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RESEARCH ARTICLE

INJURY OF THE DISTAL URETER SECONDARY TO NORMAL VAGINAL DELIVERY: A COMPREHENSIVE REVIEW

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Abstract

Spontaneous ureteric rupture after a normal vaginal delivery is a rare occurrence, with about five cases reported in literature. We reviewed the literature with the aim to evaluate the causes of such an injury, presenting signs and symptoms, diagnosis, management strategies, outcome and follow up. Recognition and timely repair are critical to prevent long term complications and ensure good quality of life for the women suffering such a trauma. Clinicians must consider spontaneous ureteral rupture in the differential diagnosis for postpartum abdominal pain and flank pain when common causes have been ruled out. Diagnosis can be made with contrast-enhanced Computed Tomography scan and cystoscopy. In majority of cases, ureteral stenting or endoscopic repair are reasonable options for management.

Introduction

Rupture of the lower part of the ureter secondary to normal vaginal delivery is a highly unusual but serious complication often arising from trauma associated with the delivery process [1]. While most ureteric injuries are associated with surgical deliveries or gynecological procedures, the potential for such injuries during vaginal delivery must not be overlooked. The condition is characterized by a tear or rupture in the ureter, which can lead to significant renal and urinary complications if not promptly diagnosed and managed [2]. The rarity of this complication indicates that there is need for increased awareness among clinicians to ensure timely intervention [3]. This review provides a detailed examination of the incidence, etiological factors, clinical presentation, diagnostic approaches, treatment strategies, and outcomes associated with ureteric rupture following normal vaginal delivery.

ReviewMethodology

We searched PubMed for both indexed and non-indexed publications in English language, before June 30th, 2024 for this review. Studies that elaborately discussed the etiology, preventive strategies, postpartum recognition, investigations, and management of ureteric injuries during immediate and delayed postpartum period were included. Our searches yielded a total of 46 articles, which were screened to 14 as mentioned in our references and formed the basis of this review.

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Incidence

The incidence of lower ureter rupture secondary to vaginal delivery is notably low [1,2], with estimates ranging from 1 in 10,000 to 1 in 30,000 deliveries. About 5 cases have been reported in the literature. Spontaneous ureteral rupture is more common on right side and in region of fornix but has also been reported to occur on left side and in lumbar region [1]. Although rare, this complication is more frequently observed in high-risk deliveries involving prolonged labor, operative vaginal delivery, or large for gestational age infants. The low prevalence makes it challenging to collect comprehensive data, thus necessitating further studies to better understand and prevent this complication [3,4].

Ureteric injuries during obstetric procedures are rare, with most occurring during cesarean sections and gynecologic surgeries. 50% cases of all ureteral injuries are attributed to obstetric and gynecologic procedures. Specific reports of ureteric rupture due to normal vaginal delivery are exceedingly rare, underscoring its exceptional nature [1]. Comprehensive reviews and case reports have highlighted this rarity, suggesting that such injuries during vaginal delivery are more often associated with specific risk factors or complications during labor [3].

Etiology

Spontaneous ureteral rupture is defined as ureteral damage in the absence of external trauma, degenerative kidney disease, previous surgery or iatrogenic manipulation [3]. Ureteral rupture is caused by increased pressure in the renal collecting system; when pressure exceeds a critical level, reported as 20 mmHg to 75 mmHg, rupture may occur [3]. The most common causes of increased intraluminal pressure are nephrolithiasis or ureteric strictures. Rarely, malignancy, bladder retention or external compression by tumors, vascular structures, or the gravid uterus can elevate pressure in the ureter, causing ureteric injury [5].

The lower ureter is anatomically positioned in a way that makes it susceptible to injury during vaginal delivery [6]. Several factors can contribute to trauma (rupture) of the ureter in this context:

The descent of the fetal head through the birth canal can exert significant pressure on the lower ureter, especially in cases of cephalopelvic disproportion or if the fetal head is large relative to the maternal pelvis. Prolonged labor may be one of the risk factors that increases the possibility of a ureteric injury due to the sustained pressure and potential ischemia of the ureteral wall. Furthermore, instrumental deliveries using forceps or vacuum extractors add more risk due to the mechanical forces applied by the instrumental delivery. Congenital anomalies of the urinary tract or pre-existing conditions such as a ureteral stricture or previous surgeries may predispose the ureter to injury during the delivery [7]. Inflammatory processes or infections that occur during labor or delivery may weaken the ureteral wall, making it more prone to rupture under the stress of childbirth.

