Complications of Operative Gynecological Laparoscopy

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ABSTRACT

Objective: To assess the incidence and type of laparoscopic complications.

Methods: A series of 2140 operative laparoscopies were reviewed in a retrospective study of patient records. The setting was a tertiary-care university hospital. Operative laparoscopy included minor procedures (minimal adhesiolysis, destruction of minimal endometriosis foci, ovarian biopsy, ovarian puncture, tubal sterilization), major laparoscopic surgery (extended adhesiolysis, tuboplasties, uterine suspension, treatment for ectopic pregnancy, salpingitis, ovarian cyst, moderate and severe endometriosis), and advanced laparoscopic surgery (hysterectomy, myomectomy, bladder neck suspension).

Results: Two major vascular complications, 3 intestinal injuries, 1 anesthesiological complication, and 4 urinary tract injuries occurred. Two minor and 5 postoperative complications were noted. The overall complication rate was 17/2140 (0.79%). The major complication rate was 10/2140 (0.46%).

Conclusions: This review is useful for helping surgeons reduce the risk of injuries and to inform patients about potential complications. These rates are similar to those that have been previously reported.

Key Words: Complications, Operative, Laparoscopy.

INTRODUCTION

Operative laparoscopy is now a common surgical procedure in many countries because of its advantages over open surgery, which include less invasive treatment and rapid patient recovery.1 The procedure is generally safe, effective, and well tolerated by patients. As with any surgical procedure, however, complications and failures of technique occur.2 The known rate of intraoperative and postoperative major complications is less than 1%, and the mortality rate is between 4 and 8 deaths per 100,000 cases.1

To describe the incidence and type of complications, the authors reviewed a series of operative laparoscopies performed or supervised by the gynecology division faculty.

SUBJECTS AND METHODS

Medical records of patients undergoing operative laparoscopy at the Department of Obstetrics and Gynecology, University of Chile Clinical Hospital from June 23, 1994, to April 30, 2000, were reviewed. The series included minor, major, and advanced laparoscopic surgery, as classified in the French collaborative study.3 The gynecology division faculty performed or supervised 2140 consecutive operative laparoscopies.

Techniques

The initiation of laparoscopy began with fashioning a subumbilical incision, elevation of the lower abdominal wall, and Veress needle insertion in a prouterine direction. Proper needle placement was verified by the hanging drop, hiss, and syringe aspiration test. Insufflation was initiated after a confirmatory hiss or hanging drop test and negative syringe tests. Insufflation was performed with intraabdominal pressure <15 mm Hg. A 10- to 12-mm trocar was inserted below the umbilicus in a prouterine direction. A 5-mm accessory trocar was placed in the lower midline, 3 fingerbreadths above the pubic symphysis in all cases. Two additional 5-mm accessory trocars were placed as necessary in the lateral lower abdomen, lateral to the inferior epigastric vessels. All 10- to 12-mm trocars had a retractable safety shield. None of the 5-mm trocars did, however. Hemostasis was...
established by bipolar and monopolar electrosurgery, Endoloop ligatures, or Endosutures. Lysis of adhesions and tissue separation was performed by sharp dissection or monopolar electrosurgery.

Intraabdominal suturing was performed for myorrhaphies during myomectomies, hemostasis, and to close the vagina during hysterectomies. All patients received 2 g of intravenous cefazolin sodium during anesthesia induction.

Complications were classified as per Querleu and Chapron.3

RESULTS

No lethal cases occurred.

Potentially Lethal Complications

Vascular

Two abdominal aorta injuries were noted. The first in a 39-year-old woman, 60 kg, with no previous surgery, who was admitted for an endoscopic myomectomy. Because she had a large uterus, a second 10-mm trocar was inserted midline between the umbilicus and xiphisternum for better vision. Trocar insertion without direct vision and low intraabdominal pressure resulted in an aortic injury that was immediately recognized. An urgent laparotomy was performed to control bleeding, and a vascular surgery consultation was obtained. The anterior wall of the aorta was sutured with the appropriate vascular technique. Four hours later, the patient became profoundly hypotensive and was readmitted to the operating room for a second procedure. Suturing of the injured posterior aortic wall was performed. The patient stayed in the hospital for 21 days, 3 days on mechanical ventilation. No sequelae have since occurred.

The second case was that of a 34-year-old, 65 kg woman with no previous history of surgical intervention. The patient was admitted for laparoscopic hysterectomy and cholecystectomy to be performed at the same time. After the patient was placed in the Trendelenburg position, the surgeon inserted a 10-mm umbilical trocar to initiate cholecystectomy. An infrarenal aortic injury occurred and immediate laparotomy with suture repair of the vascular injury was performed. Operative time was 3.5 hours. A primary anastomosis was then performed by the general surgeons. The woman went home on the 9th day after surgery without any sequelae.

