Jordan Medical Journal

ORIGINAL ARTICLE

Applying Bulldog Clamps to Prevent Stone Migration in Laparoscopic Upper Ureteral Stone Surgery

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Received: October 3, 2022

Accepted: March 5, 2023

DOI:
https://doi.org/10.35516/jmj.v58i3.504

Abstract

Background: Urolithiasis may be managed through endoscopic, laparoscopic, percutaneous, or open surgical approaches.. We introduce an effective and safe method for stone migration during laparoscopic ureterolithotomy.

Description of Technique: We used laparoscopic intraperitoneal approach, with three ports. The stone was localized, and the ureter was clamped proximally and distally using bulldog clamps to minimize the risk of stone migration.

Patients and Methods: Case 1 had a 15 mm left upper ureteral stone — refractory to ESWL. Case 2 had a 17mm right upper ureteral stone without previous stone procedure. Case 3 had a history of failed ESWL for a 17mm left upper ureteral stone.

Results: The average operative time was 55 minutes, with a mean hospital stay of two days, and a 100% stone-free rate (SFR). No complications occurred during this minimally invasive surgery, either intra-operatively or post-operatively.

Conclusion: This technique is safe and effective, enhancing the stone-free rate and facilitating the surgical procedure, which facilitates stone surgery by releasing the surgeon's hands and preventing stone migration.

Keywords: Laparoscopic ureterolithotomy, percutaneous nephrolithotripsy, ureteroscopy, extra corporeal shock wave lithotripsy

INTRODUCTION

Urolithiasis is a very common disease, which can be managed by endoscopic, laparoscopic, percutaneous, or open approaches [1]. Different surgical options can be offered to patients with large upper ureteral stones, which are refractory to medical impulsive therapy [2], although the management of large upper ureteral stones is still controversial [3]. The EAU and AUA guidelines recommend shock wave lithotripsy (SWL) or ureteroscopic lithotripsy as the first line of treatment [4]. Nevertheless, percutaneous nephrolithotripsy (PCNL) or laparoscopic ureterolithotomy (LUL) may be an appropriate option for large ureteral stones [5]. LUL has been used with stones for which

ESWL or URS is unfeasible [6]. Although it is more invasive, it provides the opportunity for complete stone clearance in a single session [7].

In several studies, LUL has a stone-free rate (SFR) from 72% up to 100% [8–10]. A lower SFR may be attributed to limited surgeon experience and improper techniques for preventing stone migration. To impede stone migration during LUL, we considered an effective and safe method for performing the procedure.

PATIENTS AND METHODS

This study design did not require institutional Ethics Committee approval since it is a technical point and case study and there were no patient interventions. However, complete explanations were given to patients about the study, informed consent was obtained, and the rights of the patients were protected. To maintain ethical principles, patient names are not used.

We present four patients with 15, 17, 17 and 18 mm upper ureteral stones. The first case had a 15 mm left upper ureteral stone, which was refractory to ESWL (Figure 1). The second case was a male with a 17 mm right upper ureteral stone without previous stone procedure (Figure 2), while the third had a history of failed ESWL for a 17 mm left upper ureteral stone (Figure 3). The final patient was a woman with an 18 mm right upper ureteral stone, which was refractory to ESWL (Figure 4).

We operated on all patients with the laparoscopic intraperitoneal approach. The patients were secured in the flank position, with three ports (two 10 mm ports in the umbilical and lateral paramedian and one 5 mm port in the proximal paramedian) applied for the introduction of the instruments. After medialization of the colon and identification of the ureter, the stone was localized, and the ureter occluded proximally and distally to the stone by bulldogs clamps to minimize the risk of stone migration (Figures 5a, b and c). This innovative technique helps release the surgeon’s hands to enable them to cut along the ureter and remove the stone. We believe this maneuver facilitates stone removal in LUL and prevents stone migration.

