



## Endourology

# Ureteroscopic lithotripsy of ureteric stone using thulium fiber laser in a pregnant patient, case report

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## ARTICLE INFO

## Keywords:

TFL  
URS  
Pregnancy  
Renal stones

## ABSTRACT

Nephrolithiasis represents a common cause of non-obstetrical abdominal pain during pregnancy with 1 out of 200 pregnancies being affected. 20%–30% of patients require ureteroscopy. Many studies were done on safety of holmium:yttrium-aluminium-garnet (YAG) during pregnancy but none on Thulium Fiber Laser (TFL). To our knowledge, this is the first reported case of pregnant patient with nephrolithiasis that was treated using ureteroscopy and TFL. We present a 28 years old pregnant woman that presented to our hospital with a left distal ureteric stone. Patient underwent URS and lithotripsy using TFL. The procedure was tolerated with no complications.

## 1. Introduction

Renal stones are rare during pregnancy; however, a non-obstetrical abdominal pain during pregnancy is most commonly due to renal stones.<sup>1</sup> It is quite complicated to treat and manage a pregnant woman with nephrolithiasis considering potential risks on the fetus associated with available options.<sup>2,3</sup> Management options include expectant and medical management, and active intervention. Active intervention refers to either temporizing measures such as ureteral stents, percutaneous nephrostomy tube, or definitive management by lithotripsy, percutaneous nephrolithotomy, or ureteroscopic (URS) stone removal.<sup>2</sup> It is estimated that 50 to 89% of stones pass spontaneously during pregnancy with conservative management and 20%–30% of pregnant patients require active intervention and undergo URS.<sup>2</sup> URS is superior to all other interventions that facilitates visualization of the ureter and renal pelvis which enables detection and fragmentation of stones using laser lithotripsy. Multiple studies have demonstrated that URS is safe during pregnancy with a complications rate that is similar to non-obstetric women.<sup>2,3</sup> Moreover, There are many studies that have been done on the safety of holmium: yttrium-aluminium-garnet (YAG) laser lithotripsy during pregnancy. One study included 45 pregnant women demonstrated that YAG laser is safe during pregnancy with no intra-operative obstetric or urological complications. All patients had normal

pregnancy outcomes with normal deliveries and healthy babies.<sup>4</sup> Another paper reviewed 54 articles concluded that there are no obstetric related complications after URS and laser lithotripsy with a complication rate similar to non-obstetric patients.<sup>3</sup> A recent prospective randomized trial comparing YAG to thulium fiber laser (TFL) revealed that TFL is superior to YAG in reducing operative complications and clearing kidney stones.<sup>5</sup> TFL achieved high ablation rates in most studies and performed better than YAG laser across a range of different settings and ablation modes when the two lasers were compared. Moreover, its ability to use low pulse energy ensures minimal stone repulsion with the repulsion threshold estimated to be 2–4 times higher than that of Holmium:YAG laser.<sup>5</sup> From a safety viewpoint, TFL poses no additional risks than other lasers. Even though there are multiple studies on safety of TFL use, none of them included pregnant patients. To our knowledge, this is the first reported case of a pregnant patient with nephrolithiasis that was treated using URS and TFL.

## 2. Case presentation

In this report, we present a 28 year old surgically and medically free woman that presented to our hospital with a left distal ureteric stone (Fig. 1). In August 2021, she was managed in the previous hospital using a left Dj stent and was scheduled for URS and lithotripsy. She got

