Subcutaneous Morphine Pump for Postoperative Hemorrhoidectomy Pain Management

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PURPOSE: Many anorectal procedures are currently being performed on an outpatient basis, hemorrhoidectomy being the exception because of the need for parenteral narcotics postoperatively. We investigated the effectiveness of a subcutaneous morphine pump (SQMP) for outpatient posthemorrhoidectomy pain control. METHODS: In Phase 1 of our study, 22 patients undergoing radical hemorrhoidectomy were started on an SQMP protocol postoperatively. Twenty-nine patients received conventional postoperative narcotic dosing. In Phase 2, 19 patients enrolled in an SQMP protocol underwent hemorrhoidectomy in an ambulatory setting. Length of hospitalization, catheterization rate, and pain control were evaluated. RESULTS: In Phase 1, zero patients in the study group and two in the control group required additional hospitalization beyond 23 hours for pain control. The rates of catheterization were similar between the two groups. Pain control was considered satisfactory in 21 of 22 study patients. There was no correlation between pain level and morphine dose. Eighteen of 22 patients experienced minor side effects, necessitating pump removal in two patients. In Phase 2, 18 of 19 patients on the SQMP were discharged from the recovery room. Cost analysis shows the combination of outpatient hemorrhoidectomy and the SQMP to be cost-effective in comparison with an inpatient stay. CONCLUSIONS: The SQMP enables hemorrhoidectomy to be done on an outpatient basis. It provides effective pain control, enjoys high patient acceptance, and is cost-effective. [Key words: Patient-controlled analgesia; Hemorrhoids; Morphine; Pain; Postoperative]


Many anorectal procedures are currently being performed on an outpatient basis. However, radical (three-quadrant) hemorrhoidectomy still necessitates a period of hospitalization postoperatively for parenteral pain control and possible urinary catheterization. Outpatient hemorrhoidectomy would be feasible if a method of pain control were available that was more effective than currently available oral narcotics. This study was undertaken to test the possibility of using a subcutaneous morphine pump (SQMP) in the outpatient setting for posthemorrhoidectomy pain management.

Patient-controlled analgesia (PCA) has been gaining in popularity for postoperative pain management. Conventional PCA, however, requires intravenous (IV) access. More recently, subcutaneously administered PCA has been shown to be equally efficacious. It is more suitable for outpatient use since it eliminates the need for IV access.

METHODS

Phase 1

Twenty-two consecutive patients undergoing hemorrhoidectomy by one surgeon (P.R.W.) were enrolled in the pilot study. Owing to the inability to predict the effectiveness and complications of the SQMP, patients were admitted on the day of surgery for a 23-hour stay. The protocol called for the pump to be started in the recovery room immediately after surgery. However, because of conflicts with nursing protocol, the first 11 patients had their pump started at the time of discharge from the hospital. The subsequent 11 patients had their pump started in the hospital by the home health nursing service.

The CADD-PCA® ambulatory infusion pump, Model 5800 (Pharmacia Deltac, Inc., St. Paul, MN), was used. The pump can be programmed to administer both continuous and bolus doses with a lockout feature to prevent overdosing. It contains a lockable 50-ml cassette for narcotics. The pump is lightweight (15 ounces) and small (1.1 inches × 3.5 inches × 6.4 inches) and is connected by a 23- to 27-gauge butterfly needle to the subcutaneous tissue of the arm, trunk, or thigh. Morphine was used in a 5-mg/ml concentration. The needle site was covered with a transparent dressing and observed daily.

Upon insertion, a bolus dose of 2 mg of morphine sulfate was given, followed by a continuous
Table 1.
Concomitant Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Study</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sphincterotomy</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Fissurectomy</td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td>Colonoscopy ± polypectomy</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Sigmoidoscopy ± polypectomy</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Excision of anal papilla</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Anoplasty</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Correction of mucosal prolapse</td>
<td>—</td>
<td>2</td>
</tr>
<tr>
<td>Vasectomy</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>Rectocele repair</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>Hernia repair</td>
<td>—</td>
<td>1</td>
</tr>
</tbody>
</table>

An oral pain medications as needed postoperatively. Both groups of patients underwent a radical (three-quadrant) hemorrhoidectomy using a closed technique under monitored anesthetic control (*i.e.*, sedation) with local anesthesia infiltration. Concomitant procedures are listed in Table 1.

