



Cystosufflation to Prevent Bladder Injury during Single Incision Laparoscopic Management of an Incisional Ventral Hernia

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Abstract

Background: Scarless/single-incision laparoscopy is becoming popular but still faces much criticism. The technique aims to reduce the risk of trocar-induced organ injury in the patient with previous abdominal surgery. We examine the application of this technique combined with cystosufflation in a patient with bladder herniation through an incisional ventral hernia. This case presentation outlines our experience using this method with initial evaluation of the safety, feasibility, and benefits of this procedure.

Methods: We examine the account of the Single incision laparoscopic repair of an incisional hernia containing the urinary bladder. To perform the operation, a 2.5 cm linear left flank incision was made and the single port platform utilized. Carbon dioxide insufflation of the bladder was utilized to define its boundaries and accomplish safe adhesiolysis during the procedure.

Results: The procedure was completed safely without any adverse outcomes.

Conclusion: Our lateral approach technique combined with cystosufflation is effective in identifying a plane between the bladder and organ structures/dense adhesions of the anterior abdominal wall especially in women who have undergone gynecological procedures.

Keywords: Laparoscopy; Single incision; Single port; Incisional hernia; Urinary bladder; Cystosufflation; Carbon dioxide

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Received Date: 25 Jul 2018

Accepted Date: 24 Aug 2018

Published Date: 27 Aug 2018

Citation:

Downes RO. Cystosufflation to Prevent Bladder Injury during Single Incision Laparoscopic Management of an Incisional Ventral Hernia. *World J Surg* *Surgical Res.* 2018; 1: 1049.

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Introduction

The prevalence of laparoscopic surgery has increased rapidly in recent years with newfound enthusiasm. Yet still laparoscopic procedures still only accounts for 30% of surgical cases done [1]. The most common abdominal surgery in women is cesarean section [2]. Hysterectomy is also commonly performed. These gynecological and obstetric procedures make subsequent laparoscopic procedures difficult. Multiple obstetric and gynecological procedures may result in thick and dense adhesions between the uterus, bladder and other abdominal organs, which obscures the dissection plane [2]. Incisional hernia occurs in approximately 20% of cases [3]. Hernial contents usually include omentum and intestine. Herniation of the urinary bladder is less common. Therefore, adhesions post pelvic surgery can increase the difficulty of laparoscopic surgery. Laparoscopic surgery is not contraindicated in patients who have undergone several cesarean sections or hysterectomy [4]. However, more caution is exercised in the patient who has a history of several previous abdomino-pelvic surgeries [4]. Adhesion characteristics (location, density and extent) have no direct correlation with the history of previous abdominal surgery and radiological studies performed as pre-surgical work-up [5].

In this case report, we look at a female who presents with herniated bladder through an incisional hernia who underwent single port laparoscopic repair. We used the technique of cystosufflation to safely accomplish bladder resection and feasibility of this surgical technique in women with anterior wall adhesions after gynecological procedures who develop incisional hernia.

Case Presentation

We present a case of incisional hernia containing the urinary bladder. Our patient was a 55-year-old who had no chronic illness. She had Cesarean sections x 2 and a hysterectomy done via a midline incision 10 years ago. She presented to the emergency department with a history of abdominal pain

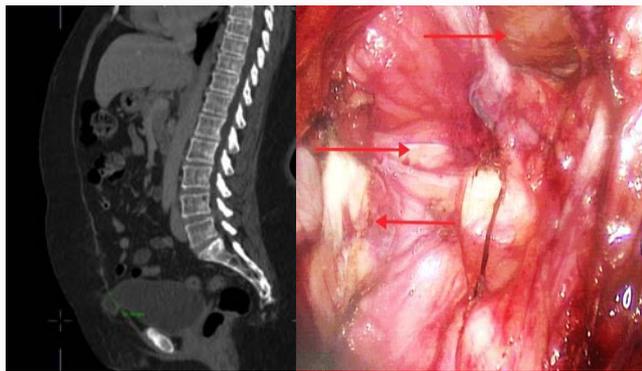


Figure 1: Multiple hernia defects with the urinary bladder herniated into one of the defect.

