

Minilaparoscopy without General Anesthesia for the Diagnosis of Acute Appendicitis

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ABSTRACT

The timely diagnosis of intra-abdominal pathology continues to be an elusive problem. Delays in diagnosis and therapeutic decision making are continuing dilemmas in patients who are females of childbearing age, elderly, obese or immunosuppressed. Minilaparoscopy without general anesthesia potentially can provide an accurate, cost-effective method to assist in the evaluation of patients with acute abdominal pain.

Laparoscopy without general anesthesia is not a new technique, but with the combination of two emerging factors-- 1) the introduction of new technology with the development of improved, smaller laparoscopes and instruments, and 2) the shifting of emphasis on healthcare to a more cost-effective managed care environment--its value and widespread utilization is being reconsidered.

We report the case of a 22 year old female with an acute onset of increasing abdominal and pelvic pain. Despite evaluation by general surgery, gynecology, emergency room staff, as well as, non-invasive testing, a clear diagnosis could not be made. In view of this, minilaparoscopy without general anesthesia was performed and revealed an acute, retrocecal appendicitis. The diagnosis was made with the assistance from the conscious patient. The utilization of this technique greatly expedited the treatment of this patient. Full-sized laparoscopic equipment was then used to minimally invasively remove the diseased appendix under general anesthesia. Both procedures were well tolerated by the patient.

Key Words: Minilaparoscopy, Local anesthesia, Diagnosis, Appendicitis.

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INTRODUCTION

Acute appendicitis is a common clinical entity with a significant morbidity and mortality,¹ predominantly in the young, elderly, immunocompromised and women in their child-bearing years. Historically, the diagnosis of acute appendicitis has relied on symptoms and signs that are present in each patient. This may pose a diagnostic challenge even to the most experienced physician, due to the fact that various pathologies mimic acute appendicitis. In combination with atypical presentations, the patient can have a delay in diagnosis. In addition, this can greatly impact the cost of treatment.

The evaluation and utilization of promising, new diagnostic tools to confirm the clinical diagnosis of acute appendicitis has historically commanded a great deal of attention from investigators. These tools include blood tests, radiological contrast studies, ultrasound and CT. However, none of them have proved to be very effective.²

Currently, laparoscopy is a widely-used minimally invasive surgical procedure that has changed the practice of surgery drastically. Many reports in the literature have validated that laparoscopy as a diagnostic tool in suspected acute appendicitis is safe and effective and may additionally reduce the number of unnecessary appendectomies.³⁻⁷ Furthermore, recent advances in medicine and technology have led to the proposal of "Minilaparoscopy without General Anesthesia," which makes use of the combination of improved, smaller laparoscopes and instruments (2 mm) and a combination of local anesthesia and I.V. sedation. With capitated managed healthcare delivery systems emerging as the dominant strategy of the future, the rapid, mobile and cost-effective diagnostic capability of this new technology is noteworthy.

Laparoscopy without general anesthesia is not a recent concept. In the early days of laparoscopy, it was used quite frequently. But the large size of the trocars, the poor light and resolution, the pain-provoking characteristics of the insufflation mediums, crudeness of instruments and physician resistance have prevented the widespread adoption of this technique.⁸⁻¹⁰

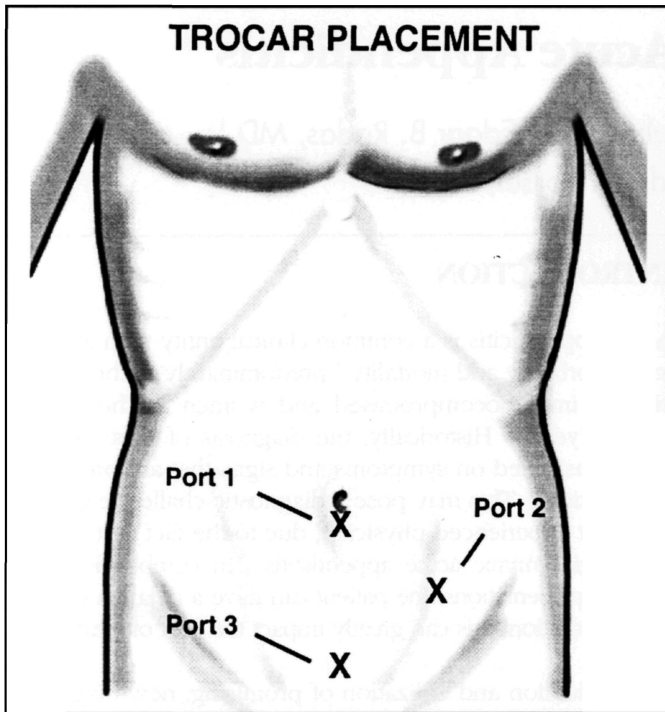


Figure 1. A scheme of the trocar placement for the procedure.

