their subjects (post-laminectomy patients with low-back pain), and that pain relief appeared within a few minutes and lasted 6–12 months. Our data do not support these observations. Although morphine combined with steroid was more effective in the relief of post-laminectomy low-back pain than steroid alone ($P < 0.03$), only 65% of our patients reported pain relief, regardless of the sequence of administration of morphine-steroid and saline-steroid. In addition, the pain relief lasted only 1 day to 6 weeks. Thirty-five percent of our patients with pain sources similar to those reported by Cohn *et al.* did not have any pain relief at all. Although irritation and inflammation do respond to epidural steroids,[7] post-laminectomy pain can also be caused by localized arachnoiditis from surgery[8] or from dye used in the myelogram[9] and perineural scar formation.[10] These latter etiologies may not respond to steroid treatment, but may have confused the etiology of pain in a large group of our patients.

We conclude that epidural morphine sulfate plus methylprednisolone will not relieve pain in all patients with chronic recurrent post-laminectomy pain. Furthermore, the effectiveness of steroid injections in relieving pain does not appear to be a good predictor of the effectiveness of morphine coupled with steroid. Morphine combined with steroid may relieve pain in patients who appear resistant to epidural injections of steroid alone. Also, a second administration of morphine and steroid may be even more effective if given within 2 weeks of the initial dose. We believe that other factors influence the response to epidural steroid treatment, and should be further explored. These include differences in climate, occupation, educational level, family and employment stresses, duration of the pain problem, the use of analgesics and psychological factors.[6]

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# Percutaneous Inguinal Block for the Outpatient Management of Post-herniorrhaphy Pain in Children

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With an increased emphasis on ambulatory surgery, especially in the pediatric age group, innovative postoperative pain management can effect a smoother transition from the hospital into the home environment. Children undergoing surgery for inguinal hernia repair represent a large volume of ambulatory pediatric surgical cases.

The traditional use of narcotics for pain control is associated with a high incidence of nausea and vomiting postoperatively in children.[1] Besides stressing surgical repair, retching and vomiting can delay discharge from the ambulatory surgical unit, and may necessitate hospital admission if severe.

Caudal epidural blocks can achieve groin incisional analgesia, but the technical aspects can be time-con-

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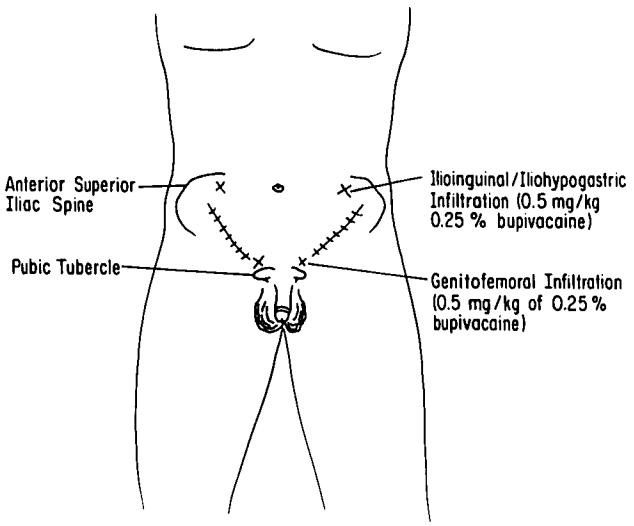


FIG. 1. Inguinal block technique and dosage.

suming in a busy ambulatory unit, and few general anesthesiologists in community hospitals will want to use this procedure.[2] In addition, caudal blocks require a relatively large volume of local anesthetic drug and result in higher plasma concentrations than those resulting from infiltration blocks.[3]

On the other hand, inguinal nerve block has a wide margin of safety, and is effective in controlling postherniorrhaphy pain well into the postoperative period.[4] In addition, it is a simple and quick procedure, and one that surgeons can administer at the end of surgery.

## METHODS AND MATERIALS

Thirty male children aged 3 months to 13 yr were studied with approval by our Human Subjects Review Committee and with parental consent. The children were not premedicated, and underwent bilateral inguinal herniorrhaphy under general anesthesia with oxygen, nitrous oxide, and halothane. No intraoperative sedatives or narcotics were administered. Each child was randomly assigned to a control (non-blocked) or an experimental (blocked) group.

TABLE 1. Pediatric Pain Assessment System

| | 0 | 1 | 2 |
|---|---|---|---|
| HR | 0–20% > preop | 20–50% > preop | 50% > preop |
| BP sys | 0–20% > preop | 20–50% > preop | 50% > preop |
| Tear | None | Watery eyes | Profuse tears |
| Subj | Comfortable | Mild pain | Mod.–sev. pain |

HR = heart rate; BP sys = systolic blood pressure; Tear = presence or absence of tearing; Subj = subjective impression of pain state.

