



Case Report

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A Useful Maneuver to Install Pneumoperitoneum for Laparoscopy in a Frozen Abdomen: Case Report

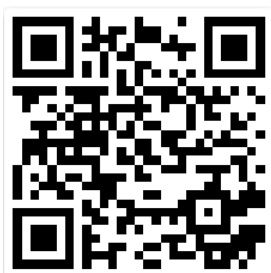
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Introduction: The presence of massive intraperitoneal adhesions known as frozen abdomen is a feared complication generated by multiple laparotomies and/or severe acute and chronic inflammatory processes. To prevent organ damage due to the adhesive process surgeons must use nontraditional approaches to install safely the pneumoperitoneum if a laparoscopic procedure has been chosen.

Material and Methods: A 44-year-old man underwent 2 emergency open laparotomies in 1999 after receiving 2 gunshot wounds and later, had a laparotomy and a colostomy closure with a satisfactory recovery.

Results: Nineteen years later he presented with subacute cholecystitis and an alternate right flank incision was made to install the pneumoperitoneum and a laparoscopic cholecystectomy was performed without incidents.

Discussion: The “blind” right flank puncture was successful, a limited pneumoperitoneum was created following which a laparoscopic cholecystectomy was carried out after an extensive lysis of adhesions.

Keywords: Peritoneal Adherences, Laparoscopy, Frozen Abdomen, Abdominal Complications, Abdominal Surgery, Peritonitis.

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Introduction

A very frequent complication of multiple abdominal surgeries, chronic pelvic inflammatory disease is the development of multiple postoperative adhesions, also known as a “frozen abdomen” (1), which is responsible for some of the most severe and lethal postoperative complications (2-4).

The safe installation of pneumoperitoneum is the most important step to perform every minimally invasive procedure and in such patients security

measures are of paramount importance, lest potentially serious complications may occur with or without the need of conversion to an open procedure (5). One of the most frequent and serious complications during this process is bowel laceration (s), especially with a previous midline laparotomy. (6,7) Several techniques using a Veress needle, a direct trocar insertion with / without a scope or with open technique access have been described (4-6).

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The case presented herein describes an alternate technique that was used successfully to install the pneumoperitoneum previous to the performance of a laparoscopic surgery in a patient with a “frozen abdomen”.

Materials and methods

Previous Clinical History:

MAMG, a 44-year-old male bodyguard underwent emergency surgery after receiving 2 gunshot wounds during an intent of abduction. After being resuscitated, an emergency laparotomy was performed and a massive hemoperitoneum and fecal material from 3 colonic lacerations were found, the cavity was irrigated and a loop colostomy in the left flank was constructed. The postoperative period was complicated with sepsis and he was reoperated on the 7th P.O. day and a purulent fecal peritonitis was found with abundant blood clots and irrigation and abdominal drainage

was done. Again, a septic febrile postoperative course was present on the 11th day and our group was consulted and the patient was transferred to our care.

After the patient was stabilized a 3rd laparotomy was performed. Several small pelvic and parietocolic abscesses were found and drained, the cavity was thoroughly cleansed, the colostomy was left in place. The patient presented a 39°C febrile peak in the 8th P.O. day and a CT Scan showed a 150 ml pelvic retrorectal presacral abscess. Because of the risks of a 4th laparotomy, and using a supine position, a postsacral incision was made (Figure 1) and the abscess and necrotic tissue were removed. The patient was discharged afebrile on the 2nd P.O. day, (the 21st day after the initial injury). Six weeks later, after mechanical cleansing of the colon, a colostomy closure was performed without complications and the patient was discharged in good postoperative status.



Figure 1. Postsacral incision used to drain a presacral abscess

Nineteen years later, the patient presented abdominal pain in the right upper quadrant and a subacute lithiasic cholecystitis was confirmed by an abdominal ultrasound.

Results

Given the obvious risks of another laparotomy and

with the patient consent, a 5 mm ENDOPATH XCEL (Ethicon, Machelen, Belgium) without a cutting tip was inserted through a previous 5 mm scar incision placed in the right flank with a pronounced Fowler position using a “blind” puncture (Figure 2).

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Figure 2. Right flank incision for insertion for the 5mm endopath XCEL.