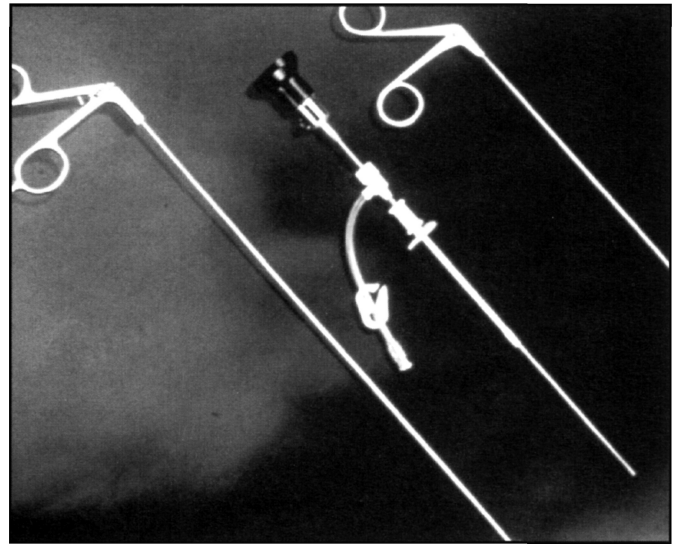


Figure 2. Minilaparoscopy instrumentation.

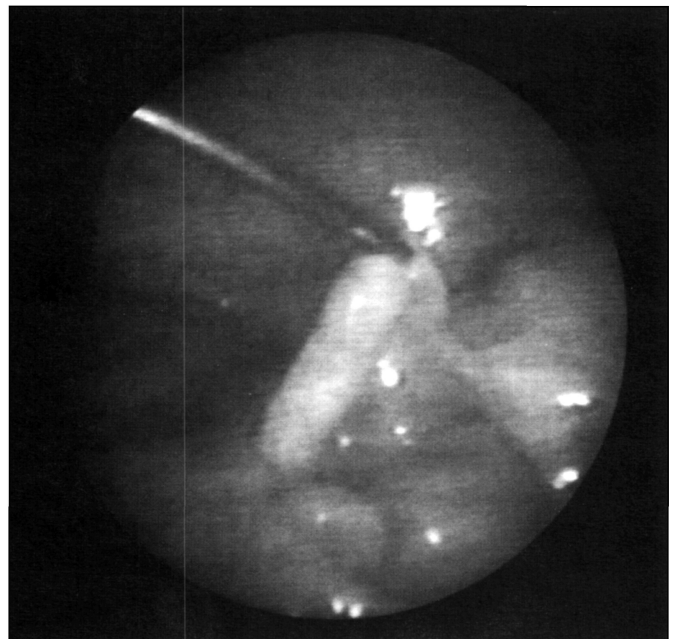


Figure 3. This photo shows the appendix under 2 mm laparoscopic view.

CASE REPORT

A 22 year old female presented to the emergency room with a chief complaint of acute lower abdominal pain of several hours duration associated with nausea and emesis. The patient had no past surgical history. On the physical examination, she was afebrile (97.2°F = 36.2°C), blood pressure was 110/70 mm Hg, and heart rate was 84 beats per minute. She had mild bilateral lower quadrant pain, right more than left. Pelvic examination revealed no discharge, minimal cervical motion tenderness, a normalized, nontender uterus, and mild bilateral adnexal tenderness. Pelvic ultrasound, liver function tests and electrolytes were within normal limits. WBC (White Blood Count) was $13.4 \times 10^9/L$ and serum pregnancy test was negative. The initial evaluation was done by another service, and it was decided that the patient was to be admitted overnight and placed on antibiotics with a diagnosis of "rule-out appendicitis vs. PID (Pelvic Inflammatory Disease)." On the following day, a consultation on the general surgery service was obtained. The pain was persistent, and physical examination remained unchanged. Rapid assays for cervical gonococcus and chlamydia were both negative. With a diagnostic dilemma still present 16 hours after admission, it was decided to perform a diagnostic minilaparoscopy without general anesthesia.

