



# Brazilian Journal of Videoendoscopic Surgery

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## TROCAR, TROCATER OU TROCARTE?

To perform laparoscopy we need a practical and functional access for the insertion of endoscopic forceps and optics. It is not such a simple task, since during a laparoscopy the abdomen is distended using CO<sub>2</sub> under pressure. Since the earliest days of laparoscopy, when it was used only for diagnostic purposes, instruments were developed that would allow the passage of optics and of forceps into the cavity without loss of the pneumoperitoneum.

This instrument would have to be able to perforate and cut and be long enough to cross all the layers of the abdominal wall. Additionally, it should possess an adequate gas sealing system. They consist basically of two parts: **Sheath** (outer component with a channel for the introduction of the forceps with a valve system that prevents the escape of gas) and **Mandril** (inner component consisting of a cutting element to penetrate the abdominal wall during its introduction).<sup>(1)</sup> This specific instrument, consisting of sheath and mandril is commonly called *trocac*, *trocater* or *trocarte*.

They are mentioned in virtually every scientific article about laparoscopic procedures, because specifying the sites in where they are placed is fundamental to describing the surgical technique. The lack of a standardized spelling for these instruments, however, hampers the work of authors and editors.

The Houaiss and the new Aurelio Buarque de Holanda dictionaries do not use the word “trocac” to represent the instrument even though this spelling is widely used in English language laparoscopy books.

In Portuguese the word “trocac” means the act of effecting change and therefore should not be used to represent the laparoscopic instrument. The term “trocater” also does not appear in these two dictionaries.

If it existed, the plural in Portuguese would be “trocateres” which sounds awkward when spoken in Portuguese. The term “trocarte” is found in the Portuguese dictionary and is derived from the French term “trocart” which was used as early as 1694 to name this surgical instrument. It refers to a “cylindrical instrument that ends in a triangular tip which is used to puncture and remove fluid from a cavity. Others claim that the name of this instrument first appeared in 1706 and is an abbreviation of “troise-quarts”, an instrument with three perforating facets combined with a cannula, for abdominal puncture and the drainage of ascites. <sup>(2)</sup>

Therefore, authors and editors of Portuguese language articles and textbooks should give preference to the use of the spelling “trocarte” when referring to the laparoscopic instrument. For the plural usage, the rule in the Portuguese language for this type of word is to add an “s” at the end; thus, it should be written “trocates”.

## REFERÊNCIAS

1. Crispi et al. Tratado de Endoscopia Ginecológica e Cirurgia Minimamente Invasiva. Revinter, 2012.
2. Thompson CJ. The History and Evolution of Surgical Instruments. NY: Schuman's; 1942. p.89-93.

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## TROCAR, TROCATER OU TROCARTE?

Para a realização da laparoscopia necessitamos de um acesso prático e funcional para a inserção das pinças endoscópicas e ópticas. Não é uma tarefa tão simples, já que durante uma laparoscopia o abdome está distendido por CO<sub>2</sub>, sobre pressão. Desde os primórdios da laparoscopia, quando era usada apenas para fins diagnósticos, já foi desenvolvido um instrumental específico que permitisse a passagem das pinças e das ópticas para dentro da cavidade sem a perda do pneumoperitônio.

Esse instrumental teria que ser perfuro-cortante e longo o suficiente para ultrapassar todas as camadas da parede abdominal. Além disso, deveria possuir um sistema de vedação de gás adequado. São compostos basicamente de duas partes: **Bainha** (porção externa que possui um canal para introdução das pinças com um sistema valvulado que impede o escape do gás) e **Mandril** (porção interna constituída de elemento cortante para atravessar a parede abdominal durante sua introdução) (1). Esse instrumental específico, composto de bainha e mandril é comumente chamado de trocar, trocater ou trocarte.

Eles são citados em praticamente todos os artigos científicos sobre laparoscopia, pois os locais nos quais são colocados tem fundamental importância durante o ato operatório. Porém, a grafia não padronizada destes instrumentos dificulta o trabalho dos autores e dos editores.

O dicionário Houaiss (e o novo dicionário Aurelio Buarque de Holanda) não utiliza o termo “trocar” para representar esse instrumento (apesar desta

grafia ser utilizada em livros de laparoscopia na língua inglesa). O termo “trocar” em português significa o ato de efetuar troca e não deve ser usado para representar o instrumento laparoscópico. O termo trocater não está presente nos referidos dicionários. Se existisse, o plural seria trocateres, que não soa muito bem na língua portuguesa. O termo “trocarte” existe no dicionário e significa: “instrumento cilíndrico que termina por uma ponta triangular, usado em punções e na retirada de líquido de uma cavidade – vem da língua francesa “trocart” (1694 – instrumento de cirurgia). Outros afirmam que o nome deste instrumento surgiu em 1706 e é uma abreviação de “troise-quarts”, um instrumento com três facetas (perfurador) combinado com uma cânula, para a punção abdominal e drenagem da ascite (2).

