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## Bladder Stone in Pregnancy: A Case Report and Review of the Literature

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Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
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**Conflict of interest:** None declared

**Patient:** Female, 28  
**Final Diagnosis:** Bladder lithiasis  
**Symptoms:** Difficult voiding • dysuria • hematuria • incontinence  
**Medication:** —  
**Clinical Procedure:** Laser litholapaxy  
**Specialty:** Obstetrics and Gynecology

**Objective:** Rare disease





**Background:** Bladder stones are rare in pregnancy, and can be associated with adverse outcomes such as recurrent urinary tract infection and obstruction of labor. Management of bladder stones discovered in pregnancy has traditionally been done via open techniques such as cystolithotomy or with percutaneous removal. Our objective was to present a case of bladder stone in pregnancy and review prior reports on bladder stones and management in pregnancy.

**Case Report:** A 28-year-old gravida 4 para 3 at 10 weeks gestation presented with dysuria, bladder spasm, weak urinary stream, and positional voiding. On first trimester ultrasound, a bladder stone (sized 3.7 cm) was identified and was confirmed by x-ray (KUB). Urology was consulted and removed the stone via cystolitholapaxy with holmium laser. Her symptoms subsequently resolved, and she went on to have an uncomplicated term spontaneous vaginal delivery. The removal of the stone enabled her to have a subsequent vaginal delivery without the potential for obstruction of labor.

**Conclusions:** Based on our review of the literature and this case report, laser cystolitholapaxy is a safe alternative to open surgery for the management of bladder stones in pregnancy. When discovered at the time of delivery, vaginal delivery is feasible if the stone is small or can be displaced. If encountered at time of cesarean delivery, then cystostomy with stone removal is recommended provided inflammation is not present.

**MeSH Keywords:** Delivery, Obstetric • Pregnant Women • Urinary Bladder Calculi

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## Background

Bladder stones in both men and women are rare and account for approximately 5% of all urinary tract stones (UTSs) [1]. Bladder stones are rarer still in women, due to the structure of the female urethra. Urolithiasis, which encompasses all urinary tract stones, is uncommon in pregnancy with 0.5% of all pregnancies being affected [2]. The presence of bladder stones places the pregnancy at risk for adverse outcomes including recurrent urinary tract infections, preterm labor, and obstructed labor [3]. We present a case of a bladder stone encountered in pregnancy which was successfully removed utilizing holmium laser cystolitholapaxy. Other management strategies for bladder stones discovered in pregnancy include open cystolithotomy and percutaneous suprapubic cystostomy.

## Case Report

A 28-year-old gravida 4 para 3 at 7 weeks gestational age presented to an outside emergency department reporting worsening dysuria, positional voiding, hematuria, and incontinence over the past month. A urinalysis revealed moderate blood with absent leukocyte esterase and nitrates. Similarly, a pelvic ultrasound confirmed intrauterine pregnancy at 7 weeks 3 days and also revealed a urinary bladder stone measuring 3.7 centimeters in greatest dimension. To confirm this finding and rule out hematoma; a kidney, ureter, and bladder x-ray was obtained. The patient was then referred to Maternal-Fetal Medicine and Urology for further management.

She was seen by Urology at 9 weeks 4 days. A holmium laser cystolitholapaxy was planned for the beginning of the second trimester when medications are safest and there is the lowest risk for pregnancy. She was started on cephalexin for urinary tract infection prophylaxis which was continued until the surgery. At 13 weeks 4 days gestation, she underwent surgical removal under neuraxial anesthesia. On cystoscopy, a large whitish yellow bladder stone was visualized at the trigone (Figure 1). The stone was then crushed using the holmium laser and the remaining fragments were flushed out with the Ellik evacuator (Bard, Covington, GA, USA). At the conclusion of the case, significant ureteral hypertrophy was noted (Figure 2). The procedure lasted 53 minutes and no catheterization was required postoperatively. She subsequently had complete resolution of her symptoms, without further complications during her pregnancy and ultimately had a vaginal delivery at term. Removal of the stone during pregnancy allowed for vaginal delivery without the potential for obstruction of labor.

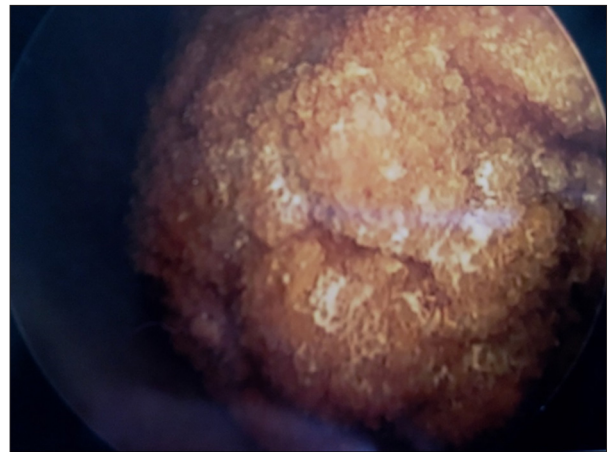


Figure 1. Bladder stone appearance at time of cystoscopy.