The scope was carefully introduced, the “click” sensation was felt and a 5 mm scope was introduced. Through this initial incision, 200 cc of CO₂ were insufflated once the initial view revealed a successful puncture and a limited view of the peritoneal cavity was obtained (Figure 3). The rest of trocars - one 10 mm and two 5 mm-,

were placed in the usual manner under direct vision. Multiple adhesions were carefully sectioned with the use of a Bipolar Electrocautery (Karl Storz, Tuttlingen, Germany) and HARMONIC FOCUS+ Shears (Ethicon, Machelen, Belgium).

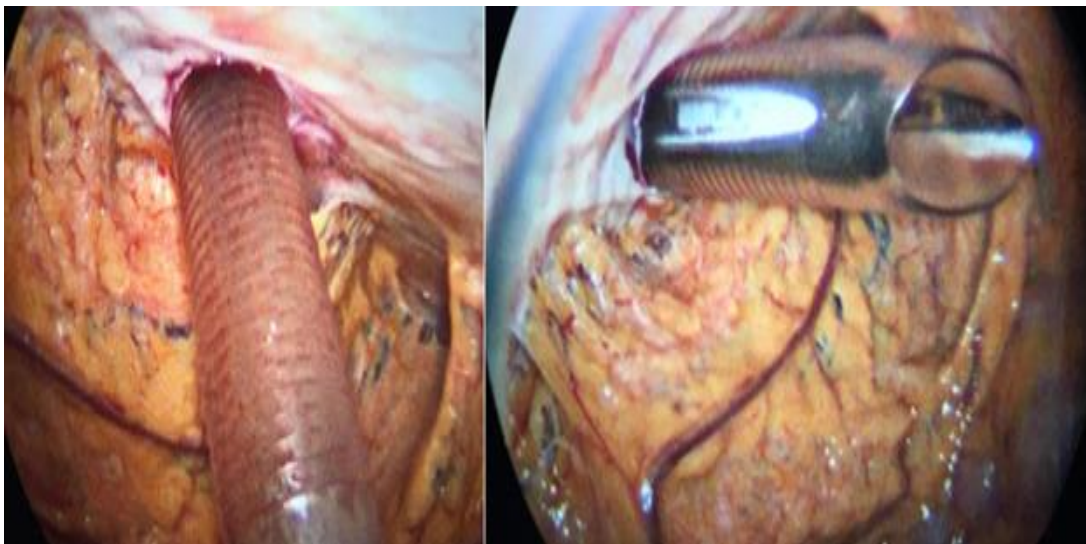


Figure 3. Intraoperative picture showing the 10mm trocar puncture near the umbilicus seen from the 1st lateral trocar (optical).

The surgical procedure was done without incidents once the gallbladder was liberated from extensive adhesions (Figure 4,5).

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Figure 4. Intraoperative picture showing multiple chronic adhesions, being carefully sectioned.



Figure 5. Intraoperative picture showing subacute lithiasic cholecystitis

Table 1. Classification scheme for the complexity of “open abdomen” (5).

| | |
|----|-----------------------------------|
| 1 | No fixation |
| 1A | Clean, no fixation |
| 1B | Contaminated, no fixation |
| 1C | Enteric leak, no fixation |
| 2 | Developing fixation |
| 2A | Clean, developing fixation |
| 2B | Contaminated, developing fixation |
| 2C | Enteric leak, developing fixation |
| 3 | Frozen abdomen |

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| | |
|----|---|
| 3A | Clean, frozen abdomen |
| 3B | Contaminated, frozen abdomen |
| 4 | Established enteroatmospheric fistula, frozen abdomen |

There were no complications and the pathology report revealed chronic lithiasic cholecystitis, negative for malignancy. The patient was discharged on the 3rd postoperative day and recovered satisfactorily. He has been followed for 4 years in the office and remains in excellent physical condition.

Discussion

Bonjer et al in 1997 compared in large series of patients the security of establishment the pneumoperitoneum by an open vs. a closed technique and found a 0.003 % less morbidity using the open technique, though there was no mortality in 489,335 procedures (5).

