Bilateral rupture of the renal pelvis as a complication of placental abruption in multiparous female

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Summary

A non-traumatic rupture of renal pelvis during pregnancy is an extremely rare complication. The authors report a case of bilateral rupture of the renal pelvis in a multiparous female who underwent emergency cesarean section during vaginal birth after previous cesarean section, owing to abrupt and massive vaginal bleeding and prolonged fetal late deceleration. During surgery, a disproportionately enlarged uterus was noted and postoperatively severe oliguria was complicated with a sustainable amount of packed RBCs transfusion. CT revealed extravasation of contrast media around bilateral perinephric space. Treatment course and review of the cause of renal pelvis rupture is discussed along with literature study.

Key words: Placental abruption; Kidney pelvis; Cesarean section; Vaginal birth after cesarean; Extravasation.

Introduction

A rupture of the renal pelvis is most commonly caused by trauma [1], and its diagnosis is usually made upon visual confirmation of the extravasation of urine or contrast media in the perinephric space [1, 2]. A non-traumatic rupture, in other words, a spontaneous rupture, of the renal pelvis can occur regardless of any underlying renal disorders [3, 4]. Although a gravid uterus may cause hydronephrosis [4], a spontaneous rupture of the renal pelvis during pregnancy is very rare [5]. A placental abruption is related with persistent uterine hypertonus, and may be disproportionately enlarged within the abdominal cavity causing severe flank pain, which is also a typical symptom of a renal pelvis rupture [6].

The authors report a case of a bilateral rupture of the renal pelvis complicated with a placental abruption in a multiparous woman who underwent an emergency cesarean section. Evidence contributing to the diagnosis of a bilateral renal pelvis rupture is given in image form, and the relation between a renal pelvis rupture and placental abruption is discussed along with a general approach for the management of renal pelvis ruptures.

Case Report

A 35-year-old multiparous woman was admitted to the delivery unit after a spontaneous rupture of the membrane at a gestational age of 39[1] weeks. Her past history revealed a previous cesarean section in 2007 and a vaginal birth after her cesarean section in 2011. This was her third pregnancy, and was complicated with the threat of abortion during the first trimester. She was referred to the present tertiary teaching university hospital at a gestational age of 26 weeks with the presumptive diagnosis of a fetal heart anomaly, i.e., tetralogy of Fallot. She was otherwise healthy and denied any history of renal problems. While she was uneventfully proceeding with augmented vertex delivery, an abrupt massive bleeding from her vagina was noted along with a prolonged late deceleration of the fetal heart rate. Assuming that she was having complications of a uterine rupture from her previous cesarean section, she was rushed to the operating room for an emergency cesarean section. During surgery, however, a placental abruption was grossly identified as her uterus became disproportionately enlarged, reaching the xiphoid process of the sternum without the occurrence of any gross tearing. Palpation revealed a persistently hypertonic gravid uterus. After expulsion of the baby, the placenta was confirmed to be complicated from a massive abruption, and persistent uterine bleeding was followed by placental delivery. Immediately after finishing the cesarean section, the radiologist successfully performed uterine artery embolization (Figure 1), and her vitals stabilized with perioperative transfusion of five packed RBCs.

In spite of the stabilization of all of her vital signs, her urination volume was determined to be as low as 7 cc per hour with a poor response to intravenous Lasix administration. Her serum creatinine level reached 1.71 mg/dl at postoperative day 1. Another transfusion still failed to maintain an adequate urination and a CT scan of her abdomen was performed to evaluate any hypovolemic renal injury from concealed intra-abdominal bleeding and/or renal parenchymal injury during surgery.

CT finally showed a leakage of contrast media from her bilateral renal pelvis from a rupture of the bilateral fornix (Figure 2). After discussion with the urologist for treatment of her renal pelvis injury, she was transferred to the urology ward and underwent bilateral JJ catheter insertion (Figure 3) at postoperative day 3. With conservative management and regular follow ups, she is now free of symptoms.