Clinical presentation

Patients with a rupture of the lower ureter following vaginal delivery typically present with specific symptoms that vary based on the severity and timing of the injury. One of the most common presentations includes acute or persistent flank pain and hematuria, which are indicative of potential ureteric injury [5]. Urinary leakage into the surrounding tissues can eventually lead to the formation of a urinoma, clinically presenting as a swelling or palpable mass in the pelvic region. In some cases, this can cause secondary infection or abscess formation [6]. If the rupture leads to significant urine extravasation and subsequent infection, the patient may develop fever, chills, and signs of systemic sepsis, necessitating urgent medical intervention. In some cases, symptoms may not be immediately apparent, and delayed presentation can occur days or even weeks after the delivery, complicating the diagnosis and worsening the prognosis [8].

Diagnosis

Diagnosing ureteric rupture post-vaginal delivery involves a combination of clinical assessment and imaging modalities. An ultrasound can be used as a first line imaging tool which can help detect ureteral stones, hydronephrosis or peri-nephric fluid collections suggestive of urine leaks [8]. If a ureteral rupture is highly suspected with no visualization of fluid collections by ultrasound, CT urography with delayed contrast can be used to provide detailed imaged of the urinary tract, helping in identifying the exact location and extent of the ureteric injury if present [6]. An alternative can be an Intravenous Pyelogram (IVP) which also helps in identifying the presence and site of any disruption or leakage [8]. In cases where other imaging modalities were inconclusive, a retrograde pyelography can provide additional detail by directly visualizing

the ureter via contrast instillation [6,8]. Cystoscopy is also employed to evaluate the ureteral orifices and confirm the extent of the rupture. Ureteral stenting or nephrostomy may be used as temporary measures while planning definitive surgical repair.

Management

The management of ureteric rupture after vaginal delivery depends highly on the severity of the injury and the patient's clinical condition at diagnosis [4]. For minor injuries without significant urine leakage, conservative management with the placement of a ureteral stent and a course of antibiotics may be sufficient [6]. Endoscopic methods such as a ureteroscopy may be used to assess and treat ureteral injuries, offering a minimally invasive option in certain cases [9,10,11].
More severe injuries typically require surgical intervention to restore urinary continuity. Techniques such as ureteroureterostomy or ureteral re-implantation (uretero-cystostomy) are commonly employed based on the location and extent of the injury [12,13]. Laparoscopic repair where feasible should ideally be performed. The outcome after laparotomy or laparoscopic repair is similar. If a urinoma or abscess has formed, drainage is necessary to prevent infection and facilitate healing. This may be performed percutaneously or surgically, depending on the size and location of the collection.

Differential diagnosis

When diagnosing lower ureteric rupture if presentation is with acute abdominal pain, it is important to differentiate from other conditions such as renal colic, urinary tract infections, bladder injuries, diverticulitis, cholecystitis, appendicitis. Each of these conditions presents with overlapping symptoms but require different management strategies [8]. Accurate diagnosis is crucial to prevent mismanagement and ensure appropriate treatment [2].

Prognosis

With prompt diagnosis and appropriate treatment, the prognosis for patients with ureteric rupture following vaginal delivery is generally positive. Most patients experience full recovery with proper management. However, there is a risk of complications such as ureteral strictures or recurrent urinary tract infections, necessitating ongoing monitoring [6]. Long-term follow up is crucial to monitor for potential complications and ensure the continued integrity of the urinary system. Regular imaging and clinical evaluations are recommended. Successful treatment typically results in a good quality of life, though some patients may require additional interventions for late complications or sequelae of the injury [7].

Complications

Potential complications following ureteral repair include urinary fistulas, persistent leakage, and renal impairment [8] These complications can affect long-term outcomes and quality of life, requiring vigilant monitoring and possible additional interventions [13].

Postoperative and Rehabilitation Care

Postoperative care involves monitoring for signs of complications such as infection or leakage, managing pain, and ensuring adequate urinary function [9]. Rehabilitation may include physical therapy and lifestyle adjustments to promote recovery and prevent long-term issues [10]. Regular follow-up visits are crucial to assess renal function and ensure complete recovery [14].

Conclusions

Rupture of the lower ureter secondary to normal vaginal delivery, while extremely rare, is a critical condition that requires timely recognition and management. This review highlights the importance of maintaining a high index of suspicion for ureteric injuries in postpartum women presenting with abdominal or flank pain with hematuria or other unexplained urinary symptoms. Conservative management with ureteral stenting is possible in selected cases and must always be considered before resorting to invasive options. Effective and timely management generally results in favorable outcomes, but vigilant long-term follow up is necessary to address any potential complications.

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