



## Technical Report: Laparoscopic Repair of Traumatic Ventral Hernia

Ikoma N\* and Harvin JA

Department of Surgery, University of Texas MD Anderson Cancer Center, USA

### Abstract

Traumatic Ventral Hernia (TVH) is a type of hernia that occurs after high impact blunt injury to the abdominal wall. In the current report, we present a 27-year-old patient who presented to our trauma center after motor vehicle collision. She was diagnosed with TVH lateral to the linea semilunaris at the level of umbilicus, involving the transversus abdominis, internal oblique, and external oblique muscle. She underwent successful laparoscopic TVH repair. Laparoscopic TVH repair is a safe and effective strategy, especially for stable patients with a small defect. Primary closure and mesh placement are recommended, and a laparoscopic technique is a safe and effective procedure.

**Keywords:** Laparoscopic hernia repair; Traumatic ventral hernia

### Introduction

Traumatic Ventral Hernia (TVH) is a type of hernia that occurs after high impact blunt injury to the abdominal wall. TVH is rare, and its occurrence is about 0.8% [1,2]. TVH occurs following blunt trauma including handle bar injury (35%), seatbelt injury (19%), and crush injury (25%) [3]. CT scan has been commonly used for diagnosis [4]. Owing to the infrequent incidence, the surgical technique and its timing of repair are not standardized yet. We herein report a case with symptomatic lateral TVH which was repaired successfully repaired by laparoscopic technique.

### Case Presentation

Patient is a 27-year-old female with no past medical history who was transferred to our trauma center after suffering motor vehicle collision. She was a restrained driver involved in a multi-vehicle pile-up which required prolonged extrication. On arrival, she had a GCS 13 with normal vital sign. Physical examination revealed soft tissue contusion and abrasions to left lower quadrant, unstable left leg with laceration. CT scan revealed grade 2 splenic injury with minimal perisplenic fluid collection and left lower abdominal wall tear lateral to the linea semilunaris at the level of umbilicus, involving the transversus abdominis, internal oblique, and external oblique muscle (Figure 1). Her other injuries included; mild subarachnoid hemorrhage, non displaced lumbar spine transverse process fractures, left open tibia-fibular fracture, and left metatarsal fractures. Patient was admitted and underwent intramedullary nailing of the left tibia and fibula on the next morning. Her subarachnoid hemorrhage was stable on the repeat CT scan, and patient was stable in good condition. However, she had become more progressive symptomatic, including increased pain and

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#### \*Correspondence:

Naruhiko Ikoma, Department of Surgery, University of Texas MD Anderson Cancer Center, Houston, Texas, USA, Tel: 713 500 7216; Fax: 713 486 0971; E-mail: [nikoma@mdanderson.org](mailto:nikoma@mdanderson.org)

Received Date: 10 Aug 2016

Accepted Date: 01 Sep 2016

Published Date: 19 Sep 2016

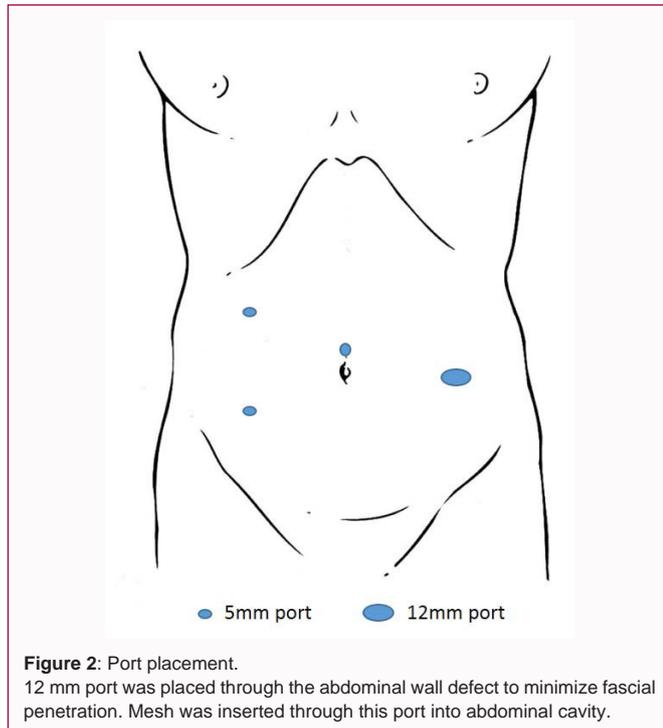
#### Citation:

Ikoma N, Harvin JA. Technical Report: Laparoscopic Repair of Traumatic Ventral Hernia. *Clin Surg*. 2016; 1: 1123.

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**Figure 1:** CT scan. CT scan revealed abdominal wall tear involving the transversus abdominous, internal oblique, and external oblique musculature on the left.



**Figure 2:** Port placement. 12 mm port was placed through the abdominal wall defect to minimize fascial penetration. Mesh was inserted through this port into abdominal cavity.

episodes of herniation. She was decided to undergo laparoscopic ventral hernia repair on hospital day 7.