of 12 hr duration that was gradual in onset, beginning periumbilical then migrating to the suprapubic region. The pain did not radiate but was associated with urinary frequency and dysuria. She notes that her urinary symptoms were long standing and intermittent but had increasingly gotten worse and associated with a progressive protrusion on the abdomen. Her urinalysis was negative. Initial examination revealed a well-hydrated patient with blood pressure of 130/84 and pulse rate of 86 beats/min. Abdomen was non-tender, the previous scar was noted with a protrusion at its center. Vaginal examination revealed no cervical excitation tenderness or adnexal fullness. Her laboratory results were all normal. She had a CT scan of the abdomen that showed a midline incision hernia. The image shows multiple hernia defects with the urinary bladder herniated into one of the defect (Figure 1). There was no evidence of strangulation noted.

A clinical diagnosis of incisional hernia was made and referred to surgical clinic. She was seen and assessed and a single port laparoscopic hernia repair was advised. She was taken to surgery and had an uneventful postoperative recovery. The patient was discharged in 1 day. The patient a full recovery with resolution of her symptoms and no residual herniation.

Surgical Technique

Patient was placed in a supine position with arms placed to the sides. The surgeon was on the patient's left and the assistant to the right of the patient. A television monitor and the insufflator system Karl Storz HD were placed to the right hip of the patient. A 16 French Foley's catheter was inserted. A 2.0 cm vertical left flank incision was made and directed down into the peritoneum. The peritoneal cavity entered and an Applied Medical single port Gel Point platform introduced. The GelPOINT™ advanced access platform enables a single incision approach by facilitating triangulation of standard instrumentation through a single incision.

Prior to insufflation, a 10/12 mm trocar and 2 mm × 5 mm trocars were then inserted through the GelPOINT™ cap in a triangular fashion and then engaged on the base. The platform was positioned to place the 10/12 mm port at the 12 o' clock with other ports at 5 o' clock and 7 o'clock respectively. We used a standard length 5 mm 30° laparoscope placed in the 5 o' clock position. A straight grasper was used for lateral retraction at 7 o' clock and 12 o' clock was used as the working port. After pneumoperitoneum established using 15 mmHg, a Swiss cheese type incisional midline hernia was identified.

There was omentum and bowel herniated through some of the defects. The urinary bladder was also noted to be herniated with

its margins ill-defined. With the use of LigaSure™ the bowel and omentum were dissected out and reduced. Intermittent carbon dioxide insufflations of the bladder was used to identify its margins and subsequently dissected freed. There was also noted to be a non-absorbable suture through the dome of the bladder from the abdominal wall closure. After extensive adhesiolysis was performed and the margins of the hernia defect defined, a large 20 cm × 25 cm oval laparoscopic mesh was placed and tacked to the anterior abdominal wall. The Gel Point was removed and patient sent to the recovery room.

Discussion

Women who have undergone cesarean section and hysterectomy are likely to have anterior wall adhesions [6]. This makes laparoscopy difficult because the port-placement cannot be established properly due to adhesions. Thus the single port approach with a flank incision is ideal in these patients. The reported incidence of bladder injury during laparoscopic incisional hernia repair is 2% [7]. With bladder herniation present the incidence of iatrogenic injury is likely to be higher. During repair, the fear is that the bladder may be damaged during dissection. Previous caesarean surgery, multiple fibroids and severe endometriosis are predisposing factors for urological misadventures [7]. Cystosufflation is a novel technique that allows the margins of the bladder to be identified decreasing injury during laparoscopy. Injury can also be identified at the time of surgery. Early bladder injury recognition does not increase post-operative morbidity when repaired during the same laparoscopic procedure [8]. Cystosufflation is well tolerated by patients and can reliably prevent iatrogenic cystotomy [5].

