Intraoperative Use Of Toradol® Facilitates Outpatient Hemorrhoidectomy

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Pain after hemorrhoidectomy is widely feared by many patients who are mostly still treated with oral/intramuscular narcotics to control their pain postoperatively. PURPOSE: In an effort to decrease posthemorrhoidectomy pain by applying newer methods of analgesia, a prospective trial was conducted to investigate the postoperative analgesic effect of Toradol® (ketorolac tromethamine; Syntax Labs, Palo Alto, CA) injected into the sphincter muscle at the time of hemorrhoidectomy and taken orally during a five-day postoperative period in a group of 24 patients (Toradol® group). Results were compared with two other groups of matching patients: one group (narcotics, n = 18) treated with standard postoperative narcotic intramuscular/oral analgesics after overnight hospital stay, and a group (SQMP, n = 21) previously treated by one of us with outpatient, subcutaneous infusion of morphine sulfate (Roxane Laboratories, Columbus, OH) via a home infusion pump. METHOD: The length of hospitalization, severity of postoperative pain and complications, costs, and side effects were analyzed by patient questionnaire at the time of the first postoperative visit and hospital and clinic records were reviewed. Differences between groups were analyzed using Student’s t-test with P < 0.05 being significant. RESULTS: Subjective pain response and hospitalization cost were significantly less in the SQMP group; however, this was at the expense of increased postoperative complications (urinary retention) and side effects (day until first bowel movement, nausea) although without a decrease in satisfaction rating. The Toradol® group had pain control equivalent to that of the narcotics group, a higher satisfaction rating, and suffered no increase in complications relative to either group. Significantly, there was no urinary retention in the Toradol® group. CONCLUSION: Postoperative pain after hemorrhoidectomy can be safely controlled as an outpatient using newer methods of pain control. These include both constant-infusion pain pump or supplemental use of the nonsteroidal analgesic ketorolac, both of which allow early release of the patient the day of surgery by diminishing postoperative pain. An important advantage of local injection of ketorolac is the elimination of urinary retention in our study group, probably by blunting the pain reflex response facilitated by prostaglandins, thus allowing safe same-day discharge. [Key words: Ketorolac; Hemorrhoidectomy; Postoperative pain; Postoperative complications; Urinary retention]


Excisional hemorrhoidectomy is still perceived by many people as extraordinarily painful. Fear of this pain often leads to delaying the inevitable visit to the surgeon when nonexcisional therapy (e.g., banding, injection or infrared coagulation) may well be appropriate for nonacute presentations of early (Grades I-II) hemorrhoids. Long-neglected hemorrhoids will more often than not entail excisional hemorrhoidectomy, where control of posthemorrhoidectomy pain usually requires the administration of various narcotic regimens. Pain may sometimes be so severe as to require the frequent administration of intravenous or intramuscular narcotics, thereby requiring expensive inpatient hospitalization. The well-known side effects of narcotic medications, including nausea, constipation, and urinary retention, may prolong the hospital stay even further.¹

With numerous recent advances in control of postoperative pain, we have applied one of these (namely, use of the nonsteroidal agent Toradol®) and compared it prospectively with our routine protocol for management of hemorrhoidectomy patients. We sought to determine 1) whether patients’ postoperative pain could be lessened safely and 2) whether length of hospitalization could be safely diminished without increasing complications. In addition, we retrospectively compared these results with a third group of our patients treated with outpatient use of subcutaneously administered morphine via an infusion pump.²

METHODS

Forty-two consecutive patients were prospectively assigned to either of the two groups, based on each physician’s preference and willingness to

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change their standard methods. To this end, two groups of approximately 20 patients each were managed at our institutions from July 1992 to December 1992 with standard excisional hemorrhoidectomy under mostly intravenous sedation and regional field anesthesia. As 23-hour inpatients, they were given either intramuscular Toradol® or a standard intramuscular narcotic agent (Demerol®, meperidine hydrochloride; Winthrop Pharmaceuticals, New York, NY) for severe pain relief, and as outpatients received either Oral Toradol® (ketorolac tromethamine; Syntex Labs, Palo Alto, CA) or standard oral narcotics (Darvocet N 100®, propoxyphene napsylate and acetaminophen; Eli Lilly and Co., Indianapolis, IN) for pain relief at home, along with our standard regimen of sitz baths. These two groups were then compared with a similar number of patients previously treated after excisional hemorrhoidectomy at our same institutions with a subcutaneous morphine pump on an outpatient basis.2