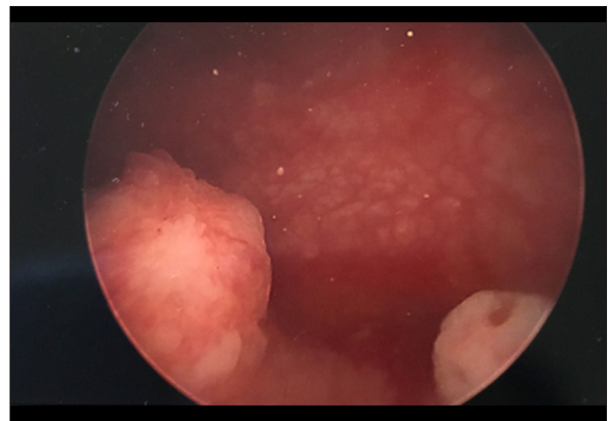


Figure 2. Ureteral orifice hypertrophy noted after removal of stone.

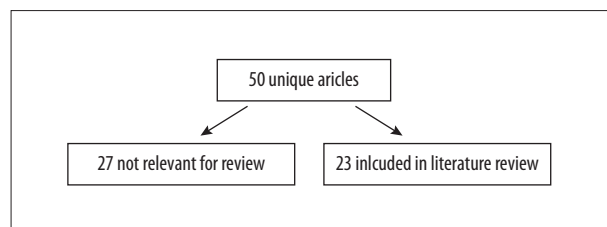


Figure 3. Literature review.

### Literature review methods

PubMed and Web of Science were searched using the following terms: urinary bladder calculi, cystolith, vesical calculus, bladder lithiasis, bladder stones “AND” pregnancy “OR” pregnant. No time period was set on the literature search.

The search by 2 authors (JRW and PMS) identified 50 unique articles. Twenty-three were relevant for review of the literature. The vast majority of these articles were case reports. While the remainder were reviews of the literature (Figure 3).

## Literature review discussion

### *What are the risk factors for development of bladder stones?*

Urinary tract infection can be a cause of or caused by urinary bladder stones. Patients with recurrent urinary tract infections are at risk for formation of bladder stones due to inflammation. Indwelling catheters are also a risk factor for development of bladder stones. Urinary stasis from neurogenic bladder can be a risk factor, such as in patients with spinal cord injury [4]. Retained suture from prior surgery can also incite the development of bladder stones. Holmstrom recently reported a case of a bladder stone due to previous cystotomy repair at the time of cesarean delivery [5]. Ruan et al. reported a case where a late complication of cervical cerclage placement in pregnancy led to suture within the bladder and development of a stone years later [6]. Rafique [7] and Hick et al. [8] describe case reports of pregnant women that had intrauterine device migration to the bladder and subsequently developed bladder stones. Additionally, there is a high frequency of stones that begin in the kidney and then become retained in the bladder [9].

### *How can bladder stones be managed when discovered before delivery?*

Bladder stones can be removed either via cystolithotomy or with cystolitholapaxy. Cystolithotomy is appropriate for larger stones; however, percutaneous suprapubic techniques have also been used to remove large stones with good results [10]. With stones that are smaller, holmium laser cystolitholapaxy is also a reasonable approach. The holmium laser is capable of fracturing stones of any composition and has minimal tissue penetration, making it ideal for use in pregnancy. While use of the laser for bladder stones has not been reported, the use of the laser for nephrolithiasis has been studied in pregnancy. A systematic review in 2012 of 116 cases of ureteroscopy in pregnancy with laser lithotripsy revealed 2 complications: 1 case of premature contractions and 1 case of ureteral perforation [11]. The limited evidence thus far suggests that holmium laser is safe for management of stone disease in pregnancy. Early diagnosis can facilitate stone removal and subsequent vaginal delivery, as in our case report, or in another reported case [12].

### *How are bladder stones managed when discovered at the time of delivery?*

At time of delivery, obstruction of labor is the most common presentation of bladder stones, especially large bladder stones. They can interfere with descent of the fetal head [13–21]. Management of these cases has involved cesarean delivery with subsequent cystolithotomy at the time of cesarean or weeks later. Timing of stone removal depends on the amount

of inflammation and bruising of the bladder that is present at delivery, as these can contribute to fistula formation if cystolithotomy is performed at the time of cesarean. However, some recommend removal at time of cesarean delivery regardless [22].

It has also been reported that in the case of smaller and mobile bladder stones it is possible to manually displace the stone above the fetal vertex and proceed with vaginal delivery [13].

### *What are the complications of bladder stones in pregnancy?*

Recurrent urinary tract infections are one of the most common complications associated with bladder stones. Due to the severity of upper urinary tract infections in pregnancy and risk for ascending infection, antibiotic prophylaxis can be recommended until removal can be undertaken. Pyelonephritis in pregnancy is associated with acute respiratory distress syndrome and significant maternal morbidity and even mortality. Additional complications described in the literature include vesicocutaneous and vesicovaginal fistulas. One case report of a large spiculated bladder stone caused a vesicovaginal fistula during pregnancy. This patient had a cesarean delivery followed by cystolithotomy and fistula repair [23]. Labor obstruction is common especially in asymptomatic large stones.

## Conclusions

After a review of the literature as described, an internal retrospective analysis of our case was performed. Two critiques were made. First, we concluded that a KUB for confirmation of a stone was not necessary even though there was minimal risk associated with a single x-ray. Second, we concluded that earlier treatment at the time of diagnosis in the first trimester could be considered after risks and benefits are discussed with the patient.

While bladder stones in pregnancy are rare, there have been many cases described in the literature. Risk factors include urinary stasis, recurrent urinary tract infections, and foreign bodies. As technology advances, minimally invasive removal may become the preferred management method and appears to be safe in pregnancy. Given the complications associated with bladder stones, a high index of suspicion should be maintained for women with an anterior pelvic mass or with voiding dysfunction.

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## Conflict of interest

All authors report no conflict of interest to disclose.

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