

Retrospective Analysis of Bladder Perforation Risk in Patients after Augmentation Cystoplasty Using an Extraperitoneal Approach

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Background: Initial management of pediatric patients with neurogenic bladder is focused on clean intermittent catheterization and medical therapies. Those with more hostile or small capacity bladders require surgical intervention including bladder augmentation that can result in significant clinical sequelae. This study examines a rarely described approach wherein the bladder reconstruction is extraperitonealized by bringing bowel segments through a peritoneal window and then closed.

Objective: The aim of this study was to determine if the rate of bladder rupture and subsequent morbidity differed between patients who have undergone an intraperitoneal versus extraperitoneal bladder augmentation. We hypothesized that an extraperitoneal approach reduced the risk of intraperitoneal bladder perforation, downstream Intensive Care Unit (ICU) admission, small bowel obstruction (SBO) requiring exploratory laparotomy, and ventriculoperitoneal (VP) shunt-related difficulties as compared to the standard intraperitoneal technique.

Methods: A retrospective chart review was conducted to assess surgical approach and outcomes in patients who underwent bladder augmentation performed between January 2009 and June 2021. Patients were identified through an existing database and manual chart review was conducted to extract data through imaging studies, operative notes, and clinical documentation. The primary outcome was bladder perforation. Secondary outcomes were ICU admission, exploratory laparotomy, and VP shunt externalization, infection, or revision for any cause. Nonparametric statistical analyses were performed.

Results: A total of 111 patients underwent bladder augmentation with 37 intraperitoneal and 74 extraperitoneal procedures. Median follow up was 5.8 years [IQR 3.0–8.6 years] and did not vary between groups ($p=0.67$). Only one patient was found to have a bladder perforation in the intraperitoneal group (log-rank $p=0.154$). There were no significant differences in time to post-augmentation ICU admission, exploratory laparotomy, or VP shunt events between the two groups (log-rank $p=0.294$, log-rank $p=0.832$, and log-rank $p=0.237$, respectively). Furthermore, a Kaplan-Meier analysis assessing time to composite complication demonstrated no significant difference between the two techniques (log-rank $p=0.236$).

Discussion: This study provides important data comparing the rate of bladder perforation and subsequent morbidity between intraperitoneal and extraperitoneal bladder augmentation. As expected, with a complex procedure, both groups suffered complications, but these data showed no difference between the two procedures. Rates of prior (abdominal) surgery may influence the decision to perform this procedure extraperitoneal.

Conclusions: Outcomes related to bladder perforation and secondary consequences do not differ significantly between patients who had bladder augmentation performed with an intraperitoneal versus extraperitoneal approach. Given the low number of adverse events in this study, larger studies are warranted.