Bowel Injuries after Laparoscopic Ovarian Drilling:
Observation of Three Cases with Review of Literatures

Karam Kamal Younis
Department Of Surgery, College Of Medicine, University Of Mosul, Mosul, Iraq
Correspondence: karamkyounis@uomosul.edu.iq
Received: 12th April 2022; Accepted: 1st June 2022.

ABSTRACT
Background: Bowel injury remains a potential serious complication of gynecological laparoscopy. Electrothermal energy, especially in the form of monopolar diathermy, is used widely during Laparoscopic Ovarian Drilling (LOD) by diathermy for clomiphene-resistant polycystic ovary disease (PCOD). Occasionally there can be unrecognized transfer of energy in the operating area, resulting in electro thermal bowel injury. If iatrogenic bowel injury is not recognized at the time it occurs, it can have devastating consequences.
Objectives: Through personal observations of 3 patients who underwent (LOD) for clomiphene-resistant (PCOD) followed by bowel perforation, we highlighted their ways of presentation, recognition, avoidance and management of such complication.
Setting: Surgical wards of Al-Jamhoori Teaching Hospital in Mosul City
Patients and Methods: Through personal observation, we report a series of 3 infertile women who underwent laparoscopic ovarian drilling for clomiphene resistant infertility but were readmitted 2-3 days later with pinhole leaks from perforated bowel.
Results: After (LOD), two patients out of three were urgently explored via laparotomy and multiple bowel perforations were found and repaired. Consequently they improved. The third patient presented lately after rupture of bowel and peritonitis. Although she underwent explorative laparotomy but her condition was potentially fatal and died from sepsis.
Conclusion: Gynecologists should be aware for the proper, safe and judicious use of diathermy during (LOD) to avoid complications with consultation and involvement of surgeons early following the procedure. High clinical suspicion is crucial for early diagnosis of bowel injuries. When diagnosis is delayed, then morbidity and mortality rises.
Keywords: laparoscopy, ovarian, drilling, bowel injuries, gynecological surgery.
**INTRODUCTION**

Laparoscopy has revolutionized the practice of gynecological surgery.\(^1\) Although rare, bowel injury is a serious complication of gynecological laparoscopy. Its incidence depends on the treated pathology and the type of procedure. Lack of surgeon’s experience and presence of previous abdominal surgery increase the risk of bowel injury. A meta-analysis of publications from 1973 to 2001 calculated the incidences of bowel injury and bowel perforation to be 0.13% and 0.22%, respectively.\(^2\) This incidence is probably an underestimate due to the retrospective nature of most studies. These injuries may vary from serosal to full thickness injuries; the latter may lead to bowel perforation or transection.\(^3\)

The most common site of bowel injury was the small bowel, followed by the large bowel and stomach.\(^4\) In a review study it has been shown that the incidence of bowel injury in gynecologic laparoscopy is 1 in 769.\(^5\)

Laparoscopic Ovarian Drilling (LOD) by diathermy for clomiphene-resistant polycystic ovary disease (PCOD) is cost effective than Laser vaporization.\(^6\) In modern practice, the only allowed surgical method of ovulation induction for women with clomiphene citrate resistant (PCOD) is LOD.\(^7\)

It has been evaluated in well-designed trials and may be an alternative to gonadotropins.\(^8\) Monopolar diathermy with the coagulation setting (interrupted, modulated, and damped waveform) is used widely for drilling as it is largely safe and effective.\(^9,10\) However, electro thermal injury can occur as a result of unrecognized transfer of energy in the operating area within or outside the field of view of the laparoscope.\(^2,7,8\)

**RESULTS**

The Procedure

In this study through three cases presented with delayed laparoscopy-related bowel injury following LOD for infertile women with clomiphene- resistant PCOS we aimed to review probable causative factors, reasons for delayed recognition and ways of presentation and management in order to be diligent on timely recognition and avoidance of such serious and devastating complication.

**Report of the Cases**

A personal observation of three infertile patients (30, 35 and 28 –year old women) underwent (LOD) for (PCOD) in clomiphene resistant infertility performed by one consultant gynecologist.

