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Single-port Laparoscopic Surgery by Use of a Surgical Glove Port: Initial Experience with 25 Cases

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Rezumat

Chirurgie laparoscopică cu un singur port folosind "port mănuşă chirurgicală": primul studiu pe 25 de cazuri

Premize: chirurgia laparoscopică cu un singur port a câştigat popularitate în ultimii zece ani. Această tehnică este folosită în unele proceduri chirurgicale. Acest articol descrie o metodă nouă şi mai ieftină, cunoscută sub numele de "portul mănuşă chirurgicală (PMC)" sau "port improvizat" şi explică studiul efectuat pe 25 de cazuri.
Metodă: s-au efectuat unsprezece colecistectomii, reparația la opt hernii inghinale prin procedeu total extraperitoneal, trei splenectomii, două rezecții gastrice şi o procedură anti-reflux.
Rezultate: Douăzeci şi patru de proceduri din douăzeci şi cinci, au fost finalizate fără să fie convertite la intervenție deschisă sau multi-port. La un pacient care prezenta atât litiaza biliară cât şi tumora gastrointestinală stromală, s-au efectuat în aceeaşi sesiune şi colecistectomie şi rezecție gastrică parcelară prin tehnica laparoscopică cu un singur port "mănuşa chirurgicală". La un alt caz, au fost efectuate două incizii suplimentare de câte 5 mm pentru hemostază. Pentru cazul de reparație a herniei hiatale, a fost necesară o intervenție chirurgicală suplimentară pentru hemoragie postoperatorie, care a fost efectuată prin aceeasi tehnică cu port mănuşă chirurgicală.
Concluzie: Chirurgia laparoscopică cu un singur port este o tehnică care poate fi aplicată în cazul multor proceduri chirurgicale. PMC este o tehnică mai nouă, pentru care unele experiente preliminare sunt deja publicate în întreaga lume. Tehnica PMC are unele avantaje cum ar fi: cost-eficiență, implantare uşoară şi sigură a portului şi extracția uşoară a pieselor chirurgicale. De asemenea poate fi utilizată şi pentru tratamentul complicațiilor postoperatorii.

Cuvinte cheie: laparoscopie cu un singur port, laparoscopie cu port mănuşă chirurgicală, depărtător Alexis

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Abstract

Background: single-port laparoscopic surgery has gained popularity over the last decade. This technique is used for several surgical procedures. This paper documents a new and cheaper access method known as "surgical glove port" or "homemade single-port", and describes our initial experience with 25 cases.
Method: Eleven cholecystectomies, eight totally extraperitoneal inguinal hernia repairs, three splenectomies, two gastric wedge resections, and one anti-reflux procedure were performed.
Results: Twenty-four procedures out of twenty-five were completed without conversion to open or multiple port techniques. An individual patient who had both cholelithiasis and gastrointestinal stromal tumor underwent both cholecystectomy and gastric wedge resection in the same session with surgical glove port technique. In another case two additional 5-mm incisions were made for hemostasis. The additional operation was required and performed by using surgical glove port for a hiatal hernia repair case, because of postoperative hemorrhage.
Conclusion: Single-port laparoscopic surgery is an applicable technique for plenty of surgical procedures. Also, surgical

glove port is a newer technique and some initial experiences have already published all over the world. Surgical glove port has advantages such as cost-effectiveness, easy and safe port implantation and specimen extraction. SGP can also be used for treating post-operative complications.

Key words: single-port laparoscopy, glove-port laparoscopy, Alexis wound retractor

Introduction

Single-port laparoscopic surgery (SLS) is a technique in laparoscopic surgery, which is based on the idea that all the laparoscopic trocars are inserted through the same incision. Especially in the last few years SLS has gained popularity because of its advantages compared to multiport surgery, such as improved cosmetics, reduced surgical trauma, expectation of reduced risk for wound complications and reduced pain (1). Despite its advantages, SLS has two major disadvantages limiting its practice. 1) Technical challenges 2) Relatively expensive tools. Although technical challenges can be dealt with, when performed by surgeons who are experienced in laparoscopic surgery, it is still of great importance to increase cost-effectiveness. This paper documents a new and less expensive access method known as "surgical glove port (SGP)" or "home-made single-port", and describes our initial experience with 25 cases.

