

# Perforation of the Small Intestine Secondary to Laparoscopic Tubal Cauterization

EDWARD C. SALTZSTEIN, M.D.,\* SAUL F. SCHWARTZ, M.D.\*\*  
CARL J. LEVINSON, M.D.\*

**T**HE MOST SERIOUS COMPLICATION of laparoscopic tubal cauterization is unrecognized or inadvertent fulguration of the ileum.<sup>2</sup>

This paper reports three recent cases of perforation of the small intestine secondary to laparoscopic tubal cauterization. Although small intestinal burn has been mentioned as a possible complication of tubal fulguration,<sup>2,3</sup> we are unaware of specific case reports of small intestinal perforation in the literature.

## Case Reports

**Case 1.** A 24-year-old woman, Gravida 3, Para 2, underwent laparoscopy with bilateral tubal fulguration on 10/5/71 (Mount Sinai Medical Center, Milwaukee, Wisconsin). Laparoscopic abdominal exploration was negative and tubal ligation was performed without incident utilizing the biopsy tong. The patient had a low grade fever the day following the procedure and complained of a slight sore throat, but 2 days after operation was afebrile and was discharged from the hospital.

On 10/8/71, 3 days after tubal ligation, the patient was readmitted to the hospital following sudden onset of lower abdominal pain starting with a cramp and becoming increasingly severe within one-half hour. She took a shot of brandy and vomited once after that. The pain described was not crampy in nature.

On physical examination, the abdomen was soft in the upper quadrants, but there was marked guarding in the lower quadrants. There was marked tenderness with rebound tenderness present in both lower quadrants. Rebound tenderness to a lesser degree was also present in the upper quadrants. The bowel sounds were hypoactive and slightly high pitched. Pelvic examination revealed marked paracervical tenderness. The white blood count on admission was 20,000 with a shift to the left. A low grade fever was present. X-rays revealed a minimal amount of gas without any free air present.

The impression at the time was that the patient had a complication of laparoscopic tubal ligation. The possibility of a burn

*From the Departments of Surgery and Obstetrics-Gynecology, Mount Sinai Medical Center, and the Medical College of Wisconsin, Milwaukee, Wisconsin 53233.*

with perforation of the small intestine was primarily considered, although pelvic inflammatory disease secondary to the surgical procedure was also considered. The patient was operated upon the evening of 10/8/71. A peri-umbilical midline incision was used. Upon entering the peritoneal cavity a moderate amount of murky peritoneal fluid was encountered. There were filmy and fibrous adhesions of the small intestine and pelvis to adjacent viscera. The uterus and tubes were inspected, and there was no evidence of acute inflammatory reaction. The site of tubal cauterization was identified and appeared to be normal for this state of postoperative recovery. A normal appendix was located in a retroperitoneal position. In the proximal ileum an area of perforation with localized coagulation necrosis about the perforation was identified (Fig. 1). The remaining small intestine was essentially normal.

An area of approximately 2 cm. surrounded the perforation which appeared to represent burned tissue. It was elected, therefore, to resect a 3 to 4-inch segment of small intestine to include all areas of coagulation necrosis. The patient made an uneventful recovery and was discharged from the hospital 9 days after operation.

**Case 2.** A 23-year-old Gravida 2, Para 2, woman was admitted to the hospital on 12/2/71 for an elective permanent sterilization procedure (St. Luke's Episcopal Hospital, Houston, Texas). On 12/3/71 a laparoscopy and bilateral tubal fulguration and division was performed, using the biopsy tong and the technic of coagulation followed by cutting/twisting. There were no unusual circumstances, and the intestine appeared to be well away from the coagulation site. However, in coagulating the left tube, "there was a blanching of the entire tube out to the fimbriated end." The patient had an uneventful postoperative course, and was dismissed from the hospital on the following day.

