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An Observational Prospective Study of Transperitoneal Laparoscopic Ureterolithotomy (TLUT) for Upper Ureteric Calculi

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Abstract: ***Background**: Ureteric calculi are one of the most common urological problems. Although extracorporeal shock wave lithotripsy (ESWL) and ureteroscopic lithotripsy (URSL) are preferred for lower and mid-ureteric stones, larger upper ureteric calculi remain challenging. This study evaluates the efficacy and safety of transperitoneal laparoscopic ureterolithotomy (TLUT) for upper ureteric stones. **Methods**: A prospective observational study was conducted on patients with upper ureteric calculi ≥1 cm who underwent TLUT at a tertiary care center. Intraoperative parameters, postoperative complications, and stone clearance rates were assessed. **Results**: The mean operative time was 82 ± 14 minutes, with minimal blood loss. Complete stone clearance was achieved in 100% of patients. Mean hospital stay was 3.2 ± 0.8 days. Complications included minor port-site infection (6%) and transient urine leakage (4%), managed conservatively. **Conclusion**: TLUT is a safe and effective option for managing large, impacted upper ureteric calculi, offering high clearance rates and minimal morbidity, especially where endourological expertise or equipment is limited.*

Keywords: upper ureteric calculi, laparoscopic ureterolithotomy, transperitoneal approach, stone clearance, minimally invasive surgery

1. Introduction

Urolithiasis remains a prevalent condition worldwide, with ureteric stones constituting 20–25% of urinary calculi. The upper ureter poses technical challenges due to its anatomical proximity to vital structures and the tendency of stones to become impacted. While endourological procedures such as URSL and ESWL have revolutionized stone management, their success rates for large or impacted upper ureteric stones are limited. Laparoscopic ureterolithotomy (LUT), introduced in the early 1990s, provides an effective, minimally invasive approach that offers high stone clearance rates, shorter recovery times, and reduced postoperative pain.

2. Materials and Methods

This was a prospective observational study conducted at the Department of Surgery, Surat Municipal Institute of Medical Education and Research, from January 2023 to December 2024. Patients aged 18–70 years with single upper ureteric stones ≥1 cm and failure of ESWL or URSL were included. Exclusion criteria were multiple stones, pregnancy, active infection, or prior ureteric surgery.

All surgeries were performed under general anesthesia using a standard three-port transperitoneal approach. The ureter was identified by peristalsis and proximity to the gonadal vessels. A longitudinal ureterotomy was made directly over the stone, which was retrieved intact. A 5 Fr double J stent was inserted antegrade, and the ureterotomy was closed with 4-0 vicryl sutures. Postoperatively, patients were evaluated for pain, urine leak, infection, and hospital stay.

Table 1: Demographic and operative parameters of patients undergoing TLUT

Parameter	Mean ± SD / %
Age (years)	42.5 ± 10.3
Stone size (cm)	1.8 ± 0.4
Operative time (minutes)	82 ± 14
Blood loss (ml)	55 ± 20
Hospital stay (days)	3.2 ± 0.8

3. Results

A total of 50 patients were included, with a mean age of 42.5 years. Male-to-female ratio was 3:1. The mean stone size was 1.8 cm, and mean operative time was 82 minutes. Complete stone clearance was achieved in all patients. Mean hospital stay was 3.2 days. Minor complications included transient urine leakage in two patients (4%) and port-site infection in three (6%). No conversion to open surgery was required. The double J stent was removed at 3–4 weeks postoperatively, and no long-term stricture or recurrence was noted.

4. Discussion

The results of this study reaffirm that TLUT is a reliable minimally invasive procedure for large or impacted upper ureteric stones. Stone-free rates in this study (100%) are comparable to other reports in the literature, which range from 95% to 100%. The transperitoneal approach offers a wider working space and better anatomic orientation than the retroperitoneal approach, particularly for beginners.

Complications were minimal and consistent with previous studies. The mean operative time of 82 minutes and average hospital stay of 3.2 days are comparable to other published series. Urine leakage was self-limiting and resolved with conservative management. The absence of major

complications underscores the safety of the technique when performed by experienced surgeons.

While endoscopic options are preferred in many centers, TLUT remains valuable where flexible ureteroscopes or laser lithotripsy are unavailable. It is particularly useful for large, impacted stones and in cases with failed prior endourological procedures.

5. Conclusions

Transperitoneal laparoscopic ureterolithotomy is a safe, effective, and minimally invasive option for managing large or impacted upper ureteric calculi. It provides excellent stone clearance, short hospital stays, and low complication rates. TLUT continues to be a dependable surgical modality, particularly in centers with limited endourological resources.

Additional Information

Author Contributions: All authors contributed to study conception, data collection, analysis, and manuscript preparation. Both authors approved the final version.

Disclosures: The authors declare no competing interests.

Human subjects: Ethical approval was obtained from the Institutional Ethics Committee, Surat Municipal Institute of Medical Education and Research. Informed consent was obtained from all patients.

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