Selection criteria included all of those presenting with symptomatic Grade III or IV hemorrhoids who were medically suitable candidates for standard excisional hemorrhoidectomy. Patients with renal insufficiency (serum creatinine >1.5), hepatic dysfunction (as determined by history or abnormal liver function tests on routine blood chemistry analysis), a history of bleeding disorders, peptic ulcer disease, or intolerance of nonsteroidal anti-inflammatory drugs or other drugs used were excluded from the study. Every effort was made to include in each group a similar distribution of patients by age, sex, and acuity of presentation. Of note, incarcerated, thrombosed, or gangrenous hemorrhoids were not a contraindication to entry into the study.

**TECHNIQUE**

Over 90 percent of patients were given generous intravenous sedation (Monitored Anesthesia Care) and the rest either general or spinal anesthesia, followed by administration of a perianal block of approximately 30 ml of a mixture of 0.25 percent Marcaine® (bupivacaine; Winthrop Pharmaceutical, New York, NY) with 1:200,000 units of epinephrine in combination with two ampules of Wydase® (hyaluronidase; Wyerst-Ayerth Laboratories, Philadelphia, PA). This solution was routinely used to infiltrate the perianal skin, anal canal mucosa, and intramuscular plane for both hemostasis and intraoperative analgesia and relaxation. Hemorrhoid removal was performed in standard fashion by each of the three investigators, always including high ligation of the vascular pedicle and liberal use of the cautery for hemostasis. Mucosa was always closed primarily with absorbable suture and a full hemorrhoidectomy always performed (i.e., all groups visible were removed, including the external complexes). Intraoperative management differed between groups only as described below.

**Toradol® Group**

This group received the full 60-mg loading dose of ketorolac intraoperatively (supplied in 2-ml syringes, with 30 mg/ml). It was injected intramuscularly locally after completing the removal of hemorrhoidal tissue but usually before mucosal closure. This dose was equally divided and injected into the underlying sphincter muscle at the base of each hemorrhoidal complex removed. Postoperative pain after discharge from the recovery room was managed by the administration of 30 mg of ketorolac intramuscularly every six hours as needed or 10 mg of ketorolac orally every six hours as needed. At the beginning of the study, all of these patients were kept overnight for a 23-hour stay, but as this new regimen proved to be safe, more patients were discharged the same day of surgery toward the end of the study period. All patients received a five-day supply of oral ketorolac upon discharge as well as a stool softener (either Surfak®, docusate calcium; The Upjohn Company, Kalamazoo, MI or Senokot® granules, senna concentrate; Purdue Frederick, Norwalk, CT) and instructions to take a bulk fiber supplement every morning with sufficient liquid.

**SQMP Group**

This group received a subcutaneous bolus injection of morphine sulfate, begun in the recovery room with a bolus dose of 2 mg and continued at a basal rate of 1 mg/hour via a home infusion pump with bolus potential, after same-day discharge (previously established as safe) from the recovery room according to a pre-established protocol at our institution. A visiting nurse saw the patient both in the recovery room and made daily postoperative home visits for the three days the pump was in place. After three days, these patients were converted to oral narcotic medications if needed after discontinuation of the pump.
also received a daily stool softener and daily bulk fiber supplements, and regular sitz baths.

**Narcotics Group**

After discharge from the recovery room, this group received standard intramuscular Demerol\textsuperscript{a} and/or oral analgesia with either Darvocet N 100\textsuperscript{b} or equivalent oral analgesic given every four to six on as circumstances may arise basis. At the beginning of the study, most of these patients were kept overnight for a 23-hour stay, then discharged home on oral medications alone. These patients too received a daily stool softener, bulk laxative with sufficient liquid, and sitz baths at least three times a day.

Each patient recorded the amount of postoperative pain experienced on a four-point verbal pain intensity scale each day for the first five days after operation (only three days for the SQMP group). The scale used was scored as follows: none = 0, mild = 1, moderate = 2, and extreme = 3. Postoperative bleeding was also scored by scoring patients' records of number of drainage pads used daily for the first five days, with a scale of 1 to 5 pads = 1, 5 to 10 pads = 2, and >10 pads = 3. Postoperative complications such as excessive bleeding, nausea, urinary retention, and impaction were recorded and assessed at each postoperative visit (at one week and three weeks) and/or home nurse visit for the SQMP group.