She was readmitted to the hospital on 12/10/71, following sudden onset of lower abdominal pain of a spurting diffuse nature. There was no nausea or vomiting. Abdominal examination revealed diffuse tenderness with moderate distention of the lower abdomen. The tenderness was most marked in the right lower quadrant. On pelvic examination, no abnormalities were noted. A culdocentesis returned 10 cc. of straw-colored fluid. The patient was treated

Submitted for publication July 13, 1972.

\* Department of Surgery.

\*\* Department of Obstetrics-Gynecology.

FIG. 1. Perforation of the distal ileum with surrounding burn reaction.



by intravenous fluids and medication for pain, and appeared to improve. However, she developed a temperature of 37.8 C, and the white count was elevated to 12,200 with a shift to the left, and the pulse rate increased. By 12/13/71, although the patient began to have intestinal function, the abdomen was distended and abdominal X-rays revealed loops of distended small intestine. Therefore, an exploratory laparotomy was performed, and a perforation of the distal ileum with a localized area of necrosis surrounding the perforation was identified. A resection of approximately 6 inches of ileum encompassing the perforation was performed. The postoperative course was uneventful.

**Case 3.** A 39-year-old woman, Gravida 3, Para 3, with a past history of cholecystectomy and pelvic surgery for endometriosis, underwent elective laparoscopy and bilateral electrocauterization and electro-surgical resection of the fallopian tubes on 10/13/70 (Doctors Hospital Complex, Milwaukee, Wisconsin). At operation, both fallopian tubes and ovaries were within normal limits.

Cauterization was performed with the biopsy tong. It was seen, after the second tube was cauterized and resected, that a section of approximately 1.5 cm. in greatest diameter of the small intestine had been cauterized. The area was white. The surrounding area was pink, and did not involve the mesentery of the small intestine. It was elected to observe the patient for possible intestinal problems.

Over the ensuing 36 hours there were increasing signs of peritoneal irritation and small intestinal obstruction, and the patient was operated upon the evening of 1/14/71. There was gross contamination in the right lower quadrant, and a loop of intestine was identified which was perforated. There was a great deal of burn reaction around the perforation. It was felt that closing the

perforation would be unsatisfactory, and 6 to 8 inches of small intestine were resected. The patient made an uneventful recovery.

### Discussion

The use of electrocoagulation to interrupt the integrity of the fallopian tube during laparoscopy is standard procedure. Reported complications of laparoscopic tubal cauterization are unusual, postoperative discomfort is minimal, and patients usually return to their normal activities within 24–48 hours.<sup>1-7</sup>

Coagulation necrosis of adjacent viscera by direct application of cautery or from sparking is a possible, even if extremely unlikely, complication of the proce-



FIG. 2. Photomicrograph of the distal ileum showing extensive coagulation necrosis.

ture. In the first two cases reported above, the operating gynecologist had no difficulty in distending the abdomen, there were no adhesions, there was no intestine in the immediate area of the tube during cauterization, and the cautery was not inadvertently applied. In the third case, coagulation of the intestine was noted at the time of tubal cauterization. Although the patient had previous pelvic surgery for endometriosis, which could be expected to result in adhesions complicating the performance of laparoscopy, the tubes and ovaries were reported as easily visualized.

Steps to prevent coagulation necrosis of the small intestine are of extreme importance.<sup>3-7</sup> Proper equipment, and good anesthesia to avoid straining, are essential. Steep Trendelenberg and adequate gas distention of the abdomen as well as appropriate manipulation of the tube with the cauterizing instrument are measures to employ to avoid contact with adjacent intestine. The cautery attachment should be connected only during actual cauterization.

