



Useful modifications to the robotic posterior retroperitoneoscopic approach to adrenalectomy in severely obese patients

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Abstract: In most recent years, the laparoscopic or robotic posterior retroperitoneoscopic adrenalectomy (RPRA) has been used as an alternative to the laparoscopic transabdominal approach. A 12-mm Covidien blunt balloon trocar has been used for the camera port in most previous posterior retroperitoneoscopic adrenalectomy (PRA) studies. This trocar is 100 mm in length and may not be long enough to dock the camera arm of the robot particularly in obese (BMI >35 kg/m²) patients with deep and thick back walls. Here we describe a technique that uses a platform [GelPOINT mini advanced access platform (mini GelPOINT)] for access in RPRA. A 52-year-old female with a history of multiple prior abdominal procedures presented with a 2 cm right adrenal mass and a BMI of 36.9 kg/m². A 10–12 mm long trocar was used through the mini GelPOINT for the robotic camera. Two long robotic trocars were also utilized. A fourth 5 mm assistant port was added for retraction and to avoid additional costly robotic instrument. The total operation time was 95 minutes (docking and console times 20 and 75 minutes, respectively). Blood loss was minimal and there were no complications. The mini GelPOINT appears to be a feasible, safe and effective alternative for RPRA procedures in severely obese patients. It is associated with an easy setup, no balloon, and easy movement of the robotic camera trocar through the gel and appears to minimize subcutaneous emphysema.

Keywords: Da Vinci robotic system; posterior retroperitoneoscopic adrenalectomy (PRA); GelPOINT mini advanced access platform (mini GelPOINT); subcutaneous emphysema; severely obese

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Introduction

In 2014, Berber *et al.* reported the first robotic posterior retroperitoneoscopic adrenalectomy (RPRA) (1). Laparoscopic or RPRA provides an excellent alternative to the adrenal in patients with prior anterior abdominal procedures (2). However, posterior retroperitoneoscopic adrenalectomy (PRA) has potential limitations (1,3-5) including: small working space, straight instruments, copious retroperitoneal adipose tissue, patient's anatomic characteristics such as a thick or obese back and the surgeon's lack of familiarity with the retroperitoneal anatomy.

A 12-mm blunt balloon trocar (AutoSuture/Covidien, Mansfield, MA, USA) (*Figure 1*) has been traditionally used by our group for the camera and has been widely described by others (3,5,6). This blunt balloon trocar is 100 mm in length and underperforms in obese patients and those with thick/deep back wall. The robot arm needs to “snap” into place and utilizes about 1–2 cm of space in the shaft of the port. In many instances, the port is not long enough to dock the robot camera arm and it may become dislodged or it does not hold the pneumoretroperitoneum leading to loss of space and subcutaneous emphysema. In some cases, the balloon can also rupture or pops back into the back muscle

wall causing unnecessary delays in the procedure.

The GelPOINT mini advanced access platform (mini GelPOINT) (Applied Medical, Rancho Santa Margarita, CA) is marketed for single-site laparoscopic surgery (7-11) including transabdominal adrenalectomy (12). GelPOINT comes in three basic sizes with the mini GelPOINT being the smallest (*Figure 2A*) which includes GelSeal cap, a

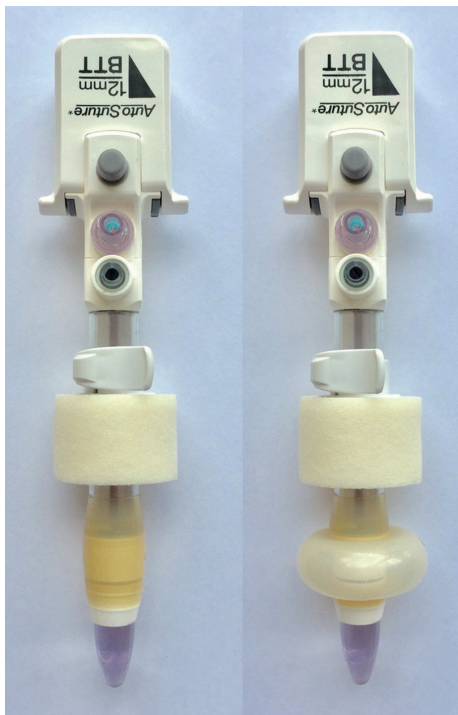


Figure 1 The 12-mm blunt balloon trocar (AutoSuture/Covidien) without and with balloon insufflation.

wound protector/retractor and three low-profile sleeves (*Figure 2B*). Here we describe a novel use of the GelPOINT mini in RPRA as an alternative to the widely used blunt balloon trocar.

