

Optimizing RIRS in Complex Renal Anatomy: A Comparative study of Tip-Flexible Suction versus Conventional Ureteral Access Sheath

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Abstract

Background/Objectives: Managing kidney stones in patients with congenital renal anomalies - such as horseshoe kidney or ectopic kidney - presents unique challenges for endourologists. In these anatomically complex cases, standard ureteral access can be difficult, and pressure management becomes critical. Suction-assisted ureteral access sheaths have emerged as a promising solution, but clinical data in this population remain limited. This study evaluates whether using a tip-flexible suction UAS improves outcomes in retrograde intrarenal surgery compared to conventional access.

Methods: We retrospectively reviewed 67 patients with confirmed renal anomalies and stones sized 2-4 cm who underwent RIRS at two academic centers between October 2022 and December 2024. Patients were grouped based on the type of UAS used: suction-assisted (TFS-UAS) or conventional (T-UAS). Surgical and postoperative outcomes, including stone-free rate (SFR), complication profile, operative time, and hospital stay, were compared.

Results: The TFS-UAS group showed a higher 30-day SFR (94.3%) compared to the conventional group (81.3%), although the difference was not statistically significant. Operative time was longer with TFS-UAS ($p < 0.001$), but this was offset by a shorter hospital stay ($p = 0.003$). No major differences were seen in complication rates.

Conclusions: Using a suction-assisted UAS during RIRS in patients with congenital renal anomalies offers notable clinical benefits. Primarily, it increases the chance of removing all stone fragments and often results in a shorter, easier recovery. While this technique may increase procedural time, the overall advantages, such as improved success rates and easier recovery, typically justify the additional time.

Keywords: RIRS, suction-assisted UAS, congenital renal anomalies, kidney stones, flexible ureteroscopy, intrarenal pressure, horseshoe kidney, ectopic kidney, ADPKD