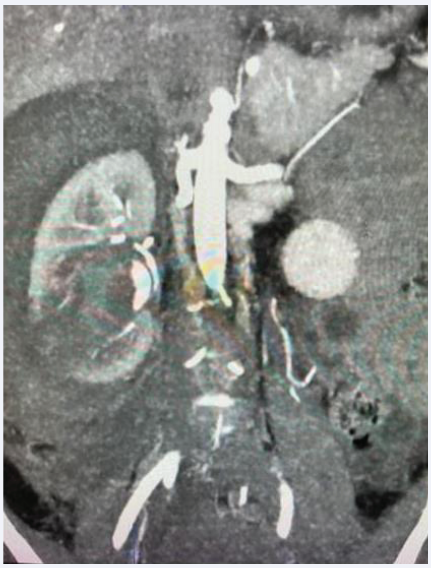

Figure 3 CT angiogram.

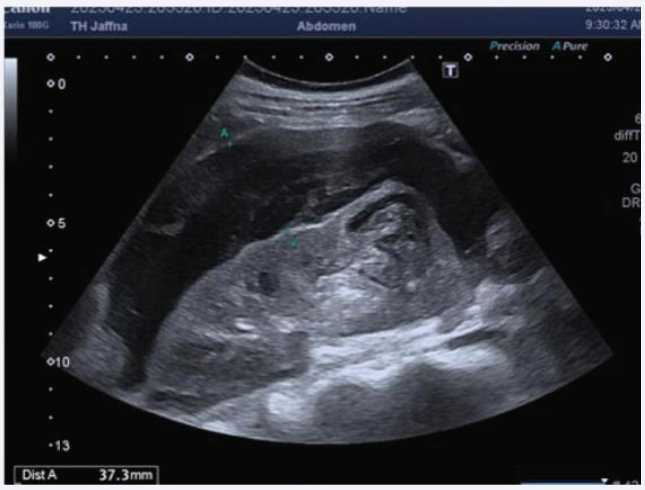

Figure 1 Ultrasound Scan of the abdomen.

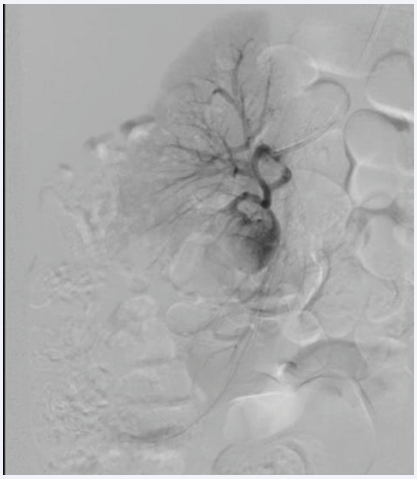

Figure 4 Anterior inferior segment artery of the right kidney.

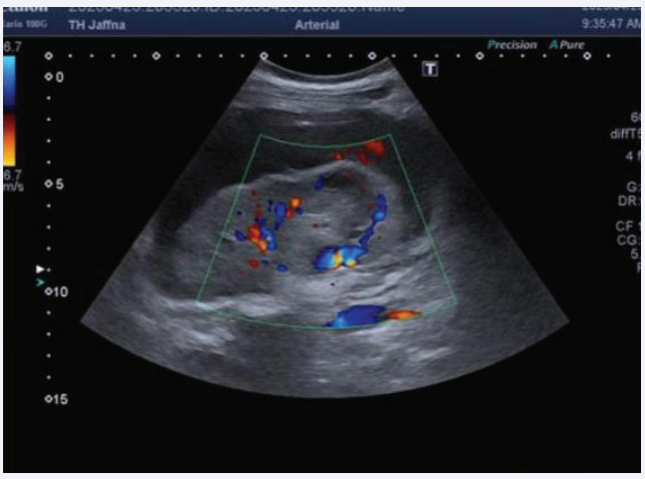

Figure 2 Ultrasound Scan of the abdomen.

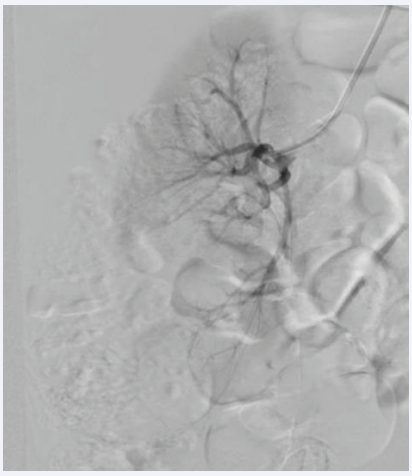

Figure 5 Embolization.

Follow up Ultrasound showed interval reduction in perinephric haematoma with no bleeding from the pseudoaneurysm. Her Hb was 8.7 g/dL and serum creatinine 81 μmol/L on discharge.

DISCUSSION

Renal artery aneurysms (RAA) are localized dilations of the renal artery and/or branches. It was the first disease process of the renal artery to be identified and has historically been considered a rare phenomenon until the widespread use of angiography [10].

A true aneurysm is a balloon like dilation of all layers of the vessel wall, whereas a false (pseudo) aneurysm is derived from tissues surrounding the arteries [10]. There are 4 basic structural types: saccular, fusiform, dissecting, and arteriovenous/ microaneurysms (12). Saccular are the most common and represent 70% to 75% of all RAAs [10-12]. Intraparenchymal RAAs are rare and account for <10% of all RAAs [11,13].

RAAs can be either congenital or acquired. Congenital RAAs have been associated with autosomal dominant polycystic disease, fibromuscular dysplasia, and tuberous sclerosis [10].