Patient

A 52-year-old female was incidentally found to have a 2 cm right adrenal mass. Her BMI was 36.9 kg/m². She underwent biochemical evaluation and was found to have a cortisol level of 2.3 after 1 mg overnight dexamethasone suppression and she had an elevated midnight salivary cortisol. She was diagnosed with subclinical Cushing's syndrome. Her surgical history consisted of an open Roux-en-Y gastric bypass, hysterectomy, C-section, cholecystectomy and multiple abdominal hernia repairs and abdominoplasty. Because of her extensive abdominal surgical history we offered her a RPRA.

Surgical procedure

The patient is positioned prone over a Wilson frame and in jack-knife. Appropriate padding is used and the operative area is prepped and draped.

A 12 mm incision is performed below the tip of 12th rib and the retroperitoneal space is dissected bluntly with the surgeon's finger. Two 8 mm long robotic trocars are placed, one lateral to the 12th rib port site and one medial about 3 cm below the junction of the 12th rib and the spine. These triangulating trocars are introduced while the surgeon's finger is inserted at the 12th rib tip port site to receive them and to avoid injury to the kidney and other structures.

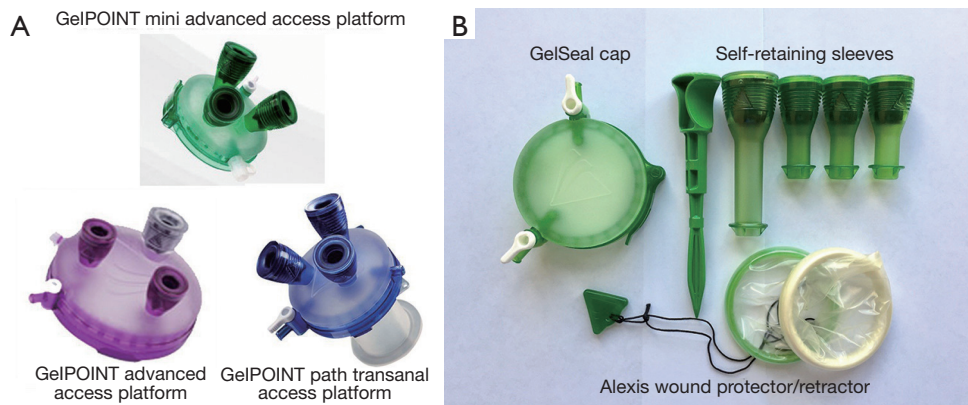


Figure 2 GelPOINT advanced access platform. (A) Three different sizes of GelPOINT advanced access platform; (B) GelPOINT mini access platform used in this report.

In this procedure we also add a 5 mm assistant port just lateral and inferior to the tip of the 12th rib port site (Figures 3,4A). A 12-mm blunt balloon trocar (AutoSuture/Covidien, Mansfield, MA, USA) is then placed in the 12th rib access site. The retroperitoneal space is then insufflated with CO₂ and the pressure is maintained at 20 mmHg. The laparoscope 30-degree camera is introduced looking up and with the help of a grasper via the lateral 5 mm port site; the loose areolar tissue behind Geroda's is taken down with care not to injure the lateral peritoneal lining (over liver for this right sided lesion).

Once the medial musculature and the lateral peritoneal layer have been clearly identified (6) the da Vinci robot is docked (Intuitive Surgical, Sunnyvale, CA, USA). The



Figure 3 CT scan at the level of 12th rib.

robotic camera arm could not be docked on the 10–12 mm blunt balloon trocar because it was too short due to the thickness of the back wall (Figures 3,4A,4B).

