The Suprapubic Cruciate Incision for Laparoscopic-Assisted Microceliotomy

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ABSTRACT

Objectives: To introduce cruciate microceliotomy for performing conventional open surgery maneuvers at laparoscopy without conversion to standard laparotomy.

Methods: Retrospective review of all pelvic operations performed by this method by a single surgical team at one institution from 1993 through 1996.

Results: We found the cruciate incision to provide excellent exposure for the performance of extensive uterine suture-reconstruction, morcellation, tubal microsurgery, and bowel surgery with excellent cosmetic and convalescent results in a series of 94 patients. No wound-related complications were noted. Postoperative analgesic requirements averaged 4.1 oxycodone/acetaminophen tablets per day, and hospital stay averaged 36 hours.

Conclusion: In our experience, cruciate microceliotomy represents a useful, minimally-invasive adjunct for the performance of open surgical maneuvers at laparoscopy.

Key Words: Laparoscopy, Minilaparotomy, Microceliotomy, Incisions, Myomectomy.

INTRODUCTION

Despite numerous advances made in laparoscopic surgery over the past decade, a well-prepared, minimally-invasive surgeon should possess an effective armamentarium of laparoscopic-assisted methods to complete an operation when laparoscopy alone may yield a suboptimal result. Surgical goals can be met and minimal-invasiveness can be maintained by the use of laparoscopic-assisted microceliotomy.1,4 Typical scenarios amenable to such an approach are myomectomy in which extensive uterine repair is required, laparoscopic hemostatic maneuvers not sufficiently rapid to keep pace with operative blood loss, time-efficient tubal reanastomosis, bowel surgery, and situations in which critical laparoscopic instrumentation have malfunctioned and cannot be immediately replaced or repaired.1,4 We have employed an effective method of laparoscopic-assisted microceliotomy to retain the convalescent and cosmetic benefits of minimally-invasive surgery when surgical judgment dictates a laparoscopic-assisted suprapubic surgical approach.

MATERIALS AND METHODS

The process of executing a laparoscopic-assisted cruciate incision is identical whether single-puncture or multiple-puncture techniques are employed. We employ the former through an intraumbilical cannula.5 Pneumoperitoneum is maintained until the peritoneal layer of the microceliotomy is opened.

During conventional laparoscopy, the urinary bladder is emptied by either straight or indwelling catheterization. The abdominal wall, directly overlying the site to be exposed via microceliotomy, is transilluminated with the laparoscope exerting upward pressure on the parietal peritoneum in the midline until a circle of light is visualized on the lower abdomen. When the incision site lies over the bladder dome, excess pressure through the laparoscope should be avoided. A 2.5 cm transverse incision over the transilluminated skin is carried down to, but not through, the anterior rectus sheath in the midline, and small bleeding points controlled (Figure 1). The wound edges are separated in the midline with narrow retractors and subcutaneous fat is cleared from the midline fascia in a cephalo-caudal axis for approximately 2 cm superiorly, and 2 cm inferiorly. The anterior rectus fascia is incised in a vertical
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Figure 1. A. The placement of a 2.5 cm transverse suprapubic skin incision is directed by laparoscopic transillumination above the surgical field. The inset demonstrates the direction of the fascial incision.

direction through the full length of the previously cleared area (Figure 2). The apex of the pyramidalis muscle is exposed inferiorly and the linea alba between the rectus muscle bellies is seen superiorly. The rectus muscles are retracted away from the midline bilaterally exposing the transversalis fascia. The thin transversalis fascia and the underlying peritoneum bulge outward due to the pneumoperitoneal pressure.

When the skin incision overlies the bladder dome, transversalis fascia is indented with a narrow skin retractor and the position of the bladder dome is noted laparoscopically and avoided by directing the transversalis fascia and peritoneum incisions superior to the bladder dome and lateral to the urachus. When the skin incision is superior to the bladder dome, the transversalis fascia and peritoneum are incised vertically and the incision is extended cranially with scissors until it extends the full length of the fascial incision. When the abdominal wall is thick and the preperitoneal fat abundant, a blunt probe inserted laparoscopically is used to tent the peritoneum to facilitate its perforation. Once completed, the full thickness of the abdominal opening is stretched vertically to assess its adequacy. When the peritoneum becomes widely separated from the undersurface of abdominal wall around the circumference of the incision, we temporarily marsupialize the peritoneal edges to the skin edges with 4 to 6 evenly-spaced sutures which are removed prior to closure of the incision. The latter greatly facilitates placement of small retractors. The uterus or adnexum is brought through the incision with upward assistance of a uterine manipulator inserted transcervically. The necessary extracorporeal surgery is performed and the organ is subsequently replaced (Figures 2, 3).

Figure 2. A. The subcutaneous fat has been cleared to permit a vertical fascial incision. B. Incision of the transversalis fascia and peritoneum is facilitated by tenting these layers with the laparoscope. C. The full thickness of the abdominal incision is extended vertically beneath the skin. D. The uterine manipulator maintains the uterus or adnexum in view while the surgeon works.

