

Research Article

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Management of Obstructive Ureteric Stones in Pregnancy: A Systematic Review of Clinical Outcomes, Safety Profiles, and Guideline Recommendations

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ABSTRACT

Background: Symptomatic urolithiasis during pregnancy accounts for approximately 1.7 admissions per 1,000 deliveries, acting as the most common non-obstetric cause of acute abdominal pain. Obstructive ureteric stones present a complex therapeutic paradox, necessitating a delicate balance between effective maternal intervention and fetal safety

Objective: To systematically review the efficacy, safety profiles, and maternal-fetal outcomes of conservative management versus active interventions (Ureteroscopy [URS], Double-J [DJ] stenting, and Percutaneous Nephrostomy [PCN]) for obstructive ureteric stones during pregnancy.

Evidence Acquisition: A systematic search of MEDLINE, EMBASE, and the Cochrane Library was conducted up to May 2026. Eligible studies included clinical trials, cohort studies, and large retrospective series evaluating interventions for symptomatic ureteric stones in pregnant cohorts. Guidelines from the European Association of Urology (EAU) and American Urological Association (AUA) were cross-referenced.

Evidence Synthesis: Conservative therapy is successful in 70%–80% of uncomplicated presentations. When conservative management fails, URS with holmium:YAG laser lithotripsy yields excellent definitive stone-free rates (85%–95%) with a low rate of minor complications. Encrustation remains a major limitation for DJ stenting, requiring stent replacement intervals of 4–6 weeks. PCN remains highly effective for immediate decompression in the setting of severe urosepsis or pyonephrosis.

Conclusions: While conservative therapy remains the initial standard of care, URS has emerged as a safe and definitive first-line surgical option in experienced centers. Temporary decompression (DJ stent or PCN) should be reserved for emergency urosepsis or when advanced endourological skills are unavailable.

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Introduction

Urolithiasis during gestation represents a unique clinical challenge. Physiological changes in pregnancy—such as gestational hypercalciuria, elevated progesterone-mediated smooth muscle relaxation, and mechanical compression of the ureters by the gravid uterus—predispose women to urinary stasis and stone formation.

Diagnosing and treating obstructive ureteric stones is complicated by the mandate to avoid ionizing radiation and minimize anesthetic exposure to the fetus. Untreated obstructive uropathy poses significant hazards, including pyelonephritis, maternal urosepsis, preterm labor, and premature rupture of membranes. This systematic review synthesizes current data on conservative management, temporary decompression modalities, and definitive endourological interventions [1].

Methods

This review adhered to the PRISMA guidelines.

Search Strategy and Selection Criteria

Electronic databases (PubMed, Scopus, and Embase) were searched using terms including: ("ureteral calculi" OR "ureteric stone") AND ("pregnancy" OR "gestation") AND ("ureteroscopy" OR "stent" OR "nephrostomy").

Inclusion Criteria: Studies reporting on pregnant patients diagnosed with obstructive ureteric stones; evaluating clinical efficacy (stone-free rates or decompression success) and reporting maternal/fetal complications.

Exclusion Criteria: Case reports with < 5 patients, review papers, and studies omitting clear neonatal or maternal follow-up data [2].

Results

Initial Approach: Expectant and Conservative Management

Data from the reviewed literature confirms that 70% to 80% of pregnant patients with symptomatic ureteric stones can pass their stones spontaneously with conservative hydration and analgesia.

Analgesic Safety: Acetaminophen remains the safest choice across all trimesters. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are strictly contraindicated in the third trimester due to risks of premature closure of the fetal ductus arteriosus and oligohydramnios.

Medical Expulsive Therapy (MET): Alpha-blockers (e.g., tamsulosin) are used off-label; however, evidence regarding safety profiles in pregnancy is still limited, requiring careful risk-benefit discussions [3].

Definitive Intervention: Ureteroscopy (URS)

Advancements in small-caliber semi-rigid and flexible ureteroscopes, alongside Holmium:YAG laser lithotripsy, have transitioned URS from an experimental technique to a preferred definitive method.

Efficacy: Quantitative synthesis demonstrates a pooled stone-free rate (SFR) of 88% to 95%.

Safety Profile: Complication rates remain low (< 10%). The risk of inducing preterm labor is approximately 1% to 3%, which does not significantly differ from baseline surgical intervention risks during pregnancy.

Technical Considerations: Standard procedures use ultrasound guidance or tactile feel to minimize or completely eliminate fluoroscopy.

Temporizing Options: Double-J (DJ) Stenting vs. Percutaneous Nephrostomy (PCN)

For patients who are unstable or where definitive urological expertise is missing, temporary drainage provides rapid relief.

Double-J Stents: Associated with a high initial success rate for decompressing the upper urinary tract. However, the gestational hypercalciuric state accelerates stent encrustation, causing high rates of stent-related pain, irritative voiding symptoms, and the mandatory requirement for stent exchanges every 4 to 6 weeks.

Percutaneous Nephrostomy: PCN provides highly reliable, immediate drainage without manipulating the lower urinary tract. It represents the gold-standard diversion technique in cases of obstructive urosepsis or pyonephrosis. Disadvantages include external bag discomfort, localized skin infections, and a risk of tube dislodgement.

Discussion and Guidelines Synthesis
Comparative Analysis of Interventions

Modality	Clinical Success Rate	Primary Efficacy Endpoint	Key Maternal-Fetal Risks
Conservative Management	70% – 80%	Spontaneous stone passage	High recurrence of renal colic; delayed urosepsis
Ureteroscopy (URS)	85% – 95%	Definitive stone-free status	Ureteric injury; transient uterine contractions
Double-J Stenting	80% – 90%	Immediate internal decompression	Encrustation; severe bladder irritative symptoms
Percutaneous Nephrostomy	85% – 95%	Emergency urinary diversion	Tube displacement; minor bleeding

Consensus from International Guidelines (EAU / AUA)

Current urological consensus statements outline clear practice pathways:

First-Line Diagnostic: Ultrasonography remains the initial diagnostic imaging modality of choice. Low-dose non-contrast CT may only be utilized as a last resort in highly complex cases during the 2nd or 3rd trimester if ultrasound is non-diagnostic.

Surgical Timing: If surgical intervention is mandatory, the **second trimester** is the safest window, avoiding first-trimester organogenesis and third-trimester premature labor triggers.

Sepsis Rule: An obstructed, infected collecting system is a life-threatening urological emergency requiring immediate decompression (PCN or DJ stent) alongside broad-spectrum antibiotics.

Conclusions

The treatment of obstructive ureteric stones during pregnancy requires an interdisciplinary approach involving urologists, obstetricians, and anesthesiologists. Conservative therapy should always be attempted first for stable patients with small stones. If intervention is indicated, URS serves as an excellent, safe, and definitive method that avoids the recurrent morbidities of indwelling stents. Emergency urinary diversion via PCN or DJ stenting must be performed immediately in cases of concurrent infection or sepsis [4].

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