CASE REPORT

Pregnancy with a ruptured renal artery aneurysm: management concerns and endovascular management

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SUMMARY

Renal artery aneurysm (RAA) affects <0.01% of the general population. Rupture of RAA is a rare catastrophe that can complicate pregnancy and is associated with high maternal and fetal mortality. Presentation is usually acute with severe flank pain, with or without haematuria, and haemodynamic instability requiring exploration and nephrectomy. A 26-year-old pregnant woman had sudden onset of gross haematuria and on evaluation was found to have a left RAA with an intrapelvic rupture and thinned out renal parenchyma. In view of the high risk of surgery, she was managed with endovascular placement of an Amplatzer type II vascular plug. Immediate and complete occlusion of blood flow was achieved and nephrectomy was avoided. Follow-up Doppler ultrasound revealed a reduced 5 cm mass in the left renal fossa with no internal flow and plug in position. She is currently on follow-up with 3–6 monthly ultrasonography not requiring any intervention.

BACKGROUND

A ruptured renal artery aneurysm (RAA) is a rare cause of haematuria in pregnant patients.¹ Owing to the rarity of this condition, the diagnosis may not be considered and the resulting delay may increase the risk of mortality. Such cases are usually managed by open surgery and nephrectomy. Since the patient was haemodynamically stable and there was considerable risk associated with nephrectomy, an endovascular approach was preferred.

CASE PRESENTATION

A 26-year-old woman (G3P2L2A0) in the 14th week of pregnancy had a sudden onset of left flank pain associated with gross haematuria of 10 days duration. There was no history of trauma, surgical intervention or any other medical comorbidity. She had previous two normal full-term vaginal deliveries 3 and 6 years ago. There was an associated significant drop in haemoglobin to 3 g/dL that required 6 units of packed cell transfusion to maintain haemodynamics. On presentation, she was afebrile and haemodynamically stable with no active haematuria. Her blood pressure was 112/76 mm Hg and haemoglobin was 7.5 g/dL. Abdominal examination revealed a 10 cm pulsatile mass in the left flank with no signs of peritonitis.

INVESTIGATIONS

The patient was evaluated with ultrasonography (USG) and MRI which revealed a 14×10×10 cm

pseudoaneurysm of the left main renal artery with an intrapelvic rupture and significant compression and displacement of the left renal parenchyma. There was no functional renal parenchyma on the left side and the right kidney was normal except for physiological hydronephrosis. Pelvic images revealed a single fetus of 14–15 weeks gestation. ([figure 1](#)).

DIFFERENTIAL DIAGNOSIS

Differential diagnosis included urolithiasis, placenta percreta, uterine rupture and ruptured ectopic pregnancy. USG showed a large aneurysm in the left renal area which was confirmed on MRI.

TREATMENT

The patient was haemodynamically stable and there was no active haematuria. The presence of a large high flow aneurysm arising from the main trunk of the left renal artery made open nephrectomy technically challenging. Thus, it was decided to treat the aneurysm endovascularly and proceed to nephrectomy if it failed and to terminate pregnancy medically once stable in view of radiation exposure. Digital subtraction angiography (DSA) was performed via the left brachial artery and the left renal artery was selectively cannulised. The angiogram showed a large high-flow aneurysm in the main left renal artery but vasculature and renal parenchyma distal to the aneurysm were not visible ([figure 2A](#)). In view of the large diameter of the artery (9 mm), high flow into the aneurysm and no functioning renal parenchyma, it was decided to plug the main renal artery with an Amplatzer vascular plug type II. We chose a 12 mm type II plug which was deployed into the main renal artery and complete occlusion was immediately achieved ([figure 2B](#)). She developed low-grade fever the following day and follow-up Doppler ultrasonography confirmed the absence of flow. Once stable pregnancy was medically terminated on day 3, she was discharged in a stable condition.

OUTCOME AND FOLLOW-UP

After 3 months of follow-up, she is symptom free. CT angiography at 4 weeks revealed a reduced 9×9 cm mass in the left renal fossa with no blood flow in the left renal artery with a vascular plug in its position ([figure 2C](#)). Doppler study at 3 months revealed a further reduction to 5 cm in size and no internal flow. She is currently asymptomatic and on regular follow up with ultrasonography at 3–6 monthly intervals.

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Figure 1 MRI ((A) axial and (B) coronal) showing a large aneurysm in the left renal area with a thin rim of the parenchyma displaced by mass effect (arrows point to the aneurysm). (C) Single fetus in utero.