Anterior wall adhesions should be anticipated in patients who have undergone cesarean section if the uterine cervix is found to be located much superior to its normal location during pelvic examination [5]. This finding presumably holds true for patients with cervical preserving hysterectomy. General laparoscopic principles dictate, the umbilical trocar is inserted first to establish pneumoperitoneum. This is made difficult because midline adhesions commonly occur in women post obstetric and gynecological procedures. Laparoscopy in such women is safer and more effective when pneumoperitoneum is established with first trocar in the upper left quadrant/flank considered virgin territory. Our technique describes using a single left flank incision, which places port platform in a safe zone. Ancillary trocars are eliminated. Sufficient adhesiolysis can be performed to secure adequate visual field for safe mesh placement. Mesh placement during repair may be difficult when the fascial defect extends towards the pubis [3]. Cystosufflation is used to carefully divide the adhesions between the bladder and anterior wall which dissection accomplished using laparoscopic scissors with monopolar coagulation. Cystosufflation is accomplished by insertion a Foley's catheter and connecting it to standard Carbon Dioxide insufflator. No special tubing is required. The bladder is repeatedly distended and deflated in an effort to define its margins and allow proper visualization. If the bladder fails to properly distend, then troubleshooting of the system is done. Once the system is properly functioning; a bladder injury suspected. Hematuria may also raise the suspicion of bladder injury. We previously described this technique, where pneumoperitoneum is created and adhesiolysis is performed from a lateral approach [10].

We believe there are multiple advantages of this surgical technique. First, because initial entry is in the lateral aspect of the abdomen, any damage to organs adhered to anterior wall can be avoided and

a pneumoperitoneum can be easily created. Anterior wall adherence occurs between intra-abdominal structures (the urinary bladder in this case) and peritoneum. The combination of the lateral approach and cystosufflation decreases difficulty in locating bladder boundaries covered by dense adhesions. The area can be dissected quickly and safely, decreasing the risk for undesirable bleeding and perforation of urinary bladder that could occur during adhesiolysis.

Bladder wall adhesion is an unavoidable side effect in patients who have undergone cesarean section [11]. In our case the scenario is compounded by hysterectomy and the fact bladder now herniates through an incisional hernia. We also note the presence of a non-absorbable suture through the dome of the bladder than seemed to be part of the fascial closure.

We therefore propose our approach when performing incisional hernia repair in women who have undergone hysterectomy previously. We hypothesize that bladder adhesions are more severe in patients who have undergone hysterectomy via midline incision versus a Pfannenstiel incision. It is still necessary to be as cautious during adhesiolysis of the anterior wall adhesions in a patient with a Pfannenstiel incision. Nevertheless, if the boundary of the bladder is obscure we recommend employing cystosufflation using carbon dioxide to distend the bladder through a Foley catheter during the laparoscopic procedure to check the border [5].

The factors to consider and be duplicated are techniques to create pneumoperitoneum and adhesiolysis. It is vital to make first entry in the left flank, not through the umbilicus, to make pneumoperitoneum. Abdominal insufflation is more difficult using the conventional means because of preexisting dense anterior wall adhesions. The distance from the anterior abdominal wall adhesions to the laparoscope is also important. If the telescope is placed via a traditional umbilical port while performing adhesiolysis, organ structures may be too close to peritoneum, which restricts the field of action, and prove too difficult for adequate dissection. It is easier to perform adhesiolysis of the anterior wall adhesions in the lateral flank. The single port platform is inserted using an open technique, which is safer and avoids placing an umbilical port and supplementary ports. It does not lead to major changes in the surgical view and the skilled laparoscopic surgeon easily corrects small discrepancies.

In conclusion, our lateral approach techniques creating a pneumoperitoneum, combined with cystosufflation to dissect a plane

between the bladder/organ structures and dense adhesions of the anterior abdominal wall are effective especially in women who have undergone gynecological procedures.

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