Patients and operative technique

SLS using SGP technique starts with a 2-cm incision at the level of the umbilicus, without dissection of subcutaneous tissue. After the incision, a small size ALEXIS® wound retractor (Applied Medical, Rancho Santa Margarita, CA, USA) is placed in the wound. Afterwards, a standard powder-free surgical glove is placed, surrounding the external ring of the retractor, and two 5-mm SILS Port® trocars (Covidien, Norwalk, CT, USA) and one 11-mm Versaport® trocar (Covidien, Norwalk, CT, USA) are inserted through the fingers of the glove by cutting the tips. Carbon dioxide insufflation can be performed through any of the trocars or the first finger tip.

Eleven cholecystectomies, eight totally extra-peritoneal (TEP) inguinal hernia repairs, three splenectomies, two gastric wedge resections, and one anti-reflux procedure were performed in Ankara University School of Medicine, Department of General Surgery, between December 2010 and September 2011 by using SGP technique.

A thirty-degree laparoscope (Olympus, Tokyo, Japan) and SILS® laparoscopic hand instruments were used in all cases. (See *Fig. 1*)

All cases were evaluated retrospectively and data concerning the following were collected: operative time, post-operative hospital stay, estimated blood loss, operative and postoperative complications. Operative time is considered to be the time passed between the skin incision and closure.

Figure 1. *All trocars are inserted through fingers of the glove by cutting the tips. Carbon dioxide insufflation can be performed through any trocars or the first finger tip*

Results

Twenty-four procedures out of twenty-five were completed without conversion to open or multiple port techniques. Average age was 49.6 (31-78). Average operative time for TEP inguinal hernia repairs was 75 minutes (55-150), average operative time for cholecystectomies was 91.6 minutes (60-115). Patients who underwent multiple procedures in one session were excluded from this calculation. No perioperative complications were seen in these cases. Hospital stay after surgery for all cholecystectomy and TEP inguinal hernia repair patients was 1 day.

An individual patient who had both cholelithiasis and gastrointestinal stromal tumor underwent both cholecystectomy and gastric wedge resection in the same session with SGP technique. Operative time for this case was 120 minutes and no complications were seen. Patient was discharged on post-operative day six.

Another patient with gastro-esophageal reflux disease was planned to undergo Nissen fundoplication procedure by using SGP technique. Because of uncontrolled bleeding from splenic hilus while performing gastric fundoplication, two additional 5-mm incisions were performed. Adequate hemostasis was achieved and surgery was completed with the help of the additional ports. Estimated blood loss in this procedure was 150 ml. No postoperative complications were seen and the patient was discharged on the fifth postoperative day.

For one unique patient which had prior open gastric surgery for peptic ulcer a subcostal 2-cm incision was used instead of a transumbilical incision. Splenectomy was performed for idiopathic thrombocytopenic purpura through subcostal incision by using SGP technique. On the post-operative second day, the patient presented with tachycardia and decrease in hemoglobin levels. Thereupon, computerized

tomography revealed a hematoma between the splenectomy site and pelvis and the patient was taken into the operation room again. Splenectomy site was explored and bleeding from the vascular stapler line was detected. Bleeding point was successfully sutured and the hematoma was drained out. This second procedure, which was performed for management of a postoperative complication, was also completed by using the SGP technique. This patient spent 8 days in the hospital after surgery.

Discussion

SLS is an applicable technique for many surgical procedures (2,3). Successful cases of colorectal (4), gynecological resections (5), cholecystectomies (6), splenectomies (7), inguinal, umbilical and incisional hernia repairs (8) and anti-reflux procedures (9) are reported. Also, SGP is a newer technique and some initial experiences in colorectal resections (10), gynecological resections (11), and hernia repairs (12) are already published all over the world.