Overall patient satisfaction with their postoperative pain relief was recorded as a yes or no. The occurrence of urinary retention, excessive bleeding, postoperative nausea, and need for stronger analgesic medications was monitored by chart review of medical records while in the hospital for 23 hours, or by a questionnaire filled out by the patients at their first postoperative visit. Details of patients’ records and results of the questionnaire were recorded in a computerized database (Excel 4.0; Microsoft Corporation) and analyzed for differences using Student’s *t*-test, with *P* < 0.05 being considered significant.

**RESULTS**

Patient parameters recorded and assessed are listed in Table 1. The average age of the narcotics (NARC), Toradol\textsuperscript{c} (TORA), and SQMP groups were not significantly different, with the average ages being 52.9, 47.9, and 48.1 years, respectively. The NARC group had a slight female to male predominance (11:7), the TORA group had an equal ratio (12:12), and the SQMP group had a male predominance (13:8).

As previously reported by Goldstein *et al.*\textsuperscript{2} from our institution, the SQMP protocol was shown to be safe and effective in diminishing hospital stay, which enabled most (90 percent) of our patients treated in this manner to be discharged the same day as surgery, resulting in only 2 of 21 patients requiring overnight hospitalization (one required intravenous antibiotics, and the other underwent simultaneous repair of a small ventral hernia and was kept fasting overnight).

Initially, all patients in the NARC and TORA groups stayed overnight after their surgery because this had been standard practice at our institution; therefore, overnight stays cannot be compared with the SQMP group. However, as the study progressed

<table>
<thead>
<tr>
<th>Table 1.</th>
<th>\textbf{Patient Results}</th>
<th>\textbf{NARC Group}</th>
<th>\textbf{TORA Group}</th>
<th>\textbf{SQMP Group}</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>18</td>
<td>24</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>53</td>
<td>48</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>No. of overnight stays</td>
<td>13</td>
<td>16</td>
<td>2*</td>
<td></td>
</tr>
<tr>
<td>Pain (preoperative)</td>
<td>0.69</td>
<td>1.42*</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Pain (average)</td>
<td>1.81</td>
<td>1.5*</td>
<td>0.9*</td>
<td></td>
</tr>
<tr>
<td>Bleeding</td>
<td>8.66</td>
<td>7.43</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>First postoperative bowel movement (day)</td>
<td>1.3</td>
<td>1.6</td>
<td>3.8*</td>
<td></td>
</tr>
<tr>
<td>Urinary difficulty (%)</td>
<td>55.6</td>
<td>37.5</td>
<td>57.14</td>
<td></td>
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<tr>
<td>Catheter (%)</td>
<td>5.6</td>
<td>0</td>
<td>47*</td>
<td></td>
</tr>
<tr>
<td>Nausea (%)</td>
<td>27.8</td>
<td>4.17*</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Satisfaction (%)</td>
<td>77.8</td>
<td>87.5</td>
<td>95</td>
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</tbody>
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\textsuperscript{a}NA = not available.

\textsuperscript{b}*P* < 0.05.
and the number of patients with a perceived reason for overnight hospitalization was analyzed in light of few complications, discharge on the same day as surgery became favored for patients in both the NARC and SQMP groups. Length of hospitalization did not differ significantly between the NARC and TORA groups, with 13 (72 percent) of 18 NARC patients staying overnight vs. 16 (67 percent) of 24 TORA patients ($P = 0.04$). Of note, no patient required more than a one-day hospital stay, and none required readmission for treatment of complications.

Acuity of presentation was compared by evaluation of preoperative pain levels as recorded and scored by patients (Fig. 1). The TORA group had a significantly increased level of preoperative pain (and thus acuity of presentation) vs. either the SQMP or NARC groups ($P = 0.04$). Those patients with a score $>2$ were judged to be acute and were significantly overrepresented in the TORA group, with 7 (29 percent) of 24 vs. 0 of 18 in NARC or $4$ (19 percent) of 21 in the SQMP groups.

In comparing scaled pain scores (Fig. 1), we found no significant difference between groups for the first night or day after surgery. However, by postoperative day two (the patient’s second day home), those in the SQMP group had better pain control than those in the NARC group ($P = 0.002$), although it took until the third day at home for this difference to become apparent vs. the TORA group ($P < 0.001$). By postoperative day three, the patients in the TORA group also had better pain control than those in the NARC group ($P = 0.011$), despite the increased acuity of presentation in the TORA group. This difference continued to be significant between groups through the rest of the study period of five days.

