Intravenous suppression in retrograde intrarenal surgery (RIRS) for staghorn calculus

Alexandros Fiamengos 1, Nikolaos Kostakopoulos 1, Andreas Karagiannis 1, Maria Zerva 1, Litsa Mosaikou 2, Ruth Roussou 3, Athanasios G. Papatsoris 1

1University Department of Urology, 2Endoscopic Unit, 3Department of Anesthesiology; Sismanoglio General Hospital, Athens, Greece

Corresponding author:
Athanasios G. Papatsoris, 2nd Department of Urology, School of Medicine, University of Athens, Greece. Tel.: 2132058119, E-mail: agpapatsoris@yahoo.gr

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We report a case of a 64 year old woman, extremely obese, treated with retrograde intrarenal surgery (RIRS) for a complete staghorn calculus under intravenous sedation. Due to severe comorbidities the patient could not undergo general or regional anesthesia. Laser lithotripsy was performed, resulting in clearance of the pelvic and middle pole stone burden.

Introduction
Although percutaneous nephrolithotomy (PCNL) is the treatment of choice for staghorn renal calculus it has a considerable complication rate in comparison with retrograde intrarenal surgery (RIRS)1-2. Furthermore, general anesthesia is needed, fluoroscopy time is more and hospital stay is longer. Therefore, RIRS is a safe alternative for treating large renal calculus in high - risk patients. RIRS can be performed under general or regional anesthesia, with a preference to the first option3. Herein, we report a case of a high risk patient with a complete staghorn calculus treated with RIRS under intravenous sedation.

Case report
A 64 years old woman had a 10 year history of a complete staghorn calculus in the right kidney (Figure 1). The patient was not operated due to severe comorbidities. In particular, she was extremely obese with BMI=49.59 (height: 1.65cm, weight: 135kg), and was a heavy smoker with 100 pack years. Furthermore, she suffered from chronic obstructive pulmonary disease (COPD), hypothyroidism and non - insulin dependent diabetes mellitus (NIDDM). Moreover, her past surgical history included cholesystectomy, followed by multiple surgeries and long hospitalizations for intestine obstructions and abdominal hernias.

The history of her present complaint was associated with the history of recurrent urinary tract infections (UTIs). A month ago the patient presented to the Accident and Emergency (A & E) Department of a hospital due to right pyelonephritis. A double J stent was inserted under local anesthesia and the patient was referred for further treatment.

The patient was admitted to our Department and had an extended preoperative investigation. She had a positive urine culture for E. coli and was covered with Cefoxitin 1g TDS. The anesthetists were not happy to perform general anesthesia; thus the plan was to per-
form RIRS under regional anesthesia and intravenous suppression. Unfortunately, regional anesthesia was not possible due to the severe obesity. Therefore, we proceeded with intravenous sedation only, including Dormixale 2mg, Fentanyl 150mg and mixture O<sub>2</sub> / N<sub>2</sub>O - 50 / 50%.

We used a 8.5F semi - rigid ureteroscope for the whole procedure, during which a 12F urethral catheter was in situ. Initially, a nitinol safety wire was inserted under fluoroscopy guidance and the JJ stent was removed. The renal pelvis was easily accessed and laser lithotripsy at 10W took place with minimal irrigation flow. Fortunately, the calculus had soft composition. After clearing the pelvic part of the staghorn we accessed and cleared the upper pole. In order to access the whole renal pelvis and upper pole the operating table was tilted in different directions. After 98 minutes we decided to cease lasering and a tiny fragments was removed in order to be sent for stone analysis and culture. Lastly, an open ended 7/26 JJ stent was inserted under fluoroscopy guidance. We inserted such a JJ stent with the plan of performing flexible ureteroscopy (fURS) at a second stage. Hopefully, the patient tolerated very well the whole procedure, recovered well and was discharged the following day with antibiotics.

**Discussion**

Nowadays, rigid and flexible ureteroscopy is a precise, minimal invasive surgery that can assess the entire collecting system in order to treat a calculus with intracorporeal laser lithotripsy<sup>4,5</sup>. Nevertheless, the upper limit of the calculus size to be treated with RIRS is questionable. Typically, the management of large intrarenal stones (> 2 cm) is performed with PCNL<sup>2</sup>. Although the stone - free rate (SFR) of PCNL is high (up to 95%), the potential complications remain a concern. Because of the evolution in technology, it is nowadays possible to treat large intrarenal stones with RIRS. Recently, Breda and Angerri reviewed the literature on the ureteroscopic management of kidney stones larger than 2.5 cm<sup>3</sup>. Of the 324 studies identified, only 10 were considered suitable for this review. There were a total of 441 patients with a mean calculus size of 2.9 cm. The SFR with an average of 1.6 procedures was 89.3%, while the overall complication rate was 8% with a major complication rate of 1.9%. Zheng et al.<sup>7</sup> performed a meta - analysis upon the efficacy and safety of RIRS versus PCNL for the treatment of renal calculi > 2cm. Two randomized controlled trials and six clinical controlled trials were included, involving a total of 590 patients. The authors concluded that RIRS is a safe and effective procedure that can successfully treat patients with calculi > 2cm with a high stone - free rate and significantly reduce hospital stay.<sup>7</sup> Therefore, RIRS can be used as an alternative treatment to PCNL in selected cases with larger renal stones and more recent publications confirm the above conclusions<sup>8</sup>.

RIRS is typically performed under general anesthesia as mentioned in the relevant EAU guidelines<sup>1</sup>. With the introduction of short - acting anesthetics, URS can be performed efficiently with high patient satisfaction and minimal postoperative recovery time. In relevant review, in 2004, Cybulski et al.<sup>9</sup> stated that URS under local anesthesia, with or without sedation, had become a viable option for a high percentage of correctly selected patients. For those patients who then required deeper sedation or general anesthesia, anesthesia could be induced quickly with the new agents such as remifentanil, propofol, and desflurane, without a prolonged postoperative recovery period. However, it is different to perform URS under local anesthesia for simple indications and to perform RIRS for large renal calculi.<sup>10</sup>

High risk patients with staghorn calculus need meticulous management. In the case of patients unsuitable
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to undergo general anesthesia the treatment options limited. Operating on such patients in a full lateral position would minimize the hemodynamic and respiratory risks and - if combined with regional anesthesia - would allow for increased patient comfort and safety. The full lateral position - while necessitating expertise and some learning for renal puncture from an unusual angle - is safe in high-risk patients. It can be safely performed using regional anesthesia, avoiding the risks of general anesthesia and allowing for patient-anesthetist communication throughout the procedure, while cardiac and respiratory parameters are improved, stable, and easily controlled. Nevertheless, in cases where even regional anesthesia can be performed, as in our patient, RIRS under intravenous sedation is a feasible option. Of course, for staghorn calculus clearance more than one session is needed with or without adjuvant extracorporeal shock wave lithotripsy (SWL).

Conclusion
Although PCNL is the gold standard for treating staghorn calculus, in high risk patients that cannot undergo general anesthesia RIRS could be a feasible alternative. The results of more comparative studies are warranted in order to establish a treatment algorithm. In selected cases of high risk patients with large renal stones that cannot undergo regional anesthesia, RIRS under intravenous sedation could be a feasible last option as in our case report.

References