

Awake Microlaparoscopy with the Insuflow® Device

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ABSTRACT

Background and Objectives: Patients undergoing laparoscopy often complain of shoulder pain, shivering, or both following laparoscopy. An increase in awake microlaparoscopic procedures has been reported. The objective of this study was to investigate the usefulness of heating and humidifying the carbon dioxide gas for the pneumoperitoneum with the Insuflow® device (Lexion Medical, St. Paul, Minnesota) during awake microlaparoscopic procedures.

Methods: Awake microlaparoscopy was performed with the Insuflow® device for heating and humidifying the carbon dioxide for the pneumoperitoneum.

Results: The incidence of transient shoulder pain in the Insuflow® group was 5% compared with 40% in the dry carbon dioxide group. No patient in the Insuflow® group complained of shivering, whereas 55% in the control group had shivering. Fogging of the microlaparoscope lens was decreased in the Insuflow® group.

Conclusions: Heating and humidifying the carbon dioxide gas produced fewer patient complaints of shoulder pain and shivering and decreased fogging of the microlaparoscope lens compared with procedures done with dry carbon dioxide during awake microlaparoscopic procedures.

Key Words: Microlaparoscopy, Pneumoperitoneum, Insuflow® device, Carbon dioxide.

INTRODUCTION

Recent advances in techniques and instrumentation have made awake microlaparoscopy a viable option for many laparoscopic procedures.¹⁻⁶ Peritoneal irritation is especially obvious during awake procedures because peritoneal irritation occurs when patients are under general anesthesia but are non compos mentis and only perceive the peritoneal pain when they awaken. Dry carbon dioxide provokes irritation and pain on peritoneal surfaces. Patients undergoing laparoscopy often complain of shoulder pain, shivering, or both, following laparoscopy. Heating and humidification of the carbon dioxide gas at a physiologic level decreases hypothermia and tissue desiccation.⁷⁻⁹ Local tissue hypothermia results from the rapid evaporation from tissue surfaces of peritoneal fluid water into the dry jet of insufflation gas.¹⁰ In addition, cold dry carbon dioxide promotes fogging of the laparoscope lens.

MATERIALS AND METHODS

Between January 1999 and October 2000, a prospective, nonrandomized study of 40 women with chronic pelvic pain who failed conservative medical therapy underwent awake microlaparoscopy in our office microlaparoscopy suite or the ambulatory surgery center of a private community hospital. Patients selected had preoperative American Society of Anesthesiologists physical status class I or II, and no history of psychiatric anxiety disorders or morbid obesity. None of the women had a history of intolerance to benzodiazepines or lidocaine, long-term drug addiction, cardiac or respiratory disease, neuropathic or swallowing disorders, or hepatic or renal encephalopathy.

Patients took nothing by mouth for a minimum of 7 hours before surgery and received a preoperative pre-load of Ringer's lactate solution. Conscious sedation¹¹ (atropine 0.2 mg, ondansetron hydrochloride 4 mg, midazolam hydrochloride 1 mg, and fentanyl citrate 250 µg) was given intravenously until satisfactory levels of sedation and comfort were obtained. The patients were prepared and draped, and a Foley catheter inserted. Administration of paracervical, periumbilical, and suprapubic blocks at the operative sites with 1% lidocaine with

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epinephrine 1:100,000, 10 mL buffered with sodium bicarbonate (10:1 dilution) was undertaken.

The pneumoperitoneum was administered in a single dose of 1.5 liters in the dry CO₂ group with standard insufflation tubing. Patients in the Insuflow® (Lexion Medical, St. Paul, Minnesota) group received continuous heated and humidified CO₂ at a setting of 6 mm Hg and a volume of up to 4 liters for the pneumoperitoneum. During the procedure, the surgeon observed the occurrence of lens fogging. Following completion of the procedure, an active effort to eliminate as much of the gas medium was made by applying pressure to the anterior and sides of the abdomen and pelvis with the patient in the Trendelenburg position prior to removal of the trocars. Upon completion of the procedure, patients were asked about the presence or absence of shoulder pain and were observed for shivering.

RESULTS

The microlaparoscopic procedures are shown in Table 1. All patients in both groups tolerated the awake diagnostic and operative microlaparoscopic procedures. However, patients in the Insuflow® group appeared to tolerate the awake procedures better. Patients in the dry CO₂ group did not comfortably tolerate volumes of gas above 1.5 liters, especially for prolonged operative procedures beyond 30 minutes. The Insuflow® group tolerated up to 4 liters continuous CO₂, often beyond 30 minutes.

The incidence of transient shoulder pain was 5% in the Insuflow® group, compared with 40% in the group using standard insufflation tubing. No patient in the Insuflow® group complained of shivering, whereas 55% in the dry carbon dioxide group had shivering. Microlaparoscope lens fogging was noticeably decreased in the Insuflow® group.

DISCUSSION

Bone-dry carbon dioxide pneumoperitoneum produces peritoneal desiccation that increases the incidence of postoperative shoulder pain and shivering.¹²⁻¹³ This effect results from the conversion of CO₂ to carbonic acid on the moist peritoneal surfaces. In this study, peritoneal irritation was more prominent when nonheated, nonhumidi-

Table 1:
Summary of Microlaparoscopic Procedures

Procedure	Number	
	Group A	Group B
Diagnostic microlaparoscopy	20	20
Conscious pain mapping	17	19
Chromotubation	10	15
Fulguration of endometriosis	7	10
Lysis of adhesions	3	11
Laparoscopic uterosacral nerve ablation (LUNA)	1	4

*A = Dry CO₂ group

fied CO₂ was used. Heating and humidifying gas for the pneumoperitoneum is desirable for awake laparoscopy. A recent study reported an increase in awake microlaparoscopic procedures, both in the United States and abroad.¹⁴ Procedures reported included diagnostic laparoscopy, tubal sterilization, chromotubation, lysis of adhesions, fulguration of endometriosis, LUNA, drainage of ovarian cysts, and appendectomy.

With the increasing trend in awake microlaparoscopy, patient comfort will continue to play a major role in the success of these procedures. Heating and humidifying the carbon dioxide gas allows the use of larger volumes of gas for the pneumoperitoneum, as well as longer operating time. The Insuflow® device appears to decrease shoulder pain and shivering often seen with the use of bone-dry carbon dioxide and decreases the frequency of lens fogging.

CONCLUSIONS

Heating and humidifying the carbon dioxide produced fewer patient complaints of shoulder pain and shivering following awake microlaparoscopic surgery. In addition, it was observed that lens fogging is decreased when the pneumoperitoneum gas is heated and humidified.

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