

# Robotic surgery approach to incarcerated inguinoscrotal hernia: A case report

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## ABSTRACT

**Introduction:** Repair of inguinal hernias is one of the most common procedures performed by general surgeons today. Specifically, management of incarcerated inguinal hernias currently open tension free repair followed by laparoscopic approaches (transabdominal preperitoneal and totally extraperitoneal) is the most prevalent. More recently, the application of robotic platform da Vinci surgical system has permutated every aspect of general surgery including hernia surgery. We describe our experience with robotic approach to repair of incarcerated inguinoscrotal hernia. **Case Report:** We present an 81-year-old male with a three-year history of reducible right inguinal hernia that presented to the emergency department with inability to reduce the hernia. He was subsequently diagnosed with right incarcerated inguinoscrotal hernia and recommended to undergo surgical intervention. Robotic surgical approach was chosen for repair of his hernia. patient underwent successful robotic repair with mesh of right incarcerated inguinoscrotal hernia and had an unremarkable postoperative course.

**Conclusion:** The 3D high definition imaging and superior dissection control of the robotic platform da Vinci surgical system affords the surgeon unique advantage in approaching incarcerated inguinal hernias. Although, currently open and laparoscopic approaches are more prevalent, the robotic approach is safe and effective option.

**Keywords:** Inguinoscrotal hernia, Robotic hernia repair, Robotic herniorrhaphy, Robotic incarcerated 32 inguinal hernia, Robotic surgery, Robotic TAPP

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## INTRODUCTION

Today the inguinal hernia repair is one of the most common procedures performed by surgeons throughout the world. The management of inguinal hernias dates back to ancient Egypt and was first described in 1500 BC. Over the years the surgical approach to inguinal hernia has evolved along with the technological innovations of mankind.

Currently, open tension free repair of incarcerated inguinal hernia is most prevalent, however, laparoscopic transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) approach have been well validated

in numerous studies. The robotic platform da Vinci surgical system is a newest innovation of minimally invasive surgery. The robotic platform has been widely adopted in general surgery including repair of incarcerated inguinal hernias. We describe our experience with robotic approach to incarcerated inguinoscrotal hernia as well review the current literature.

## CASE REPORT

An 81-year-old male with a chronic history of right inguinal hernia presented to the emergency department. The patient has had the hernia for three years, however, became concerned when he no longer was able to actively reduce the hernia. Further questioning revealed that the hernia has been incarcerated for one week. Originally painless, now patient described aching pain sensation with dragging-like pressure in the groin that has gradually gotten worse. He denied nausea, emesis, fever or chills and admitted to having regular bowel movements. Past medical history was significant for hypertension, diabetes mellitus, and hyperlipidemia. Medications taken for his comorbidities include lisinopril, atorvastatin, nifedipine and insulin. Past surgical history was only significant for cataracts. Physical examination revealed an incarcerated but not strangulated right inguinoscrotal hernia. The hernia mass was non-reducible and obscured the normal spermatic cord structures. There were no skin changes, including discoloration or retractions, and no palpable inguinal lymph nodes. Digital rectal examination revealed an empty rectal vault and no intraluminal masses.

Laboratory studies did not demonstrate leukocytosis. Computed tomography scan of the abdomen and pelvis without contrast showed fluid containing right inguinoscrotal hernia that measured about 5 cm in AP diameter. There was no bowel present in the hernia sac and the fluid measured in the sac was about 18 Hounsfield units (Figure 1A–C).

The patient was taken to the operating room for a robotic repair of incarcerated right inguinoscrotal hernia with mesh. Standard antiseptic technique was used to prep the patient and a total of three port site incisions were made for the da Vinci robot arms to dock and enter. The patient was placed in Trendelenburg position and robotic 8-mm trocars were placed in each anterior axillary line and a 30-degree camera was placed in the up position in the umbilical port. The robot was docked in the standard fashion. The right inguinal region was visualized and the peritoneum was scored from the medial umbilical fold laterally to the anterior superior iliac spine. A preperitoneal flap was created by dissecting the peritoneum away from the spermatic cord and vas deferens anteriorly with the hook electrocautery. Medially, Cooper's ligament was identified and no direct hernia was appreciated. The incarcerated indirect inguinoscrotal hernia containing preperitoneal fat was carefully dissected off the cord structures and reduced.

