

Title:

Pediatric Urology Robotic Major Reconstruction: A Scoping Review

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Abstract:

Background: Robotic assistance has expanded the scope of minimally invasive major reconstruction in pediatric urology, but adoption varies and comparative advantages over open surgery remain uncertain.

Objectives:

1. Map and synthesize evidence on robotic major lower urinary tract reconstruction in children, focusing on continent catheterizable channels (Mitrofanoff/Monti), bladder augmentation, and bladder neck reconstruction (BNR).
2. Compare perioperative and postoperative outcomes with open approaches.
3. Identify barriers and gaps to inform future research.

Eligibility criteria: English-language clinical studies reporting primary data on patients <18 years undergoing the targeted robotic procedures for neurogenic bladder or severe voiding dysfunction. Oncologic indications, editorials, nonclinical studies, and abstracts without full text were excluded.

Sources of evidence: MEDLINE (Ovid), Embase (Embase.com), Cochrane Library (Wiley: CDSR and CENTRAL), and Web of Science Core Collection (Clarivate).

Charting methods: A standardized extraction form (with calibration) captured bibliographic details, study design, patient and procedural characteristics, and outcomes (operative time, estimated blood loss, length of stay, pain, complications, continence, revision/reoperation, follow-up). Data were summarized descriptively in tables/figures; no meta-analysis was performed due to heterogeneity.

Results: Of 218 records screened, 67 studies were included from 2004-2024. Many were case reports/series. Feasibility reports for catheterizable channels (\pm augmentation/BNR) showed low conversion-to-open (7%), complication rate of 16.7% (most commonly stomal stenosis, wound infection, UTI), mean length of stay 5.7 days, and reported success/continence of \sim 99%. Six retrospective comparisons (136 robotic vs 121 open cases) found similar complication, reoperation, and continence rates; the only consistent significant difference favoring robotics were lower postoperative morphine equivalents, with descriptive trends toward less estimated blood loss (EBL) and shorter hospital stay but longer operative times.

Conclusions: Robotic major reconstruction in pediatric urology is feasible and safe in experienced hands, with outcomes broadly comparable to open surgery and potential benefits in analgesia and resource use. Adoption remains constrained by pediatric anatomy, costs, learning curves, and case volume. Standardized definitions of continence, rigorous complication reporting, prospective multicenter data, cost analyses, and long-term functional follow-up are needed to benchmark and optimize care.