Preoperative Risk Factors for Intraabdominal Adhesions Should Not Contraindicate Surgical Laparoscopy for Infertility

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ABSTRACT

Objective: Abdominal wall adhesions at laparoscopy may predispose infertile patients to access-related injuries and increase the complexity of the procedure. We have observed concern from referring physicians regarding the safety of surgical laparoscopy in infertile patients who previously underwent surgery because of the risk of abdominal adhesions. To assess the risk of intraabdominal adhesions at laparoscopy, a retrospective cohort study was performed.

Methods: All infertile patients who underwent a reproductive laparoscopic procedure in a 6-year period at our institution were included in this study. A chart review was performed to obtain demographic/surgical data and identify preoperative risk factors for intraabdominal adhesions. Operative videotapes were reviewed to determine the presence and location of adhesions. Standard statistical analyses were performed.

Results: During the study period, 254 infertile patients underwent reproductive surgical laparoscopy, and videotapes on 164 (65%) were available for review. A total of 88 patients (54%) were identified with preoperative risk factors for intraabdominal adhesions (group 1), while 76 (46%) had no risk factors (group 2). The relative risk of adhesions was 1.34 (95% CI, range 0.89 to 2.01, P=0.18) when risk factors were identified. There were no differences in the groups regarding patient age, operative time, access technique, conversion to open surgery, or complications. Estimated blood loss was significantly higher in group 2, likely due to the predominance of laparoscopic surgery for ovarian endometriomata and complexity of the cases rather than the presence or absence of intraabdominal adhesion risk factors.

Conclusions: No difference existed in the risk of intraabdominal adhesions in infertile patients with and without identifiable preoperative risk factors. Preoperative risk factors for intraabdominal adhesions should not contraindicate the surgical laparoscopic approach for reproductive procedures.

Key Words: Infertility, Laparoscopy, Adhesions.

INTRODUCTION

Reproductive applications of laparoscopy have broadened to include various diagnostic, reconstructive, and ablative operations. A major concern at laparoscopy remains intraabdominal adhesions, which may predispose a patient to access-related injury and can make the dissection of vital structures difficult, leading to increased complexity of the procedure. Previous intraabdominal surgery has been reported as a relative contraindication to the laparoscopic surgery among infertile women, necessitating a different approach.

We have observed concern from referring physicians regarding the safety of laparoscopy in infertile patients who previously underwent surgery, because of the risk of intraabdominal adhesions. Furthermore, in our tertiary referral center practice, we have observed intraabdominal adhesions in patients with and without risk factors for adhesions at laparoscopy. Successful reproductive procedures have been completed in the majority of these patients.

To better understand the risk and incidence of intraabdominal adhesions at laparoscopy, we performed a retrospective cohort study to assess infertile patients with and without preoperative risk factors and who performed the reproductive laparoscopic procedures.

MATERIALS AND METHODS

All infertile patients who underwent laparoscopic reproductive surgical procedures from April 2000 to April 2006 were included in this retrospective cohort study. Risk factors for intraabdominal adhesions were defined as previous abdominal surgery at the same anatomical site (in-
cluding those with adnexal or uterine surgery) at a different site, or at the same and a different site, pelvic endometriosis (moderate to severe disease), inflammatory disorders of the gastrointestinal or genitourinary tracts, or a combination of these factors.

For further specification, previous surgery was defined as any type of open abdominal, pelvic, or flank surgery with the potential to cause intraabdominal adhesions, including multiple laparotomies, abdominal myomectomy, cesarean delivery, abdominal wedge resection of the ovaries, adnexal surgery (including salpingectomy for ruptured ectopic pregnancy), abdominal repair of uterine perforation, abdominal operations for correction of double uterus, gastrointestinal procedures, vascular procedures, cholecystectomy, and appendectomy. Inguinal procedures, superficial abdominal surgery or endoscopic gastrointestinal, gynecological, or urological procedures were not considered intraabdominal surgery. Thus, unless patients had also undergone other procedures that qualified as intraabdominal, they were classified as having undergone no previous surgery. These classification criteria conform to previously established standards in surgical reports.6–8

