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

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ABSTRACT

Background : Bowel injury remains a potential serious complication of gynecological laparoscopy. Electro thermal 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.

أصابات الامعاء المتعلقة بمنظار البطن بعد تثقيب المبايض بالكي الكهربائي منظاريا: وصف لثلاث حالات مع مراجعة المصادر

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الخلاصة

خلفية البحث : إن الطاقة الكهرو حرارية، خصوصاً على شكل استحرار monopolar كهربائي، مستعملة على نحو واسع أثناء عمليات التثقيب بالكي الكهربائي بالمنظار للمبايض للمريضات المصابات بالعقم العنيد الاستجابة لمنشطات المبايض بدواء الكلومفين لمتلازمة تكيس المبايض ، من حينٍ لآخر يُمْكِنُ أَنْ يكون هناك نقلَ غير مشاهد مِنْ الطاقةِ الحرارية في منطقةِ التداخل الجراحي إلى الأمعاء القريبة من المبايض، يُؤدّي دلك إلى الإصابات الحراريةِ فيها.

أهداف البحث : للتعرف على العلامات السريرية وطرق الوقاية والعلاج ل ٣ مريضات مصابات بالعقم كن قد اجرين عملية التثقيب بالكي الكهربائي بالناظور للمبايض وتبين بعد إجراء عملية استكشاف البطن الجراحي لهن إصابتهن بإصابات حرارية في الأمعاءِ كنتيجة للنخرِ coagulative سببه نقلِ غير مشاهد للطاقةِ الكهرو حرارية إلى الأمعاء أثناء العملية

موقع البحث : ردهة طوارئ الجراحة العامة في مستشفى الجمهوري التعليمي لمدينة الموصل .

المرضى والطريقة : من خلال مشاهدة شخصية لثلاث مريضات مصابات بالعقم العنيد الاستجابة لمنشطات المبايض الدوائية (الكلوميد) لمتلازمة تكيس المبايض اجري لهن عملية تثقيب كهربائي للمبايض بالكي المنظاري واللاتي أُدخلنَ ثانية بَعْد مرور ٢ إلى ٣ أيام من اجراء العملية وكن مصابات بعلامات بطنٍ حادّ وتم اجراء استكشاف بطن لهن وتبين وجود انثقاب في جدار الامعاء مع التهاب غشاء البريتون .

النتائج : بعد عملية كي المبايض الكهربائي بالمنظار تم اجراء فتح بطن استكشافي طارئ لمريضتين ممن راجعن مبكرا وخلال يومين من العملية وكان لديهن اعراض بطن حاد وتبين وجود جروح وثقوب متعددة في الامعاء الدقيقة حيث تم خياطة الامعاء وبزل البريتون وتحسنت حالتهما بينما كانت هنالك مريضة راجعت متأخرا بعد العملية وهي مصابة بالتهاب غشاء البريتون مع علامات صدمة خمجيه ومع هذا تم اجراء استكشاف بطن لها سريعا الا ان وضعها الصحي كان متدهورا وفارقت الحياة بعد العملية في ردهة الانعاش

الاستنتاج : بعد مشاهدة تلك الحالات الثلاث وبعد مراجعة المصادر نَقترحُ بأنّ يكون الاطباء جراحو الأمراض النسائية مدركَين للاستعمال الامن والمتعقّلِ للاستحرار monopolar الكهربائي أثناء إجراء عملية التنقيب بالكي الكهربائي بالناظور للمبايض لتَفادي حدوث الاختلاطات وفحص جدار الامعاء اثناء اجراء العملية بالإضافة إلى المراقبة الجيدة للمريضة بعد العملية وإجراء الاستشارة المبكّرةِ لاختصاصي الجرّاحة العامة ذوي الخبرة عندما تَبْدو على المريضات علامات بطن حاد مبكراً بعد العملية.

الكلمات المفتاحية : التثقيب الكهربائي، المبايض، ألمنظاري اصابات الامعاء.

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. [1] In a review study it has been shown that the incidence of bowel injury in gynecologic laparoscopy is 1 in 769 [4].

Laparoscopic Ovarian Drilling (LOD) by diathermy for clomiphene-resistant polycystic ovary disease (PCOD) is cost effective than Laser vaporization. [5] In modern practice, the only allowed surgical method of ovulation induction for women with clomiphene citrate resistant (PCOD) is (LOD).