A quantitative estimate of pain relief afforded by each method was assessed by summing the total mean pain scores for the entire postoperative period of five days and comparing them between groups (Fig. 2). The patients in the SQMP group received significantly ($P = 0.002$) better pain relief than those in the NARC group as a whole, but failed to achieve statistically significant better pain relief than those in the TORA group ($P = 0.096$) when compared over the entire postoperative period recorded. This was despite significantly more pain preoperatively in the TORA group patients.

Bleeding was assessed by quantifying the number of perineal dressings used per day over the five-day period after surgery. Unfortunately, a similar result was not available for comparison of the SQMP group reported previously. There was no significant difference found at any stage of the postoperative period in the amount of bleeding between those patients in the TORA or NARC group. No patient required readmission or reoperation for control of postoperative bleeding in any of the groups; however, a single patient in the TORA group had an oozing suture line oversewn at the first postoperative visit.

For the purposes of this study, constipation was defined as subjective difficulty with bowel movements in the postoperative period. The incidence of postoperative constipation did not differ significantly between groups, but was lowest in patients in the TORA group at only 33.3 percent vs. 44.4 percent and 57.1 percent in patients in the NARC and SQMP groups, respectively. A single patient in the SQMP group developed a fecal impaction.

![Figure 1. Bar graph comparing pain scale ratings of 0 (none) to 4 (agonizing) among groups at presentation and daily after surgery. SQMP = SQMP groups.](image1)

![Figure 2. Bar graph representing average total pain among groups. SQMP = SQMP groups.](image2)
The first postoperative bowel movement was significantly delayed in the SQMP patients vs both the NARC and TORA patient groups, with this traumatic event first occurring on the third postoperative day (average, 3.6) in the SQMP group.

In accordance with current reports, every effort was made to limit perioperative fluids and use regional anesthesia to avoid urinary retention. Two methods of qualifying this fairly common postoperative complication after hemorrhoidectomy (reported incidences range from 0 to 52 percent, averaging 20.1 percent)³⁻⁵ were assessed; namely, difficulty with urination and catheterization rate. The first parameter, defined as any subjective discomfort experienced with urination, was not significantly different between groups. However, the catheterization rate was markedly higher in the SQMP group (47.6 percent) vs. only 5 percent in the NARC group and 0 percent in the TORA group (Fig. 3). The increased proportion of males in the SQMP group may account for some of the difference; however, numerous other factors have been implicated⁶ (Table 2). Surprisingly, despite the increased acuity of the TORA group there were no catheterizations necessary.

The TORA group had a significantly lower incidence (4 percent) of nausea than either of the narcotic-treated groups, 28 percent and 33 percent in the NARC and SQMP groups, respectively (P < 0.05).

On a whole, freedom from pain seemed to rank most highly with patients in terms of satisfaction, which was comparable between the SQMP and TORA groups. Overall, 95 percent of the patients in the SQMP group stated their overall satisfaction with their postoperative course vs. 87.5 percent of patients in the TORA group and 78 percent of the patients in the NARC group. The increased incidence of transient difficulties with nausea, urinary retention, and constipation seen in the NARC and SQMP groups were viewed as less of a problem by the patient than adequate pain relief. However, these complaints still represent significant morbidity which often prompts return to the hospital or office for treatment.

**DISCUSSION**

With recent technologic advances in both surgical and anesthetic techniques, coupled with an increasing demand by third-party payers for shorter hospitalizations, many surgical procedures that previously required hospitalization now are commonly performed on an outpatient basis. As Bleday et al.⁷ state, many surgeons still are reluctant to perform true “outpatient” hemorrhoidectomy because of the reasons mentioned previously: 1) inadequate pain control postoperatively and 2) the fear of complications (e.g., bleeding, urinary retention, impaction, etc.), which may require rapid return to the hospital. With the recent report by Richman⁸ on its use in anorectal surgery, and ketorolac’s widespread use both during and after surgery by our anesthesiology colleagues,⁹ this seemed like an ideal agent to try and improve postoperative pain control considering its relative lack of harmful side effects over short-term use.⁹

With this in mind, our study was designed to compare both efficacy and possible side effects against our standard technique, plus comparison against an alternative newer method of pain control for posthemorrhoidectomy pain.

