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Single incision laparoscopic primary and incisional ventral hernia repair as the standard of care in the ambulatory setting; Does less equal better outcomes; Case series and literature review

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ABSTRACT

INTRODUCTION: The consensus about whether the single port approach is advantageous remains controversial. As the ambulatory service becomes the standard of care, techniques are in evolution to augment the patient experience in this setting. This forms the basis for evaluating SILS (Single Incision Laparoscopic Surgery) prosthetic ventral hernia repair in the ambulatory setting. We report a SILS technique of ventral hernia repair using the Stryker Ideal-eyes articulating laparoscope and standard laparoscopic instruments in the day-case setting.

PRESENTATION OF CASES: We report three cases of ventral hernias (one primary and two incisional). All were completed using single port techniques. They were done in the ambulatory setting and require no admission. Single incision laparoscopic repair of primary and incisional ventral hernias was completed successfully in all cases without conversion to standard laparoscopy. Median (range) operative time was 66 min (39–95 min). No intra- or postoperative complications were recorded. No episodes of prolonged postoperative pain were reported. We examine the literature and subsequently discuss the feasibility of ambulatory single port ventral hernia repair.

CONCLUSION: SILS prosthetic repair of primary and incisional ventral hernia is easily feasible. In our series, SILS ventral hernia repair appears to be safe and effective. It may decrease parietal trauma augmenting its use in the ambulatory setting. Technology will continue to improve the wide applicability of this technique. Larger randomized trial studies are required to determine the rates of port-site incisional hernia compared with multiport laparoscopy.

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1. Introduction

Laparoscopic ventral hernia repair has long been proven to be superior to the open approach when compared in safety, efficiency, and recovery time [1–8,11]. There are no standardized approaches for this surgical technique [2,3]. The risk of port site incisional hernia remains a concern, with wide variation [8]. Franz in 2008, demonstrated that patients who are prone to develop hernia; have intrinsic extracellular matrix and wound healing deficiencies [9]. Using SILS techniques reduces the number of incisions in these patients. Using special single access devices like the Gelpoint and Triport further restrict the incision length to 2 cm–2.5 cm, which could directly impact port site hernia rates. Comparative studies have failed to show the intensity of early pain in traditional laparoscopic versus open ventral hernia repair [1,3,6]. It remains to be studied whether pain would be less in a SILS control group. Single-incision laparoscopy has become the normal clinical practice. It

is a versatile technique and many procedures are commonly performed via SILS [1–8]. However, only a few reports on ventral hernia surgery through single incision have been published. We report 3 cases of single port ventral hernia repair and review the literature for the feasibility and safety of single-port access laparoscopic primary and incisional ventral repair with prosthetic mesh using conventional laparoscopic instrumentation (Fig. 1).

2. Case series

2.1. Case 1

A 37-year-old woman with no chronic illness presented with recurrent episodes having sharp, crampy abdominal pain, non radiating, aggravated by palpation and sitting up and walking/standing. Lying down in the supine position alleviated it. It was associated with vomiting, intermittent abdominal distention and weakness. She is noted to have two Caesarian sections in the past. She had a bmi (body mass index) of 28.5. She sought medical attention and reviewed in the clinic. She was noted to a large ventral incisional

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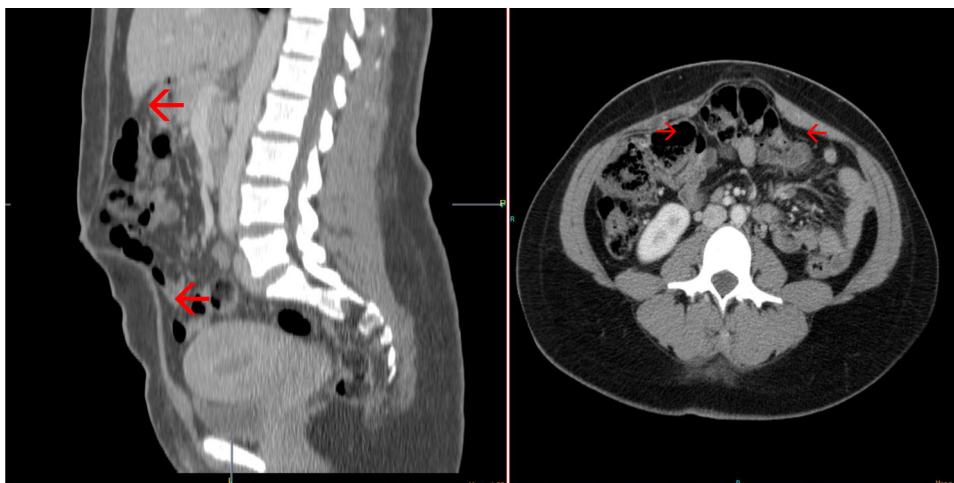


