

The Effect of Hernia Size on Length of Stay and Outcomes in Robotic Ventral Hernia Repair

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Introduction

Hernia repairs are one of the most common surgical procedures performed. Hernias occur when intestinal contents protrude because of a defect in the fascia of the abdominal wall. In robotic ventral/incisional hernia repair, 90% of the hernias are incisional. Additional comorbid conditions that can lead to herniation include obesity, smoking, diabetes, etc.

Common hernias include inguinal, hiatal, congenital diaphragmatic, and ventral hernias (umbilical, subxiphoid, off-midline, lumbar, spigelian, and parastomal). The first laparoscopic hernia repair surgery was performed in 1991 at Our Lady of the Lake (LOL) hospital in Baton Rouge by Dr. Karl LeBlanc, with the first paper about this approach published by him in 1993. However, over the last several years, the robotic approach has gained popularity. Since April of 2014, Dr. LeBlanc, the principal investigator, has been performing hernia repairs robotically—rather than laparoscopically. The defect size affects operative time, hospital length of stay, and outcomes.

The purpose of this IRB-approved medical chart review study, a retrospective analysis of prospectively collected data, is to evaluate the effect of ventral/incisional hernia defect size on operative time, length of stay, and outcomes. Our hypothesis is that larger size hernia defects will be associated with longer operative time, hospital stay, and perhaps adversely affecting outcomes.

Robotic Hernia Repair

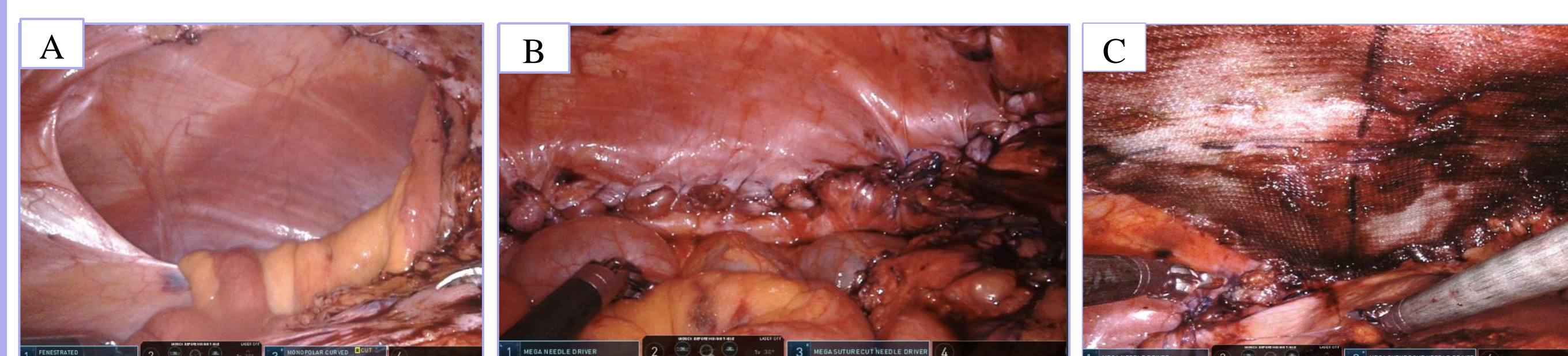


Figure 2. Robotic surgical repair approach. (A) Incisional hernia. (B) The defect was closed by sutures (ex: permanent barbed sutures). (C) The closed defect was then covered with an intraperitoneal mesh (ex: Ventralight ST, SYNECOR IP).

Advantages:

- Enhanced visualization (3D instead of 2D)
- Surgical dexterity and range of motion
- Precision
- Ability to access difficult places and previously inaccessible places
- Faster suturing and knot tying

Disadvantages:

- Learning curve
- Cost

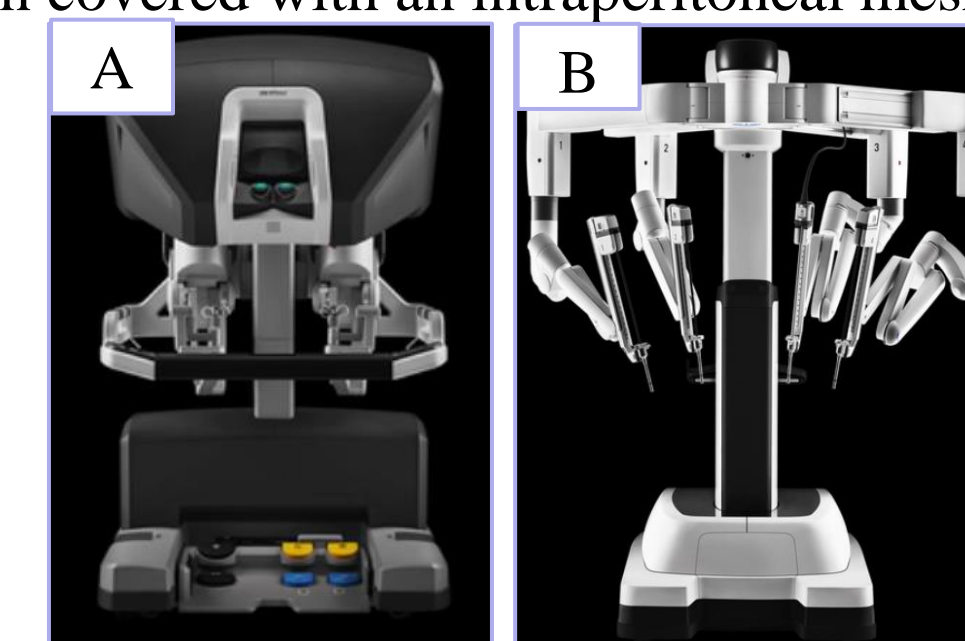


Figure 3. Robot Equipment (imaging from Intuitive) (A) Surgical console. (B) Working unit.

Discussion

• Previous research has compared open, laparoscopic, and robotic-assisted approaches in inguinal hernia repair. LeBlanc et al. has found inguinal hernia repairs to be effectively performed with all three approaches. Moreover, no difference in conversion and complication rate were found between robotic surgery and open surgery groups, as well as no difference between the robotic surgery and laparoscopic surgery. While operative times were generally longer for robotic-assisted surgeries, this approach had time to return to normal activities similar to that of laparoscopic approach and significantly faster than the open approach.

• There is some concern about shifting from previous methods to new robotic methods with regards to the learning curve. Yohannes et al. compared learning curves for robotic versus laparoscopic urological surgeries, in which physicians were given tasks to do via the robotic or laparoscopic approach, and completion times were measured. The robot-assisted approach yielded average times of 242.6 and 101.8 seconds for trials 1 and 5, while the laparoscopic approach had average times of 205.3 and 169 seconds. The learning curve difference for the robotic approach was statistically greater, even though the difference in improvement among the two approaches was not statistically significant. This study suggests that surgeons can be relatively flexible, fast learners of the robotic-assisted method.

• Thus, the robotic-assisted approach's comparable outcomes to other methods—combined with its high precision, dexterity, and visualization—has led to increased interest of using this method in the field of surgery.

• Robotic hernia repair is still a relatively new surgical approach. This has sparked interest in not only investigating the advantages and disadvantages of the procedure itself, but also associations between hernia defects that were repaired by this approach and patient outcomes.

• For our retrospective study of robotic hernia repairs, we predict that larger hernial defects will be associated with longer hospital stays and post-operative complications, compared to smaller hernial defects. We predict a similar pattern when analyzing each type of hernia (umbilical, lumbar, spigelian, etc) individually.

Types of Hernias

Type of Hernia	Description
Incisional	<ul style="list-style-type: none"> • Refers to any hernia that occurs due to incomplete surgical wound healing • 90% of ventral hernias • 90% of incisional hernias are midline defects
Umbilical	<ul style="list-style-type: none"> • Congenital, acquired • Intestines herniate at umbilicus due to a weak anterior abdominal wall at the umbilical ring
Lumbar	<ul style="list-style-type: none"> • Congenital, primary acquired, secondary acquired (incisional) • Defects in transversalis fascia of the abdominal muscles • Superior and inferior lumbar hernias
Spigelian	<ul style="list-style-type: none"> • Congenital or acquired • Lateral ventral hernia • Herniation between abdominal muscles along semilunar lines