A patient presenting with a previous history of repeated complicated laparotomies and / or inflammatory intra-abdominal process, requires a careful, special approach due to the anticipated adhesive process (6,7). The risk increases the more abdominal surgeries were performed (RR 3.2, 95% CI: 1.2-8.7) and it is also frequent in pelvic gynecological interventions (3). Colorectal surgery is mentioned by some groups as the surgical procedure that causes most intra-abdominal adhesions, especially ileal pouch-anal anastomosis (6).

Peritoneal adhesions prevalence after open abdominal surgery is reported in 63-97%, and one third of these patients are readmitted within the next 10 years for several conditions related to Small Bowel Obstruction (3). Abdominal Small Bowel Obstruction is the most common complication of peritoneal adhesions, being the overall prevalence close to 4.6-9%, depending on the type of procedures and the patient's postoperative evolution (6-8).

The indication for a laparoscopic approach in a frozen abdomen must be made considering the possibility of postoperative complications already mentioned, and multiple factors have to be considered in this decision: the patient's previous medical history and anatomy, the surgeon's choice and experience of the surgical group, the

possibility of a present septic / inflammatory process and available resources among others (9). Non-conventional placement of ports in a new laparoscopic procedure may prevent visceral trauma and hemorrhage and/or contamination (1). This is the main reason why several authors proposed a new site for the initial port placement with what appears to be an adequate instrument to decrease the possibilities of visceral damage due to a blind puncture (10 -13).

The most common alternate initial puncture is the Hasson umbilical procedure done under direct vision with several modalities, and the results of reported complication rates are not better than the use of optical trocars or Verres needle establishing the pneumoperitoneum (14-19). In 1992, Perissat suggested the upper left abdomen initial trocar insertion for laparoscopic cholecystectomy in similar situations (18,19). Traditionally, once the initial puncture has been done successfully a limited pneumoperitoneum is established and a 3 or a 5 mm scope is inserted to document that such puncture has not produced any damage to the intraperitoneal viscera. It is then very important to take down the multiple adhesions very carefully to avoid bleeding and /or visceral lesions and then the rest of the trocars are inserted under direct vision (13).

We propose an alternative initial approach using a 5 mm optical trocar at the lateral axillary line, above the umbilicus, near to the right paracolic gutter, as a safety point of entry in this frozen abdomen far from the main scenario of multiple previous surgeries. This lateral approach has also been proposed for the initial access, because of the probability of less adhesions away from previous incisions, usually at midline; thereafter a 5mm scope allows to establish a limited pneumoperitoneum and then introduce the rest of trocars under direct vision -if possible one placed in the umbilicus-, avoiding any visceral or vascular laceration and then, using the appropriate instruments patiently taking down the adhesions, and finally continuing with the procedure as usual. The approach herein described thus allowed our

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surgical group to perform a laparoscopic cholecystectomy successfully in a hostile abdomen.

Choi et al describe an open subcostal approach with good results, (20). The so-called Stauffer technique proposes a para-umbilical/sub-costal optic port (21), but the inherent risk for epigastric vascular injury must be considered (22). Lessons learned from lateral entry (23) and laparoscopic ventral hernia repair consistently demonstrate just thin adhesions or even the lack of, near to the lateral peritoneal reflection (24).

In reference to the presacral retrorectal drainage of the residual abscess used during the first hospitalization, it must be mentioned that since 1884 Kraske (25) reported surgical procedures done through a similar approach for resection of the rectum and anal tumors known as the Kraske's technique (26,27), and it represents a simple quick and useful maneuver used by our group in a highly complicated abdomen. Other authors have reported different procedures using this approach (28,29).

Finally, in relation to the ostomy closure, although it has been usually considered that such closures should be carried out after the 2nd or 3rd postoperative months (30-31), new evidence reveals that an early closure is beneficial with excellent results primarily in young patients, reducing the patient's social and emotional burden (32,33).

Disclosures

Angel Martínez Munive has no conflict of interest. Jareth Lassard Rosenthal has no conflict of interest. María Sofía Tron Gómez has no conflict of interest. Jorge Cueto García has no conflict of interest.

Author Contributions:

Jorge Cueto García and Angel Martínez Munive performed the surgical procedure and were involved in the manuscript writing and review. Jareth Lassard Rosenthal and María Sofía Tron Gómez were involved in the manuscript writing and review.