Fig. 1. CT scan abdomen showing hernia with divarication. Arrows shows approximate dimensions.



Fig. 2. CT scan abdomen showing hernia.

hernia with divarication of the rectus muscles. This was later confirmed on CT scan, with dimensions of 14 cm × 10 cm. She was offered a single port laparoscopic hernia repair at our ambulatory center. It was completed uneventfully using the technique described below. She was discharged from the recovery with the rest of her course was uneventful. The patient was reviewed on day 3 postoperatively and follow up was 3 months with no complications and good cosmetic outcome (Fig. 2).

2.2. Case 2

A 45-year-old man with no chronic illness presented with asymptomatic abdominal swelling. He is noted to have this swelling from childhood with increasing in size over the past year. He had a bmi of 32.1. He sought medical attention and diagnosed with a primary ventral hernia. On examination, he a large ventral primary hernia with and associated umbilical hernia. On CT scan, the hernias were confirmed and spanned an area of 11 cm × 6 cm. He was offered a single port laparoscopic hernia repair in the outpatient setting. It was completed uneventfully (see method below). He was discharged from the recovery bay. He review spanned 4 months an uneventful course. He had no complications (Fig. 3).

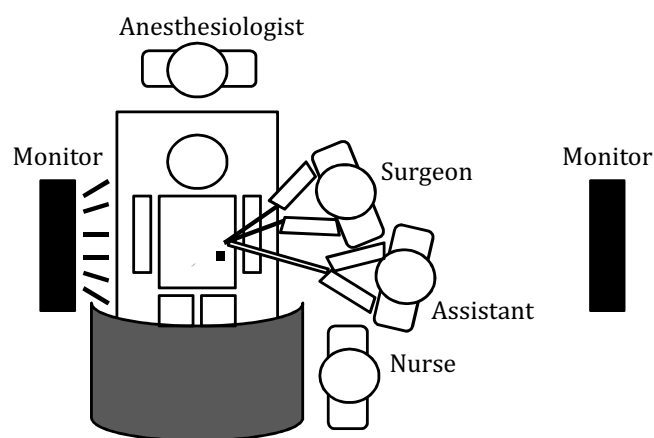


Fig. 3. Operating room set up.

2.3. Case 3

A 43-year-old man with no chronic illness presented with sharp, crampy abdominal pain. He is noted to be a drummer by profession. He reports having recurrent episodes of non-radiating pain, aggravated by playing the drums, sitting up and walking/standing. It was associated with intermittent abdominal distention. He is noted to have had a laparoscopic appendectomy 7 years previously. He had a bmi of 31. He sought medical attention, which brought him to the emergency room and subsequently referred to clinic. He was noted to a chronically incarcerated incisional hernia at the previous umbilical incision. He had no pre-operative imaging but hernia clinically noted to be 6 cm × 8 cm. He had single port laparoscopic hernia repair at our ambulatory center. He complained of mild post-operative pain, which required additional analgesia. He however was discharged from the recovery with an uneventful course. The patient was reviewed in clinic for 3 months with no complications and good cosmetic outcome.