Table 1. Characteristics of common ventral hernias

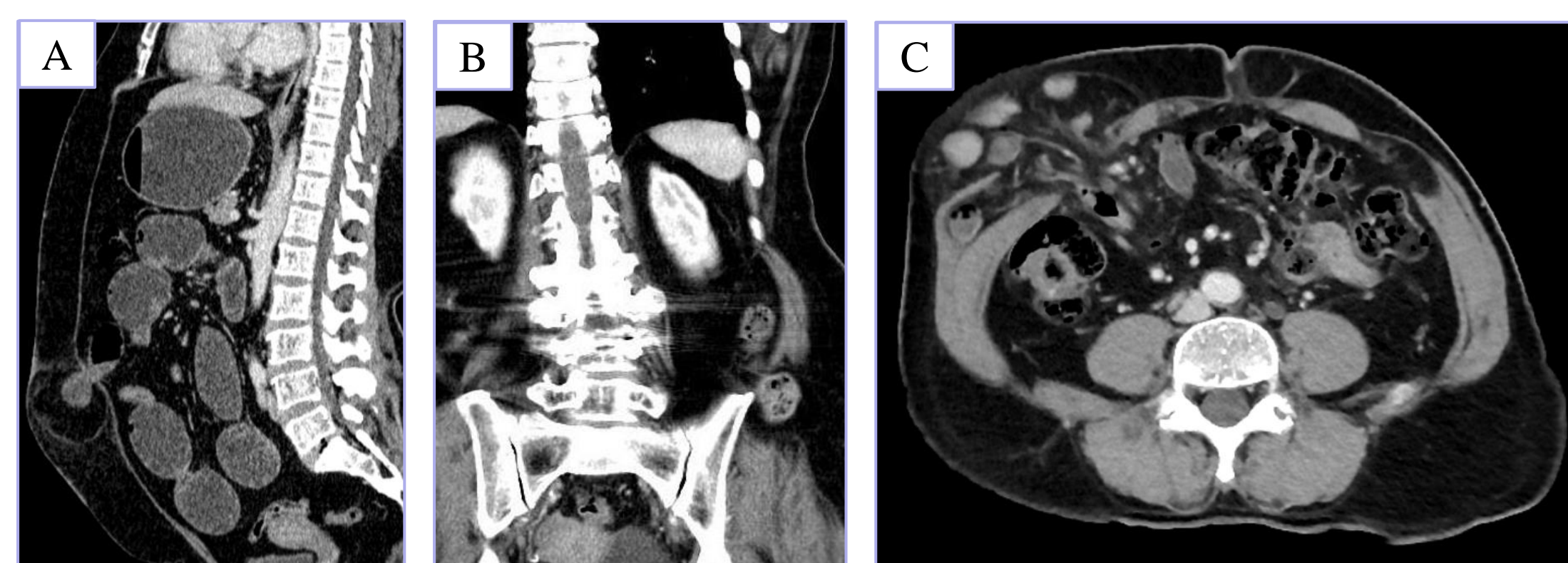


Figure 1. Ventral hernia types (imaging from Radiopaedia). (A) Umbilical hernia with small bowel protruding. (B) Left lumbar hernia with bowel protruding into inferior triangle. (C) Bilateral spigelian hernia (right side more easily seen in this image)

Methods

Study Population:

- Adult patients (>18 years) who underwent robot ventral/incisional hernia repair at OLOL between January 1, 2015 – July 31, 2020 by the principal investigator
- EPIC search for retrospective data collection on prospective data using MRN

Data Collection (REDCap):

- Date
- Diagnosis
- Hernia type and size
- Mesh/Suture type and size
- Procedure/console time
- Length of stay
- 30-day post-operative complications (infection, hematoma, thrombosis, etc.)

Analysis:

- Hernia size categorized based on:
 - Area (small = < 100 cm²; large = >100 cm²)
 - Width (small = < 10 cm; large = > 10 cm)
 - Length (small = < 10 cm; large = >10 cm)
- Length of stay and post-operative complications will be compared to ventral hernia sizes
- Further analysis will compare variables specifically within each type of ventral hernia

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