SGP technique has three major advantages to standard SLS: 1) Expensive surgical tools are not needed 2) Port implantation is relatively easy and safe 3) Provides increased mobility of hand tools.

The difference between the costs of classic SLS and SGP is a deterministic factor in developing countries like ours. The ALEXIS® wound retractor and surgical glove that we use in SGP technique, cost only around 100 Euros, which is approximately a third of classic SLS port expenditure.

Port implantation is easier and safer in SGP technique. We think that laparotomy via the 2-cm incision can prevent visceral injuries in the course of port implantation. Thus, comparative studies with large case series are needed.

The wound retractor is essential for SGP. By its use, while taking the specimen out in oncologic surgeries and infected organ surgeries, tumor seeding risk and contamination risk may decrease, respectively.

According to our initial experience, conversion to classic multi-port laparoscopy is a possible and easy solution for dealing with intra-operative complications, such as hemorrhage, and visceral injury. Besides, as in our experience with post-operative hemorrhage after splenectomy, SGP can be used for treating post-operative complications.

Increasing awareness and practice of SGP will reduce surgical costs and increase feasibility of SLS.

References

1. Pfluke JM, Parker M, Stauffer JA, Paetau AA, Bowers SP, Asbun HJ, et al. Laparoscopic surgery performed through a single incision: a systematic review of the current literature; J Am Coll Surg. 2011;212(1):113-8. Epub 2010 Oct 30.
2. Nicolau AE. Laparoscopic appendectomy. Chirurgia (Bucur). 2011;106(4):495-503.
3. Târcoveanu E, Vasilescu A. Surgical treatment of inguinal hernia with peritoneal laparoscopy. Chirurgia (Bucur). 2012; 107(1):95-102.
4. Geisler D, Garrett T. Single incision laparoscopic colorectal surgery: a single surgeon experience of 102 consecutive cases; Tech Coloproctol. 2011 Nov 18. (Epub ahead of print)
5. Fader AN, Escobar PF. Laparoendoscopic single-site surgery (LESS) in gynecologic oncology: technique and initial report; Gynecol Oncol. 2009;114(2):157-61. Epub 2009 May 28.
6. Raakow R, Jacob DA. Single-Incision Cholecystectomy in about 200 Patients; Minim Invasive Surg. 2011;2011:915735. Epub 2011 Jul 2.
7. Barbaros U, Dinççağ A. Single incision laparoscopic splenectomy: the first two cases; J Gastrointest Surg. 2009;13(8):1520-3. Epub 2009 Apr 14.
8. Agrawal S, Shaw A, Soon Y. Single-port laparoscopic totally extraperitoneal inguinal hernia repair with the TriPort system: initial experience; Surg Endosc. 2010;24(4):952-6.
9. Barbaros U, Demirel T, Sumer A, Deveci U, Tukenmez M, Cansunar MI, et al. Pure SILS Floppy Nissen Fundoplication with Hiatal Repair: A Case Report; SISRN Gastroenterol. 2011;2011:347487. Epub 2011 Jul 3.
10. Day W, Lau P. Novel "glove" access port for single port surgery in right hemicolectomy: a pilot study; Surg Laparosc Endosc Percutan Tech. 2011;21(3):e145-7.
11. Kim WC, Lee JE, Kwon YS, Koo YJ, Lee IH, Lim KT. Laparo-endoscopic single-site surgery (LESS) for adnexal tumors: one surgeon's initial experience over a one-year period; Eur J Obstet Gynecol Reprod Biol. 2011;158(2):265-8. Epub 2011 May 26.
12. Lee YS, Kim JH, Hong TH, Lee IK, Oh ST, Kim JG, et al. Transumbilical single-port laparoscopic transabdominal preperito-neal repair of inguinal hernia: initial experience of single institute; Surg Laparosc Endosc Percutan Tech. 2011; 21(3):199-202.