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References

1. Kyriazanos ID, Manatakis DK, Stamos N, et al. Surgical Tips in Frozen Abdomen

Management: Application of Coliseum Technique. Case Report. Case Rep Surg. [serial online]. April 2015;309290. doi:10.1155/2015/309290.

2. López-Cano M, Pereira JA, Armengol-Carrasco M. Acute postoperative open abdominal wall: Nosological concept and treatment implications. *World J Gastroint Surg.* 2013;5(12):314-20. doi:10.4240/wjgs.v5.i12.314.
3. Fevang BT, Fevang J, Lie SA, et al. Long-term prognosis after operation for adhesive small bowel obstruction. *Ann Surg.* 2004;240(2):193-1. doi:10.1097/01.sla.0000132988.50122.de
4. Catarci M, Carlini M, Gentileschi P, et al. Major and minor injuries during the creation of pneumoperitoneum. A multicenter study on 12,919 cases. *Surg Endosc.* 2001 Jun;15(6):566-9. doi:10.1007/s004640000381.
5. Bonjer HJ, Hazebroek EJ, Kazemier G, et al. Open versus closed establishment of pneumoperitoneum in laparoscopic surgery. *Br J Surg.* 1997;84(5):599-2.
6. Van der Voort M, Heijnsdijk EA, Gouma DJ. Bowel injury as a complication of laparoscopy. *Br J Surg.* 2004 Oct;91(10):1253-8. doi:10.1002/bjs.4716.
7. Karayiannakis AJ, Polychronidis A, Perente S, et al. Laparoscopic cholecystectomy in patients with previous upper or lower abdominal surgery. *Surg Endosc.* 2004;18(1):97-1. doi:10.1007/s00464-003-9001-4.
8. Morais M, Gonçalves D, Bessa-Melo R, et al. The open abdomen: analysis of risk factors for mortality and delayed fascial closure in 101 patients. *Porto Biomed J.* 2018;3(2):e14,1-5. doi:10.1016/j.pbj.0000000000000014.
9. Kirkpatrick AW, Roberts DJ, De Waele J, et al. Intra-abdominal hypertension and the abdominal compartment syndrome: updated consensus definitions and clinical practice guidelines from the World Society of the Abdominal Compartment Syndrome. *Intensive Care Med.* 2013;39(7):1190-06. doi:10.1007/s00134-013-2906-z.
10. Arung W, Meurisse M, Detry O. Pathophysiology and prevention of postoperative peritoneal adhesions. *World J Gastroenterol* 2011;17(41):4545-53. doi:10.3748/wjg.v17.i41.4545.