A mini GelPort was introduced instead using the 12 mm port site. A 10–12 mm extra-long trocar (Ethicon Endo-Surgery, Guaynabo, Puerto Rico, USA) was then inserted through the gel port for the robotic camera (Figure 5A,B). Once this was achieved, the 8 mm robotic cardiore forceps were used on the left sided and the 8 mm robotic cautery hook was used in the right-sided port. The 30-degree camera was then introduced looking down and dissection is carried from lateral to medial removing all the tissue above the kidney. The kidney is retracted caudad by the assistant. The right adrenal vein is dissected, clipped with 5 mm Hem-o-lok clips (Teleflex Medical, Morrisville, NC, USA) and then divided by the first assistant through the assistant port. The entire adrenal gland is then placed in an Endopouch retriever (Ethicon Endo-surgery, Cincinnati, OH, USA) and removed via the mini GelPOINT site. After making sure the area is hemostatic, the CO₂ is removed and the camera port site closed at the fascia level. All other port sites are closed at the skin level.

Results

Total operation time was 95 minutes, docking and console times were 20 and 75 minutes and blood loss was minimal. Final pathology was consistent with a 2.2 cm cortical adenoma. The gland weighed 16.3 g. The patient was

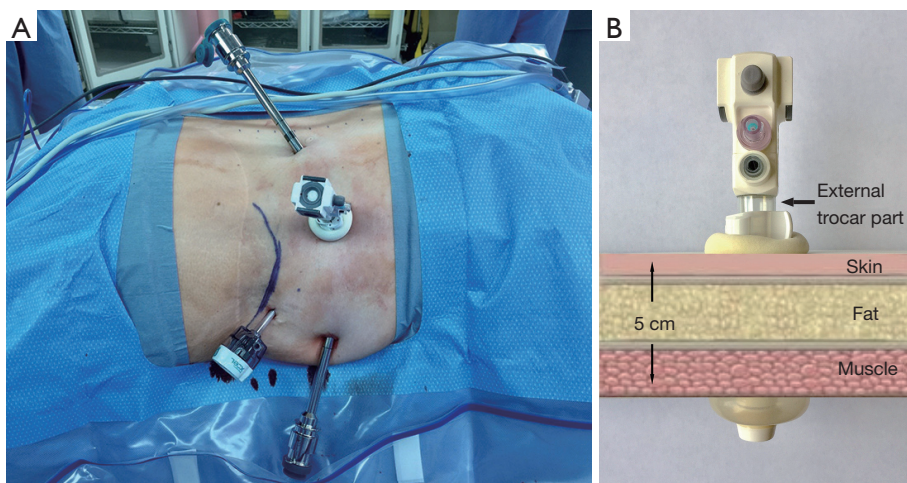


Figure 4 Port placement with blunt balloon trocar. (A) Port placement during a RPRA using the standard blunt balloon trocar (AutoSuture/Covidien); (B) model of placement of blunt balloon trocar. RPRA, robotic posterior retroperitoneoscopic adrenalectomy.