Intestinal

Three patients with previous abdominal surgery had major intestinal injuries. One occurred during lysis of adhesions during a hysterectomy. A diagnosis was made when the patient experienced peritonitis on the third postoperative day. She was operated on and sutures were used to repair the rectal injury. Afterwards, 2 additional operations were necessary for surgery toilette, and a third intervention was necessary for a tracheotomy. Later (21 days), vaginal vault bleeding occurred that was suture repaired. The patient was in the hospital for 41 days, 29 days on mechanical ventilation and 20 days with a tracheotomy.

In a third patient, a diagnosis of intestinal injury was made by the gynecologist during laparoscopic adhesiolysis. An immediate laparotomy was performed and 40-cm of intestine were resected. A primary anastomosis was done. The patient was in the hospital for 19 days. Both of the above 2 intestinal injuries were caused by electro surgical injuries.

Anesthetiological

A healthy 42-year-old woman had an aspiration pneumopathy and respiratory distress. She was placed under intensive care and stayed in the hospital for 13 days.

Nonlethal Intraoperative Complications

Major

Urinary tract: One case of ureter injury occurred in a 33-year-old woman who had had a previous surgery (appendectomy) and who underwent a laparoscopic hysterectomy. A urinoma was diagnosed postoperatively and a pigtail catheter was placed in the right distal ureter for 2 months.
Three bladder injuries: A 48-year-old woman who had had a previous surgery (appendectomy) underwent a laparoscopic hysterectomy. A cystotomy occurred during bladder dissection and cervix lysis. Immediate endoscopic suture of the bladder was accomplished and the patient had an uneventful recovery.

A second 45-year-old, 60 kg, woman who had previous surgery (bilateral tubal sterilization) underwent a laparoscopy hysterectomy. During vaginal extraction of the uterus, an accidental 3-cm bladder injury occurred with Pozzi forceps. Repair of the bladder was accomplished per vaginum with continuous polygalactin 3-0 suture. The day afterwards, retrograde pyelography revealed a blockage of the left ureter. On the 4th postoperative day, a pigtail ureteral catheter was placed, and the patient went home 6 days after laparoscopic surgery.

A third case involved a 54-year-old, 67 kg, woman who had had a previous surgery (cholecystectomy) and who underwent laparoscopic hysterectomy and bilateral adnexectomy. At the completion of the surgery, air was noted in the urine collection bag. On the first postoperative day, an urethrocystogram was done, and a bladder fistula was identified. A Foley urine catheter was passed and after 8 days was removed. On the 12th day, the woman returned and a bladder-vaginal fistula was diagnosed. Fistulectomy and bladder surgery were performed by a urologist 44 days after the first laparoscopic surgery.

Bleeding from the dissection area: A myomectomy was done in a 33-year-old woman, 61 kg, with no previous surgeries. Immediate laparotomy and suture repair were required to control bleeding. After 3 days in the hospital, the patient was discharged home.

Epigastric: A minor epigastric injury occurred due to a lower lateral 5-mm trocar in a 32-year-old woman, 73 kg, undergoing diagnostic laparoscopy. Intraoperative coagulation was accomplished with an uneventful recovery after 2 postoperative hospital days.

Postoperative Complications

Ileus

One case of postoperative ileus occurred after a 2-hour laparoscopic hysterectomy. The patient had an uneventful postoperative course. After 2 days, she went home.

Vaginal Vault Complications

Bleeding: Seven days after a laparoscopic hysterectomy, vaginal vault bleeding occurred in a 41-year-old, 69 kg, woman. Suture of the vaginal vault was required to control the bleeding.

Infection: One incidence of wound infection occurred 28 days after an operation. Antibiotic treatment was successful in treating the infection.

Venous thromboembolism: After a 4-hour laparoscopic hysterectomy and cholecystectomy, a 46-year-old woman (71 kg, 1.56 m tall, with no previous surgery) developed a superficial venous thrombosis in her left leg 2 weeks after surgery. Medical treatment was accomplished, and the patient had an uneventful recovery.

Peyelonephritis: A 37-year-old woman underwent total laparoscopic hysterectomy. On the first postoperative day, a pyelonephritis developed. After proper antibiotic therapy, the patient improved.