It has been evaluated in well-designed trials and may be an alternative to gonadotropins[6] Monopolar diathermy with the coagulation setting (interrupted, modulated, and damped waveform) is used widely for drilling as it is largely safe and effective. [2,7] . 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]

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.

RESULTS

The Procedure

After reviewing their records, tubal patency was assessed by injection of methylene blue dye through Leech-Wilkinson cannula through the cervix. The ovary was grasped by holding the ovarian ligament. The ovarian wall was pierced to a depth of2-5 mm with a monopolar hood electrode set to a power of 40-50 Watts exposure for 3 seconds.Then8-10 punctures were performed in each ovary .The cautery is continued until capsule and the cortex of the ovary is penetrated and drilling was done far away from mesovarium. [9] The patients were well and discharged from hospital after 24 hours, but 2 to 3 days later they were unwell having generalized abdominal pain , distension and swinging fever with sweating .

So all were readmitted to the surgical emergency department at Al-Jamhoory Teaching Hospital. On readmission, two patients who came within 2 days of their LOD had lower abdominal guarding , rebound tenderness and absent bowel sounds

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 (Figures1,2and3).

In all 3 cases, the perforations were closed after refreshment of the edges with 1or2interrupted 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) [2]. Up to 50% of all injuries associated with laparoscopy happen during initial entry phase . [10] The rest of cases are due to trauma from surgery, thermal injuries from electro-surgery[11] and others.[12,13]

Though rare, electro thermal injury to near structures during (LOD) can result from direct application of diathermy, insulation failure, direct coupling or capacitive coupling [14] table 1 [15] 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[16].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. [10] .

Shorter durations of elevated temperatures were seen with bipolar diathermy, the Ligasure (Valleylab, Boulder, Colorado), and the Harmonic Scalpel (Ethicon Endo-Surgery, Cincinnati, Ohio)[15].

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. [16] . Small bowel injuries normally present at 4.5days (range 2–14) while colon injuries 5.4 days (range 1–29). [6] . The reasons leading to delayed presentation of bowel injuries are listed in Table3.[15]

Baggish et al in table 4 listed the main clinical presentations of bowel injuries after laparoscopic surgery[17]. Most of these presentations where found in our 3 patients . Late diagnosis associated with higher morbidity and mortality with regard bowel injury. [15].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%[2]. . 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). [18] 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. [19] Three-Dimensional (3D) laparoscopic gynecological surgery was developed to provide the surgeon with a monitor image that closely resembles actual anatomy. This improves accuracy of laparoscopy yet, the impact of 3D laparoscopic gynecological surgery on bowel injury needs to be assessed. [20,21]

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

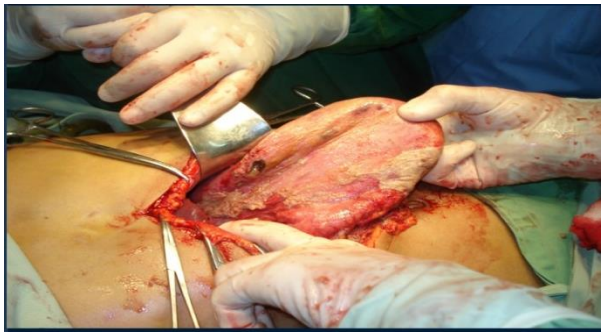

FIG.2 Multiple bowel perforations in a 35 – year woman 2 days after LOD

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

TABLES

Table1 Mechanisms of Diathermy Injury

INJURY TYPE	MECHANISM
Direct application of diathermy/insulation failure	Unintended or careless activation of the diathermy probe
Direct coupling	Contact or close approximation of a noninsulated instrument with the active electrode within the abdomen, establishing an unwanted and unnoticed current path
Capacitive coupling	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
Pedicle effect	A similar effect can occur when applying monopolar diathermy to pedicled structures, where the burn is at the end of the pedicle

Table2 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

Table3 Possible reasons leading to delayed recognition of bowel injuries

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

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Table4 Clinical presentations of bowel injuries

Symptom	Sign
Abdominal pain	Direct or rebound tenderness
Bloating	Abdominal distension
Nausea, vomiting	Diminished bowel sounds
Fever, chills	Elevated or subnormal temperature
Difficulty breathing	Tachypnea, tachycardia
Weakness	Pallor, hypotension, diminished consciousness

Source: Baggish17

Disclosure Statement

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

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