Phase 2

Nineteen consecutive patients undergoing hemorrhoidectomy in an ambulatory setting were evaluated. The SQMP protocol was altered from that in Phase 1 to give a continuous dose of 1 mg/hour for two days, with patient-controlled bolus doses of 1 mg available every 20 minutes. The pump was started in the recovery room, and patients were discharged to their homes. Nursing visits were made as in Phase 1.

Data were analyzed using Student's *t*-test. A statistically significant level was *P* = 0.05.

RESULTS

Phase 1

Demographic data of both the study and control groups reveal no statistically significant difference between the two groups; *P* = 0.093 (Table 2).

Length of Hospitalization. Two patients in the control group and none in the study group required hospitalization beyond 23 hours for pain control, not a statistically significant difference (*P* = 0.217). Two patients in each group required a longer stay owing to the need for urinary catheterization (*P* = 0.778).

Incidence of Catheterization (Table 3). Ten patients (45 percent) in the study group and seven (24 percent) in the control group required urinary catheterization. This difference was not statistically significant (*P* = 0.114). Within the study group, half had the pump started immediately postoperatively, while the other half received traditional

Table 2.
Patient Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Study</th>
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<tbody>
<tr>
<td>Number of patients</td>
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<td>29</td>
</tr>
<tr>
<td>Male</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Average age (range), yr</td>
<td>42 (27–59)</td>
<td>46 (25–79)</td>
</tr>
</tbody>
</table>

Table 3.
Patients Requiring Catheterization

<table>
<thead>
<tr>
<th></th>
<th>Study</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>40</td>
<td>43</td>
</tr>
<tr>
<td>Volume of urine</td>
<td>600 cc (200–1,000)</td>
<td>620 cc (300–1,000)</td>
</tr>
<tr>
<td>Hours post operation</td>
<td>9.7 (6.33–20.33*)</td>
<td>11 (7.5–17.25)</td>
</tr>
</tbody>
</table>

* Voided spontaneously postoperatively; required a catheter the next day.
intramuscular (IM) and per os (PO) pain medications until discharge, at which point the pump was placed. There was no statistically significant difference in the catheterization rate between these two groups \((P = 0.416)\) (Fig. 1).

**Pain Level.** The average pain levels on a scale of 1 to 10 on days one, two, and three were 4.0, 3.8, and 3.7, respectively. Figure 2 demonstrates a more uniform pain level on day one, with a wider variation on the following two days. Figure 3 shows that the first postoperative bowel movement occurs most commonly on day three. The pain level associated with that bowel movement averaged 5.6, with a distribution most similar to the pain rating on day three (Fig. 4; compare with Fig. 2).

**Pain Medications.** On the first evening home, most patients required little more than the continuous infusion of morphine sulfate (Fig. 5). However, on the second and third days, the total daily dose varied considerably (Fig. 6). In four patients, the pump was used for four days, while one patient had it for six days.

While hospitalized, the control group took an average of 1.7 doses/day of IM narcotics, in addition to 2.1 doses/day of PO narcotics. In the study group, 3 of 11 patients on the pump in the hospital required additional IM or PO narcotics for pain control.

**Correlation Between Doses and Pain Level.** While on the pump, individual dose vs. pain level was evaluated. As can be seen in Figure 7, there was no correlation between these.

**Side Effects (Table 4).** Most patients reported minor side effects from the morphine, necessitating pump removal in two. However, only one patient expressed dissatisfaction with the pump. There were no complications associated with the use of the pump.

**Cost Analysis.** The cost of the pump varies with the insurance companies' contracted price. It averages $148.00 (range, $55–$265). Nursing visits average $72.50 (range, $55–$90 per visit). For three days, the average cost is $661.00 (range, $330–$1,065). A potential cost is that of a Foley catheter ($34). A 23-hour stay at the medical center for a
hemorrhoidectomy costs $2,407, vs. $1,265 for the same procedure performed at a nearby free-standing outpatient surgical facility. If the patient requires an additional hospital day for urinary catheterization, the hospital bill rises dramatically to $6,594, as this is coded under the diagnosis-related group “excision of hemorrhoids with complications.” In Figures 8 and 9, the cost savings of ambulatory surgery over a one-day stay are shown to be $481, while for a two-day stay the cost differential is $4,654.

