African Journal of Urology

CASE REPORTS

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Wunderlich syndrome in pregnancy: life threatening bleeding renal angiomyolipoma in first and third trimesters—two case reports and literature review

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Abstract

Background Renal angiomyolipoma (AML) is a prevalent benign tumour of the kidney. However, Wunderlich syndrome, marked by retroperitoneal haemorrhage, remains a rare and critical complication of large AMLs. During pregnancy, AMLs demonstrate an accelerated growth pattern and pose an elevated risk of rupture, leading to massive retroperitoneal haemorrhage. This report presents two compelling cases of life-threatening bleeding AML during the first and third trimesters, shedding light on the urgent need for heightened awareness and management strategies in pregnant women with AML. These cases underscore the novel and crucial aspect of the increased vulnerability of AMLs in pregnancy, emphasizing the importance of timely diagnosis and intervention.

Cases presentation The first patient is a 37-year-old lady who presented at 27 weeks of gestation with foetal distress, abdominal pain and hypovolemic shock. Emergency Caesarean section was performed for possible abruptio placenta, and a large non-expanding retroperitoneal hematoma was found intra-operatively. Post-delivery computed tomography (CT) angiography assessment showed left perinephric hematoma from bleeding AML at the lower pole. She was hemodynamically unstable after CT and underwent an emergency nephrectomy. Post-operative recovery was uneventful. The second patient is a 30-year-old lady who presented with right abdominal pain at 11 weeks of gestation with hypotension and an actively bleeding ruptured AML found on the abdominal MRI. She underwent angioembolization at 12 weeks of pregnancy with a radiation shield to protect the foetus. She recovered well after the procedure and continued her pregnancy. Her baby was born healthy at term with no evidence of any congenital malformation.

Conclusions When dealing with renal angiomyolipoma during pregnancy, multidisciplinary team management is crucial for the best management care. Stable cases can be treated conservatively, while unstable cases may require angioembolization or nephrectomy. The management plan should prioritize the best outcomes for both the mother and foetus. During the first trimester, angioembolization is safe and effective in controlling bleeding. However, minimizing radiation exposure is crucial, especially during organogenesis. Tailored interventions are essential to optimize outcomes in this unique patient population.

Keywords Wunderlich, Bleeding, Rupture, Angiomyolipoma, Pregnancy

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1 Introduction

Wunderlich syndrome, initially described by Wunderlich in 1876 as "spontaneous renal capsule apoplexy," remains a rare yet significant condition characterized by spontaneous non-traumatic renal haemorrhage into the subcapsular and perirenal space, often associated with ruptured renal angiomyolipoma (AML) [1]. In this case report, we present two compelling cases of life-threatening bleeding AML during the first and third trimesters of pregnancy, further contributing to the limited literature on this unique clinical scenario. These cases highlight the exceptional challenges faced in diagnosing and managing bleeding AML during pregnancy. Our findings underscore the importance of a multidisciplinary approach and showcase potential implications for the clinical management of pregnant individuals with this rare and critical condition.

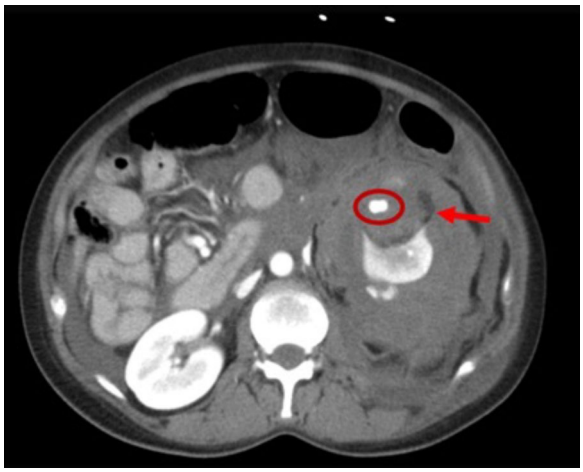

Fig. 1 CT abdomen contrast axial view showed angiomyolipoma of the left kidney (red arrow) with surrounding perinephric hematoma. Contrast pooling (red circle) noted within the angiomyolipoma suggestive of active bleed

2 Cases description

The first case is a 37-year-old lady, gravida 5 para 3 + 1, who presented at 27 weeks of gestation with lower abdominal pain, which was treated by the obstetrician as threatened preterm labour. Nine hours after admission, she developed hypotension (89/55 mmHg), associated with sinus tachycardia (heart rate [HR]: 140 bpm) and cold peripheries. She remained haemodynamically unstable despite aggressive resuscitation. The abdomen was tender on palpation. Haemoglobin (Hb) level dropped from 10 g/dL to 7 g/dL. The obstetrician decided to proceed with emergency Caesarean section in view of decompensated shock and possible abruptio placenta. Midline incision and upper segment Caesarean section was performed. A large retroperitoneal haematoma was found upon entering the peritoneal cavity. General surgeon was consulted on-table, and decision made to investigate with a CT angiogram as the haematoma was not expanding.