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11. Köstenbauer J, Truskett PG. Current management of adhesive small bowel obstruction. *ANZ J Surg* 2018;88(11):1117-22. doi:10.1111/ans.14556.
12. Podda M, Khan M, Di Saverio S. Adhesive Small Bowel Obstruction and the six w's: Who, How, Why, When, What, and Where to diagnose and operate? *Scand J Surg.* 2021;110(2):159-69. doi:10.1177/1457496920982763.
13. Krishnakumar S, Tambe P. Entry complications in laparoscopic surgery. *J Gynecol Endosc Surg.* 2009;1(1):4-11. doi:10.4103/0974-1216.51902.
14. Philips PA, Amaral JF. Abdominal access complications in laparoscopic surgery. *J Am Coll Surg.* 2001;192(4):525-36. doi:10.1016/s1072-7515(01)00768-2.
15. Cueto GJ, Jacobs M., Chapter 28, Cholecystectomy, in: Cueto J, Jacobs M, Gagner M. *Laparoscopic Surgery.* New York: McGraw Hill, 2003:191-5.
16. Dunne N, Booth MI, Dehn TC. Establishing pneumoperitoneum: Verres or Hasson? The debate continues. *Ann R Coll Surg Engl.* 2011;93(1):22-4. doi:10.1308/003588411X12851639107557.
17. George R, Radhakrishna V, Mathew M, et al. Modified Hasson technique: a quick and safe entry of first port into the abdomen. *Int Surg J.* 2019;6(8):2802-5. doi:10.18203/2349-2902.isj20193087.
18. Périssat J, Collet D, Belliard R, et al. Laparoscopic cholecystectomy: The state of the art. A report on 700 consecutive cases. *World J Surg.* 1992;16:1074-82. doi:10.1007/BF02067064.
19. D'Allemagne B., Small Bowel Obstruction and Adhesiolysis, Chapter 40, In: Cueto J, Jacobs M, Gagner M. *Laparoscopic Surgery.* New York: McGraw Hill, 2003:301-3.
20. Choi SB, Han HJ, Kim WB, et al. The efficacy of subcostal-approach laparoscopic cholecystectomy in patients with previous midline incisions: comparative analysis with conventional laparoscopic cholecystectomy. *J Laparoendosc Adv Surg Tech A.* 2014;24(12):842-5. doi:10.1089/lap.2014.0117.
21. Tsamalaidze L, Permenter SL, Stauffer JA. Subcostal Trocar Approach Using Four 5- mm with Exclusive Removal (STAUFFER): An Efficient and Useful Technique for Laparoscopic Cholecystectomy. *J Laparoendosc Adv Surg Tech A.* 2018;28(3):311-9. doi:10.1089/lap.2017.0554.
22. Thomas MA, Rha KH, Ong AM, et al. Optical access trocar injuries in urological laparoscopic surgery. *J Urol.* 2003 Jul;170(1):61-3. doi:10.1097/01.ju.0000067622.2888675.
23. Palmer R. Safety in laparoscopy. *J Reprod Med.* 1974;13(1):1-5.
24. Sharma A, Mehrotra M, Khullar R, et al. Laparoscopic ventral/incisional hernia repair: a single centre experience of 1,242 patients over a period of 13 years. *Hernia.* 2011;15(2):131-9. Doi:10.1007/s10029-010-0747-z.
25. Agorastos S, Alex A, Feldman J, et al. Robotic resection of retrorectal tumor: An alternative to the Kraske procedure. *J Solid Tumors.* 2013 ;3(4):13–6. doi:10.5430/jst.v3n4p13.
26. Localio SA, Eng K, Ranson JH. Abdominosacral approach for retrorectal tumors. *Ann Surg* 1980;191(5):555-60. Doi: 10.1097/00000658-198005000-00006.
27. Anil Z., Araki K. & Gayet, B. Single-site laparoscopic approach of Kraske procedure for a presacral local recurrence of rectal adenocarcinoma. *Surg Endosc* 2016;30:2137–8. doi: 10.1007/s00464-015-4431-3.
28. Miller LE, Bhattacharyya R, Miller VM. Clinical Utility of Presacral Neurectomy as an Adjunct to Conservative Endometriosis Surgery: Systematic Review and Meta-Analysis of Controlled Studies. [serial online]. *Sci Rep.* 2020;10(1):6901. doi:10.1038/s41598-020-63966.w
29. Abild N, Bulut O, Nielsen CB. Endoscopic stapled marsupialisation of chronic presacral sinus following low anterior resection: a simple option in selected cases. *Scand J Surg.* 2012;101(4):307-10. doi:10.1177/145749691210100416.
30. Herrle F, Sandra-Petrescu F, Weiss C, et al. Quality of Life and Timing of Stoma Closure in Patients With Rectal Cancer Undergoing Low Anterior Resection With Diverting Stoma: A Multicenter Longitudinal Observational Study. *Dis Colon Rectum* 2016; 59(4):281-90. doi:10.1097/DCR.0000000000000545.
31. Sherman KL, Wexner SD. Considerations in Stoma Reversal. *Clin Colon Rectal Surg.*

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2017;30(3):172-7. Doi:10.1055/s-0037-1598157.

32. Menahem B, Lubrano J, Vallois A, et al Early Closure of Defunctioning Loop Ileostomy: Is It Beneficial for the Patient? A Meta-analysis. *World J Surg* 2018;42(10):3171-8. doi:10.1007/s00268-018-4603-0.
33. Clausen FB, Dohrn N, Hölmich ER, et al. Safety of early ileostomy closure: a systematic review and meta-analysis of randomized

controlled trials. *Int J Colorectal Dis.* 2021;36(2):203-12. doi10.1007/s00384-020-03761-1.

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