DISCUSSION

RAA is an unusual diagnosis and affects <0.01% of the general population and 2.5% of the hypertensive population. It is the second most common type of visceral artery aneurysm and constitutes 15–25% of all such cases.^{2–4} They are mostly located in the main renal artery usually at its bifurcation. Typical age at presentation is between 40 and 60 years with no gender predilection. Atherosclerosis and fibrous dysplasia are the two most common underlying aetiologies, but RAA can be present in patients with angiomyolipoma, congenital renal malformations, a history of trauma or renal surgery, malignancy or systemic infection. Our patient was a 26-year-old pregnant woman with no such history.

Haemodynamic changes during pregnancy, that is increased blood volume and cardiac output, raised intra-abdominal pressure and hormonal alterations, affect the arterial wall and increase the risk of rupture of RAA, more so in the third trimester.^{5–6} Our patient had third pregnancy which may have increased the risk of development and rupture of the aneurysm. The patients are asymptomatic till the aneurysm ruptures and presents with severe flank or abdominal pain with or without haematuria. Owing to the pregnant state, such presentation can be misdiagnosed as placental abruption or uterine rupture case-arean section planned for, with the final diagnosis made only at exploration.⁷ Our patient had flank pain with gross haematuria without any haemodynamic instability and ultrasonography revealed a left RAA, avoiding misdiagnosis.

Treatment is recommended for all aneurysm >2cm in size or >1cm aneurysm in child bearing age group, or if there is progressive enlargement, anterior venous fistula, uncontrolled

hypertension or hemorrhage.³ Rupture of RAA is a life-threatening condition with mortality rates as high as 20%.³ The outcomes are poorer in pregnant patients with 38% maternal and 74% fetal mortality.⁵ Although successful management by endovascular treatment of ruptured intracranial aneurysms with delivery of a healthy baby by elective caesarean section has been described in the literature, RAAs are mostly treated surgically with either nephrectomy or renal salvage with in situ or ex situ aneurysmal repair. Endovascular interventions are reserved for ruptures in post-partum period.^{3–8} Our patient already had 2 live children and was in second trimester of pregnancy. She was given options for surgery and endovascular treatment with associated risk to fetus. She opted for the less invasive endovascular approach with a subsequent need for medical termination of pregnancy.

Traditionally, endovascular aneurysmal repair requires insertion of coils, cyanoacrylate or gelfoam. Coil embolisation is excellent for narrow neck aneurysm or small calibre vessels where multiple coils can be deployed to block the feeder vessel. However, in the current case, the aneurysm was arising from the main renal artery and there was a high chance of coil migration. To completely occlude inflow into the main renal artery, we used an Amplatzer vascular type II plug. This is a flexible, self-expanding, nitinol-based cylindrical device with a wide array of applications. As compared to coils, it resists migration; thus, it can be accurately placed and causes immediate and complete embolisation. Complete interruption of blood flow into the aneurysm was documented immediately after deployment and this was confirmed the next day and 1 month later.

Figure 2 Digital subtraction angiography performed via the left brachial artery with selective cannulation of the left renal artery. (A) Angiogram showing a large aneurysm arising from the main renal artery (arrow) with a guide wire placed in it. (B) Flush angiogram performed after deployment of the vascular plug showing complete embolisation. (Inset: Amplatzer type II plug). (C) Contrast-enhanced CT scan performed at 4 weeks follow-up showing a large pseudoaneurysm in the left renal fossa with no blood flow (white arrow) and vascular plug in position (black arrow).

Patient's perspective

I was afraid of open surgery and the associated high risk, so I opted for this procedure and it has worked well for me. There was minimal pain, quick recovery and it avoided a large scar on my left side. It is just that I have to be on regular follow-up for some time.

Learning points

- ▶ Ruptured renal artery aneurysm in a pregnant patient is a rare presentation with potential for misdiagnosis and mismanagement.
- ▶ Endovascular management with coils or gelfoam in high flow large aneurysms is not possible due to the potential for run-off.
- ▶ The Amplatzer plug is a self-expanding nitinol mesh with the ability to resist dislodgement.
- ▶ Plugging of the main renal artery effectively occludes arterial flow and can avoid nephrectomy.

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interpretation of the data; revised it critically for important intellectual content and final approval. PS contributed to analysis and interpretation of the data; revised it critically for important intellectual content and final approval. BN contributed to concept and design and analysis and interpretation of the data; drafted the manuscript and revised it critically for important intellectual content, and final approval.

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