Medical charts were reviewed to collect demographic data, identify preoperative risk factors for intraabdominal adhesions, and record surgical details. No attempt was made to assess preoperative symptoms suggestive of adhesions. Operative videotapes were reviewed in each case to determine the presence or absence and characterize the extent of abdominal wall adhesions when present. An adhesion was defined as bowel or omentum, or both, adherent to the abdominal wall that was laparoscopically visible in the operative field using a standard laparoscope with a 0-degree lens. All surgical laparoscopic procedures were performed by the same surgeon.

The location of abdominal access was predetermined based on the disease site. Generally, a Veress needle and Visiport technique (United States Surgical Corp., Norwalk, Connecticut) was achieved through the umbilicus in midline procedures and at the lateral border of the rectus muscle on the ipsilateral side of disease in adnexal surgery. Adhesions were scored on a modification of the adhesion scale of the gynecologic Operative Laparoscopy Group,9 including grade 1- thin and filmy adhesions, grade 2- opaque adhesions composed of more dense tissue, and grade 3- cohesive, thick tissue including intraabdominal organs, such as small or large bowel. Based on the amount of the operative field occupied by adhesions, as viewed from the end of the camera port, the extent of adhesions was considered minor (occupying less than 10%), moderate (occupying 10% to 25%), and severe (occupying greater than 25%) of the operative field. Cases that initially involved attempted laparoscopic reproductive surgery and were converted to open surgery during the procedure were assessed at the time of conversion by inspecting the intraperitoneal cavity.

Data were analyzed using a commercially available statistical software package with $p < 0.05$ considered statistically significant according to the unpaired $t$ test for parametric data or the Mann Whitney U test for data without parametric assumptions. Relative risk was calculated using contingency tables, and Fisher’s exact test was used to determine statistical significance.

**RESULTS**

During the study period, 254 patients underwent laparoscopic reproductive surgery. The operative videotape was available for review in 164 women (Table 1). Laparoscopic access was achieved using a Veress needle and Visiport technique. The access technique was based on surgeon experience and not related to patient risk factors.

Of the 164 patients, 88 (54%) were identified with at least one preexisting risk factor for intraabdominal adhesions (group 1), whereas in 76 (46%) no risk factors were identified (group 2). Overall, intraabdominal adhesions were not identified in the operative video in 92 (56%) and 72 (44%) patients, respectively. Of the 92 patients with adhesions, 56 (61%) had risk factors for adhesions and 36 (39%) did not. The relative risk of intraabdominal adhesions at laparoscopy in a patient with identifiable risk factors was 1.34 (95% CI 0.89 to 2.01, $p = 0.18$). No statistically significant differences occurred between groups 1 and 2.

| Procedure | n |
|-----------|---|
| Adhesiolysis | 72 |
| Ovarian cystectomy (including ovarian endometrioma) | 66 |
| Ovarian drilling for polycystic ovaries | 10 |
| Fimbrioplasty | 4 |
| Salpingectomy | 4 |
| Salpingostomy | 4 |
| Oophorectomy | 2 |
| Ablation of endometriotic spots | 2 |

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Preoperative Risk Factors for Intraabdominal Adhesions Should Not Contraindicate Surgical Laparoscopy for Infertility, Shokeir T et al

JSLS (2008) 12: 267–272
and 2 regarding patient age, operative time, access technique, access injuries, conversion to open surgery, or complications (Table 2). Estimated blood loss was significantly higher in group 2 (P<0.05).

In the majority of group 1 patients with preexisting risk factors for adhesions, previous surgery was the main identifiable risk factor, and it was the risk factor found in about 55% overall (Table 3). Known pelvic endometriosis was the risk factor in 16 patients. Inflammatory disorder risk factors included pelvic pain syndrome, nephrolithiasis, upper urinary tract infection, colitis, cholecystitis, choledolithiasis, gastrointestinal bleeding, gastric ulcer, hepatitis, inflamed-irritable bowel, and septic miscarriage in 2 each. No adhesions were present in 14 of the 48 patients with previous abdominal surgery (Table 3). Time from previous surgery to the present did not appear to affect the presence or severity of adhesions (data not shown).