We found that the use of ketorolac, by both intramuscular and oral routes, did not cause any increase in posthemorrhoidectomy complications, namely, bleeding, constipation, or urinary retention.
Both intramuscular and oral ketorolac, as with all nonsteroidal anti-inflammatory drugs, can cause bleeding by reversibly inhibiting platelet function and prolonging bleeding time. Therefore, we excluded those patients judged to be at most risk for this possible complication. As crudely measured by counting blood-soaked perineal dressings, we did not observe any evidence of increased postoperative hemorrhage in the TORA group patients vs. either the NARC or the SQMP patients. However, since the incidence of significant hemorrhage is low (around 1 percent), in reports of hemorrhoidectomy, to find any significant difference between groups would probably take much larger cohort sizes. None of the patients in any group required return to the operating room for postoperative hemorrhage, although one patient in the TORA group required "incidental" oversewing of a bleeding suture line at the time of the first postoperative visit. No patients required transfusion.

Constipation, as measured by delay in the first bowel movement, was significantly prolonged in both groups on narcotics, with either oral or subcutaneous delivery. The constipating effects of these medications are well known, and therefore the difference between the TORA group patients and those on narcotics was not surprising, despite our usual protocol of both bulk fiber and a mild stool softener postoperatively.

As reported previously, average cost in 1992 for three-day use of the subcutaneous morphine pump averaged $661.00, with the cost of a five-day prescription for oral Toradol averaging $25.00 in our area and for Darvocet N 100 approximately $20.00. With costs of possible treatment for urinary retention including Foley catheterization ($34.00), home nursing visit ($72.50) or emergency room visit ($350.00), or possible readmission (up to $6,594.00 for diagnosis-related group code "excision of hemorrhoids with complications"), the cost savings of a safe oral non-narcotic are obvious. Increasing use of the 23-hour stay in recent years has diminished hospitalization costs somewhat; however, same-day discharge is optimal—if safety and efficacy of pain relief are proven.

Urinary retention rate was significantly different between the SQMP group and those taking oral pain medications. Many factors have been shown to play a significant role in posthemorrhoidectomy urinary retention (Table 2), with reported rates varying from 0 to 70 percent. As first shown by Richman, the number of patients suffering urinary retention with ketorolac use was zero, as was also seen in our patients, thereby effectively eliminating one of the serious concerns about performing outpatient hemorrhoidectomy. Unfortunately, we did not compare patients for the other well-known factors, thus making us unable to say to what extent these others may have contributed to the lack of urinary retention in the TORA group. Suffice it to say that we endeavored to limit the amount of perioperative fluids administered; however, wide variations occurred because of the use of different anesthesiologists, anesthetic techniques, acuity of presentation, age, duration of procedure, and so forth. Also, the use of a home visiting nurse may have indirectly contributed to the rather high catheterization rate of those in the SQMP group, since nursing time constraints and frequency of visits probably influenced their willingness to catheterize early rather than to return in the middle of the night.

The mechanism of urinary retention, representing an annoying but rarely serious complication, is thought to reflect reflex urethral spasm with secondary trigone dysfunction as a result of pain from the anal canal. We hypothesize that the infiltration of ketorolac locally at the site of origin of the pain stimulus blunts the conduction or generation of the painful stimulus via the afferent pain fibers of the anal canal, thereby minimizing trigone dysfunction. Ktorolac's action of inhibiting the generation of prostaglandins (by inhibiting the cyclooxygenase pathway of production), which have been shown to sensitize pain receptors to both mechanical and chemical stimulation, may serve to reduce the sensitivity of the afferent nerve fibers, thus diminishing the pain reflex response.

CONCLUSIONS

We believe that postoperative pain after hemorrhoidectomy can be safely controlled using two newer methods of pain control. These include both the use of an outpatient constant-infusion pain pump or supplemental use of the nonsteroidal analgesic ketorolac, both of which allow early release of the patient the day of surgery. Side effects in our study were minimal, with patients expressing the most satisfaction with use of the SQMP. However, this came at the expense of increased postoperative (minor) complications, mainly uri-
nary retention and uncomfortable side effects such as nausea and constipation. Those patients treated with local intramuscular injection of the newer nonsteroidal agent ketorolac, both at the time of operation and postoperatively, had pain control equivalent to that of the group treated with standard oral narcotic agents, but with a higher satisfaction rating, no increase in complications, and a zero rate of postoperative urinary retention.

True outpatient hemorrhoidectomy is thus possible by incorporating either of these techniques for postoperative analgesia, with significant advantages available for both the patient and society in terms of comfort and cost savings.

REFERENCES