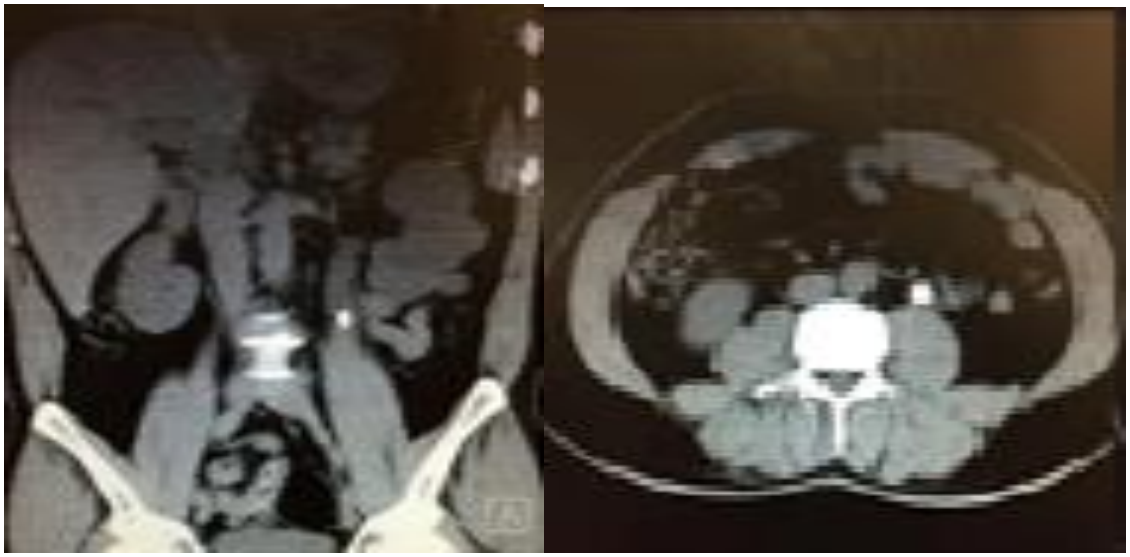

Figure 1. Case 1: 15 mm left ureteral stone

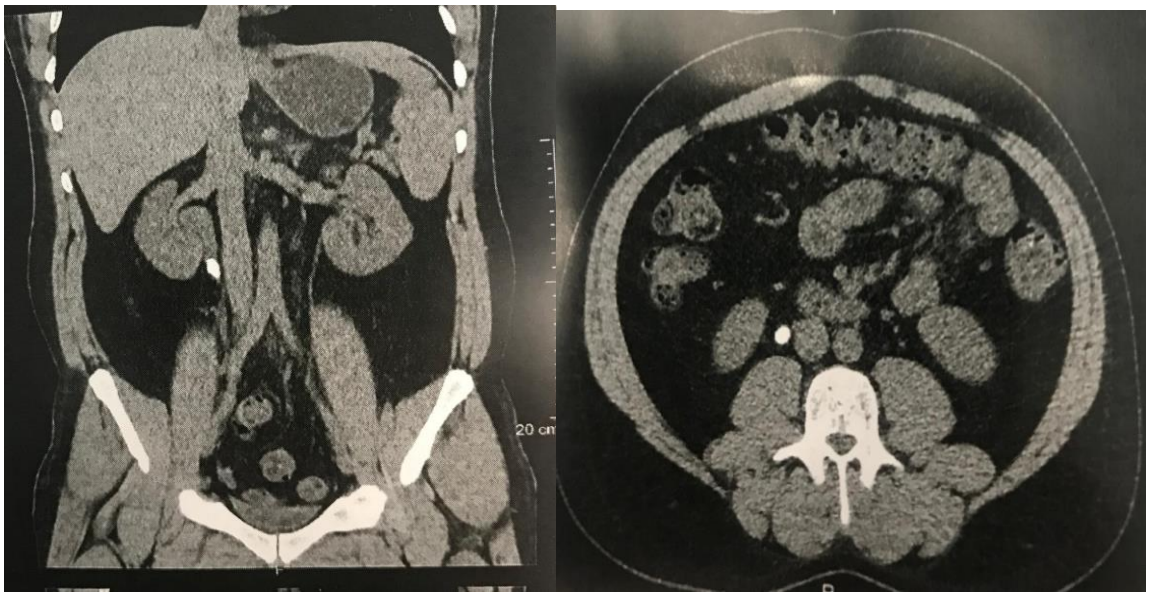

Figure 2. Case 2: 17 mm right ureteral stone

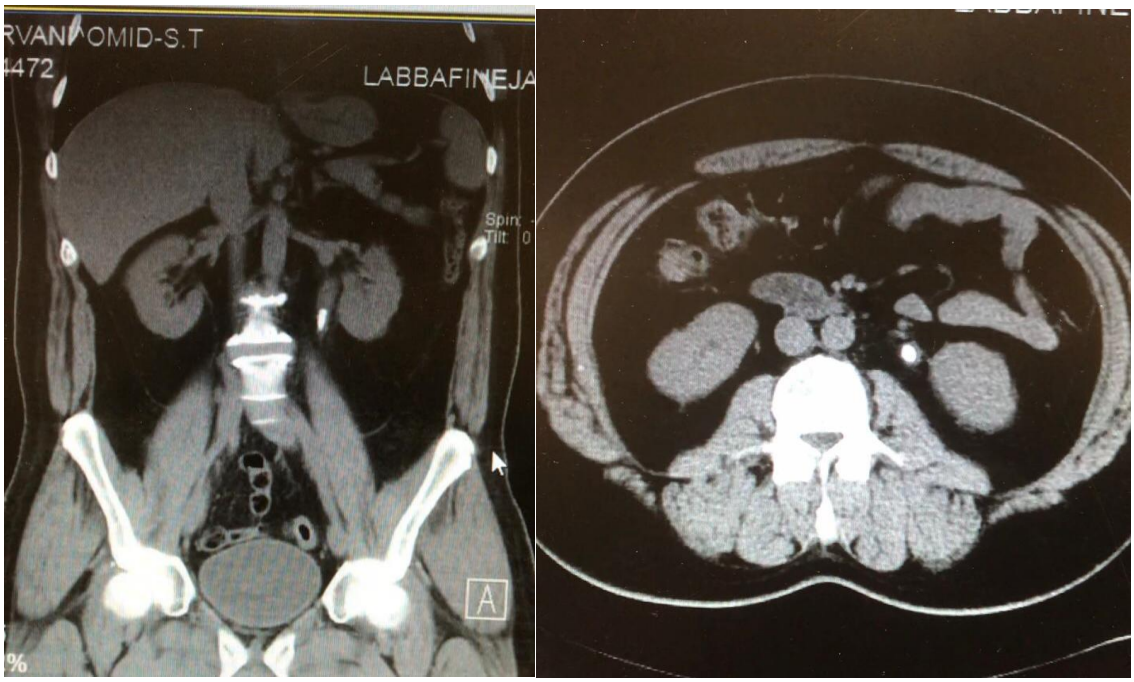

Figure 3. Case 3: 17 mm left ureteral stone

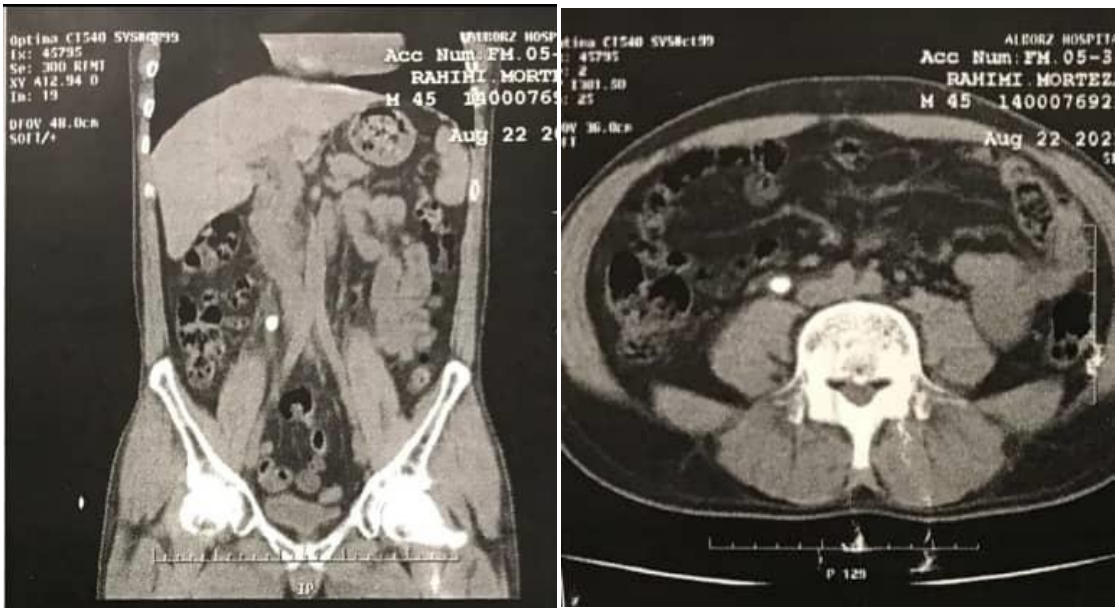

Figure 4. Case 4: 18 mm right upper ureteral stone

Figure 5a. Dilated proximal ureter

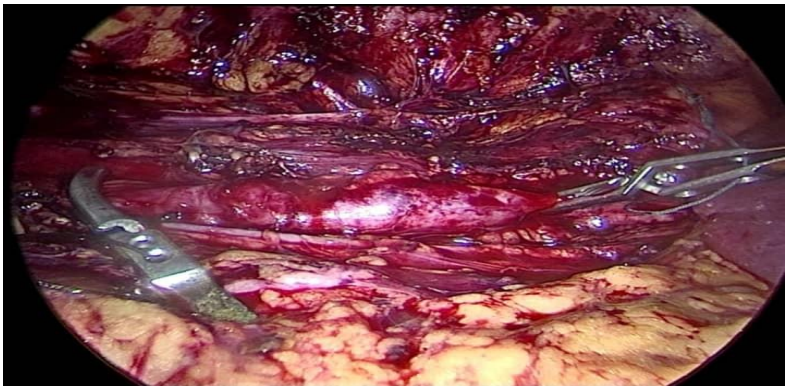