3. Method of repair

Patients were placed in a supine position with arms placed to the sides and the legs straight. The surgeon was on the patient's left and the assistant to the left of the surgeon. A television monitor and the insufflator system Stryker Ideal-eyes were placed to the right hip of the patient. The size of the hernia was marked with a 5 cm margin marked on the deflated abdomen. A 2.0–2.5 cm vertical

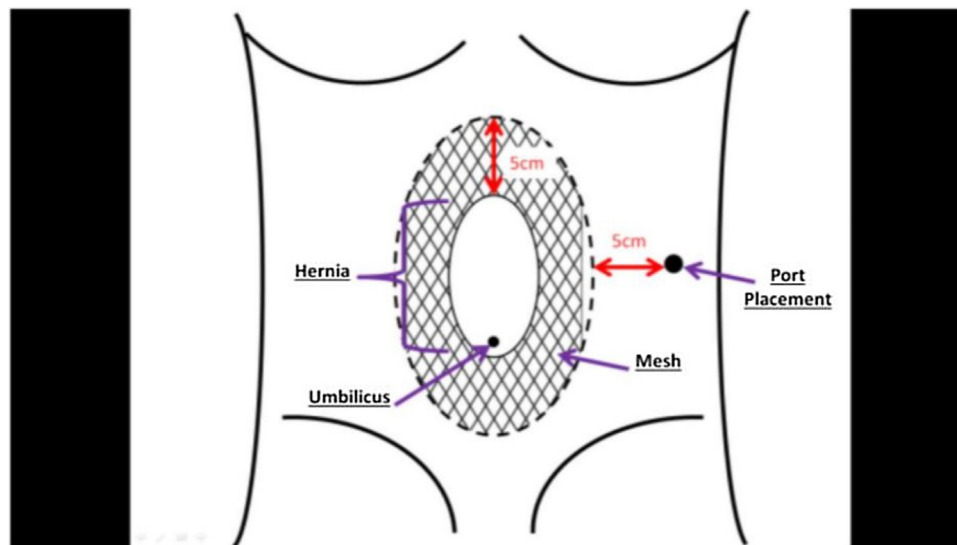


Fig. 4. Mesh placement. Illustrated by Forestall Dorsett.

left flank skin incision was marked and made 5 cm from the previous margin outlined at the level of the umbilicus. It was directed down into the peritoneum. A special single incision port Karl Storz S-PORT® system was placed through the incision. Platforms like the S-PORT® and GelPOINT™ eliminate the Swiss-cheese damage done to the fascia with earlier techniques. The S-PORT® is a cost effective, reusable modular single-incision laparoscopic platform that allows a high degree of the freedom of movement [12]. It allows for precise control of telescopes and instruments with simple extraction of resected tissue. It has variable adjustment for the incision size (Fig. 4).

The position of the team and the choice of the abdominal incision were dependent upon the localization of the hernia defect. The hernias were on the midline in all cases and the team stood on the patient's left with the camera assistant to the surgeon's left, and the incision was performed in the left flank. The peritoneal cavity was entered using the open approach. An S-retractor was placed through the incision to facilitate the insertion of single port base. The upper cap of the device was then assembled. A 10-mm, articulating Stryker Ideal-eyes laparoscope was inserted. Straight disposable instruments were inserted into the abdomen through the S-PORT® platform.

LigaSure™ was used as it facilitating dissection, cutting, adhesiolysis and positioning of mesh eliminating the use of multiple instruments. Freeing of hernia contents was always achieved with the aid of extra-abdominal counter pressure by assistant hands. Dissections of peri-hepatic ligaments and urachal structures were achieved similarly to the current technique of multiport laparoscopic ventral hernia repair. A 5-mm straight tacker device was also used. The hernia defect was freed from the greater omentum and from the fatty tissue covering the parietal peritoneum. Utilizing the principles of inline viewing no conflict between the surgeon's and the assistant's hands was evident. Inline viewing is a concept which evolved following the development of natural orifice transluminal endoscopic surgery (NOTES). All instruments occupied one line of sight. Conventional laparoscopy advocates triangulation around a central optical instrument and thus SILS is thought to be contrary to this. Newer port systems (SILS™, GelPOINT™, TriPORT™) allow a combination of inline viewing and triangulation to accomplish the surgery. Preoperative estimation of the size of the hernial defect was either clinically or by CT scan and appropriate prosthesis size was selected with minimal overlap of 5 cm in all directions. Dual face prosthesis was rolled tightly and inserted through the 11-mm

trocar of the S-PORT®. A percutaneous stitch placed at 12, 3, 6, 9 o'clock were temporarily used to affix the mesh to the parietal wall. While the surgeon exerted external manual pressure, the mesh was tacked to the wall in a double row fashion. The temporary percutaneous stitches were tied after deflation of the abdomen. The cutaneous scar was closed by intradermal sutures. All patients wore an abdominal brace for 6 weeks.