DISCUSSION

Potentially Lethal Complications

Vascular

The incidence of major vascular injuries during laparoscopy is unknown or probably underreported. Penfield\textsuperscript{4} sent questionnaires to 25 experienced laparoscopists asking about their knowledge of major vascular injuries incurred during laparoscopy. Twelve of the respondents described 19 vascular injuries, 8 of which were to the aorta. Nordestgaard et al\textsuperscript{2} reviewed the literature and found 20 cases of major vascular injuries during laparoscopic procedures. Of the vessels injured, most were near the distal aorta and its major branches or the inferior vena cava and its tributaries. Only one of these cases was caused by sharp dissection. The rest were caused either by the pneumoperitoneum needle or the trocar, with the former predominating. The distal aorta is subject to injury because a trocar is usually inserted a few centimeters below the umbilicus and the trocar is frequently inserted without laparoscopic visualization.

In the relaxed state, the distance from the skin to the great vessels is reduced to a few centimeters, especially in thin persons. To minimize the risk of vascular injury, several authors have emphasized the importance of inserting the insufflation needle at a 45° angle.\textsuperscript{2} Penfield\textsuperscript{4}}
concluded further that factors like failure to place the patient in the Trendelenburg position, failure to elevate or stabilize the abdominal wall, lateral insertion of the needle or trocar, inadequate pneumoperitoneum, and failure to rotate the trocar during insertion could also lead to large-vessel injury during pelvic laparoscopy.  

The first major vascular injury in our series was the result of insertion without direct vision and low intraabdominal pressure as was described by Penfield. Incomplete vascular repair during the first laparotomy resulted in a high-risk situation because the woman became profoundly hypotensive and needed a second operation. This severe problem could have been avoided with careful examination of the aortic injury and suture of both anterior and posterior walls. Early recognition of a vascular injury is paramount to expeditious treatment. If blood is returned after the needle insertion or a retroperitoneal hematoma is identified after the insertion of the laparoscope, preparation for immediate laparotomy should be made. Initial control of large bleeding vessels should be accomplished by digital or sponge pressure rather than by using nonvascular instruments, which result in additional trauma to the vessels. Our patient should have had a full and fast recovery because of her youth and previous healthy condition, but the postoperative shock and reoperation required to repair the missed posterior wall injury did not allow it.

The second case resulted from an umbilical trocar insertion with the patient in the Trendelenburg position. An immediate diagnosis was made and an appropriate vascular repair was performed.

**Intestinal**

Direct injury of the gastrointestinal organs can be produced by both the Veress needle and by operating port trocars. The size of the enterotomy has significant implications for diagnosis, treatment, and postoperative recovery. Bowel injuries have been reported to occur in between 0.1% and 0.2% of cases. The anatomic distribution of these injuries included small bowel 52%, colon 32%, duodenum 11%, and stomach 4.5%. Although the shielded, double lumen Veress needle is effective for avoiding injury to mobile organs, this needle is less effective for preventing injury to fixed structures. Bowel perforation may be difficult to detect intraoperatively and requires immediate laparotomy for repair or resection. The postoperative results are also different when bowel preparation is done. Its indications before operative laparoscopy are becoming a matter of medical and legal debate. The authors’ indications for preoperative bowel preparation were not consistent. They were, in general, similar to open laparoscopy indications but not all open laparoscopies have bowel preparation. Bateman et al estimate that 50% of patients who satisfied their criteria for open laparoscopy and 5% of patients who fell outside their open laparoscopy indicators would have benefited from bowel preparation. Based on a review of the literature, the best results reported are obtained when bowel perforation is diagnosed immediately and laparotomy for repair is performed at the same time. A common form of bowel injury occurs during adhesion separation.

In these 2 cases, bowel perforation was difficult to detect intraoperatively, and a diagnosis was made several days after the operation when peritonitis was present. The delay in diagnosis and proper treatment led to prolonged hospitalizations, repeat operations, difficult recuperation, and high costs. In the last case, the diagnosis was made intraoperatively during the laparoscopic surgery. Immediate conversion and appropriate treatment led to short postoperative hospitalization and a good recovery.

**Anesthesiological**

The complication rate of anesthesia for laparoscopy is between 0.016% and 0.75%. Various anesthetic techniques are associated with certain complications. Therapeutic laparoscopy may require placement of the patient in the Trendelenburg position, which increases the risk of reflux and aspiration. Therefore, endotracheal anesthesia with muscle relaxants and controlled ventilation is typically required.

Despite the fact that endotracheal anesthesia was given to our patient, she experienced nausea and vomiting in the postoperation period after extubation. Proper intensive care brought about good results and total patient recuperation.

