



Continuous local anesthetic infusion for children with spina bifida undergoing major reconstruction of the lower urinary tract

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Summary

Objective

While many options for postoperative analgesia are available to the general patient population, choices are limited for individuals with spinal dysraphism. We hypothesized that the use of continuous local anesthetic infusion following major reconstruction of the lower urinary tract in children with spina bifida would significantly decrease need for opiate use, while maintaining adequate pain control.

Materials and methods

Children with spina bifida who underwent major reconstruction of the lower urinary tract at Children's Hospital Colorado were identified from January, 2003 through January, 2013 were identified. In addition to enterocystoplasty, procedures included Mitrofanoff or Monti creation, bladder neck reconstruction, and Malone antegrade continence enema. Patients who had local anesthetic infusion catheters placed in the incision were compared to patients without catheters. Opioid consumption was calculated by conversion of any opiates into IV morphine (mg/kg) on postoperative days (POD) 0–3. Pain was assessed by mean and maximum FLACC scores on POD 0–2. Use of antiemetic medications and wound related complications were recorded as secondary metrics. Patients with other etiologies for neurogenic bladder and bowel were excluded. Patients whose pain was assessed by other assessment scales were excluded. Chi-squared analysis was used for nominal variables, students t-test was used for analysis of continuous variables. *P* values <0.05 were considered significant.

Results

36 myelomeningocele patients who underwent primary enterocystoplasty met the inclusion criteria. All surgeries were open procedures. 24 patients in the infusion catheter group were compared to 12 patients who received primary analgesia by PCA or

IV narcotics. There were no significant differences in age, sex, weight or spinal defect level between the two groups. Opioid use, as defined by IV morphine equivalents, was significantly less in the wound soaker group on all PODs. The total opioid use after POD #0–3 was 0.55 mg/kg in the wound soaker group vs 1.66 mg/kg in the IV/PCA group (*p* = 0.03). FLACC scores were uniformly lower in the wound soaker group, but were not significantly different. There was a significant decrease in need for postoperative antiemetic use in the wound soaker group (36.5% vs 83.3%, *p* = 0.014). Complications and hospital stay were similar between both groups.

Discussion

The advantage of local anesthesia is the reduction of systemic opioids and their subsequent adverse side effects. Our results suggest that in children with spina bifida undergoing major reconstruction of the lower urinary tract narcotic consumption is approximately 1/3 when continuous local anesthetic catheters are placed into the incision. The need for antiemetic medication is also significantly less. While this technique has been validated in a variety of other settings, it may be most beneficial in patients with myelomeningocele or other spinal dysraphism where epidural placement is generally contraindicated and narcotic use may have a particularly deleterious effect on preexisting neurogenic bowel function. The primary limitation of our study is that it is a retrospective review of a limited number of patients. Patients were not randomized and subject to other management differences that could have influenced our results in unknown ways.

Conclusions

Continuous local anesthetic catheters are a simple, effective alternative strategy to provide postoperative analgesia while reducing systemic opiate use and associated adverse effects.

Table Comparison of patient characteristics and perioperative outcomes.

	IV/PCA	Infusion catheter	p Value
N	12	24	
Mean age (yrs)	10.0	8.1	0.13
Sex (M/F)	6/6	10/14	0.95
Weight (kg)	37.2	30.0	0.24
IV morphine (mg/kg)			
POD #0	0.18	0.087	0.039
POD #1	0.55	0.18	0.007
POD #2	0.56	0.16	0.011
POD #3	0.37	0.12	0.002
Total #0–3	1.66	0.55	0.004
FLACC scores			
Mean POD #0	1.31	0.82	0.2
Max POD #0	3.25	2.63	0.45
Mean POD #1	1.65	1.27	0.54
Max POD #1	4.58	3.57	0.18
Mean POD #2	0.92	1.07	0.84
Max POD #2	3.25	2.95	0.42
Antiemetic POD #0–3	10 (83.3%)	9 (37.5%)	0.014

Introduction

Post-surgical pain management is an essential component for successful operative outcomes. The benefits of optimizing pain control include improved convalescence and reduction of postoperative pulmonary complications [1]. Opioids have been the traditional choice for postoperative pain management, but carry a significant side-effect profile, often with undesired clinical outcomes that include respiratory depression, postoperative nausea and vomiting, ileus, sedation and pruritis [1,2]. The use of incisional local anesthetic instillation or 'single shot' regional analgesic techniques is an effective strategy to diminish pain scores while decreasing opioid use [2]; however, the duration of analgesia is limited. An indwelling caudal or lumbar epidural catheter is an attractive pain-control option for patients requiring postoperative hospitalization, but may limit mobility, and is not an option in some patients with spinal dysraphism such as myelomeningocele.

The majority of patients with myelomeningocele have neurogenic bladders. In patients with elevated bladder pressures that fail conservative management, including intermittent catheterization and anticholinergics, surgical interventions such as enterocystoplasty, Mitrofanoff creation and bladder neck reconstruction may be considered. In this postoperative setting, pain control can be challenging, as caudal and epidural catheters are not an available option for analgesia. Furthermore, narcotic use may exacerbate pre-existing neurogenic bowel dysmotility, which is also common in this patient population.

To provide effective pain control with fewer side effects and decreased time to convalescence, continuous infusion of site-specific analgesia has been reported in a variety of adult surgical specialties [3]. In the pediatric population, there are

proprietary locally infused pain-relief systems that have been described [4,5] and also a technique utilizing spinal epidural catheters [6]. In the present study, it was hypothesized that the use of 'wound soakers' in patients with myelomeningocele and undergoing major urologic reconstruction would provide adequate postoperative analgesia while significantly decreasing the need for opioids.

Materials and methods

After institutional IRB approval was obtained (COMIRB #12-1291), all patients with myelomeningocele who underwent major urologic reconstruction at the Children's Hospital, Colorado, were identified from January 2003 through January 2013. Inclusion criteria included a known diagnosis of myelomeningocele and a primary procedure of enterocystoplasty with or without concurrent Mitrofanoff or Monti procedures, antegrade continence mechanism, or bladder neck reconstruction. Exclusion criteria included other diagnoses leading to neurogenic bladder as well as secondary or re-do procedures.

Patients were divided into two groups: patients who received infusion catheters for primary postoperative pain control ('wound soaker' group) were compared to the remaining patients who were managed by IV narcotic administration or patient-controlled analgesia pumps (IV/PCA group). The technique of wound soaker placement prior to closure of the incision has previously been described [6]. A continuous infusion of 0.1% Ropivacaine was determined by the patient's weight (0.2 ml/kg/hr in each catheter, for a total of 0.4 ml/kg/hr). The infusion was monitored by both the pediatric urology and acute pain anesthesiology service.

Trained nurses assessed all patients postoperatively, initially in the recovery room and after arrival on the

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