Portanto, tantos os autores quanto os editores deveriam dar preferência para o uso da grafia “trocarte” para se referirem ao instrumento laparoscópico. No caso de se usar o plural, a regra na língua portuguesa é acrescentar o “s” no final deste tipo de palavra e, desta maneira, deve ser escrito “trocartes”.

## REFERÊNCIAS

1. Crispi et al. Tratado de Endoscopia Ginecológica e Cirurgia Minimamente Invasiva. Revinter, 2012.
2. Thompson CJ. The History and Evolution of Surgical Instruments. NY: Schuman's; 1942. p.89-93.

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# LESS - Practical and Technical Aspects

## LESS – Prática e Aspecto Técnico

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### ABSTRACT

**Introduction:** In recent years Laparoendoscopic Single-Site (LESS) cholecystectomy has emerged as a consensus technique between natural surgical access via the skin and a natural orifice, the umbilicus. Instruments are merged into a single incision. However, LESS surgery is hindered by a range of technical issues. **Objective:** To describe standardization of LESS cholecystectomy, with low cost and results similar to laparoscopic cholecystectomy (LapChol). **Technical Report:** Prospective randomized trial comparing LapChol and LESS. LESS portals were tested aiming to standardize the procedure. **Preliminary Results:** Forty-seven patients were operated using 10 and 5 mm optics, a clip applicator, and forceps through the portal. There were five conversions to conventional laparoscopy, no morbidity, and no deaths. Fifteen operations were performed without conversions with the final standardized configuration; the mean operative time for these 15 was 48 min. **Discussion:** LESS Cholecystectomy is a feasible procedure which requires the acquisition of fewer VL instruments. This standardized procedure is low-cost and achieves morbidity, operative and discharge times comparable to conventional VL Cholecystectomy.

**Key words:** SILS/ single site surgery. Cholecystectomy. Laparoscopic. Minimally Invasive. Trocar. LESS.

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### INTRODUCTION

Laparoscopic cholecystectomy (LC) is the gold standard for the treatment of cholelithiasis and is currently the most common indication for elective surgery. Familiarity with videolaparoscopic (VL) procedures, training, and the development of new materials has made the rapid expansion of these operations possible. The pursuit of minimal surgical impact, lower morbidity, and fewer complications continues to drive the development of even less invasive techniques, involving one, or even no incisions, in order to make the surgery feasible and its outcomes and complications comparable to those with LC.<sup>1</sup>

In recent years Laparoendoscopic Single-Site (LESS) cholecystectomy emerged as a consensus technique between natural surgical

access via the skin and a natural orifice, the umbilicus.<sup>2</sup> This technique includes a portal with multiple entries and flexible or adapted VL instruments merged into a single transumbilical incision approximately 3.0 cm in length. LESS leads to an excellent cosmetic result, with only one site of pain and potential infection and very low morbidity.<sup>3-5</sup> Several recent reports have demonstrated advanced procedures performed via LESS, including nephrectomy (including in renal transplantation), adrenalectomy, colectomy, and robotic surgeries.<sup>6-17</sup>

The objective of this article is to describe the surgical solutions and standardization of transumbilical LESS cholecystectomy which achieve surgical results similar to those obtained with conventional videolaparoscopic cholecystectomy.

## MATERIALS AND METHODS

In November 2008, a plastic conic prototype port was developed with an external opening of 15 cm and an internal opening of 3 cm for use in training boxes. Rigid and curved laparoscopic instruments were used for training with novel triangulation and reversed hands techniques. In April 2009, a single portal (SP) prototype was manufactured (Wom Industrias SRL, Argentina) along with 1.8-mm needle forceps for accessory puncture; this needle forceps, a new instrument, has a 5 mm tip, similar to that used in VL mounted inside the abdominal cavity.

In July 2009, a research project was proposed to the Post-Graduate Program of Surgical Sciences of the Federal University of Rio de Janeiro (UFRJ) to compare LC and LESS. Approval of the study protocol was obtained from the Ethics and Research Committee of UFRJ's Clementino Fraga Filho University Hospital. This prospective trial randomized twenty patients to LC and twenty patients to LESS. We compared the surgical results and measured pre- and post-operative polymerase chain reaction-t (PCR-t) and interleukin-6 (IL-6) levels, with the aim of quantifying the systemic inflammatory response.

The conventional VL and LESS portal instruments had been registered with and authorized by the appropriate federal regulatory agencies. A well standardized transumbilical LESS cholecystectomy procedure was used and the description of this standardized technique is the objective of this report.

### - Technical Considerations

LESS surgery at the umbilicus and another locations can be hindered by several technical issues.<sup>18,19</sup> Most of these issues have been addressed by the medical and surgical instrument industries. The acquisition of new specially-designed instruments however, adds significantly to the cost of LESS procedures. Brazilian surgeons faces an additional challenge; in some instances these instruments are not available for purchase or have not been licensed by the regulatory authorities.