Acquired etiologies include longstanding untreated hypertension, atherosclerosis, blunt and penetrating trauma, recent surgical manipulation (open, laparoscopic, and/ or endovascular), angiomyolipoma's, infectious (mycotic), polyarteritis nodosa, malignancy, coagulopathy, radiation, and/ or cyclophosphamide use. Acquired RAAs have a highly variable location and size (1 to 10 cm), although most (> 90%) are smaller than 2 cm. The risk of rupture is thought to vary inversely with size, and most investigators agree that aneurysms larger than 2 cm are more likely to undergo rupture. The rupture rate occurs in approximately 30% of cases, with mortality greater than 20% [14-17].

RAP is a rare clinical entity that may occur after renal biopsy, renal surgery, renal transplantation, penetrating trauma, or blunt renal trauma. Passage of blood from a lacerated renal artery to the renal parenchyma leads to the formation of RAP [1,2]. In renal transplant patients, pseudoaneurysms can result from infection or technical failure at the site of the anastomosis [6].

After renal injury, combination of hypotension, coagulation, and pressure from the surrounding tissues, such as the vascular adventitia, renal parenchyma, and Gerota's fascia, result in temporary cessation of the bleeding. Later dissolution of the clot and surrounding necrotic tissue results in recanalization between the intravascular and extravascular space, which ultimately leads to formation of a pseudoaneurysm. With restoration of normal blood flow in the artery, the pseudoaneurysm can grow in size and eventually become unstable, with erosion into the surrounding perinephric tissue [3-5].

However, spontaneous rupture of RAP as in our case, without history of surgery, renal biopsy, significant abdominal trauma, and systemic disease, is a very rare entity. Previous trivial abdominal trauma may also be a predisposing factor for the development of renal RAP and the patient may not elicit history of such minor event.

Symptoms of RAP may include abdominal tenderness, abdominal mass, hematuria, hypertension, and shock. Signs and symptoms of RAP may develop immediately after the insult, or they may be delayed [18]. Hematuria is the most common symptom associated with RAP and results from the erosion of RAP into the adjacent renal collecting system; this may occur within 2 to 4 weeks after the injury [19]. However, patients can present with nonspecific symptoms and therefore RAP is incidentally found.

In fact, the diagnosis of RAP is challenging. Angiography has been the gold standard tool for diagnosis. However, if the patient is stable, noninvasive tests such as contrast medium-enhanced CT, color Doppler sonography, or magnetic resonance angiography should be performed [20]. CT angiography has advantage of imaging of the entire urinary tract and is the technique of choice for follow-up [21]. RAP is best seen on the arterial phase, which appears as a focal high attenuation lesion with a density similar to that of the adjacent arterial vessels. RAP may also be visible in the nephrographic phase but may be missed when the adjacent renal parenchyma is densely enhanced, masking the high density of the pseudoaneurysm. Due to washout of contrast material from the pseudoaneurysm in pyelographic phase, RAP will not be seen [22].

Pseudoaneurysm resembles a cystic mass on sonography. The ultrasound findings may not be sufficient to distinguish a hematoma from a pseudoaneurysm. Color Doppler sonography is very useful and shows characteristic to-and-fro flow within the lesion. If imaging findings are not conclusive and there is clinical suspicion of RAP, or the patient is hemodynamically unstable, angiography should be undertaken. In addition to high sensitivity in identifying RAP, the advantages of angiography include the potential to achieve simultaneous endovascular management of RAP [23].

Currently, no definite guidelines exist for the size at which an RAP should be repaired in an asymptomatic patient. In general, aneurysms greater than 2 cm in diameter are considered to have a high risk of rupture [24]. In fact, it has been reported that most pseudoaneurysms are small and asymptomatic and sometimes resolve spontaneously [25].

Given that ruptures have also been reported in smaller aneurysms if left untreated, it was decided that an intervention on the RAP would decrease the risk of ultimate rupture [26].

In our case, the size of the pseudoaneurysm was smaller and arising from anterior inferior segmental renal artery. A team of interventional radiologists and a urosurgeon decided to intervene in the pseudoaneurysm by endovascular embolization.

Management methods of RAP are also a challenging issue, and a variety of treatment modalities have been exploited so

far [19]. In general, angiographic embolization is the procedure of choice for management of RAP due to its minimally invasive and selective nature and the maximal preservation of renal parenchyma [18].

The embolization material should be chosen based on the patient's vascular anatomy and the specific clinical indication or pathologic process necessitating the procedure. Resorbable materials, coils, inert particles, and sclerosants (liquids) can be used, depending on the clinical indication and vascular structure to be occluded [27,28].

However, embolization for the management of RAP appears to have some shortcomings such as possible reflux of embolic material into the normal proximal vessel if the distal branch has not been selectively cannulated and the risk of more generalized ischemia resulting from thrombosis of a main feeding branch [19,27,28]. To overcome these limitations, treatment with covered stent grafts on RAP located in branches of visceral arteries has been suggested [23].

CONCLUSION

In conclusion, we herein showed a case of 19-year-old woman with spontaneous asymptomatic segmental RAP suspected in USS of the abdomen, which was later confirmed with CECT renal angiography and DSA of the renal artery.

RAP was treated with selective glue angioembolization of the middle segmental renal artery, and follow-up imaging showed successful resolution without evidence of complications.

Clinicians and radiologist need to bear in mind that even without history of major renal trauma or surgery, renal pseudoaneurysm can occur in asymptomatic individuals. Renal artery embolization is a minimally invasive technique for the diagnosis and management of RAPs. Unlike other imaging modalities, such as CT and USG, angiography not only demonstrates the anatomic location of pseudoaneurysms, but also allows the interventional radiologist to treat this potentially life-threatening complication quickly and effectively. Our case demonstrates the efficacy of this technique.

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