Figure 5b. Applying bulldogs clamps proximally and distally to the stone

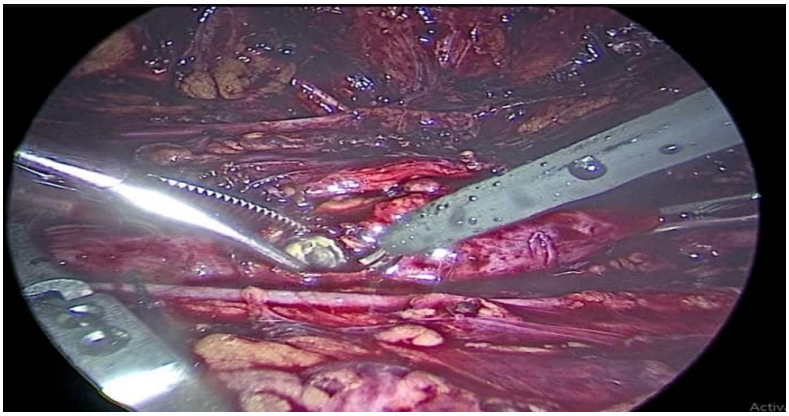

Figure 5c. Removal of ureteral stone with grasper

RESULTS

We applied this novel technique to four patients with large upper ureteral stones and operated successfully with bulldog clamps proximally and distally to the stone. Mean operation time was 55 minutes, mean hospital stay was two days, and SFR was 100%. No complications occurred during this minimally invasive surgery, either intraoperatively or postoperatively.

DISCUSSION

LUL is an efficient option for a large, impacted ureteral stone, following the failure of ESWL or URS therapies, in cases where stone clearance with a single treatment session is required, or where appropriate technological instruments are lacking. Since the first description of LUL by Wickham [11] in 1979, multiple studies have reported its efficacy and safety [12].

