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CASE REPORT

Investigating incidence, pathophysiology, and management of renal artery aneurysms post-delivery: case report

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ABSTRACT

Background: Renal artery aneurysm (RAA) during the postpartum phase is an uncommon occurrence that has a high death rate for both the mother and the fetus. It often develops as a result of alterations in the integrity of the vascular wall brought on by hormonal and hemodynamic shifts. RAA rupture during the post-partum phase is extremely difficult to diagnose early.

Case presentation: In our case a 27-year old female pregnant about 37 weeks and 5 days. She was admitted to our hospital with swollen face, puffy eyes, oedema on the feet, hypertension, and tachycardia. She was decided for labor, day 1 post-vaginal delivery the vitals showed tachycardia, hypotension and she had severe dizziness, pale look, severe pain in the right side of abdomen, and right flank. The computed tomography scans showed a rare case of post-delivery RAA. She was controlled with right sided nephrectomy.

Conclusion: RAAs in postpartum patients are rare and often misdiagnosed, leading to high maternal and fetal mortality. Early diagnosis and immediate intervention are crucial for better outcomes, with nephrectomy being the most secure method for controlling such cases.

Keywords: Renal artery aneurysm, post-delivery, pregnancy, nephrectomy.

Introduction

A renal artery aneurysm (RAA) is an uncommon condition characterized by a dilated segment of the renal artery, exhibiting a diameter exceeding twice that of a normal renal artery [1].

The prevalence of visceral arterial aneurysms ranges from 0.01% to 2% within the population, with 0.01% to 0.09% occurring in the renal arteries [2]. Most renal artery anomalies are identified incidentally during imaging studies and do not present immediate health risks [3]. It is typically identified in the general population either incidentally or following investigations for hypertension [4].

Pregnancy increases the risk of ruptured artery aneurysms relative to the postpartum phase.

The pregnancy and postpartum period induce significant physiological changes in the vasculature, including alterations in blood pressure and renal hemodynamic, which could potentially help in the formation or growth of RAAs. [5]. The mortality rate for non-gestational RAA rupture is about 10%. Pregnancy is associated with a mortality risk of 50% for the mother and 80% for the baby, respectively [6]. The natural progression of RAAs in postpartum patients is mostly undocumented; nonetheless, if ruptured, a RAA cause increasing morbidity and mortality rates compared to that observed in individuals during their third trimester [7].

Acute back, flank, or stomach discomfort are the first signs of a ruptured RAA [8]. These symptoms are somewhat prevalent during the postpartum period and can be brought on by ovarian vein thrombosis, pyelonephritis, puerperal endometritis, puerperal abscess, following pains, and ovarian tumor torsion

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[9]. As a result, it is extremely difficult to diagnose RAA rupture early in the postpartum phase. Rupture of RAA, on the other hand, is a life-threatening emergency disease that requires immediate diagnosis and care [10]. Here, we described a case of RAA rupture in the early postpartum period that was identified by computed tomography (CT). Using data that is seldom published, we compiled and characterized the best diagnostic techniques and treatment choices for RRA in the postpartum period.

Case Presentation

A 27-year-old pregnant case who suffered bacterial kidney disease, but not following regular follow-up, came to our hospital at gestational age of 37 weeks and 5 days, with swollen face, puffy eyes, oedema on the feet. On arrival, blood pressure was 140/99, and tachycardia.

Repeated blood pressure reading was on the higher range, and laboratory profile was deranged. Cardiotocography was categorized as category I. She was advised admission for blood pressure control and for induction of labor, but patient signed discharge against medical advice the following day. The patient again visited the emergency room with the same complaints and was admitted an established labor patient progressed and delivered vaginally.

Day 1 post-delivery, her vitals showed tachycardia, hypotension, and she had severe dizziness, pale look, severe pain in the right side of the abdomen, right flank. Urgent labs and CT scan done labs showed significant drop in the hemoglobin levels CT scan revealed ruptured right RAA with active bleeding (Figure 1), she was transferred to theatre for immediate management. Interventional insertion of renal artery (right) was done, exploration done showed huge right sided retroperitoneal hematoma right sided nephrectomy was done.

The histopathological examination showed an extensive renal pelvis hematoma consistent with the diagnosis of ruptured RAA, the artery seen in renal pelvis showed degenerative changes.