When additional laparoscopic work is required following microceliotomy, the wound edges are approximated with tenacula to seal the abdominal cavity. Upon completion of the operation, the anterior rectus fascia is repaired with delayed-absorbable suture, irrigation is performed, any significant dead space is obliterated with fine absorbable suture, and the skin edges are approximated with either subcuticular sutures or staples. We do not routinely suture the parietal peritoneum or the transversalis fascia. Postoperatively, neither dietary restriction nor bladder catheterization are routinely employed.
RESULTS

Beginning 1993, we employed the laparoscopic-assisted cruciate microceliotomy incision described above to facilitate performance of laparoscopic uterine reconstruction and morcellation subsequent to extensive laparoscopic myomectomy (75 cases), to expedite the performance of microsurgical tubal reanastomosis (19 cases), and to perform suture repair of the small and large bowel (4 cases). The decision to employ this specific incision was made at the time of preliminary operative laparoscopy based upon the need to perform pelvic surgery not well-suited to laparoscopic approaches. No technical difficulties were encountered in executing or repairing the cruciate incision and there was no bladder injury, ileus, wound infection, pelvic pain, or wound herniation consequent to its performance in these patients. Similarly, there was no need to perform conventional laparotomy in any of these patients. Mean postoperative hospital stay in this series of patients was 36 hours (range 6 - 96). Mean analgesic intake (oxycodone 5 mg with acetaminophen 325 mg tablet) in-hospital was 4.1 tablets per day (range 0 - 10).

DISCUSSION

The concept of a microceliotomy must be defined to be distinct from that of minilaparotomy because of the great difference in surgical utility and convalescent impact engendered by these two approaches.

A minilaparotomy represents nothing more than a conventional laparotomy of limited length (commonly 3 to 6 cm) performed either vertically or transversely (sometimes with Maylard-like transection of the rectus muscles). Through a minilaparotomy, the performance of a surgical procedure must frequently be preceded by packing of the bowel and the placement of retractors (usually fixed-blade devices) to generate exposure sufficient to work effectively. The conventional process of obtaining exposure at laparotomy relies foremost upon incisional length. The latter suggests that a minilaparotomy, employed as the sole means of surgical access, assessment, and treatment, will suffer from limited surgical exposure. The use of bowel packing and fixed retractors (and sometimes muscle splitting) will often result in an uncomfortable, slow recovery typical to most laparotomies irrespective of the cosmetic appearance.

A microceliotomy, in contrast to the latter, represents a true minimally-invasive incision in terms of targeted exposure and surgical expediency without compromise in convalescent impact or cosmesis. A microceliotomy is the product of a preliminary laparoscopic survey and operation. Unlike a conventional minilaparotomy, the microceliotomy is made with full visual knowledge of the extent of intraperitoneal pathology and is made at a very precise location for the performance of very specific tasks. Only that portion of the uterus or adnexum which is being worked upon extracorporeally need be exteriorized at a given time. Delicate dissection, retroperitoneal and ureteral assessment, and other matters unrelated to the specific tasks for which microceliotomy is demanded are part of the laparoscopic phase. Thus, less exposure is required, but effective exposure is generated. There is no need to treat the microceliotomy as an exploratory maneuver at any time. These qualities obviate the need for fixed retractors, bowel packing, and extended exposure permitting laparotomy techniques to be performed through a skin incision of less than 3 cm in length. The consequence of the latter is greatly diminished postoperative discomfort and bowel dysfunction.

The concept of the cruciate incision where the skin is opened transversely and the fascia is incised vertically originated with Küstner in 1896. As a method of conventional laparotomy this approach suffers from difficulties with exposure and seroma formation. It is disparaged by most operators in favor of complete transverse or complete vertical incisions. As a method of microceliotomy, however, the incision permits vertical extension of the fascia without the need to expand the skin incision - similar to a vertical incision, but superior cosmetically. Being essentially a
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vertical midline incision in its deeper layers, intraperitoneal entry is relatively bloodless. Also, since the incision is small, the extent of subcutaneous dissection required to expose the fascia in a vertical direction is limited and has not required the use of drainage nor has it been associated with seroma formation as has the full-sized Küstner incision.

Small transverse incisions of the skin and fascia are limited anatomically by the pliability of the rectus muscles when a Pfannenstiel technique is employed because the midline attachment of the undersurface of the anterior rectus sheath to the linea alba cannot be freed extensively. Thus, unless the patient has extremely flaccid rectus muscles as in late pregnancy, or the fascial incision is extended bilaterally permitting further cranio-caudal midline fascial undermining, simple retraction of the rectus muscle bellies is unlikely to significantly increase working room. An abbreviated Maylard approach with transection of the rectus muscles bypasses the limitations of the Pfannenstiel method but may generate considerable postoperative discomfort and takes longer to heal. Furthermore, with both of these techniques, lateral tractive force on the skin edge as the fascia is extended runs parallel to the maximum skin tension lines of Langer in the lower abdomen and is likely to exceed the skin’s breaking strength leading to undesirable enlargement of the skin incision. In contrast, skin traction with the cruciate incision is directed cranio-caudally at the midline - the strongest part of the skin incision - and is much less likely to result in lateral extensions.

Higher on the lower abdominal wall, above the semilunar line of Douglas, the cruciate incision necessitates division of the posterior rectus sheath and should prove as effective a microceliotomy as that described in this report. However, our experience indicates that when microceliotomy is required above the level of Douglas, extension of the umbilical laparoscopic port to 2 cm with firm retraction caudally best fulfills the demands of the former without the need for any secondary incision.

In conclusion, the need for assistance by open techniques for the completion of laparoscopic-assisted procedures is infrequent but demands an incision of limited size since the majority of exposure-demanding work is performed laparoscopically. The suprapubic cruciate microceliotomy represents a minimally-traumatic, well-tolerated adjunct for the execution of laparoscopic-assisted procedures which retains the benefits of minimally-invasive surgery.

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