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Thoracic Epidural versus Morphine Patient Controlled Analgesia After Laparoscopic Colectomy

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Abstract

Despite the benefits of the laparoscopic approach to colorectal surgery patients still experience significant levels of pain post- operatively. This study aimed to compare the use of thoracic epidural vs. morphine patient controlled analgesia in the management of pain after laparoscopic colorectal surgery. A retrospective analysis of hospital records was performed for 16 patients undergoing laparoscopic colorectal surgery (8 thoracic epidural, 8 patient controlled analgesia). Visual rating scale pain scores (0 – 10) were significantly lower for patients managed with thoracic epidural in recovery (mean [95% CI]) (0 vs. 5.3 [3.6-6.9]), at 6 hours (1 [0-2.0] vs. 5.4 [4.2-6.5]), 12 hours (0.4 [0-1.1] vs. 4.4 [3.3-5.4]) and 24 hours (1.3 [0-2.8] vs. 5.9 [4.9-6.9]). Thoracic epidural offers the optimal analgesia and quality of care to the patient following laparoscopic colectomy.

Keywords: Laparoscopic anesthesia; epidural versus morphine; laparoscopic colectomy; anethesia in colorectal surgery.

INTRODUCTION

Laparoscopic abdominal surgery avoids a large incision in the abdominal wall, thereby reducing both postoperative pain and the initiation of the postoperative inflammatory cascade response.[1] A number of studies including the COST trial have shown a reduction in analgesic requirements following laparoscopic colectomy compared with open colectomy.[2-4] Despite this reduction in analgesic requirements the intra-abdominal dissection and prolonged distension of the peritoneum and abdominal wall during laparoscopic colectomy, results in significant postoperative pain requiring provision of excellent analgesia to facilitate recovery.

In open surgery the two established techniques for postoperative pain management are thoracic epidural analgesia (TEA) and patient controlled analgesia (PCA) with intravenous morphine. TEA has been shown to provide superior pain relief when compared to PCA for up to 72 hours following open abdominal surgery.[5]

One previous American study by Senagore et al[6] demonstrated that pain control, measured as a secondary outcome, was significantly improved at 6 and 18 hours following laparoscopic surgery in patients receiving TEA compared to PCA. However the epidural opiate dosage was larger than those conventionally used in European practice and the TEA arm were allowed rescue analgesia with intravenous morphine boluses. One further study has shown improved analgesia in the first 48 hours after surgery with TEA using lower opiate dosages.[7]

This paper reports our experience of TEA vs PCA in the management of patients following laparoscopic colectomy.

METHODS

Patients

Sixteen patients who underwent laparoscopic colectomy (right hemicolectomy, sigmoid colectomy or subtotal colectomy) were included in this comparative study. The two groups of patients were those who received morphine PCA and those managed with TEA for postoperative pain control.

Mechanical bowel preparation was used in all cases, although limited to a single phosphate enema for right hemicolectomy. Prophylactic cefuroxime 0.75-1.5 gm and metronidazole 500 mg were administered intravenously at the induction of anesthesia. All patients had a catheter inserted at surgery and removed once sufficiently mobile and once the epidural catheter had been removed in the TEA group. All patients were permitted clear fluids immediately after surgery and a full diet introduced once any distention had settled and the patient had passed flatus. Patients were discharged from hospital when tolerating a normal diet and pain was well controlled on oral analgesics.

Anesthesia and Epidural Techniques

Preoperatively patients were visited by members of the acute pain service and received detailed oral and written information on the verbal rating pain scoring scheme and the method of postoperative analgesia that would be provided dependent on Consultant Anaesthetic preference. No patients received pre-medication.

Patients who had TEA all had the catheters placed at the mid-thoracic dermatomal level T7/8 or T8/9 prior to anesthesia. The epidural block was established with incremental doses of 0.25% L-Bupivacaine up to maximum dose of 15 ml. General anesthesia in both the TEA and PCA groups was induced with propofol (2-3 mg/kg) and fentanyl (1-2 mg/kg) and muscle relaxation achieved with rocuronium prior to intubation of the trachea and ventilation. Anesthesia was maintained with sevoflurane in an air/oxygen mixture. The PCA group received morphine intraoperatively up to a maximum dose of 15 mg. Both groups had intravenous paracetamol 1gm and this was continued postoperatively either orally or intravenously 6 hourly.