CT scan revealed a huge left perinephric and pararenal haematoma extending into retroperitoneum and intraperitoneal space. The haematoma measured about 24 cm and occupied mainly the left retroperitoneum extending into the pelvic cavity. The haematoma displaced the left kidney anteromedially, uterus and urinary bladder into the right hemipelvis. A heterogeneous mass measuring approximately 3.1 × 4.4 × 4.3 cm with mainly haematoma and minimal fat within was noted at the lower pole of the left kidney, likely a bleeding AML. The discontinuity of the mass inferiorly was suggestive of a ruptured tumour. 1.4 × 1 cm pseudoaneurysm was seen with the mass, and there was active bleeding into the perinephric space (Fig. 1). She underwent emergency nephrectomy, clot evacuation and haemostasis. A ruptured tumour

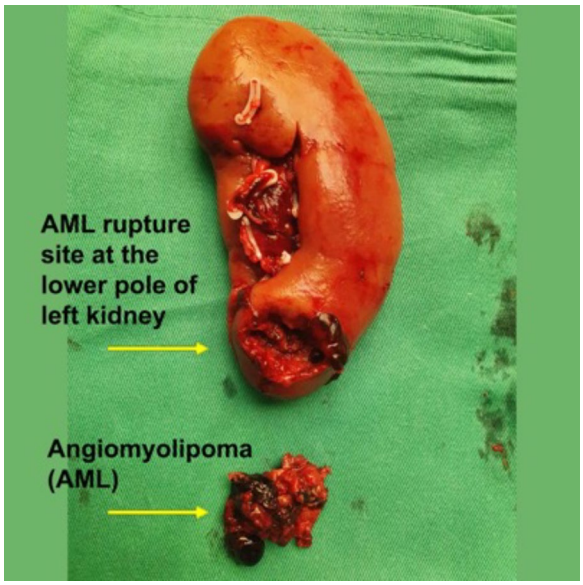

Fig. 2 Ruptured angiomyolipoma at the lower pole of left kidney

was noted at the lower pole of the left kidney (Fig. 2). Her postoperative recovery was uneventful, and she was discharged well on post-op day 7. Unfortunately, her baby developed pulmonary and intracranial haemorrhage and passed away on day 2 of life. Histopathological examination showed typical features of angiomyolipoma.

The second case is a 30-year-old lady, gravida 3 para 2, who presented with right-sided abdominal pain at 11 weeks of gestation. She was haemodynamically stable, with a tender mass palpable on the right lumbar

region. Hb was 10.8 g/dL, and ultrasound showed right AML with perinephric haematoma. Magnetic resonance imaging (MRI) of the abdomen/pelvis showed ruptured bleeding right AML measuring 7.6×6.5 cm with perinephric haematoma (Fig. 3). Multidisciplinary team discussion and management was initiated involving the urologists, obstetricians, feto-maternal specialist, interventional radiologists and critical care physician. She was initially managed conservatively with bed rest, but she developed hypotension (90/60 mmHg) and tachycardia (HR = 130 bpm) on post-admission day 4. Hb plummeted to 6.9 g/dL, and she required three units of packed cell transfusion. She was stable after the initial resuscitation efforts. However, her Hb dropped again to 8.9 g/dL on the next day. Understanding the risks of radiation exposure to her foetus, she opted for angioembolization of the AML at 12 weeks of gestation (Fig. 4). Minimal fluoroscopy and an abdominal shield were utilized to protect the foetus from excessive radiation exposure. She recovered well post-embolization, and her baby was delivered healthy at term, with no evidence of congenital malformation.

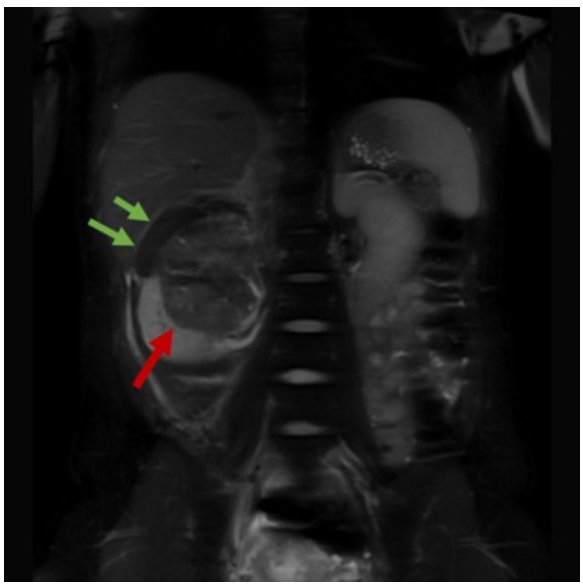

Fig. 3 MRI abdomen (T2 Haste FS Coronal) showed right upper pole angiomyolipoma (green arrow) with perinephric hematoma (red arrow) indicating active bleed

