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Preemptive Analgesia Does Not Reduce Pain or Improve Postoperative Functioning

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ABSTRACT

Objectives: To examine the effectiveness of preemptive analgesia in gynecologic laparoscopy patients.

Methods: A double-blinded, randomized trial was performed from June 2000 to June 2001. Preoperatively, patients were randomly assigned to 0.25% bupivicaine or normal saline control. Following anesthetic induction, the study drug or a placebo was injected prior to the proposed incisions.

Results: Of the 164 patients enrolled, 85 were randomized to the study group and 79 to the control. Age, surgery indication, and estimated blood loss did not vary significantly between groups. Overall mean pain score (± standard error of the mean) for study and control groups did not differ at 4 hours (3.2±0.3 vs 3.2±0.3) or at 24 hours (4.2±0.3 vs 4.2±0.3). Incisional pain scores also did not differ at 4 hours (3.0±0.3 vs 2.7±0.3) or at 24 hours (3.6±0.3 vs 3.6±0.3). Both groups were similar in activity limitation at 24 hours and oral narcotic consumption within 24 hours postoperatively. After stratifying surgery type for level of complexity, no difference was noted between groups. Multiple logistic regression analysis also noted no difference in outcomes.

Conclusion: Preemptive analgesia in patients undergoing gynecologic laparoscopy does not reduce postoperative pain or decrease the time to return of normal activities.

Key Words: Preemptive analgesia, Gynecologic laparoscopy, Bupivacaine.

INTRODUCTION

Preemptive analgesia has been studied in a variety of operative settings with conflicting results.[1-3] In 1994, Turner[4] tested the effectiveness of preincisional local anesthesia prior to appendectomy in a randomized, nonblinded study. Local anesthesia did not reduce postoperative pain when infiltrated either before or after the incision was made. In a recent randomized clinical trial, 5 patients receiving preincisional local anesthesia had reduced pain scores after surgery and a longer delay to their first need for analgesic medication. However, an objective measure of physical functioning was not performed.

The goal of the present study was to conduct a randomized, double-blind, placebo-controlled trial of preemptive analgesia in patients undergoing laparoscopy to evaluate whether preemptive analgesia reduces patients' degree of postoperative pain and their perception of functional limitation postoperatively. If significant differences were found, routine use of preemptive analgesia in laparoscopy could be recommended leading to decreased pain and increased postoperative activity levels in patients undergoing this common gynecologic procedure.

METHODS

The Institutional Review Board of Northwestern University approved this study. From July 1, 2000 to July 1, 2001, healthy women who were scheduled for gynecologic laparoscopic procedures were invited to participate. Surgical indications included sterilization, infertility, pelvic pain, endometriosis, adnexal mass, and fibroids. Patients with known hypersensitivity to local anesthesia and those undergoing laparoscopic-assisted vaginal hysterectomy were excluded. After obtaining informed consent, patients were randomized by pharmacists to either saline placebo or local anesthesia, using block randomization in sets of 6 and assigned according to a random number table. Study solution was dispensed in a 20 mL syringe by a pharmacist with anesthesiologists, surgeons, operating room staff, recovery room staff, and the patient blinded to the contents. The treatment-group syringe contained 20 mL of 0.25% bupivacaine, and the control

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group syringe contained 20 mL of 0.9% saline.

All patients underwent a standardized general anesthetic induction and maintenance with standardized premedications. Once the patient was under general anesthesia and prepped and draped, 5 mL of the study drug was injected with a 22-gauge needle into the subcutaneous tissues of the proposed incision sites 1 to 2 minutes prior to the creation of incisions. Surgery was then conducted as planned and incisions closed at the end of surgery based on the surgeon's preference. In the recovery room, pain medication was given by nursing personnel when requested by the patient. Patients were discharged with prescriptions for oral pain medications, including narcotics and nonsteroidal antiinflammatory medications and were asked to record the amount of pain medication used for the next 24 hours. Overall postoperative pain and incisional postoperative pain were evaluated 4 hours after incision closure by nurse interview, using a visual analog scale, and approximately 24 hours after incision closure by phone interview, using a verbal analog scale. Postoperative activity limitation was similarly assessed by phone interview approximately 24 hours after incision closure. Age, diagnosis, procedure, operating room time, blood loss, and complications were recorded.

Sample size was determined by a power analysis with a treatment group of 82 and a control group of 82 required to have 80% power to detect a 24% reduction in pain score at a level of significance of α=0.05.[6] Outcome variables included the visual and verbal analog pain scale scores, total amount of narcotic pain medication used, and the presence or absence of functional limitation. Statistical analysis was accomplished using the χ^2 test for dichotomous variables, the Student *t* test for normally distributed data, and the Mann-Whitney *U* test for nonparametric data. In all cases, $P<0.05$ was considered significant.

RESULTS

One hundred sixty-three of 164 randomized patients completed the study. One patient was excluded because of lack of data collection postoperatively. The treatment

Table 1.
Demographics for the Study and Control Groups

	Placebo	Local
N	85	78
Age (years)*	35.4±1.1	38±1.2
Indication*	2.2±12	2.4±13
Sterilization	13	16
Pelvic pain or infertility	32	21
Adnexal mass	27	26
Fibroids	11	11
Laparoscopic Surgery*	2.7±18	2.9±18
Diagnostic laparoscopy + fulguration	30	19
Tubal ligation	12	15
Ovarian cystectomy	20	19
Unilateral or bilateral salpingo-oophorectomy	7	10
Hysterectomy and bilateral salpingo-oophorectomy	10	11
Myomectomy	4	4
Operating Time (hours)*†	1.4±0.1	1.8±0.1
Estimated Blood Loss (mL)*	74±9.3	107±21.3

*Mean ± standard error of mean.
†$P<0.05$.

groups did not differ significantly in age, diagnosis, surgery, or estimated blood loss **(Table 1)**. The treatment group contained 79 patients, and the placebo group contained 85 patients. Overall and incisional pain scores as rated by visual analog or verbal analog scale did not differ significantly 4 hours or 24 hours postoperatively **(Figure 1)**. Similarly, the amount of narcotic pain medication used in the first 24 hours after surgery did not differ between the 2 groups. Functional limitation at 24 hours after surgery was also equivalent between the placebo and local groups **(Figure 2)**. We developed a multiple logistic regression analysis containing all measured risk factors and outcomes. In the full model, no variable was found to be significantly associated with preemptive local anesthesia.