PROCEDURE

The patient was taken to the operating room and placed in the dorsal lithotomy, and the abdomen and perineum were prepared and draped in the usual fashion. A total of 15 cc of marcaine/lidocaine mixture was used for local anesthesia of three puncture sites. The first site was the umbilicus. The second site was in the left lower quadrant lateral to the rectus muscle, and the third site was located in the midline through the suprapubic area (Figure 1). Intravenous sedation was titrated to the patient's comfort level with a total dose of 250 mcg of fentanyl and 3 mg of midazolom. An

11 blade was used to make a 2.5 mm incision in the intraumbilical area. A 2.8 mm Microlap Introducer (Imagyn Medical Corp., Laguna Niguel, CA) along with a 150 mm Veress needle (Surgineedle, AutoSuture, Norwalk, CT) was inserted. Pneumoperitoneum was obtained with an intra-abdominal pressure of 8 mm Hg. A 2 mm fiberoptic scope (Microlap, Imagyn Medical Corp., Laguna Niguel, CA) was introduced and a second mini-site trocar was placed in the left lower quadrant after local anesthetic injection (**Figure 2**). A 2 mm blunt probe and atraumatic grasper were used to manipulate the pelvic and abdominal organs. The patient had the entire abdomen examined. The ovaries, tubes and uterus had a normal appearance. Similarly, the liver, gallbladder and stomach did not show any gross abnormality. Our attention was turned to the right lower quadrant. The patient was found to have a retrocecal appendix which was inflamed demonstrating erythema, induration, and hypervascularity (**Figure 3**).

At this point it was decided to convert the procedure to general anesthesia and perform a traditional laparoscopic appendectomy. A 10 mm trocar (Versaport, Auto Suture, Norwalk, CT) was inserted through the intraumbilical portion of the umbilicus, and a 0°, 10 mm laparoscope was then introduced in the peritoneal cavity. Another 12 mm trocar was placed in the midline suprapubic area, and a 5 mm trocar (Versaport, AutoSuture, Norwalk, CT) was placed in the left lower quadrant. The retrocecal appendix was exposed, and an Endo GIA 30 vascular stapler (AutoSuture, Norwalk, CT) was used on the mesentery and then an Endo GIA 30 non-vascular on the appendix. A 10 mm specimen bag (Endocatch, AutoSuture, Norwalk, CT) was introduced in the cavity to remove the appendix without difficulty. O-polysorb (AutoSuture, Norwalk, CT) was used to close the 12 mm and 10 mm trocar sites. The skin was closed with simple interrupted subcuticular stitches of 5-0 Biosyn (AutoSuture, Norwalk, CT).

DISCUSSION

The concept behind minimally invasive procedures is to provide a more efficient and effective method of diagnosing and treating diseases with reduced morbidity and mortality, faster recovery associated with less pain, and early return to normal activities. For many indications, these goals have been realized with laparoscopic treatment. The pursuit of continuous improvement in laparoscopic techniques has led our investigations to attempt to convert a minimally invasive procedure into an even less invasive one. This can be realized with the utilization of miniaturized scopes and instruments. The incisions caused by this equipment are less traumatic than traditional 10/12 mm sized laparoscopic instruments. Also, diagnostic and therapeutic procedures can be accomplished with a lower intra-

abdominal pressure. Both of these factors may decrease the level of pain associated with laparoscopy.

The role of laparoscopy without general anesthesia has been underestimated in the surgical community. It is believed that general anesthesia is indispensable in order to eliminate the patient's movement, the sensitivity to pain and to exclude the interference of the pneumoperitoneum by the patient's ventilation. Extensive experience, primarily from gynecologic procedures, refute these assumptions. Mehta has reported a series of 250,136 consecutive laparoscopic sterilizations under local anesthesia with full-sized laparoscope demonstrating no compromise in efficacy nor complication rate.¹¹ However, with more effective and safer I.V. sedation with reversal capability, better monitoring with the utilization of pulse oxymetry, and better visualization and quality of miniaturized equipment, this technique has the potential of worldwide impact. Currently, minilaparoscopy, also called office laparoscopy, under local anesthesia is successfully used in gynecology for infertility investigation,¹² tubal ligation,¹³ adhesiolysis,¹⁴ biopsies¹⁵ and chronic pain diagnosis.⁹ But it has the potential of being frequently used by general surgeons.

Acute appendicitis represents the most common indication for emergency abdominal surgery.² Minilaparoscopy without general anesthesia is a very effective technique for early diagnosis and prompt treatment. Schwaitzberg showed that the miniature equipment under general anesthesia was adequate enough for the performance of a liver biopsy.¹⁶ Coddington recently reported a consecutive cross-over comparison of traditional and micro-laparoscopic instrumentation. No difference in diagnostic accuracy was found.¹⁷ Therefore, if performed in the face of abdominal pain when clinical findings are difficult to interpret and various imaging techniques have failed to yield a diagnosis, minilaparoscopy without general anesthesia has the potential of delivering a speedy diagnosis, safely, in a cost-effective manner. It has the potential as well to reduce needless hospital stays for observation of patients and can lower the incidence of appendical perforation and its attendant morbidity that results in expensive convalescence. Also, when negative findings take place, it avoids unnecessary major surgery and general anesthesia.