3 Discussion

Recent literature reviews indicate that the most common cause of Wunderlich syndrome is tumours (57–61.5%), of which 24–31.5% were benign, mainly renal AML [1, 2]. The incidence of AML in the general population is approximately 0.13%, with women affected more frequently than men, and it is often associated with tuberous sclerosis complex (TSC). In recent years, pregnancy has been linked to an increased risks of AML rupture. Other significant risk factors for AML rupture include tumour size greater than 4 cm, genetic abnormalities and intra-tumour aneurysm [3].

The literature review by Raft et al. identified 72 cases of AML associated with pregnancy reported between 1952 and 2004. Of these cases, 80% presented with haemorrhage, and only 26% of renal AML cases had been documented prior to pregnancy [4]. Preece et al. reported 21 cases of ruptured AML in pregnancy over a 35-year period [5]. The most common presenting symptom was abdominal pain, occurring in 76.2–88% of cases, followed by hypotension or shock in 33–42.1%, and gross

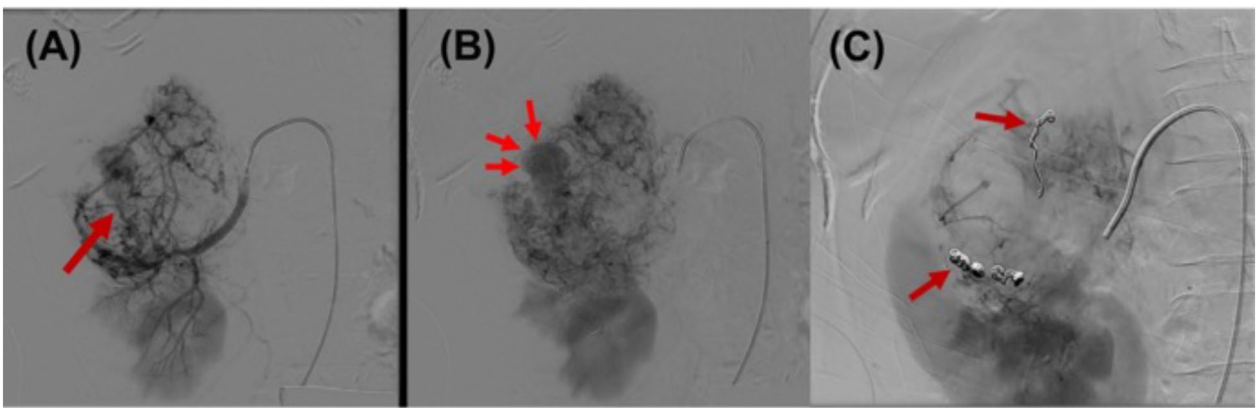

Fig. 4 **A** Right renal angiogram shows multiple abnormal arteries supplying the upper pole angiomyolipoma with contrast extravasation (red arrow) in keeping with active bleed. **B** Delayed phase of the angiogram shows pooling of contrast at the contrast extravasation area (red arrows). **C** Post-embolization renal angiogram with multiple coils (red arrow) within the feeder arteries causing almost complete devascularization of the right upper pole angiomyolipoma

hematuria in 19–24% [4, 5]. Less than 10% of patients presented with a palpable mass [5].

Pregnancy affects AML in various ways. First, an increase in oestrogen and progesterone during pregnancy was associated with the pathogenesis of AML and its increased growth rate. Immunohistochemical studies found positivity for hormonal receptors (oestrogen and progesterone) in > 25% of cases [6]. Gould et al. reported a case where a new 4 cm AML developed in a 15-year-old girl after 12 months of oestrogen/progestin oral contraceptive therapy for menorrhagia [7]. The increased number of oestrogen and progesterone receptors on smooth muscle cells results in deceleration of ureter movement, dilated ureter and mild hydronephrosis. The increased blood volume and renal plasma flow during pregnancy, haemodynamic disturbance and increased blood pressure may also contribute to aneurysm formation and AML rupture. During labour, the increased muscle sensitivity to oxytocin, increased abdominal pressure with uterine contraction, and haemodynamic disturbance can lead to AML rupture easily [3].