The patients with an epidural catheter were commenced immediately postoperatively on an infusion of 0.125% bupivacaine and 4mcg/ml of fentanyl at 8 mls/hour and this could be titrated up to 15 ml/hour to maintain adequate analgesia. Those with a PCA prescription had the handset connected in recovery and a standard prescription of 1mg bolus of morphine with a 5 minute lockout. Opiates via any other route were not administered to any patient.

All the patients were evaluated daily by the acute pain service and the epidural infusion and PCA analgesia continued until they were able to tolerate oral analgesia.

In the postoperative period pain was assessed using the verbal rating score from 0-10. Maximum pain at both rest and on movement was evaluated in the recovery unit at one hour following surgery and at 6, 12, 24 and 48 hours postoperatively.

Postoperative nausea that required treatment was managed in all patients with a standardized anti-emetic protocol consisting of cyclizine as first line therapy and subsequently ondansetron and dexamethasone as second and third line treatments.

Data Collection and Analysis

Data was retrieved from the medical notes, anesthetic record and observation charts. The demographic data analyzed included age, sex, ASA grade, indication for surgery, the surgical procedure performed and the operation duration. The primary outcome measure was verbal rating scale (VRS) pain scores on a scale of 0-10, one hour after surgery in recovery and at 6, 12, 24 and 48 hours postoperatively. Secondary outcome measures recorded were the total length of hospital stay (nights in hospital from the day of surgery to discharge) and adverse effects of TEA or PCA, namely nausea and vomiting requiring treatment with an antiemetic, hypotension (systolic BP < 100 mmHg) respiratory depression (respiratory rate < 10 breaths per minute) and pruritis.

STATISTICS

Demographic data is presented as median (interquartile range) or number (proportion) and analyzed by Mann-Whitney U-test. Pain scores are presented as means and 95% confidence intervals and analyzed by paired t tests.

RESULTS

Sixteen patients were identified having undergone laparoscopic colectomy. Eight had been managed with TEA and 8 managed with PCA. The demographic data of these groups is summarized in Table 1.

TABLE 1: Demographic data of patients managed with TEA or PCA following laparoscopic colectomy

	TEA (n = 8)	*PCA (n = 8)*	*p-value*
Age: years*	73 (54-77)	61 (31-68)	0.08§
Sex: M:F	4 : 4	5 : 3	
Procedure			
Segmental colectomy	7 (88%)	7 (88%)	
Subtotal colectomy	1 (12%)	1 (12%)	
Indication			
Malignancy	7 (88%)	7 (88%)	
Inflammatory bowel disease	1 (12%)	1 (12%)	
ASA grade			
I	1 (12%)	0	
II	5 (63%)	6 (75%)	
III	2 (25%)	2 (25%)	
Operation duration: minutes*	180 (156-190)	173 (139-240)	0.52§

Values are *median (interquartile range) or number (proportion). P values calculated using § Mann-Whitney U-test.

VRS pain scores and adverse effects of analgesia are shown in Table 2. VRS pain scores were significantly lower in the TEA group in recovery and at 6, 12 and 24 hours postoperatively. There was no significant difference in VRS pain scores at 48 hours, (Fig. 1). ANOVA also confirmed a significant difference in VRS pain scores in recovery and at 6, 12 and 24 hours post-operatively. There was no significant difference in mean hospital stay between the two groups. A number of patients in each group experienced adverse effects from analgesia (Table 2).

TABLE 2: VRS pain score, TEA/ PCA adverse effects and length of hospital stay for patients managed with TEA or PCA following laparoscopic colectomy

	TEA (n = 8)	*PCA (n = 8)*	*p value*
VRS pain score**			
Recovery	0 (0-0)	5.3 (3.6-6.9)	<0.0001¶
6 hours	1 (0-2.0)	5.4 (4.2-6.5)	0.001¶
12 hours	0.4 (0-1.1)	4.4 (3.3-5.4)	<0.0001¶
24 hours	1.3 (0-2.8)	5.9 (4.9-6.9)	0.002¶
48 hours	2.8 (0.8-4.7)	4.1 (2.5-5.8)	0.218¶
TEA/ PCA adverse effects			
Nausea and vomiting	2 (25%)	5 (63%)	
Hypotension	2 (25%)	2 (25%)	
Respiratory depression	0	0	
Pruritis	1 (13%)	0	
Length hospital stay (days)*	5(4-5)	4(3.3-6.8)	0.91§

Values are *median (interquartile range), **mean (95% CI) or number (proportion). P values calculated using ¶Paired t-test, § Mann-Whitney U-test.