The overall rate of conversion to open surgery in the 164 patients was 18%, and most conversions were done in those patients undergoing laparoscopic cystectomy for ovarian endometriomata. Of the 92 patients with adhesions in the 2 groups, 24% required conversion to open surgery to complete the procedure. Only 2 patients required conversion due to extensive intraabdominal adhesions, including 1 with bowel-related access injury and 1 due to failure to progress during laparoscopic adhesiolysis. The conversion rate in patients without adhesions was 11% (P>0.05, not significant).

Estimated adhesion severity in the 92 patients with adhesions was minor in 52%, moderate in 37%, and severe in 11%. Adhesions involving large bowel adherent to the abdominal wall were found in 20 (22%) patients. Combined small- and large-bowel adhesions were documented in 18 (20%) patients, which were grade 3 on the gynecologic Operative Laparoscopy Group scoring scale. The remaining adhesions were omental, including grade 1 in 36 patients (39%) and grade 2 in 18 (20%). In 32 patients (35%), adhesions were estimated to be in the primary port placement field and in 60 (65%) were an estimated minimum of 5 cm from the primary port site.

**DISCUSSION**

Laparoscopic approaches are being increasingly used for a wide variety of complex reproductive procedures among infertile women.1 Intraabdominal adhesions increase the risk of bowel injury during access7 with delayed detection of bowel injury significantly increasing the risk of a fatal outcome.2,4 The incidence of adhesions has been estimated to be almost 100% in patients with a history of previous surgery and 28% in those without earlier surgery in the general and gynecologic surgery populations.10–14 The access-related visceral injury incidence rate is 0.3 to 3/1,000 cases.4,9,15 We evaluated experience with adhesions in an infertile population and used intraoperative video to define and better analyze the presence of intraabdominal adhesions among this select patient group.

In this cohort study, the incidence of intraabdominal adhesions in patients with and without risk factors was 64% and 47%, respectively. The adhesion incidence in group 2 was somewhat higher than reported values, which may have been related to underlying pathological conditions in these patients. When analyzing this small group of patients according to the risk factors for adhesions, the relative risk of adhesions was 1.34 (95% CI 0.89 to 2.01, P=0.18) in those with known risk factors. The broad CI and the P value indicate that no statistically significant increase for risk in adhesions occurred in either group, which supports our observations. However, a larger sample size may have resulted in a different outcome because

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**Table 2.**

Operative Details on Patients With and Without Risk Factors for Adhesions

|                      | With Risk Factors | No Risk Factors |
|----------------------|------------------|----------------|
| N (%)                | 88 (54)          | 76 (46)        |
| Mean Age ± SD        | 27 ± 12          | 26 ± 12        |
| Mean Operative Time  ± SD (min) | 43 ± 1          | 41 ± 4         |
| Mean Estimated Blood Loss ± SD (mL) | 721 ± 1345      | 1335 ± 1852*   |
| Access Injuries      | 0                | 1              |
| Conversions to open surgery (%) | 14 (8.5)        | 16 (9.8)       |
| Complications (%)    | 5 (5.7)          | 6 (7.9)        |

*P < 0.05

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**Table 3.**

The Presence or Absence of Adhesions According to Risk Factors in the 88 Patients in the Risk Factor Group (Group 1)

| Risk Factor            | Adhesions (n) | No adhesions (n) |
|------------------------|---------------|-----------------|
| Previous surgery       | 34            | 14              |
| Pelvic endometriosis   | 14            | 2               |
| Inflammatory disorders | 12            | 10              |
| 2 Coexisting risk factors | 2             | 0               |

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*P = 0.05
repeating the relative risk calculation with twice the sample size yielded a statistically significant difference in the groups.