**Report of the Cases**

A personal observation of three infertile patients (30, 35 and 28 –year old women) underwent (LOD) for (PCOD) in clomiphene resistant infertility performed by one consultant gynecologist.
while one patient aged 28 years who came after 3 days of her LOD had high fever, distended rigid and silent abdomen with tachypnea and features of shock not responsive to dynamic fluid challenge. All patients had neutrophil leukocytosis. Imaging (abdominal ultrasound) in the two patients revealed free fluid in the pelvis > 5 cm while the patient with septic shock had large amount of free fluid in the abdominal cavity. Because of presumptive diagnosis of acute abdomen with ominous peritoneal signs, urgent explorative laparotomies were done for all three patients. In all, the findings were multiple pin-hole small bowel perforations and early peritonitis except the patient with shock where she had fully established fecal peritonitis, macerated friable and fluffy small bowel walls with fibrinous adhesions (Figures 1,2 and 3).

In all 3 cases, the perforations were closed after refreshment of the edges with 1 or 2 interrupted 00 Vicryl suture and in the patient with fecal peritonitis we performed additionally resection of 10 cm segment of jejunum containing multiple perforation with end to end anastomosis.

Thorough peritoneal lavage was done, close drains were left in situ and post operative systemic antibiotics were instituted. Two patients (30 and 35 years old women) who consulted earlier within 48 hours of (LOD) made uneventful recoveries and were discharged on the seventh and eighth postoperative days, respectively while the 28 – year old woman who consulted late (more than 72 hours after LOD) with a fully established fecal peritonitis had delayed recovery postoperatively and was immediately admitted to ICU with intensive monitoring. Few hours after surgery, she deteriorated, became confused, agitated, hyper thermic with respiratory distress and all features of sepsis. Later, she suddenly lost consciousness, became cyanosed and died.

**DISCUSSION**

Bowel injury is a serious technical complication of (LOD). Up to 50% of all injuries associated with laparoscopy happen during initial entry phase. The rest of cases are due to trauma from surgery, thermal injuries from electro-surgery and others.

Though rare, electro thermal injury to near structures during (LOD) can result from direct application of diathermy, insulation failure, direct coupling or capacitive coupling table 1.

According to possible risk factors for laparoscopic bowel injury listed in table 2 and as a consequence of unnoticed transfer of electro thermal injury, the bowel can then undergo delayed coagulative necrosis and breakdown. We feel that this was the mechanism in these patients as the temperature at the tip of electrosurgical instruments remains elevated for a while after their use within or outside the field of view of the laparoscope.

It was shown that after the use of a monopolar diathermy instrument for 15 seconds, its tip temperature can be elevated above 42°C (the temperature at which coagulative necrosis occurs) for 55 seconds. Shorter durations of elevated temperatures were seen with bipolar diathermy, the Ligasure (Valleylab, Boulder, Colorado), and the Harmonic Scalpel (Ethicon Endo-Surgery, Cincinnati, Ohio). It is reported that only 30–50% of intestinal injuries are recognized during surgery. The remainder may present any time from 1 to 30 days after surgery. The length of time from surgery to recognition is variable depending on the site and type of bowel injury. Small bowel injuries normally present at 4.5 days (range 2–14) while colon injuries 5.4 days (range 1–29). The reasons leading to delayed presentation of bowel injuries are listed in Table 3.

Baggish et al in table 4 listed the main clinical presentations of bowel injuries after laparoscopic surgery. Most of these presentations where found in our 3 patients. Late diagnosis associated with higher morbidity and mortality with regard bowel injury. In a review of 31 papers published between 1973 and 2001 examining 329,935 laparoscopic procedures, the mortality rate from laparoscopy-induced bowel injury was as high as 3.6%. Bishoff JTand Allaf ME stated that once peritonitis becomes generalized, the patient’s condition may deteriorate quickly with a risk of chest consolidation, sub-diaphragmatic abscess, septicemia and multi-organ failure (MOF). and this was the scenario of the 3rd case with late presentation who died from peritonitis and sepsis.

Of the practical reasons for diagnostic delay of laparoscopic related bowel injuries in this study may be related to patients delay in consulting the surgeon, the treating surgeon /gynecologist may fail to place intestinal injury at the top of the differential diagnosis and may invariably consider the postoperative abdominal problem to be an ileus or intestinal obstruction.