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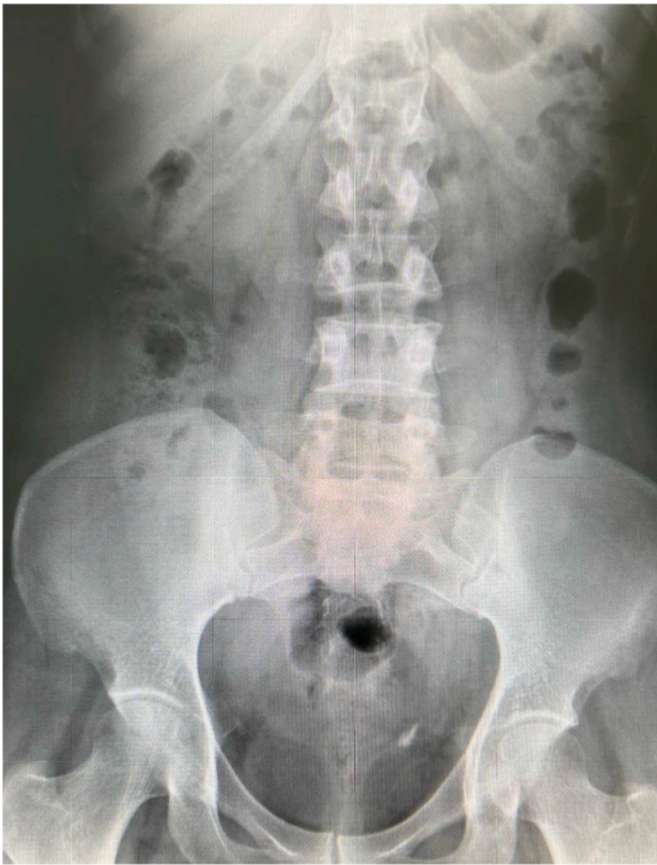


Fig. 1. Stone in the left distal ureter.

pregnant in September 2021 which interfered with her treatment due to lack of facilities. Following her referral to our hospital, once she reached 20 weeks gestation, she underwent her treatment plan that included URS and lithotripsy using TFL.

Under spinal anesthesia, cystoscopy was introduced into the bladder. Right previous DJ stent was identified with no encrustations and removed. DJ stent was cannulated using Guidewire. Semirigid ureteroscope advanced following the guidewire. Stone was identified distally and complete fragmentation was achieved using laser lithotripsy with our standard TFL configurations as follows (Short pulse, Energy: 1 J, Frequency: 15 Hz and Power on 15 Watt). All stone particles were removed using a Dormia basket. Right DJ stent was exchanged over the previously-inserted guidewire size 7-French Multi-Length. The patient tolerated the procedure well with no complication and was shifted to the recovery room in a good position.

Ultrasound scan was performed by the Obstetrics team pre and post the surgery and the fetal heart was reassuring. Two weeks later she presented to the urology suite for right DJ stent removal using cystoscopy under topical anesthesia. Patient tolerated the procedure well. She had a cesarean section due to failure to progress with vaginal delivery. Baby is alive with normal growth.

### 3. Discussion

The precise evidence that pregnancy increases the risk of developing renal stones is lacking.<sup>1</sup> It represents a clinically significant entity as it has been associated with a significant elevation in the risk of gestational diabetes, recurrent miscarriage, chronic hypertension, mild pre-eclampsia and cesarean deliveries.<sup>2</sup> Multiple studies have compared TFL with YAG showing fundamental architectural constraints that are involved with the YAG laser design compared to the TFL which are considered advantageous factors in favor of TFL.<sup>5</sup> Multiple studies suggest that TFL surpasses YAG laser in many manners including higher absorption coefficient in water by four-fold, lower pulse energy (at the lowest possible level of 0.025), smaller conducting laser fibers (50–150  $\mu\text{m}$  radius), and higher maximal frequency (as high as 2000 Hz).<sup>5</sup> In addition, higher stone free rate after a single session of URS lithotripsy were achieved using TFL in comparison to YAG laser. Moreover, there were remarkably fewer intraoperative complications and significantly less operative time associated with TFL. In conclusion, TFL seems advantageous when it comes to URS lithotripsy and multiple studies are in favor of moving towards TFL to be the mainstay of renal stone treatment in the future. In addition, Many studies have been done on safety of YAG lithotripsy during pregnancy and none have been done on TFL to our knowledge. More studies need to be done and shed light on this new modality as it is superior to YAG in many ways.

### 4. Conclusion

Renal stones are a common cause of non-obstetrical abdominal pain during pregnancy. URS and laser lithotripsy is known to be effective and definitive management. It is well tolerated with comparable risks as in non pregnant patients. TFL is a new modality that outperforms YAG and needs more attention. To our knowledge, this is the first reported case of a pregnant patient with kidney stones that is treated using TFL. The procedure was tolerated well with no complications to the mother or the fetus.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.eucr.2023.102437>.

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