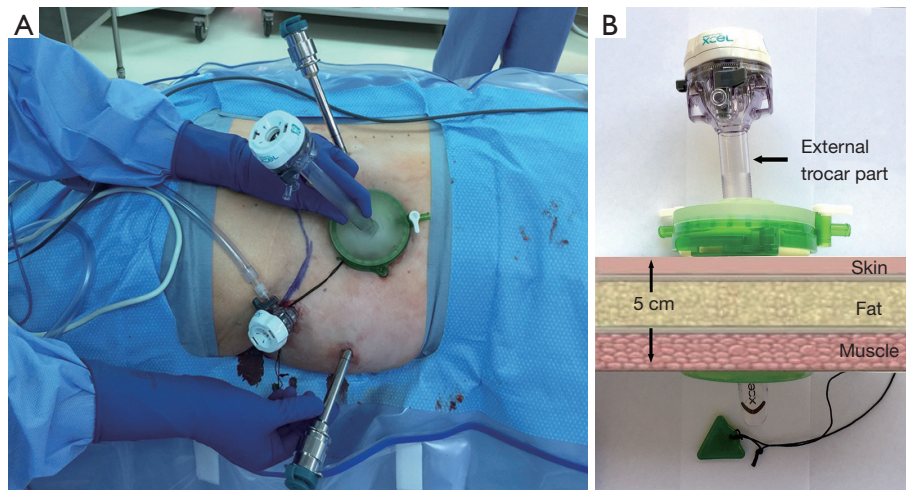


Figure 5 Port placement with mini GelPOINT. (A) Port placement during a RPR using the advanced access platform mini GelPOINT (Applied Medical); (B) model of placement of mini GelPOINT. RPR, robotic posterior retroperitoneoscopic adrenalectomy.

discharged after one night stay in the hospital and there were no complications.

Discussion

The PRA is a safe and effective minimally invasive technique that avoids the abdominal cavity in patients who have had extensive abdominal procedures (2). Robotic technology can potentially improve some of the limitations of the laparoscopic PRA (1).

A 12-mm blunt balloon trocar (AutoSuture/Covidien, Mansfield, MA, USA) (Figure 1) was used in RPR for the robotic camera, and has been described by prior investigators (3,5,6). This blunt balloon trocar is only 100 mm in length and often not long enough to dock the robotic camera arm particularly in severely obese patients or those with thick/deep back wall. The blunt balloon trocar is recommended for the retroperitoneal approach to adrenalectomy because the balloon allows retention of the pneumoretroperitoneum, which is held at higher pressures (20–30 mmHg) than during transabdominal approaches. In severely obese patients or in those with thick or deep back walls the balloon trocar falls short and may “pop” out of position failing to sustain the required retroperitoneal pressures. This happens more often when the robot technique is being used because the camera arm of the robot requires approximate 2 cm of docking space and the trocar may not be long enough to achieve this (Figures 3,4B). In some of our severely obese patients (BMI >35 kg/m²),

the thickness of the back wall can be >45 to 50 mm and the balloon has ruptured or popped back into the back muscle wall leading to unnecessary delays in the procedure as well as increased subcutaneous air due to poor seal.

Since 2010, the mini GelPOINT has been used for single-site laparoscopic cholecystectomy (7), colectomy (8), gastrectomy (9), nephrectomy (10,11) and trans-abdominal adrenalectomy (12). The mini GelPOINT platform includes GelSeal cap, a wound protector/retractor and three low-profile sleeves (Figure 2B) and can be used in small incisions 1.5 to 3 cm in size. The GelSeal Cap offers a pseudo abdomen platform for triangulation of standard laparoscopic instrumentation and provides a flexible fulcrum for easy instrument articulation and movement. The Alexis wound protector/retractor offers atraumatic retraction and specimen retrieval as well as wound protection.

Because the blunt balloon trocar did not hold well in our severely obese patient, we switched to the mini GelPOINT with its GelSeal Cap and wound protector (Figure 5B). Because the 10–12 mm long trocar was inserted through the GelSeal Cap, this long camera trocar was used alone through the GelCap with the other two long robotic trocars at different sites to effectively allow robotic docking and minimize external robotic arm collisions (6). We observed no air leak around the camera trocar site during the procedure. The mini GelPOINT port never became dislodged and allowed us to easily manipulate the camera without issue.

In our previous laparoscopic and RPR cases, we

observed minor subcutaneous emphysema. This has been previously described and is an expected observation in RPAs, particularly as procedure time and insufflation pressure increases (13). During and after the described case, the patient had no subcutaneous emphysema. We believe that the wound protector of the mini GelPOINT provides a very effective seal through the back wall around the camera port site and effectively prevents air leaking and infiltrating the subcutaneous tissues. This may be useful to the surgeon when he or she expects a longer procedure time.

Conclusions

In this case study, the mini GelPOINT appeared to be a feasible, safe and effective alternative for RPRA procedures in severely obese patients. Its use helped prevent dislodging of the camera port, loss of retroperitoneal pressure and the accumulation of subcutaneous emphysema.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/ales.2017.08.05>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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