The application of minilaparoscopy without general anesthesia and its bulky equipment liberates this technique from the confines of the operating theater. Therefore, diagnostic procedures can be performed in the emergency room, at the bedside, treatment room, or in a physician's office in a timely fashion. These locations allow diagnostic laparoscopy to be carried out with a more cost-effective profile. The billing of anesthesia and the tremendous cost for an operative theater can be avoided. The size of the

instrumentation approaches the size of the equipment used routinely in the interventional radiology suite. Therefore, if morbidity and mortality and diagnostic effectiveness in certain clinical situations is validated, diagnostic minilaparoscopy without general anesthesia may become the frontline diagnostic tool for acute abdominal pain--avoiding the cascade of a collage of multiple diagnostics that do not provide definitive information. In this patient, the appendix was examined under direct view while the patient was able to actively participate in localizing the source of the pain (conscious pain mapping). When the diagnosis of appendicitis is confirmed via minilaparoscopy, the patient can be admitted to the operating room, and a laparoscopic appendectomy can be performed with full-sized instruments. This technique represents a contribution to promoting a more accurate and rapid treatment of a pathological entity that continues to be a diagnostic dilemma.

We have reported on minilaparoscopy without general anesthesia performed in the physician's office.^{9,12} Advantages of this setting include increased speed of procedure scheduling, reduced delays, and a greater than 70% reduction in costs. For patients with acute or chronic pain, the procedure of conscious pain mapping allows the patient to help guide the surgeon to the appropriate localization of the pain foci.⁹

References:

1. Wagner JM, McKinney WP, Carpenter JL. Does this patient have appendicitis? *JAMA*. 1996;276:1589-1594.
2. Sarfati MR, Hunter GC, Witzge DB, et al. Impact of adjunctive testing on the diagnosis and clinical course of patients with acute appendicitis. *Am J Surg*. 1993;166:660-664.
3. Pedersen AG, Petersen OB, Wara P, Qvist N, Laurberg S. Laparoscopy in suspected acute appendicitis: Experiences with the first 233 laparoscopies at a university hospital department. *Ugeskr Laeger*. 1996;158:2377-2380.
4. Cox MR, McCall JL, Padbury RT, Wilson TG, Watchow DA, Toouli J. Laparoscopic surgery in women with a clinical diagnosis of acute appendicitis. *Med J Aust*. 1995;162:130-132.
5. Jadalla FA, Abdul-Ghawi AA, Tibblin S. Diagnostic laparoscopy reduces unnecessary appendectomy in febrile women. *Eur J Surg*. 1994;160:41-45.
6. Olsen JB, Myren CJ, Haahr PE. Randomized study of the value of laparoscopy before appendectomy. *Br J Surg*. 1993;80:922-923.
7. Taylor EW, Kennedy CA, Dunham RH, Bloch JH. Diagnostic laparoscopy in women with acute abdominal pain. *Surg Laparosc Endosc*. 1995;5:125-128.
8. Palter SF. Office laparoscopy under local anesthesia. In Azziz R, Murphy A, eds. *Practical Manual of Operative Laparoscopy and Hysteroscopy*, Second Edition. New York: Springer; 1997:239-247.
9. Palter SF, Olive DL. Office laparoscopy under local anesthesia for chronic pelvic pain. *J Am Assoc Gynecol Laparosc*. 1996;3:359-364.
10. Palter SF, Duleba A, Zreik T, et al. Office microlaparoscopy under local anesthesia: Experience from the first 1000 cases. *J Am Assoc Gyn Laparosc*. 1996;3:38.
11. Mehta PV. A total of 250,136 laparoscopic sterilizations by a single operator. *Br J Obstet Gynaecol*. 1989;96:1024-1034.
12. Palter SF, Olive DL. Office laparoscopy under local anesthesia for infertility: Utility, acceptance, and cost/outcome analysis. *Fertil Steril*. 1995;64:S8-S9.
13. Riskey F, Pennehouat G, Fernandez R, Confino E, Rodriguez O. Microlaparoscopy: a preliminary report. *Hum Reprod*. 1992;8:1701-1702.
14. Steege JF. Repeated clinic laparoscopy for the treatment of pelvic adhesions: a pilot study. *Obstet Gynecol*. 1994;83:276-279.
15. Childers JM, Hatch KD, Surwit EA. Office laparoscopy and biopsy for evaluation of patients with intraperitoneal carcinomatosis using a new optical catheter. *Gyn Oncol*. 1992;47:337-342.
16. Schwaitzberg SD. Use of microlaparoscopy in diagnostic procedures: a case report. *Surg Laparosc Endosc*. 1995;5:407-409.
17. Faber B, Coddington CC. Minilaparoscopy: A comparative study of diagnostic accuracy. *Fertil Steril*. 1997;(in press).