**Nonlethal Intraoperative Complications**

**Major**

**Urinary tract:** Ureteral injuries occur occasionally with an incidence of 0.34%. Thermal injuries to the ureters during gynecologic procedures can usually be managed
with nonoperative means, such as ureteral stenting, urinary bladder drainage, and antibiotic therapy. The overall incidence of thermal ureteral injuries is approximately 0.01%.1

In our case of ureteral injury, there were dense adhesions present that caused a difficult and incomplete dissection. These factors contributed to ureteral damage and the delay in diagnosis and treatment.

**Bladder injuries:** Bladder injury occurs most frequently in patients who have had a previous intraabdominal surgery. The appearance of gas bubbles in the urine collection bag is usually the first sign of this complication. In the first case, careless bladder dissection resulted in a cystotomy that was treated immediately. In the second case, an accident occurred at the moment of uterine extraction. A blind maneuver to get the cervix led to bladder damage. Bladder repair via the vagina was followed by ureter blockage. A urethrocystogram the day afterwards established the diagnosis and allowed for appropriate treatment with good results during the same hospitalization.

In the third case, gas bubbles were seen by surgeons at the end of the laparoscopic operation. However, they did not make an immediate diagnosis or immediately treat the patient. Conservative management with a Foley catheter and late treatment of the fistula did not help in obtaining a rapid and good recovery.

**Minor**

Although the deep epigastric vessels are not considered “major vessels,” they are very important because recognition of their injury is often delayed and leads to significant morbidity and mortality. In the literature, cases of death or severe stroke due to very delayed recognition of the inferior epigastric artery injury and resultant profound hypotension have been reported. Management by coagulation of the parietal peritoneum cranial and caudal to the injury site is all that is required. Failing this maneuver, the abdominal wall should be incised medially and laterally from the sheath down to the peritoneal membrane. Suture ligatures are then placed cranially and caudally, along the course of the epigastric vessels.2

In our first case, technical difficulty in applying an endoscopic hemostatic suture occurred. It was solved by immediate laparotomy and open suturing. The second patient had a minor epigastric injury that was intraoperatively coagulated without complications.

**Postoperative Complications**

Ileus is a rare reported complication. Although early mobilization minimizes the risk of ileus, patients requiring extensive bowel manipulation and packing are at risk for ileus and may experience a delay in the return of normal bowel function. This may have been the case in our patient who experienced ileus after a 2-hour uneventful total laparoscopic hysterectomy.

**Vaginal Vault Complications**

**Bleeding and infection:** In women undergoing total laparoscopic hysterectomy, the technique used to close the vaginal cuff is not different from that for traditional closure. The vagina is closed transversely with multiple interrupted suture of 0 or 1 polygalactin suture secured with extracorporeal knot tying. A modification of the laparoscopic approach is to use electrical energy for cutting and hemostasis. The use of thermal energy may result in more tissue damage to the vaginal cuff. It may be advisable to minimize the use of thermal energy, so that the tissue is not overdesiccated. Sutures should always be placed in viable tissue.6

In our 2 cases (bleeding and infection), thermal energy was used extensively for dissection and hemostasis. Thermal damage may have been more extensive than realized and the vaginal vault sutures may not have been placed in viable tissue.

Superficial venous thromboembolism is a rarely reported complication.7 It should be carefully noted that even with the patient in the lithotomy position, intraperitoneal pressure of 15 mm Hg significantly obstructs venous return from the legs. Single-dose prophylactic anticoagulation is recommended to prevent deep vein thrombosis and pulmonary embolus. In our case, a 4-hour operating time was important in the genesis of the complication. This patient did not receive any prophylactic anticoagulation.

**Pyelonephritis:** The reported rate of urinary tract infection is between 0.8 to 2.4 per 100 women undergoing hysterectomy or major operative laparoscopy.8-10 Routine catheterization of the urinary bladder is recommended to avoid injuring the distended organ.1 This is why all patients in our series were catheterized with a Foley bladder catheter. Prophylactic antibiotic therapy was also
given to prevent infection. Despite this, a patient without an important previous urinary history had pyelonephritis. In this instance, it may be that proper routine antiseptic steps were not taken.

Reports from retrospective surveys by individual surgeons are suspected of underestimating the complication rate, as reporting is often incomplete.\(^3\) In spite of a retrospective analysis, a high risk of underregistering may occur. It is important to document complications and to define specific complications and complication rates.

Our overall complication rate was 17/2140 (0.79%), and the major complication rate was 10/2140 (0.46%). The overall complication rate from the French collaborative study in advanced laparoscopic surgery was 0.89%,\(^3\) and major complication rates between 0.22% and 0.34% have been reported.\(^5\) The evaluation of the incidence and type of complications in our series should be useful to improve our skills in the next series of operative laparoscopies.

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