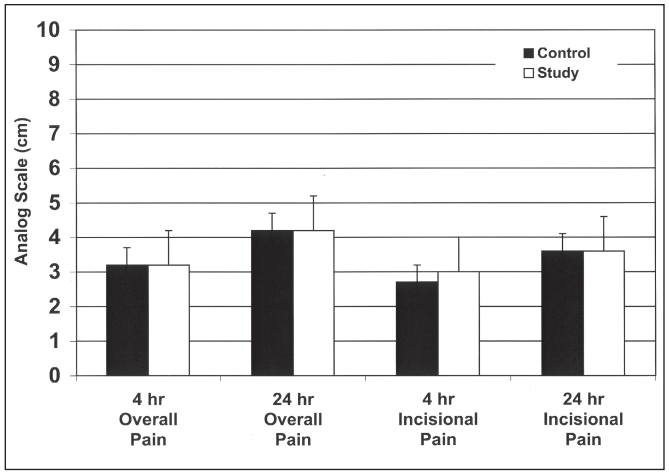

Figure 1. Visual analog pain score results 4 and 24 hours postoperatively.

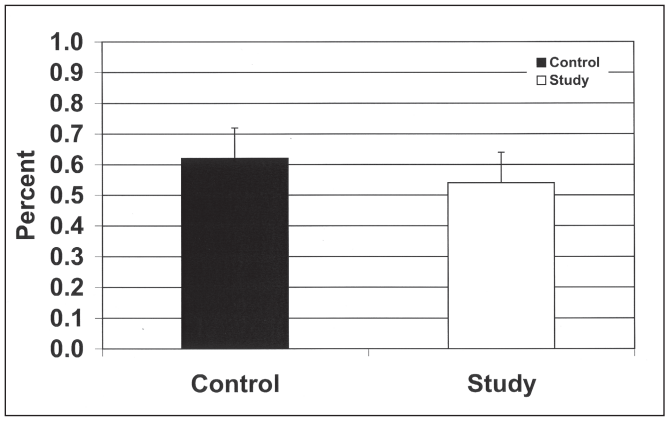

Figure 2. Activity limitations 24 hours postoperatively.

DISCUSSION

It is thought that pain experienced after surgery is due to a hyperexcitable state of the central nervous system caused by functional changes in the dorsal horn of the spinal cord after afferent impulses from incisional trauma. This hyperexcitable state persists even after the stimuli that initiated it cease.[7] Some of the proposed benefits of laparoscopic surgery include decreased skin and peritoneal stimulation and ultimately reduced hospital stays and shortened postoperative recovery. To improve on these benefits, the concept of local anesthetic infiltration at laparoscopic incision sites, whether preemptive or postoperative, has been used empirically by many practitioners. However, in the current trial, we found no difference between groups when comparing pain scores, narcotic usage, or functional limitation postoperatively. Our findings are in contrast to those of Ke et al[5] who found a significant difference between treatment and control groups with respect to pain scores measured 24 hours postoperatively using the modified McGill Present Pain Intensity scale.[8]

Our study may have been limited by the method used for data collection. Data were collected by telephone interview for the 24-hour postoperative questionnaire; therefore, some patients were not available at the appropriate time interval. If patients were not available for their 24-hour interview, subsequent phone calls were made, and patients were asked to recall their pain and function status at the 24-hour time period. We recognize the possibility of recall bias but expect that the effect would be randomly distributed between study and control groups. Another potential limitation of this study is the possibility of nonuniform injection of the study drug into incision sites. As local anesthetic infiltration is a commonly used procedure in gynecology and obstetrics, competency was assumed. Again, the design of the randomized, clinical trial should reduce this treatment bias. To completely eliminate this bias, we would have needed to reduce the number of surgeons participating in the study, which would have resulted in an extended period of data collection, and the results would not be applicable to as many gynecologic surgeons.

In addition, the method we used to measure pain may have contributed to our differing results as compared

with the results of other studies that found a difference in pain scores when utilizing preemptive analgesia. We utilized visual and verbal analog scales to quantify pain. Although this method differs from the McGill Present Pain Intensity scale used by Ke, both are widely supported as accurate methods of quantifying pain.[8,9] However, visual analog and verbal analog scales have been described as particularly useful in assessing pain in the same person at different times, which may make them more accurate in comparing pain scores in this particular study, perhaps lending more validity to our results. In addition, as opposed to the study by Ke et al,[5] we did not require standardized closure of incision sites, but this is unlikely to have altered pain scores significantly. Most surgeons report closing the skin layer alone for umbilical 10-mm and 5-mm ancillary incisions.

CONCLUSION

In summary, we were unable to demonstrate that the use of preemptive analgesia in patients undergoing gynecologic laparoscopy is effective in altering the perception of postoperative pain or allows patients to resume normal activities more rapidly.

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