Recently, such catastrophic complications can be lessened by robotic surgery which improves visualization and access to peritoneal cavity. Whether this reduces bowel injuries or not, this needs to be further investigated.
CONCLUSIONS

Delayed recognition of laparoscopic - related bowel injuries and its aftermath has been frequent ground for allegations of surgical malpractice. Besides the proper and judicious use of diathermy during (LOD) with safe handling, a detailed inspection of the intestine should be practiced routinely during and at end of the laparoscopic procedure to ascertain color and integrity of its wall. Extensive literature review and through the patients observed in this report, they all point to the safe measures that aimed at timely recognition of complication and early consultation once there is a suspicion of bowel injury.

FIGURES

FIG.1 Bowel perforations in a 30 –year old woman 2 days after LOD

FIG.2 Multiple bowel perforations in a 35 – year woman 2 days after LOD

FIG.3 Multiple small bowel perforations in a 28 – year woman 3 days after LOD with fecal peritonitis

TABLES

Table 1: Mechanisms of Diathermy Injury

<table>
<thead>
<tr>
<th>INJURY TYPE</th>
<th>MECHANISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct application of diathermy/insulation failure</td>
<td>Unintended or careless activation of the diathermy probe</td>
</tr>
<tr>
<td>Direct coupling</td>
<td>Contact or close approximation of a noninsulated instrument with the active electrode within the abdomen, establishing an unwanted and unnoticed current path</td>
</tr>
<tr>
<td>Capacitive coupling</td>
<td>A part of the electrical current flows into the patient, though the instrument is well insulated; thus, diathermy flowing through an active electrode (hook and graspers) can induce a current in its metal cannula despite insulation and if the point of contact is small, overheating can damage adjacent tissues</td>
</tr>
<tr>
<td>Pedicle effect</td>
<td>A similar effect can occur when applying monopolar diathermy to pedicled structures, where the burn is at the end of the pedicle</td>
</tr>
</tbody>
</table>

Table 2: RISK FACTORS FOR LAPAROSCOPIC BOWEL INJURY

- Unrecognized electrosurgical thermal damage
- The use of unsharpened instruments (in particular, trocars
- Adhesions secondary to past abdominal surgery
- Operator skills
Table 3 Possible reasons leading to delayed recognition of bowel injuries

<table>
<thead>
<tr>
<th>RISK FACTORS FOR LAPAROSCOPIC BOWEL INJURY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury outside the operating field caused by bowel retraction or handling with sharp instruments</td>
</tr>
<tr>
<td>Unrecognized injury on entry or during closure of port sites</td>
</tr>
<tr>
<td>Thermal injury with subsequent bowel wall necrosis and breakdown</td>
</tr>
<tr>
<td>Postoperative abscess with subsequent fistula formation</td>
</tr>
<tr>
<td>Herniation through port site</td>
</tr>
<tr>
<td>Post-operative narcotic medication masking pain</td>
</tr>
<tr>
<td>Atypical presentation due to different inflammatory or immunological response</td>
</tr>
<tr>
<td>Clinician denial</td>
</tr>
</tbody>
</table>

Table 4 Clinical presentations of bowel injuries

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain</td>
<td>Direct or rebound tenderness</td>
</tr>
<tr>
<td>Bloating</td>
<td>Abdominal distension</td>
</tr>
<tr>
<td>Nausea, vomiting</td>
<td>Diminished bowel sounds</td>
</tr>
<tr>
<td>Fever, chills</td>
<td>Elevated or subnormal temperature</td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td>Tachypnea, tachycardia</td>
</tr>
<tr>
<td>Weakness</td>
<td>Pallor, hypotension, diminished consciousness</td>
</tr>
</tbody>
</table>

Source: Baggish17

Disclosure Statement
The author declare that there is neither financial disclosure nor conflict of interest regarding the publication of this manuscript.

REFERENCES
Bowel Injuries after Laparoscopic Ovarian Surgery

Karam Kamal Younis


Ann Coll Med Mosul June 2022 Vol. 44 No. 1