

Decreased complications with enhanced recovery after surgery protocol in children undergoing urologic reconstructive operations

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Background

ERAS is well established in adults but has not been well studied in pediatric patients. Previous work shows that ERAS is a safe alternative to standard care, but its precepts remain controversial among some pediatric urologists. The purpose of this study is to assess the association of ERAS with risk of complications in patients undergoing urologic reconstructive surgery that required a bowel anastomosis. We hypothesized that ERAS would decrease complications as compared to historical controls.

Methods

IRB approval was obtained to prospectively enroll patients <18 years in ERAS if they were undergoing urologic reconstruction that included a bowel anastomosis. ERAS protocol entailed 16 unique items, including: no bowel prep, pre-op oral liquid carbohydrate, minimization of opioids in favor of non-opioid analgesia, regional anesthesia, laparoscopy when feasible, no excess drains, no post-operative nasogastric tube (NG), early enteral feeding, and early removal of intravenous fluids (IVF). Recent (2009-2014) historical controls were propensity matched in a 2:1 ratio on age, sex, ventriculoperitoneal (VP) shunt status and whether patient was undergoing bladder augmentation. Patients were analyzed for ED visits, re-admission within 30 days, re-operation within 90 days and adverse events occurring within 90 days of surgery. Given the matched nature of the two cohorts, continuous variables were compared using logistic regression using generalized estimating equations and categorical variables were compared using the Mantel-Haenszel test. All tests were two-sided and p-values < 0.05 were considered significant.

Results

26 historical and 13 ERAS patients were included. Median ages were 10.4 (IQR 8.0-12.4) and 9.9 years (IQR 9.1-11), respectively (p=0.94). There were no significant differences in prior abdominal surgery (38% vs 62%) or primary diagnosis of spina bifida (62%) between groups. Median ERAS protocol items achieved per patient was 8 of 16 (IQR 4-9) historically vs 12 of 16 (IQR 11-13) in the ERAS cohort. ERAS significantly improved use of pre-op liquid load (p<0.001), minimization of opioids (p=0.046), early discontinuation of IVF (p<0.001), and early feeding (p<0.001). Length of stay decreased from 8 days (range 3-41 days) for historical patients to 5.7 days (range 2-22 days). This difference was not significant. There was an inverse correlation between number of ERAS items achieved per patient and length of stay

(adjusted $R^2=0.25$). 90-day complications per patient decreased from 2.1 to 1.3 (OR 0.71, 95% CI 0.51-0.97). There were fewer complications per patient across all grades with ERAS. Most complications were grades 1 (20 vs 7 total complications) or 2 (22 vs 9 complications). Grades 3 (10 vs 1 complications) and 4 (4 vs 0 complications) were less common. No differences were seen in ED visits, re-admissions or re-operations.

Conclusions

Implementation of ERAS in a pediatric urology population undergoing urologic reconstructive operations with a bowel anastomosis is feasible, safe and appears to decrease 90-day complications. Multicenter study will be required to confirm the potential benefits of adopting ERAS on complications, length of stay, and cost.