4. Discussion

Incisional hernias occur at a rate of 2–11% [1]. Laparoscopic ventral hernia repair over the last decade has become a standard approach to repair many types of ventral and incisional hernias [3–7]. It has been shown to be superior to open hernia repair, with generally fewer complications and recurrences [1–8]. Laparoscopic repair of ventral hernias are advantageous in hernias with a minimum defect of 3 cm [3]. Minimally invasive repair is even more so appropriate in the morbidly obese patient [4]. Additionally, closing the defect primarily has been advocated. However, primary fascial closure during laparoscopic hernia repair has not been proven to decrease complications when compared with bridged techniques [10]. By adapting the multi-port technique slightly, we have maintained the same principals through a single incision. SILS hernia repair can be done in virtually done in all patients, minimizes the chance of unrecognized bowel injury, allows the surgeon to thoroughly dissect adhesions, visualize occult adjacent defects and place the mesh over a larger space thereby minimizing the chances of recurrence. We believe this technique may reduce port site hernia rates.

Our series demonstrates that the technique is safe and feasible. The short follow-up period and number of patients does not allow for any conclusions regarding long-term results and recurrences to be made. We expect similar or better results with our techniques in larger studies.

A prospective study by Uranues in 2008 showed that the number of previous operations and repairs did not affect traditional laparoscopic results in terms of recurrence and complications [5]. Laparoscopic repair has also demonstrated superiority with respect to post op ileus [3]. We expect similar results with SILS techniques.

Cases of prolonged post-operative pain were negligible [8]. No study reported increased incidence of port site hernias. Larger randomized studies are required to test pain scale and whether SILS contributed to decreased port site recurrences rates.

Costs of materials are certainly one aspect of any new technique that must be monitored. As we have previously demonstrated in SILS cholecystectomy, the technique can be introduced without adding significant additional costs [7]. This technique does not use any specialized instrumentation other than the single access platform. The S-PORT®/GelPOINT™ are relatively small expenses in this laparoscopic technique compared to its multi-port alternative. The overall costs are not altered significantly. Further follow-up will be required to confirm this hypothesis. We perform minimal subcutaneous dissection during platform insertion, which may contribute to decreased pain. We only use standard straight instruments with no clashing. We prefer to use the Ideal Eyes articulating laparoscope but using a straight standard 30° laparoscope can easily be used alternatively. We secure the mesh to the abdominal wall using a mesh-tacker as well as trans-fascial sutures. Technological advances such as the AccuMesh™ positioning device may reduce the need for transfascial sutures and aid in cosmesis as well as pain control.

This technique is easy to adopt, because it generally does not require additional instrumentation or extra training. It is also a good introduction to and good practice for single access MIS techniques.

One of the most pivotal advantages is the contribution to the surgeon's learning curve with SILS techniques. These will continue to become more popular with patients, and will be used for an increasing variety of cases. Our experience with single incision cholecystectomy has demonstrated its safety and superior cosmesis and has quickly becoming the standard of care at our ambulatory center. Natural orifice and robotic surgery are the next logical steps in our evolution and these techniques serve as a bridge. With cost making these technologies unattainable in our present socio-economical environment; SILS using a single access platform can become the "poor man's robot".

There are very few disadvantages. The total length of incision may only be slightly less with the SILS port technique or in some cases a little longer, relative to a multi-port technique. However, the incision is placed laterally and in one location with less dissection required. This has the possibility of significantly impacting analgesia requirements.

5. Conclusion

SILS prosthetic repair of primary and incisional ventral hernia is safe and effective in the ambulatory setting. Continuing to evolve this technique will allow to wide applicability of this technique. Larger randomized trial studies are required to test outcomes such as port site hernia, pain and outcomes. This technique may be cost effective in the third world setting with no need for expensive specialized equipment.

Conflicts of interest

None.

Sources of funding

None.

Ethical approval

This was not a research study. It was a retrospective analysis. No ethical approval was obtained.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Ross downes-design, writing, analysis, revision.

Guarantor

Ross Downes.

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