

Postoperative Pain Management after Radical Cystectomy: Comparing Traditional versus Enhanced Recovery Protocol Pathway

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Purpose: Opioids have traditionally been the mainstay of pain management after radical cystectomy for bladder cancer but they have many side effects. The efficacy of opioid sparing analgesics after cystectomy as part of a protocol of enhanced recovery after surgery has yet to be proved. We compared opioid use, pain score and postoperative ileus in consecutive patients on a protocol of enhanced recovery after surgery and those on a traditional protocol after radical cystectomy.

Materials and Methods: Using our institutional review board approved bladder cancer database we retrospectively reviewed the records of patients who underwent open radical cystectomy using a traditional protocol or a protocol of enhanced recovery after surgery for pain management. A total of 205 patients were ultimately enrolled in study, including 81 on a traditional protocol and 124 on the enhanced protocol. Opioid use and pain scores were analyzed and compared up to postoperative day 4. All routes of opioid use were recorded and converted to the morphine equivalent dose for comparison. Postoperative pain was recorded using a visual analog scale. Postoperative records were reviewed for the incidence of ileus.

Results: Patients on the enhanced recovery after surgery protocol and those on a traditional protocol were similar demographically. When analyzing data up to the median hospital stay on the case group, patients on enhanced recovery used significantly less opioids per day (4.9 mg vs 20.67 mg morphine equivalents, $p < 0.001$) and reported more pain (visual analog scale 3.1 vs 1.14, $p < 0.001$). They also experienced a significantly lesser incidence of postoperative ileus (7.3% vs 22.2%, $p = 0.003$) and had a significantly shorter median length of hospital stay (4 vs 8 days, $p < 0.001$).

Conclusions: Patients on the protocol of enhanced recovery after surgery used significantly less opioid analgesics, possibly contributing to decreased postoperative ileus and shorter length of hospital stay.

Abbreviations and Acronyms

CCI = Charlson comorbidity index
ERAS = enhanced recovery after surgery
LOS = length of hospital stay
PCA = patient controlled analgesia
POD = postoperative day
POI = postoperative ileus
RC = radical cystectomy
VAS = visual analog scale

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Key Words: urinary bladder neoplasms, cystectomy, pain, opioid, analgesics

BLADDER cancer is the second most common urological malignancy with urothelial carcinoma comprising nearly 90% of all bladder cancers. Although the majority of patients present with superficial disease,

20% to 40% present with invasive bladder cancer or invasive bladder cancer develops.¹

RC is the gold standard treatment for muscle invasive bladder cancer as well as some T1 and noninvasive

disease. It is a major operative procedure with significant perioperative morbidity and complications, of which one is pain management.²⁻⁴ Opioid analgesics have traditionally been the mainstay of post-cystectomy pain management.⁵ Opioid analgesics could be associated with side effects, including respiratory depression, hormonal and immunological dysfunction, sedation and POI.^{6,7} POI remains a common complication of surgery, contributing to a prolonged hospital stay and increased economic burden.⁶ Furthermore, in certain patients physical dependence on and tolerance to opioids develop, requiring long-term use of opioids after surgery, which would carry multiple complications including deteriorating quality of life. Recent studies have explored using multimodal pain management protocols after RC but opioid analgesics remain the mainstay of these pain management protocols. To our knowledge the efficacy of opioid sparing analgesics after cystectomy as a part of an ERAS protocol has yet to be proved.

ERAS protocols are evidence-based multimodal pathways that optimize perioperative care of patients who undergo complex surgeries. Our experience with an ERAS protocol after RC was reported in a prior study.⁸ An ERAS pain management protocol involves nonopioid analgesics starting intraoperatively with intravenous acetaminophen followed by ketorolac, oral acetaminophen and subfascial continuous infusion of local anesthetics postoperatively. Opioids are used as breakthrough if needed. The traditional pain management protocol involves using primarily intravenous and/or epidural opioid analgesics, including PCA. We retrospectively compared opioid use, pain score and postoperative ileus in consecutive patients on ERAS and traditional protocols after RC.

MATERIALS AND METHODS

Study Population

We retrospectively reviewed prospectively collected data on consecutive patients who underwent open RC performed by 3 primary surgeons using the same surgical technique with an ERAS or a traditional protocol for bladder cancer from 2010 to 2013. The ERAS protocol was implemented in May 2012. Patient consent and institutional review board approval were obtained. Patients were excluded from analysis if they were not operated on by an ERAS surgeon, had a history of opioid use, were transferred to the intensive care unit postoperatively with different pain control management, had prolonged intubation postoperatively, died intraoperatively or underwent salvage or adjuvant surgery.

Pain Management Protocols

For the ERAS protocol postoperative pain was primarily controlled with intravenous/oral acetaminophen and/or

ketorolac as well as more consistent use of para-incisional subfascial catheters to infuse a constant rate of local anesthetic. Oral pain medications were started on POD 1 with most patients transitioned to only oral pain medications by POD 3. Intravenous morphine and secondarily oral opioids were used as breakthrough pain medications.

For the traditional protocol postoperative pain was primarily controlled with intravenous and/or epidural opioids. Patients were most commonly given epidural hydromorphone, epidural fentanyl, and/or intravenous morphine or hydromorphone PCA. Supplemental acetaminophen or ketorolac was used as needed. Para-incisional subfascial catheters were used in conjunction intermittently. Patients were eventually transitioned to opioid or nonopioid oral pain medications later in the stay. Most patients were off opioids at the time of discharge home and were encouraged to use nonopioid analgesics if needed.

Data Collection

Patient data were compiled from our bladder database, which captures all data back to 1971. ERAS cases specifically were followed prospectively to capture all aspects of perioperative data. Opioid use and pain scores were analyzed and compared up to the median hospital stay in the case group. Nursing staff captured VAS pain scores. All VAS scores on 1 day were averaged to produce the mean VAS score of that hospital day. Mean VAS scores of each hospital day were then averaged across the entire median hospital stay to provide the mean VAS score per day for that hospital stay. Many patients reported the most pain on PODs 0 and 1, and pain trended down in later days. However, there were also patients in whom pain was much more variable and who had higher spikes of pain later in the hospital stay. All routes of opioid use were recorded for each patient with meticulous chart review during the hospital stay and converted to the morphine equivalent dose for comparison (table 1). Previous studies of the conversion of epidural to intravenous opioids reveal a range of possible ratios. We used the lowest epidural-to-intravenous conversion ratios to minimize overestimating the potency of epidural opioids. Pain scores were reported with the VAS and daily averages were recorded.

Patient records for the entire postoperative stay were reviewed for the POI incidence. POI was diagnosed based mainly on clinical symptoms, including nausea, vomiting, delayed passage of flatus after surgery, abdominal distention and inability to tolerate an oral diet.

Table 1. Opioid conversion ratios

Medication	Ratio
Oral:	
Oxycodone	0.5
Hydromorphone	1.33
Tramadol	0.083
Hydrocodone	0.33
Intravenous:	
Morphine	1
Hydromorphone	6.66
Fentanyl	50
Epidural:	
Hydromorphone	13.33
Fentanyl	50

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