#### Treatment and follow-up

After pneumoperitoneum was established via a right upper quadrant, the hernia was inspected via right lateral 5-mm port (Figure 2). Approximately 4-cm long and 3 cm wide defect of all 3 layers of the lateral abdominal wall was clearly visualized (Figure 3). An incision was made over the hernia defect and a 12-mm port placed through the defect. Four 0-Prolene sutures were placed in the middle of each side of 11 x 9 cm piece of synthetic mesh, which was rolled up and placed in to the abdomen through the 12-mm port. The hernia defect was closed with multiple 1-PDS sutures placed by

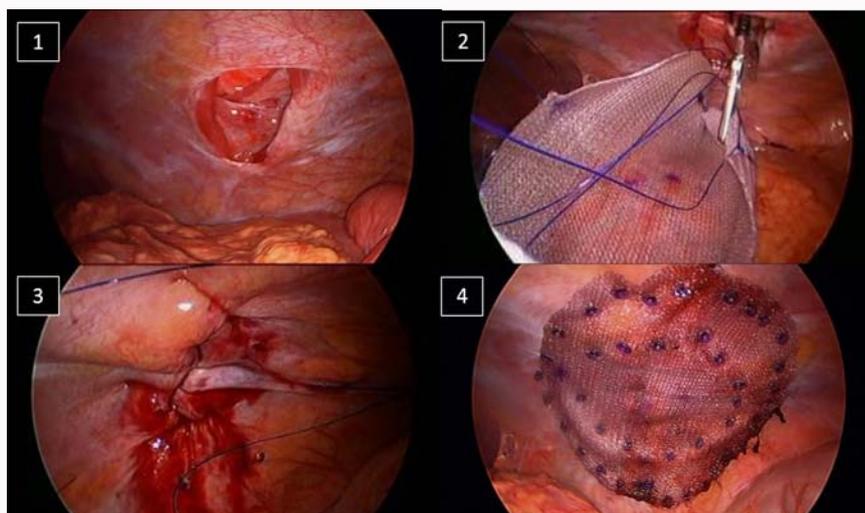
Carter-Thomason suture passer, including all 3 layers of abdominal wall fascia (Figure 2). Then, Carter-Thomason suture passer was used to retrieve the four transfascial sutures and secure the mesh to the abdominal wall. Laparoscopic tacker was used to secure the rest of the mesh in a double crown manner. Patient tolerated the procedure well without complications. She did well post-operatively, and was discharged on post-operative day 1 with good pain control.

#### Discussion

A blunt TVH is caused by a trauma insufficient to penetrate the skin, but able to disturb muscular and fascial tissues. This possibly is caused by three mechanisms: an increased intraabdominal pressure, a direct injury, a tangential shearing force on muscular layer, or combination of those [5]. Traumatic abdominal wall hernias have been reported to occur in a variety of regions. The most common are the lower quadrants, lateral to the rectus sheath, and the inguinal area, often secondary to handlebar and seat belt injuries [6].

Since the first TVH was reported in 1906, multiple case reports or case series have been reported. But number of reports of laparoscopic repair of TVH is still limited, and the surgical technique is still not standardized [7]. We experienced a case with a traumatic ventral hernia at left lower quadrant lateral to rectus muscle, which was repaired by primary fascial defect closure with under-lay mesh placement by laparoscopic technique. The technical key points of this patient's repair were; starting laparoscopic inspection from contralateral side of hernia which provides excellent visualization of the defect, 12-mm port placement through the ventral hernia which prevents unnecessary fascial injury for mesh insertion, and primary defect closure with Carter-Thompson suture passer which minimizes skin incision. This technique can be applicable for majority of traumatic ventral hernias and can be safely performed. In case the defect is too big for primary closure, component separation technique can be considered.

Timing of TVH repair should be decided case-by-case basis regarding the size, location, symptoms of the hernia, risk of incarceration, and mostly patient's condition associated with



**Figure 3:** Intraoperative pictures.  
 1. Abdominal wall tear was clearly visualized by laparoscopy  
 2. Mesh was inserted through the 12 mm port  
 3. En-masse transfascial interrupted sutures were placed to close abdominal wall  
 4. Mesh was tacked circumferentially in double-crown fashion

concomitant injuries. In cases who requires emergent laparotomy, simultaneous repair of ventral hernia should be considered during the same operation if feasible. In case of stabilization without surgical intervention, repair should be delayed [8]. However, since the risk of incarceration exists and delay of repair causes muscle contraction which makes future repair difficult, repair of TVH is recommended at the earliest timing when the patient's condition allows.

Repair of TVH can be performed as open, local exploration, and laparoscopic technique [7]. Among them, laparoscopic technique is a good option, which provides excellent abdominal exploration and visualization of the abdominal wall defect, without creating large fascial incision which can potentially cause incisional hernia. Laparoscopic repair of TVH can be used in the emergency [6-11], and nonemergency at the first admission or electively scheduled at a later time [11-12]. In patient without contamination, the use of mesh is recommended for TVH repair [13], which still can be done with laparoscopic technique. Currently there is a tendency among laparoscopic surgeons to close the primary defect before placing the mesh, since some publications showed benefits when the defect is primarily closed in non-trauma population [14-15]. The usage of Carter-Thomason provides secure full-thickness multi-layer fascial closure in laparoscopic hernia repair.

## Conclusion

TVH is rare complication of blunt trauma, which can cause significant morbidities such as incarceration of the bowel. Laparoscopic TVH repair is a safe and effective strategy, especially for stable patients with a small defect. Primary closure and mesh placement are recommended, and a laparoscopic technique is a safe and effective procedure.

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