Endourology

Modified salvage endoscopic combined intrarenal surgery in a single functional kidney with refractory staghorn stone

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ARTICLE INFO

Keywords:
ECIRS
Staghorn
Salvage PCNL
Single-kidney

Introduction

Endoscopic combined intrarenal surgery (ECIRS) simultaneously combines flexible ureterorenoscopy and percutaneous nephrolithotomy (PCNL) to explore the pyelocaliceal system and aims at the one-access resolution of urolithiasis along the entire urinary tract.1 It is a practical option for the treatment of complex renal calculi.2 The major advantage of using simultaneous antegrade-retrograde therapy for complex renal calculi is the better stone-free rates by exploiting the full array of endourological armamentarium.3

We hereby present a case to determine safety and efficacy of ECIRS in the treatment of a complete staghorn stone in a patient with a single functional kidney.

Case presentation

Clinical history

A 69-year-old Caucasian man came to our institution with a single left functional kidney and an ipsilateral staghorn stone. His medical history included arterial hypertension, paroxysmal atrial fibrillation and coronary artery disease. At the time of endourological assessment the patient was on apixaban, which was discontinued during surgical interventions. Preoperative serum creatinine was 1.71 mg/dl situating the patient in KDOQI stage III chronic kidney disease.

Diagnostic studies

Preoperative ultra-low dose non-contrast enhanced CT scan revealed a dysplastic right kidney and a staghorn stone in the left kidney occupying the upper, middle and lower caliceal systems with minimum dilation of the pyelocaliceal system (Fig. 1). The longitudinal length of the left kidney was 11.7 cm with a parenchymal thickness of 1.88 cm. The length of the right kidney was 7.6 cm with a parenchymal thickness of 0.72 cm. Stone longitudinal, width and height dimensions were 93.0 mm, 36.5 mm and 33.2 mm respectively, with a 15.7 mm² volume and 6929.5 mm² surface. Preoperative MAG3 renal furosemide scintigraphy revealed a split renal function of 90% on the left and 10% on the right. Urine analysis and culture were negative.

Intervention

A double J ureteral stent was previously placed to manage obstruction and enhance ureteral dilation (Fig. 1). A retrograde intrarenal surgery (RIRS) as the most harmless therapy option was first planned; however, ureteral narrowness impeded the placing of a ureteral access sheath (Flexor Cook Medical®) 12/14F thus the retrograde approach was abandoned. Percutaneous renal access attempts were carried out in the lower and upper calyxes, however, due to difficulty in accessing the collecting system the middle-posterior calyx was punctured with Chiba-needle 18G under biplanar fluoroscopic and ultrasound guidance. Mini-PCNL was performed by dilating tract with 18 Fr Amplatz sheaths (Richard Wolf, Knittlingen, Germany) and Holmium laser (LisaLaser OHG, Katlenburg-Lindau, Germany) lithotripsy partially reduced stone...
burden (Fig. 1). The procedure was complicated by acute bleeding and therefore suspended; it required no blood transfusion and was managed conservatively.

Lastly, ECIRS was performed in Galdakao-modified supine Valdivia position a week later by the same surgeon experienced in various endourological treatment modalities such as PCNL, RIRS and ECIRS. Irrigation fluid (0.9% NaCl) was located at 30 cm above the patient chest to avoid high intraluminal pressures. Cystoscopy was performed using 22F cystoscope (Karl Storz, Tuttingen, Germany); retrograde pyelography conducted with ureteral catheter 5F (Optimed, Ettingen, Germany) and introduced with fluoroscopic guidance. A 0.035" hydrophilic guidewire (Cook Medical, Bloomington, IN, USA) was placed in the ureteral lumen and subsequently semi-rigid ureteroscopy was carried out using 7.5/9.8Fr ureteroscope (Richard Wolf). Due to ureteral narrowness a ureteral access sheath was not used and percutaneous renal access was carried out through nephrostomy tube. The percutaneous tract was dilated to 18 Fr using single use Amplatzer dilators. Stones were disintegrated using Holmium laser (500µm) in dusting mode (max- 1.0J, max. 25Hz, long pulse length). A 15F nephroscope (Richard Wolf) was used to ensure proper outflow of irrigation fluid between Amplatz working sheath and nephroscope during the procedure. Stone fragments were washed out using the “vacuum cleaner” effect or retrieved using N-Gage nitinol basket 1.9F (Cook Medical). At the end of the procedure, a 7Fr, 28cm double-J ureteral stent (Rüschi Medical, Kernen im Remstal, Germany) and nephrostomy tube 14Fr (Optimed) were inserted. Postoperative pyelography did not show any contrast leakage outside the collecting system and small clinically insignificant residual fragments in the lower calyx. Operative time was 209 minutes.

Outcome

Postoperative blood analysis showed normal haemoglobin and electrolyte values. Nephrostomy tube was removed 3 days after surgery, preceded by an antegrade pyelography to demonstrate absence of obstruction and free passage of contrast to the bladder. To rule out the suspicion of a contralateral renal tumor, an abdominal MRI was performed 5 months after ECIRS revealing no stones in the collecting system (Fig. 1). Follow-up creatinine was 1.72 mg/dl.

Discussion

Our report demonstrates the feasibility of ECIRS after a previous unsuccessful prone PCNL attempt in a patient with a single-kidney, renal insufficiency and complex urolithiasis. In addition, it further supports emerging data regarding its success and safety. Scoffone et al. prospectively studied the safety and efficacy of ECIRS in GMSV for the treatment of large/complex urolithiasis. Of the 127 patients, 5 (3.9%) had solitary kidneys and 42 (33.1%) had multiple or staghorn stones. Stone free rate was 81.9% after first treatment and 87.4% after second look procedure using the same percutaneous tract in the same hospital stay. Overall complications were low, with a transfusion rate of 3.15% in four patients and 2 urosepsis cases, which promptly responded to broad-spectrum antibiotic therapy. A significant association has been found between the number of involved calyces and stone surface area as predictors for stone free rates after ECIRS. In addition to our patient having the entire pyelocaliceal system completely occupied by a staghorn stone with moderate pyelocalicial dilation, a narrow ureteral lumen impeded the insertion of a ureteral sheath to ease retrograde lithotripsy. Through this case report we provide further evidence in the feasibility of ECIRS in a salvage scenario of a single-kidney patient after a previous prone PCNL failed attempt. Our data contributes to patient safety by showing stabilization of renal function and achieving a stone free status after a 6-month follow-up with no complications. Lastly and importantly, it heralds a new treatment panorama for single-kidney patients with complex urolithiasis.

Conclusion

Despite a previous PCNL failed attempt and ureteral narrowness that impeded the insertion of a ureteral access sheath, ECIRS is safe and efficacious in patients with single functional kidneys and large complex renal stones. Lastly, further renal function deterioration was prevented up to 5 months after surgery.

Declarations

Consent for publication: Written informed consent for publication of clinical details and images was obtained from the patient.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors’ contributions

RS drafted the manuscript, MA analysed and interpreted the patient data regarding stone disease and endourological treatment, AM carried out the ECIRS management of the patient. All authors read and approved the final manuscript.

Acknowledgements

The article processing charge was funded by the German Research Foundation (DFG) and the University of Freiburg in the funding programme Open Access Publishing.

Abbreviations

ECIRS endoscopic combined intrarenal surgery
PCNL percutaneous nephrolithotomy
CKD chronic kidney disease

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