Lipoma removed from the abdomen as passed off the field for pathology. Covidien ProGrip self-fixating mesh was used to cover the preperitoneal space overlying indirect defect as well as the rest of the potential hernia sites. The peritoneal flap was closed with a running 6-inch V-Loc suture. The patient was extubated in the operating room and discharged home the same day after a non-114 complicated postoperative course.

## DISCUSSION

There are multiple techniques that are used to repair incarcerated inguinal hernias.

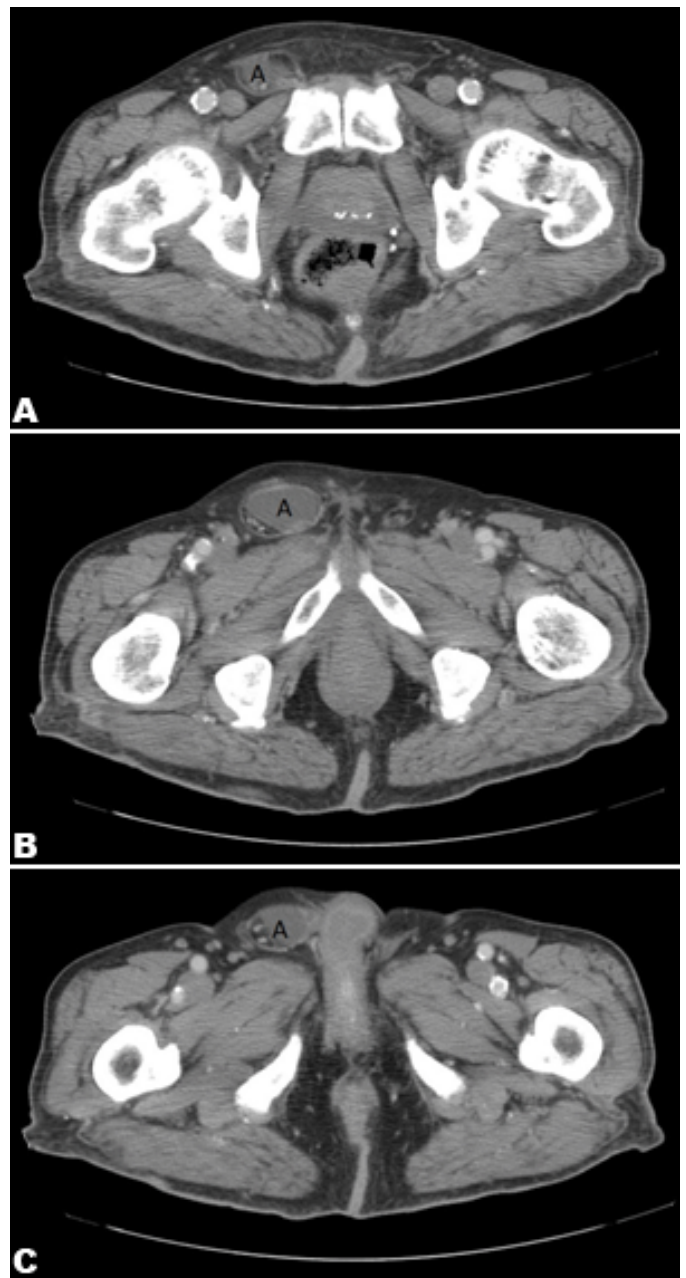


Figure 1: (A–C) Computed tomography scan of abdomen and pelvis without contrast identifying right incarcerated inguinoscrotal hernia.

The open approach has been used the longest, but there are newer and more desired techniques that are now becoming available. The laparoscopic approach is a well-studied and desired method by surgeons and patients for correcting incarcerated inguinal hernias. Laparoscopic techniques for repairing inguinal hernias can be divided into the totally extraperitoneal (TEP) procedure and the transperitoneal (TAP) procedure. Choosing which technique depends on surgeon preference or surgeon experience, and there are various case scenarios that have been conducted and published using each technique [1].

The open technique to repair incarcerated inguinal hernias has been around the longest and is preferred by the surgeons who have been practicing for many years.