The single access-related injury in this cohort occurred with Veress needle and Visiport technique use in a patient with no previous surgery and planned for bilateral ovarian drilling for PCOS. The patient had marked adhesions of the mid descending colon to the anterior abdominal wall. Unfortunately, this adhesion was not predicted preoperatively due to the absence of risk factors. A retrospective review demonstrated that abdominal ultrasound was not performed, whereas transvaginal sonography was done to confirm the diagnosis. We do not suggest abdominal ultrasound as a method of investigation to be done routinely in all of our cases; however, some authors have reported the use of sonography to localize abdominal wall adhesions with excellent accuracy in high-risk individuals. Although ultrasound may be considered in patients who have identified preoperative risk factors for adhesions to select a safe access site, routine ultrasound in all who have undergone laparoscopic reproductive surgery would likely not be cost effective.

Estimated blood loss was higher in group 2 ($P < 0.05$), which may have been related to the specific surgery performed and complexity of the cases rather than the presence or absence of intraabdominal adhesion risk factors. Included in group 2 were a larger number of cases of difficult laparoscopic resection of ovarian endometrioma, which tends to involve increased rates of blood loss and conversion to open surgery although this is not the usual case for endometriosis surgery, even in the most complicated cases, in experienced hands. In this cohort, preoperative risk factors for intraabdominal adhesions did not increase operative time, the rate of conversion to open surgery, or complications. The conversion rate was higher in patients with versus without adhesions independent of risk factor status. Only 2 patients required conversion due to adhesions associated with a single bowel injury and difficult adhesiolysis that failed to progress, respectively.

We do not consider risk factors for or the presence of intraabdominal adhesions to be contraindications to laparoscopic infertility surgery. Some authors use the Hasson technique of open laparoscopy because the safety of this technique has been validated in such cases, although we know that open access may not limit bowel injury. Other alternatives to the open access technique have been reported. Some studies have described a left upper quadrant access site with and without mini-laparoscopes to assess peri-umbilical adhesions before direct access is obtained through the umbilicus. The left upper quadrant mid clavicular line site or Palmer’s point was the most commonly selected access site in these studies.

Successful access to the peritoneal cavity was attained in all cases. In our patients with intraabdominal adhesions, only 35% of the adhesions were located close to the primary port site, thus, predisposing to bowel injury at initial port placement. Most of the remaining 65% of adhesions required adhesiolysis to complete the intended procedure, suggesting that these adhesions were significant.

This study was limited by the relatively small number of patients, which may have influenced the relative risk CI and did not allow subgroup analysis for the different risk factors or for multiple coexisting risk factors. Another drawback of this study was the specific study population comprising the cohort. All patients had pelvic pathology, including 36 with documented adnexal adhesions related to previous surgery or endometriosis, or both. To our knowledge, the influence of the underlying pelvic pathology on intraabdominal adhesions is unknown, although we noted that 59% of patients with intraabdominal adhesions had coexisting adnexal pathology.

Because the natural history of formation of different intraabdominal adhesions in relation to the presence or absence of preoperative risk factors could not be determined exactly, in our study no attempt was made to correlate the preoperative risk factors with the estimated adhesion severity seen at laparoscopy. A new study would need to be designed to assess which risk factors correlated with the presence of moderate and severe adhesions and which require the need to proceed to open surgery from the start.

The results presented in this article may not be applicable in general gynecologic cases involving other underlying pathological conditions. This study was not designed to assess the best or safest access technique. Rather, we analyzed the risk of intraabdominal adhesions in patients with and without preoperative risk factors.

**CONCLUSION**

No difference existed in the risk of intraabdominal adhesions in this small group of patients with and without preoperative risk factors. Preoperative risk factors for intraabdominal adhesions should not contraindicate the laparoscopic approach for reproductive infertility surgery. A prospective randomized study of Veress versus Hasson.
access techniques is required before any conclusions can be drawn regarding the best access.

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