Although the SFRs in most series were reported as more than 90% [13, 14], in several studies these rates were about 70% [9, 10]. A lower SFR may be attributed to several reasons, such as limited surgeon experience, number of ureteral stones, and improper techniques for preventing stone migration. To prevent stone migration, some surgeons have applied vessel loops proximally to the stone, which may need the release of the ureter [10]. Others have applied a grasper proximally to the stone, which requires an extra port and restricts the surgeon's hands. In contrast, applying a bulldog clamp proximally to the ureter releases the surgeon's hands to enable them to cut along the ureter and remove the stone, thus facilitating the procedure. Recently, some reports showing higher SFRs in LUL were achieved by applying a flexible ureteroscope, which improves stone clearance, with the stone migrating into the renal pelvis. However, using a flexible ureteroscope in cases of stone migration prolongs the operative time and surgery cost, even when the instrument is available in the operation room [15]. LUL, however, duplicates open ureterolithotomy and is a minimally invasive procedure [16].

Both transperitoneal and retroperitoneal LUL were compared with open ureterolithotomy, and lower analgesic requirements, shorter length of stay (LOS) (3–3.3 days vs. 4.8–8 days), and shorter convalescence (1.8 weeks vs. 3.1 weeks) were reported with LUL [13]. In the largest LUL series by Simforoosh et al. [14], with 123 patients, an SFR of 96.7% was reported with calculi ranging from 1–5.6 cm.

Studies comparing LUL with URS, PCNL, or ESWL for ureteral stones have shown favorable SFRs for LUL, reaching up to 100% [17]. LUL, however, has significantly higher SFRs compared to ESWL (93.3% vs. 35.7% in one study) [10]. In our practice, applying proximal and distal bulldogs helps release surgeons' hands, as noted earlier. Applying a bulldog clamp proximal to the ureteral stone in LUL is a safe and effective maneuver, which increases the SFR of the procedure, thus facilitating the stone surgery.

Author Disclosure Statement

All authors declare no conflict of interest.

Confirmation statement

Each listed author confirms their research is supported by an institution primarily involved in education or research.

Funding Information

There is nothing to disclose for all authors.

Acknowledgements

We would like to show our gratitude to the Rasool Akram Medical Complex Clinical Research Development Center (RCRDC), especially Mrs. Farahnaz Nikkhah, for her technical and editorial assistance.

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تطبيق البلدغ المشبك لمنع هجرة الحصوات في جراحة حصوات الحالب العلوية بالمنظار

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Received: October 3, 2022

Accepted: March 5, 2023

DOI: https://doi.org/10.35516/jmj.v58i3.504

الملخص

الخلفية والاهداف: يمكن إدارة تحص البول عن طريق التنظير الداخلي أو بالمنظار أو عن طريق الجلد أو الطرق المفتوحة. نقدم طريقة فعالة وآمنة لترحيل الحجر خلال.LUL

المنهجية: استخدمنا طريقة التنظير داخل الصفاق، مع ثلاثة منافذ. الحجر موضعي ويتم غلق الحالب في مكان قريب وبعيد عن الحجر بواسطة البلدغ لتقليل مخاطر هجرة الحصوات. و الحالة الاولى كان لديها حجر حالب علوي يسار بقطر 15 ميلى متر مقاومة ل ESWL والحالة 2: كان لديه حجر الحالب العلوي الأيمن 17 ميلى متر دون إجراء الحجر السابق؛ الحالة 3: كان لها تاريخ رسبت في ESWL لحجر الحالب العلوي الأيسر مقاس 17 ميلى متر.

النتائج: كان متوسط وقت العملية 55 دقيقة، وكان متوسط الإقامة في المستشفى يومين وكان SFR 100 % درجة مئوية. لم تحدث أي مضاعفات خلال هذه الجراحة طفيفة التوغل، أثناء الجراحة وبعدها.

الاستنتاجات: هذه مناورة آمنة وفعالة، مما يزيد من معدل الإجراءات الخالية من الحصوات مما يسهل جراحة الأحجار عن طريق تحرير أيدي الجراح ومنع انتقال الحجر.

الكلمات الدالة: البلدغ المشبك، حصوات، الحالب، المنظار.