She improved and was discharged and was asked for follow-up. After visiting outpatient department after 1 week, she was doing well with controlled blood pressure with satisfactory recover shown in post procedure scans.

Discussion

Atherosclerosis, trauma, fibromuscular dysplasia, and iatrogenic damage are some of the risk factors for aneurysms. It is rare for the aneurysm to rupture spontaneously. Size more than 2 cm, high blood pressure, and pregnancy are risk factors for aneurysm rupture [7]. The prevalence of RAA is rare, and they often do not cause any symptoms. Surveys for hypertension are frequently used to find it at random [11]. Herein we presented a 27-year-old pregnant case in 37 weeks and 5 days. She had a history of hypertension, and recent pregnancy were the risk factor of aneurysm.

After 32-34 weeks of gestation, the amount of blood in the mother's circulation rises 40%-45% more than that of women who are not pregnant [12]. From a nadir

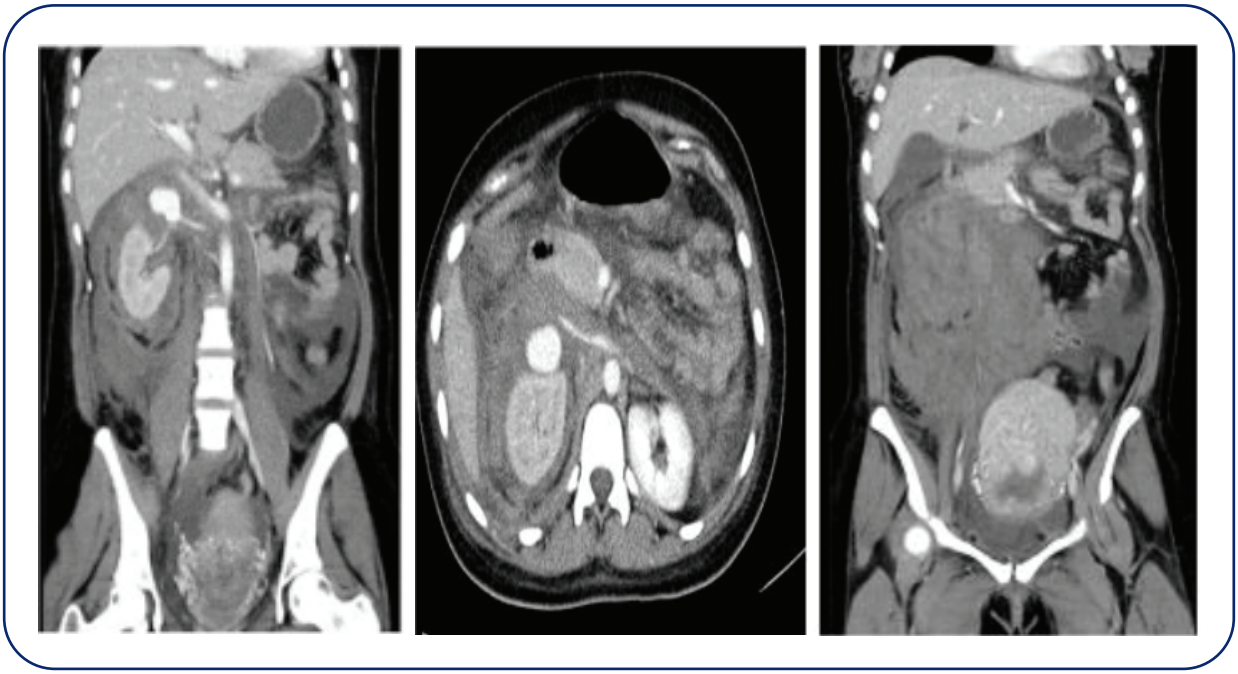

Figure 1. CT scan showed right RAA with active bleeding.

at 24-26 weeks of gestation to the end of pregnancy, maternal blood pressure progressively increases with gestation [12]. Five percent to 10% of pregnancies are complicated by hypertensive problems [12]. Increased pressure on arterial aneurysms and compression of the intra-abdominal artery can result from gravid uterine enlargement [13]. Based on their histology observations, Nolte et al. [14] argued that steroid hormone high levels during pregnancy can cause a severe deterioration of the structure and integrity of major arteries. During pregnancy, particularly in the third trimester, these physiological and pathological changes in the mother increase the risk of rupture of RAA and other arterial aneurysms, such as splenic artery aneurysms, which are more prevalent than RAA. Furthermore, in the early postpartum phase, these maternal changes are not addressed. As a result, the risk of RAA rupture appears to continue for some time after delivery [15].