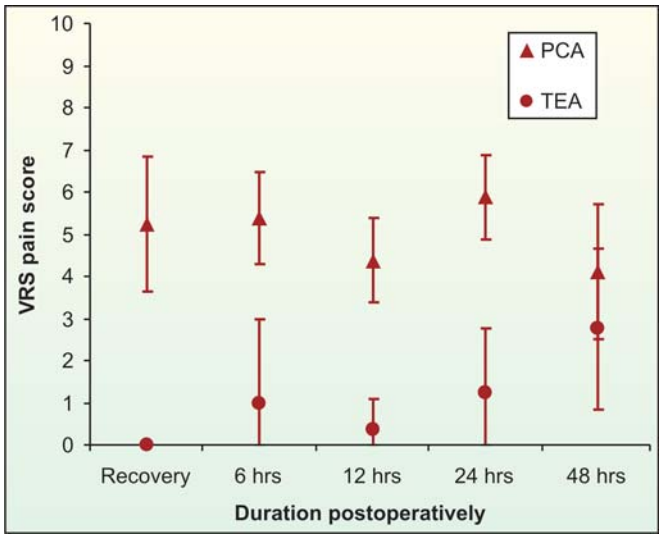

Fig. 1: Comparison of VRS pain scores for patients managed with TEA or PCA following laparoscopic colectomy. Data points represent means with 95% CI error bars.

DISCUSSION

This study shows that TEA provides significantly better pain relief compared to morphine PCA in the first 24 hours following laparoscopic colectomy. Our findings are consistent with the previous studies showing an analgesic benefit with the use of TEA.[6,7] We have also confirmed Taqi et al's findings that improved analgesia can be achieved with lower opiate dose epidurals and without the need for intravenous "rescue" opiate analgesia.

As well as the humanitarian argument in offering optimum pain relief to patients, the physiological benefits of improved pain relief with TEA following open surgery include reductions in the incidence of cardiac and respiratory complications[8] and a reduction in the duration of gastrointestinal ileus.[9] Although these benefits have only been proven to result in improved outcomes for high risk patients (ASA ≥ III) undergoing high risk surgery. There is evidence of similar improved outcomes with the use TEA in laparoscopic colectomy with a reduction in hospital stay[6] and accelerated return of bowel function and dietary intake.[7] However in our study the improved pain scores of the TEA group within the first 24 hours did not translate into a reduction in length of hospital stay (5 [4-5] vs 4 [3.3-6.8] days). This may be due to the small numbers in our study as the markedly higher mean pain scores within the PCA group (4.4-5.9 vs. 0-1.3) would be expected to reduce respiratory function and the patient's ability to mobilize. Length of hospital stay is also a crude measure of postoperative complications and may cover over differences in minor complications. Also of note the patients in our study were relatively young (73 yrs [54-77] and 61 yrs [31-68]) and fit (12 of 16 ASA I or II) which may mean as with open surgery the major benefits in terms of improved outcomes will be seen in high risk patients.

Adverse effects of analgesia were noted in significant numbers of patients in both groups. Hypotension was seen in both the TEA and PCA cohorts (2 [25%]). These figures are consistent with previously published incidences (37-80%) of complications due to autonomic blockade with the use of TEA.[8] There appeared to be a notably high incidence of nausea and vomiting associated with PCA. This is unsurprising given that this group of patients will have experienced much higher systemic concentrations of morphine. The use of fentanyl in the TEA infusion may also have been significant, given that it is associated with a lower incidence of nausea and vomiting in comparison to morphine.

Retrospective studies may be subject to bias in case selection. We have included all the laparoscopic colectomies performed at our hospital and excluded only those converted to open surgery. It should be remembered that a prospective study in this area would also be subject to bias since it is impossible to blind the patients or staff as to the analgesic technique. The staff caring for these patients were not aware of this study at the time of documenting pain scores.

CONCLUSION

Considerable pain is experienced after laparoscopic colorectal surgery and TEA offers superior analgesia compared to morphine PCA. Despite these proven benefits of epidural

analgesia it has been difficult to demonstrate an improvement in overall patient outcome with regard length of hospital stay. Attention has increasingly turned to improving quality of recovery and a return to normal level of functioning. A good measure of quality of recovery is the patients' level of pain relief and it is now accepted that patient satisfaction has become an indicator of quality of medical care. TEA appears to offer an optimum quality of care in recovery from laparoscopic colorectal surgery.

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