TABLE 2. Patient Data, Duration of Analgesia, and Pain Medication

| | Blocked | Non-Blocked |
|---|---|---|
| No. of Patients | 15 | 15 |
| Age Range | 3 months–13 yr | 3 months–13 yr |
| Pain score (combined 1 h and 8 h) | $\bar{x} = 1 \pm 1$ | $\bar{x} = 5 \pm 1$ |
| No receiving pain medication | | |
| Narcotic | 0 | 9 |
| Non-narcotic | 0 | 12 |
| Duration of analgesia | $\bar{x} = 6.5 \pm 0.5$ h | $\bar{x} = 0.5 \pm 1$ h |

At the conclusion of surgery, percutaneous infiltration nerve blocks of the ilioinguinal, iliohypogastric, and genitofemoral nerves were performed (by the author) according to the technique described by von Bahr.[5] A 25-gauge 6.4 cm needle was partially inserted at a first site 0.5–2.0 cm medial to the anterior superior iliac spine (for ilioinguinal and iliohypogastric infiltration) and at a second site proximal to the pubic tubercle (for genitofemoral infiltration), as depicted in figure 1. Bupivacaine (0.25%) without epinephrine at a dose of 1 mg/kg was given on each side, with a maximum total dose of 2 mg/kg for a bilateral block.[3] Each infiltration site received 0.5 mg/kg of 0.25% bupivacaine.

All children were evaluated for pain severity 1 h after arrival in the recovery room, and again at 8 h postoperatively, by a blinded, trained observer. A pediatric pain assessment system (developed by the author) was used to evaluate each child (table 1). The pain score ranged from 0 (no pain) to a maximum of 8 (severest pain). In addition, the need for postoperative narcotics and non-narcotic analgesics was recorded for each group.

## RESULTS

Results are shown in table 2. Children who received the inguinal blocks had lower mean combined pain scores (at 1 and 8 h) than children in the control (non-blocked) group. The experimental (blocked) group needed no analgesics in the first 8 h postoperatively. Analgesic requirements were markedly higher in the non-blocked group, with nine children requiring a narcotic in the recovery room and 12 children requiring non-narcotic analgesics in the first 8 h after surgery. As an added benefit, the blocked children were noted to urinate and ambulate sooner in the ambulatory surgical unit than the non-blocked children. Most importantly, the period of analgesia in the blocked group ranged from 6–8 h, allowing a smooth transition from the ambulatory surgical unit to the home. There were no complications of the block technique in this study.

## Discussion

The application of peripheral nerve block techniques for controlling postoperative pain in children is underutilized in pediatric surgery. With an increasing emphasis on ambulatory surgery, especially in children, more emphasis should be placed on pain control issues to effect a smooth recovery and an expeditious discharge from the ambulatory unit.

Inguinal hernia repair lends itself well to infiltration nerve block, and can improve the ambulatory surgical experience for children undergoing this surgical procedure. The technique is easy to perform, requires very little extra time, and has very few side effects. Inguinal nerve blocks are especially effective for pediatric postoperative pain control. With a duration of analgesia of 6–8 h, these blocks allow most children to return home to a more familiar and comfortable environment.

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# Intravenous Labetalol for Treatment of Postoperative Hypertension

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Hypertension may develop in the immediate postoperative period. Several studies have demonstrated increased levels of circulating catecholamines, suggesting a causal relationship.[1,2] The development of postoperative hypertension warrants immediate assessment and treatment to reduce the risks of myocardial infarction, arrhythmias, congestive heart failure, stroke, bleeding, and other end-organ damage.[1] Current therapy includes the use of vasodilators, alpha and beta adrenergic blocking drugs, and calcium channel blocking drugs. Often, a combination of these drugs is required to maintain a safe balance between myocardial oxygen consumption, cardiac output, and arterial blood pressure.

Labetalol hydrochloride (Trandate®, Glaxo) is a combined alpha- and beta-adrenoceptor blocking agent currently approved for oral and intravenous use in the treatment of hypertension. Labetalol has been utilized for the treatment of hypertensive emergencies,[3–7] but its use has not been reported in the surgical patient who develops hypertension during emergence from general anesthesia.

We speculated that labetalol may be an appropriate drug for controlling acute postoperative hypertension. We therefore sought to evaluate the potential efficacy, safety, and dose of labetalol necessary for the treatment of hypertension following general anesthesia. We report on the use of intravenous labetalol in 15 such patients.

## Methods

This study was approved by the Institutional Review Board of Duke University Medical Center, and all patients gave written informed consent prior to surgery. The patients were A.S.A. Physical Status I–III scheduled for elective surgery requiring general anesthesia. Patients for whom beta-adrenergic blocking drugs were

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