The management of rupture AML in pregnancy is very challenging, especially between the first trimester and early second trimester when the foetus is rapidly growing during the organogenesis period. Termination of pregnancy should be considered and discussed in patients diagnosed with large AML with a risk of rupture during early pregnancy. At the moment of writing, as far as the authors are aware, there are no guidelines on the management of this group of patients. Depending on the patient's will for delivery, the patient's and foetus's clinical status, the gestational period, and expertise available, management can be broadly categorised into conservative, angioembolisation and nephrectomy. A multidisciplinary collaboration involving urologists, obstetricians, fete-maternal specialists, interventional radiologists, critical care physicians and anaesthesiologists is essential to ensure optimal maternal and foetal outcomes.

Our literature review found six reported cases (in English language) of ruptured AML in the first trimester. It occurred as early as 6-week gestation with tumour size ranging from 10 to 21 cm in largest diameter. One patient at 12 weeks of gestation with stable haemodynamic status was treated conservatively and underwent elective concurrent caesarean section and nephrectomy successfully at term [8]. Although angioembolisation, which involves X-rays, is contraindicated in pregnancy, it has also been reported to be successful in the first trimester. Angioembolisation should be delayed until after 12 weeks of gestation (after the completion of organogenesis). Trans-radial approach [9], minimal fluoroscopy use, and foetal shield [10] can be utilised to minimise radiation exposure to the foetus. In both reported cases, the patients' pregnancy course was uneventful and a normal healthy infant was delivered at term. Our patient underwent regular surveillance scans by the fete-maternal specialist post-embolization, and she successfully delivered a healthy baby at term with no evidence of congenital malformations.

Three cases of ruptured AML in the first trimester underwent emergency nephrectomy. First, a 24-year-old primigravida at 6-week pregnancy presented with severe abdominal pain and tenderness with hypotensive shock mimicking ectopic pregnancy. She underwent emergency retroperitoneal partial nephrectomy after failed embolization and uneventful delivery via elective Caesarean section later [11]. Another patient with a relatively stable haemodynamic status also had a nephrectomy performed in the first trimester and continued uneventful pregnancy with a normal infant delivered at term [12]. The last reported case was a patient with TSC who presented with life-threatening hypotensive shock and intact multiple pregnancies and required emergency exploratory laparotomy, massive blood transfusion and nephrectomy. Due to the severe complication, the continuation of pregnancy was impossible and therapeutic abortion was performed [13].

Management in the second and third trimesters is still challenging but generally less complex than in the first trimester. For full-term pregnant women with AML, a combined nephrectomy and Caesarean section is often the preferred option, as it effectively addresses the renal condition while ensuring the safety of both mother and foetus [3]. Abdominal pain and hypotensive shock in the third trimester can mimic abruptio placenta as illustrated in our case.

Key lessons learned from our first case include:

- If a bedside ultrasound of the abdomen had been performed, the large retroperitoneal haematoma could have been identified before the patient was sent to the operating theatre.
- An immediate radiological assessment following stabilisation and surgical consultation could have been beneficial if the haematoma was discovered earlier, allowing surgeons to be better informed and prepared for nephrectomy during the same procedure as the emergency Caesarean section.

4 Conclusions

AML is a rare surgical emergency with a higher risk of growth and rupture during pregnancy, requiring multidisciplinary management. Decisions are based on the mother's stability, gestational age, and foetal condition, with angioembolization and nephrectomy both viable options in the first trimester, though embolization should ideally be delayed until after 12 weeks gestation (after

completion of organogenesis), to minimize foetal risk of malformation. Our case demonstrates that angioembolization at the end of the first trimester can be performed safely, resulting in a healthy delivery.

Acknowledgements
The authors thank the Critical Care, Obstetrics and Gynaecology teams from HSIS and HSAAS for their expertise and contribution to the multidisciplinary management of these two patients.

Disclosure
The abstract of these case reports had been submitted to Malaysian Urological Conference (Virtual) 2021 for poster presentation. The abstract is published in BJU International. 2021;128:49–49. doi.org/https://doi.org/10.1111/bju.15606.

Author contributions
VK was the primary doctors for both cases, drafted the manuscript and performed the literature review. OF, CLKS, SAMZ and KAMG were the consultant's in-charge who planned the treatments and performed the nephrectomy for one of the patient. MNMY, EAR and MFAKK were the radiologists involved who performed the imaging and angioembolization. All authors read and approved the final manuscript.

Funding
Not applicable.

Availability of data and materials
Not applicable.

Declarations

Ethics approval and consent to participate
Ethical approval is not required for case report publication in my institution.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Competing interests
The authors declare that they have no competing interests.

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Received: 12 June 2023 Accepted: 12 October 2024
Published online: 23 October 2024

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