Phase 2

There were 19 patients (7 male and 12 female) with an average age of 47 years (range, 30–88 years).
**Catheterization.** Four patients (21 percent), three male and one female, required urinary catheterization.

**Length of Stay.** Eighteen were discharged from the recovery room, while one patient stayed 23 hours because of nausea. No patient required readmission.

**Pain Level.** The pain level averaged 5.2, 4.1, and 4.7 on days one, two, and three, respectively, with a wide distribution among patients.

**Pain Medications.** The amount of pain medication per 24 hours was higher in Phase 2 patients, owing to the change of dosage protocol. However, a wide variation among patients persisted (Fig. 10). The pump was used for four days in four patients.

**Side Effects.** Almost all patients experienced mi-
nor side effects (Table 5), and one patient discontinued the pump. All patients expressed satisfaction with the pump.

Complications. There were no complications related to the pump.

**DISCUSSION**

Hemorrhoidectomy is associated with a disproportionate amount of pain for the "size" of the operation. Because of this and the urinary retention that frequently follows, it has been necessary to hospitalize patients postoperatively.

The PCA pump was first introduced in 1972. Since then it has received widespread acceptance for postsurgical pain control. Its main advantage is that it allows the patient immediate access to narcotics after his/her perception of pain. Numerous studies have documented its efficacy, safety, and patient satisfaction. It has not been shown, however, to alter the length of hospitalization or postoperative costs in abdominal surgery. The PCA pump delivers a loading dose, after which the patient self-administers bolus doses at preset intervals (lockout). These bolus doses are much smaller and are given more frequently than traditional parenteral narcotics, thereby achieving a more con-
Our study confirms the efficacy of the SQMP in achieving postoperative pain control. All but one patient in both study groups expressed satisfaction with the level of pain control achieved. The one dissatisfied patient was subsequently discovered to be a prescription drug abuser.

The rate of urinary catheterization is high in this study although not out of line with recent reports. Perioperative fluid restriction has been shown to decrease the incidence of urinary retention in anorectal surgery. In this series, perioperative fluid intake was not restricted. Additionally, overzealous nursing efforts resulted in many premature catheterizations that might have been avoided had the patients not been queried hourly as to whether they had voided yet.

The SQMP did not alter the incidence of urinary catheterization, which is somewhat surprising in that pain is felt to be a contributing factor leading up to it. A recent report, however, cited two cases in which PCA use masked urinary retention, leading to increased discomfort and morphine consumption. Morphine was felt to inhibit the sensation of urgency and to increase the sphincter tone, resulting in urinary retention.

The SQMP was not responsible for any postoperative complications in this study. One complication that has been described in the literature is respiratory depression occurring with excess se-
dation.\textsuperscript{5, 7, 17} This should not be a problem if the SQMP is correctly administered. With narcotic analgesics, analgesia occurs at a lower dose than does sedation. Clinically, this has been shown by the fact that patients using PCA have consistently lower sedation and pain scores than those using conventional pain control methods.\textsuperscript{6, 9} There were numerous minor side effects due to the morphine and not related to the mode of delivery.

The variability seen in our patient's pain levels and their narcotic requirements has been well described in comparable studies.\textsuperscript{1, 2, 6–8} The lack of correlation between pain levels and narcotic doses was well demonstrated in this study.

Prior studies, conducted in the setting of major abdominal surgery, have not shown a decreased length of hospitalization or a cost difference as a result of the use of PCA. This study, however, clearly demonstrated the potential for major cost savings because of the fact that the hospitalization could be reduced. No patient in the SQMP groups required hospitalization beyond 23 hours for pain management. Furthermore, in Phase 2, 18 of 19 patients could be discharged from the recovery room.

**CONCLUSIONS**

The SQMP provides a safe, effective, and economical means for outpatient posthemorrhoidectomy pain control, eliminating the need for inpatient parenteral analgesia. It does not alter the incidence of urinary retention. It enjoys a high rate of patient satisfaction despite a significant number of minor side effects.

**ACKNOWLEDGMENTS**

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**REFERENCES**