Discussion

In 2009, Matsubara *et al.* stated that 30 cases of non-traumatic renal pelvis rupture in pregnant women had been reported, including Wolff *et al.*'s five-decade study, in which 25 cases were reviewed [3, 7]. According to the Matsubara *et al.*'s study, the spontaneous rupture of the renal pelvis

Revised manuscript accepted for publication October 22, 2014

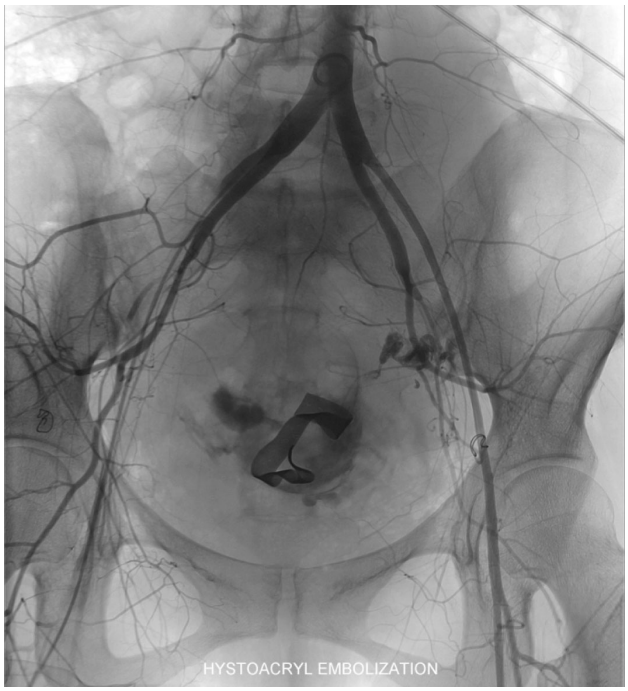

Figure 1. — Uterine artery embolization is performed. Right uterine artery is too small to engage. Left uterine artery is embolized with 1 cc of glue-lipidole mixture.

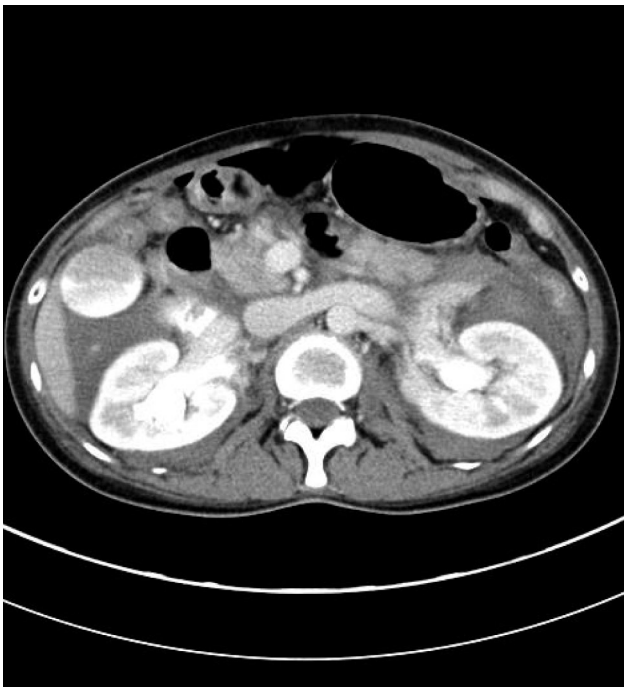

Figure 2. — Abdominal CT showing bilateral contrast media leakage.

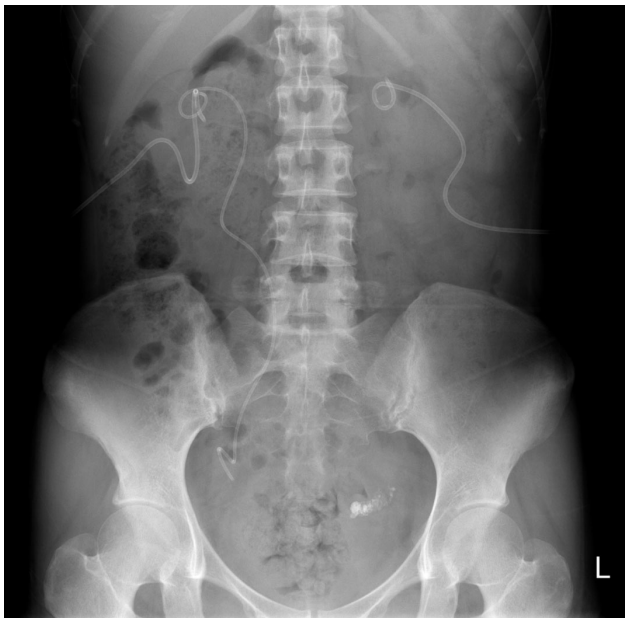

Figure 3. — KUB showing both PCN and right D-J catheter. Left ureter has a severe obstruction.