One study measured 49,657 patients who underwent an inguinal hernia repair between 2007 and 2011 in Quebec, Canada. Fifty-six percent of these cases were performed using an open technique and 8% were performed using the laparoscopic technique.

This study showed that an open approach is favored for all clinical scenarios, even for situations where published guidelines recommend a laparoscopic approach.

Surgeons remain divided on the best technique for inguinal hernia repair: while more than half never perform laparoscopic inguinal hernia repair (LIHR), the small proportion who perform many use the technique for a large proportion of their cases. There appears to be a gap between the best practices put forth in guidelines and what surgeons are doing in actual practice and that surgeon would benefit in educational programs to train those who have the desire to explore new surgical techniques [2].

To add, there have been many reputable studies conducted using the totally extra 140 peritoneal (TEP) procedure. One study included 4565 laparoscopic TEP hernia repairs between January 2001 and January 2011 with 27 complications and two deaths which showed that the rate of TEP complications is low, but the TEP technique must be meticulous to avoid intraoperative complications [3]. Another study used data from a six-year prospective study that evaluated the TAPP repair procedure for both chronically and acutely incarcerated hernias. An accompanying resection therapy became necessary for only four of the emergency cases (11.1%) and two of the chronically incarcerated cases (1.3%) in the TAPP group. Postoperative morbidity was 2.8% in the emergency group and 3.8% in the chronically incarcerated group, which does not differ from the rate for TAPP used on reducible hernias [4].

In addition to the laparoscopic and open approaches, surgeons have recently been starting to transition to the robotic approach, which has many advantages and has proven to be a feasible and safe alternative.

One study using the robotic technique to repair incarcerated inguinal hernias measured the results of 123 hernia repairs, 45 of those being done using a robotic approach. Surgical complications included a hematoma

in three patients, two seromas and one superficial surgical site infection at a trocar site, which resolved with oral antibiotics. Chronic postoperative complications included the persistence of hematomas in two patients. Same day discharge was achieved in 60 patients with a mean length of stay of eight hours. Neither mortality nor conversion to open surgery occurred. This study showed that robotic repair of inguinal hernias is safe and versatile, which allows the surgeon to perform this procedure in more complex cases such as those involving incarcerated and/or recurrent hernias [5].

Another study reported a series of 16 patients who underwent robotic single-port total extraperitoneal inguinal hernia repair compared to 16 cases of conventional single-port inguinal hernia repair. Although operation time was comparable in both, the time wasted for scope cleaning was 8.5 minutes for conventional compared to 1.5 minutes for robotic surgery, which shows that robotic surgery for inguinal repairs is feasible and efficient [6].

A recent case report was published that followed the case of a 53-year-old man who underwent a robotic-assisted laparoscopic repair of a giant incarcerated recurrent inguinal hernia that contained bladder and ureters. During the procedure, the bladder and both ureters were carefully dissected free from the scrotum, while preserving the testicle and spermatic cord. A 6x4 inch pre-peritoneal polyester composite mesh was then used to repair the defect. This case concluded that inguinal hernias are challenging, but the robotic approach allows for fine dissection and is an excellent alternative to open surgery [7].

## CONCLUSION

Overall, there are many techniques available for the repair of incarcerated inguinal hernias, which have been proven to be reliable and effective. The open and laparoscopic (TEP and TAP) techniques have been around longer and studied most. However, the robotic technique with advanced 3D high-definition imaging and superior dissection control has demonstrated to be a safe and viable option in approach to repair of incarcerated inguinoscrotal hernia.

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## Author Contributions

Thomas J. Shaknovsky – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Lance U. Jung – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Seth Iskowitz – Analysis and interpretation of data,  
Revising it critically for important intellectual content,  
Final approval of the version to be published  
Zahra Beizaeipour – Analysis and interpretation of data,  
Revising it critically for important intellectual content,  
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### Guarantor

The corresponding author is the guarantor of submission.

### Conflict of Interest

Authors declare no conflict of interest.

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### SUGGESTED READING

- Robotic Repair of Right Inguinal Scrotal Hernia. [Available at: <https://www.youtube.com/watch?v=uD5dRr48Bzo>]

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