The clinical picture in the above reported cases suggests a typical pattern, consistent in all respects with spreading pelvic peritonitis. The first two patients had very uneventful postoperative recoveries from laparoscopic tubal cauterization until the third to seventh day when they developed sudden lower abdominal pain which began to spread to the remainder of the abdomen. This was associated with a rising fever and white count. Nausea and vomiting were inconstant accompanying symptoms. Physical examination revealed the presence of abdominal tenderness with rebound primarily in the lower abdomen. Pelvic examination was unremarkable except for evidence of peritoneal irritation. In both cases a complication of laparoscopy was suspected, and a differential diagnosis between postoperative pelvic inflammatory disease and small intestinal perforation secondary to electro-coagulation was made.

In the third case, intestinal burn was noted at the time of tubal cauterization, and perforation undoubtedly followed soon thereafter. Perforation in these three cases occurred hours, 3 days, and 7 days following intestinal burn, and the time delay from burn to perforation would appear to be related to the severity of the coagulation necrosis.

At operation, the small intestinal perforations were readily demonstrated. The degree of peritonitis depended upon the amount of spillage and the length of time from perforation to exploration. The small perforation, in all three instances, was surrounded by an area of coagulation necrosis grossly visible, and it was deemed advisable to resect a portion of small intestine sufficient to include this area of coagulation necrosis (rather than simple closure of the perforation). Histologic examination of the resected tissue confirmed the

presence of coagulation necrosis spreading for 1-2 cm, (Fig. 2). Therefore, resection of small intestine would seem to be indicated to prevent subsequent reperforation, and resection of the small intestine with end-to-end anastomosis was followed by complete recovery in all three patients.

Exploration was delayed in Case 2. A trial of conservative therapy to treat a possible inflammatory process in the absence of a definite diagnosis of small intestinal perforation was deemed advisable. Delay in operation following intestinal perforation is fraught with complications, and further delay in operating on Case 2 could have had a high morbidity rate with secondary small intestinal obstruction and intra-abdominal abscess. Appropriate therapy appears to be immediate operation upon suspicion of small intestinal perforation. The risk of delay with perforation would greatly outweigh the risk of exploration for pelvic inflammatory disease in an otherwise normal young woman.

### Summary

Three cases of perforation of the small intestine following laparoscopic tubal cauterization for female sterilization are reported. Measures to avoid cauterization of adjacent viscera during laparoscopy are emphasized. Patients have (unless perforation is immediate) sudden lower abdominal pain up to 7 days after tubal cauterization, and subsequently develop spreading peritonitis. The time delay from burn to perforation appears to be related to the severity of the coagulation necrosis. Appropriate treatment consists of prompt surgical exploration with resection of small intestine to include areas of coagulation necrosis surrounding the small perforation.

### Acknowledgment

Case 2 was kindly forwarded to us by Dr. Raymond H. Kaufman, Acting Chairman, Department of Obstetrics-Gynecology, Baylor University College of Medicine.

Case 3 was kindly forwarded to us by Dr. Nathan M. Hilrich, Attending Gynecologist, Doctors Hospital Complex, Milwaukee, Wisconsin.

### References

1. Black, W. P.: Sterilization by Laparoscopic Tubal Electrocoagulation: An Assessment. *Am. J. Obstet. Gynecol.*, **111**: 979, 1971.
2. Black, W. P.: Sterilization by Laparoscopic Tubal Electrocoagulation: An Assessment. *Obstet. Gynecol. Surv.*, **27**:383, 1972.
3. Corson, S. L. and Bolognese, R. J.: Laparoscopic Nuances. *Fertil. Steril.*, **22**:684, 1971.
4. Fear, R. E.: Laparoscopy: A Valuable Aid in Gynecologic Diagnosis. *Obstet. Gynecol.*, **31**:297, 1968.
5. Horwitz, S. T.: Laparoscopy in Gynecology. *Obstet. Gynecol. Surv.*, **27**:1, 1972.
6. Peterson, E. P. and Behrman, S. J.: Laparoscopic Tubal Sterilization. *Am. J. Obstet. Gynecol.*, **110**:24, 1971.
7. Seigler, A. M.: Trends in Laparoscopy. *Am. J. Obstet. Gynecol.*, **109**:794, 1971.