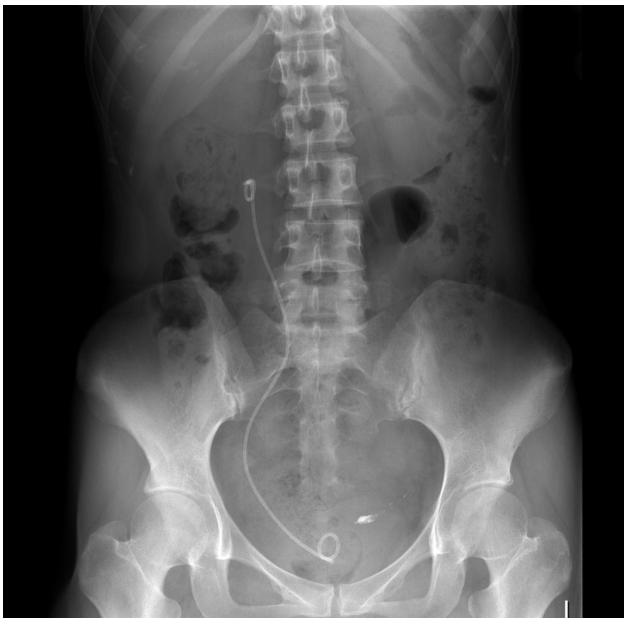

Figure 4. — Follow-up KUB showing right D-J catheter. Left ureter showing no stricture.

was unilaterally involved in all cases, extremely preferable toward the right side owing to the dextro-rotation of the gravid uterus and right ovarian vein overlying the right ureter [8]. Tang *et al.* reported an interesting case of left renal pelvis rupture owing to an obstruction of the left ureteral orifice after a cesarean section in 2009 [9]. In his study, a cystoscope revealed a swollen bladder wall surrounding the ureteral orifice with visible sutures, and the authors suggested that a urinary tract injury may be a complication of a cesarean section.

Supposing that placental abruption might have an effect on uterine contraction [10], thus resulting in an irregular enlargement of the uterus, it does not seem unfounded to state that forces from the gravid uterus, which was progressing toward an abruption, directly reached the retroperitoneal renal pelvis strongly enough to cause a rupture. Association of a placental abruption with a renal pelvis rupture and the rarity of bilateral involvement make the case distinguishable.

The mechanisms of a renal pelvis rupture are not yet fully understood [11], but an abrupt and uncompensated increase in hydrostatic pressure within the urinary collection system exceeding the capacity of the renal pelvis is thought to play a pivotal role in the pathogenesis. This is also supported by the fact that 28 cases of spontaneous renal pelvis rupture have occurred in the right pelvis which is fragile under compression [3]. Because the patient had no urinary symptoms and was not complaining of severe flank pain after her cesarean section, it was difficult to apply a renal pelvis rupture as a differential diagnosis of her anuria.

In regard to the diagnosis of a renal pelvis rupture, while intravenous urography (IVU) has been considered the gold standard of diagnosis thus far, a CT scan using a contrast medium has become invaluable [1, 2]. Serial ultasonography, color duplex Doppler sonography, and a plain abdomen X-ray may also be helpful, and early pregnancy MRIs are sometimes useful as well [5, 12-13]. The present authors also confirmed the diagnosis of a bilateral renal pelvis rupture through a CT scan (Figure 2).

The treatment of a renal pelvis rupture largely depends on the rupture site and its severity along with the accompanying hemodynamic event [9]. In cases of the local involvement of the urinary collection system, a rupture may be managed conservatively, and mainstream treatment consists of indwelling a ureteral catheter or percutaneous nephrostomy [14]. Less frequently, when a massive hemorrhage from renal parenchyma jeopardizes the patient's hemodynamic stability, the need for explorative surgery is indicated [15]. While the present patient suffered from massive uterine bleeding and was stabilized through uterine artery embolization (Figure 1), management of her injury to her bilateral urinary collection system focused on a minimally invasive JJ catheter insertion alongside PCN drainage with close observation (Figure 4). After regular follow-ups by her urologist, she is now free of any urinary symptoms.

Conclusion

Clinicians should keep in mind that when a pregnancy is complicated by a placental abruption, the renal pelvis can be damaged by an enlarged gravidity regardless of a previous history or urinary symptoms or disease. It is therefore recommended to promptly evaluate the patient with a CT scan using a contrast medium or other effective imaging study when she experiences a new onset of severe flank pain or hematuria. When the diagnosis of a renal pelvis rupture is made through an identification of extravasation, a minimally invasive management such as a JJ catheter insertion is necessary to avoid severe complications, such as an irreversible renal parenchymal injury or hemodynamic instability from a massive hemorrhage. Further studies investigating the mechanism of a renal pelvis rupture during pregnancy and under the condition of a placental abruption seem to be necessary in the near future with an adequate numbers of cases.

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