To the best of our knowledge, the literature has documented seven postpartum women with RAAs, three of whom had intact RAAs at the time of presentation [16-18]. There have been three further reports of RAA ruptures following delivery. The first was a rupture case in which the contralateral kidney was absent from birth, and the second was a regrettable case that required several laparotomies, a hysterectomy, and a salpingo-oophorectomy before the ruptured RAA was diagnosed 1 week after the patient was discharged following a caesarean section [19]. In different research, extensive hematuria appeared after CT angiography, and aneurysm rupture was noted 1 day after caesarean delivery [7]. According to Nakamura et al. [15], CT with contrast was used to diagnose a case of rupture of the RAA in the early postpartum phase. For hemostasis, the patient underwent renal artery embolization. The majority of RAAs are asymptomatic and discovered by chance when imaging tests are done for unrelated reasons. Approximately 25% of RAA patients have symptoms [20]. Severe flank pain and back or stomach discomfort are signs of pregnancy associated with RAA rupture. There may be hematuria or indications of cardiovascular instability. There have been reports of unilateral, abrupt, acute flank discomfort that is followed by hemorrhagic shock [6]. Due to the rarity of RAA rupture during pregnancy, many of these symptoms are frequently confused with common obstetric issues including uterine rupture or placental abruption, which can cause a delay in diagnosis that might be deadly for both the mother and the fetus. The mechanical kinking of the renal artery branch where the aneurysm is situated may be the cause of the blood flow obstruction linked to hypertension and RAAs [21]. Additional contributing variables might be concomitant renal artery stenosis or distal embolization from the aneurysm [22]. Regarding our case, she admitted with swollen face, puffy eyes, oedema on the feet, hypertension, and tachycardia. She was decided for labor, day 1 post-vaginal delivery the vitals showed tachycardia, hypotension and she had severe dizziness, pale look, severe pain in the right side of abdomen, and right flank. The CT scans showed a rare case of post-delivery RAA. Enlargement of the retroperitoneal hematoma and prolonged hypotension despite transfusion and administration of intravenous fluids and vasopressors resulted from increased hemorrhage from the ruptured RAA during birth due to decreasing uterine pressure [2]. Over the past 30 years, significant advancements in vascular imaging methods have increased the number of RAAs diagnosed. The majority of RAAs are identified by chance during unrelated abdominal imaging or during a diagnosis for uncontrolled hypertension. The most popular imaging method for diagnosing RAAs is CT, although duplex ultrasonography, magnetic resonance imaging, and contrast angiography can all be used to detect them [23]. Regarding our case, the final diagnosis depended mainly on CT scan results, which showed ruptured right RAA with active bleeding.

RAA in pregnant and postpartum individuals can be treated in a variety of ways. These techniques include surgical treatments, renal embolization, and monitoring based on the patient's vital signs and clinical symptoms. Nephrectomy is the safest treatment for patients with kidney aneurysms that are intraparenchymal and hilar [24]. Histopathology plays a crucial role in understanding the underlying cause and extent of the aneurysm, guiding treatment decisions, and assessing the overall health of the removed kidney. Histological examination of the aneurysm wall, surrounding tissue, and the kidney itself can reveal the presence of atherosclerosis, fibromuscular dysplasia, hematoma or other conditions contributing to the aneurysm [25]. Our case was controlled with right sided nephrectomy, the histopathological examination showed extensive renal pelvis hematoma consistent with the diagnosis of ruptured RAA, the artery seen in renal pelvis showed degenerative changes.

Conclusion

RAA in the postpartum period is a rare and relatively unexplored area of research. The clinical presentation is frequently misdiagnosed and confused with more prevalent illnesses. Delays in diagnosis are linked to high rates of maternal and fetal death. For pregnant or postpartum cases who report with abrupt and severe flank pain, particularly if this is followed by a decrease in blood pressure, ruptured RAA should be considered in the differential diagnosis. Better maternal and fetal outcomes depend on early diagnosis and prompt intervention. Nephrectomy is the most secure way for controlling such cases.

List of Abbreviations:

CT	computed tomography
RAA	renal artery aneurysm

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Due permission was obtained from the patient to publish the case and the accompanying images.

Consent to participate

Not Applicable.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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