### - The portals

LESS portals can be flexible or rigid, disposable or reusable, and are available in various lengths and diameters. These characteristics are all accompanied, to some degree, by problems of

ergonomics, attrition, and triangulation. For example, the maximum working range between the outside and inside openings (or rings) and the forceps should be sought; motion must be free/seek over all axes, including the diagonal. Separate entrances restrict this mobility, and if an external part is rigid, the triangulation will depend exclusively on instrument curvature or articulation. A too-long inner portion results in higher friction and restraint, and if it is rigid, a larger incision in the skin and aponeurosis will be required to insert it. A flexible inner part can be deformed to adapt to a smaller wall incision, and preferably be self-expanding, a small incision can be dilated, facilitating the sealing and anchoring of the single port (SP). Although more economical in the long term, it is difficult to construct permanent SPs from flexible composites.

### - Instrumentation

Classic LESS instrumentation includes a curved or flexible forceps, an optic, and a pincer for gallbladder traction; this fundus forceps creates tensile stiffness in the portal that immobilizes the entire system. There is also a workspace issue, since it is very difficult to manipulate two 10 mm instruments (for example, a clip applicator and an optic) through a single port. Acquiring the skill necessary to perform an inverted triangulation with one's hands crossed is challenging (Figure 1). One solution to these issues is to promote traction of the base of the gallbladder with an accessory instrument that can be inserted into the umbilicus via another punch in the aponeurosis a short distance from the SP. An even simpler solution is to place traction against the wall by placing a suture line in the intercostal space, an approach that we use routinely.<sup>20</sup> To avoid crossing hands, special curved pincers can be used (Figure 1).

## PRELIMINARY RESULTS AND EVOLUTION OF THE TECHNIQUE

Several pilot surgeries (prior to enrolling patients in the present study) were performed beginning in July 2009 to determine the ideal technical conditions and to acquire expertise in terms of instrument and procedure standardization. The original prototype, a permanent autoclavable device, had a surgical steel skeleton, a silicone-nylon coating, two 5 mm entries, and two 10 mm entries. During this pilot stage ten patients were operated on with a 10 mm 30° optic, a

10 mm clip applier, curved tweezers for traction on the base of the gallbladder (5 mm), and needle forceps in the right upper quadrant. The mean operative time was 135 min, and the mean skin incision size was 4.5 cm. No conversions, complications, or deaths occurred.

Difficulties encountered during the pilot stage while operating through a single port included friction, suboptimal ergonomics, partial deflation of the pneumoperitoneum, and the sometimes awkward interplay between the camera and the new triangulation. Nonetheless, with this prototype we were able to eliminate the needle forceps and simultaneously place four instruments into the SP: a 10 mm optic, tweezers for the surgeon's left and right hands, and curved forceps for fundal traction. In three cases, the surgeon experienced a substantial deterioration of operability – finding it virtually impossible to coordinate the optics, tweezers, and clip applicator – and opted for conversion to conventional laparoscopy. The mean operative time for these conversions exceeded 150 minutes.

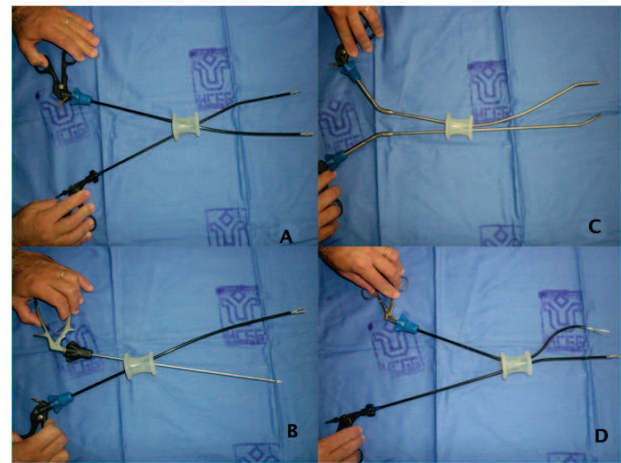
To address these limitations the traction forceps (at the fundus) was eliminated. Instead a needle puncture with a nylon suture was performed in the right costal margin through the gallbladder, retracting it to the abdominal wall and exposing the gallbladder pedicle. The second step was the change provided by the use of a 5 mm optic. Ten patients were operated with this configuration with an average operating time of 75 minutes; there were no conversions or deaths. Accessory 5 mm trocars were required in three cases: twice in the subxiphoid region for cholangiography, and once for ligation of the cystic duct with an external loop. All patients were discharged within 24 hours.

We also addressed the visibility of the 5 mm optic, which is worse than the 10 mm optic, but necessary when using a 10 mm clip applier. The procedure is rendered more comfortable with the usual High Definition (HD) laparoscopic image, combined with only two 5 mm instruments. So we changed the clip applicator to this size. Nine procedures were performed with this configuration. There were no conversions; the mean operative time was 67 minutes.

Maintaining the pneumoperitoneum during LESS is challenging. A partially or completely flexible portal brings mobility to the system, but allows deformations that disrupt the pneumoperitoneum. With a single connection, the maximum CO<sub>2</sub> flow is

approximately 17 L/min. To address CO<sub>2</sub> leakage, we used a 40-L insufflator mounted on a Y-shaped silicon tube set allowing two entries for CO<sub>2</sub>, which allowed more gas can be applied to compensate what was lost. (Figure 2)

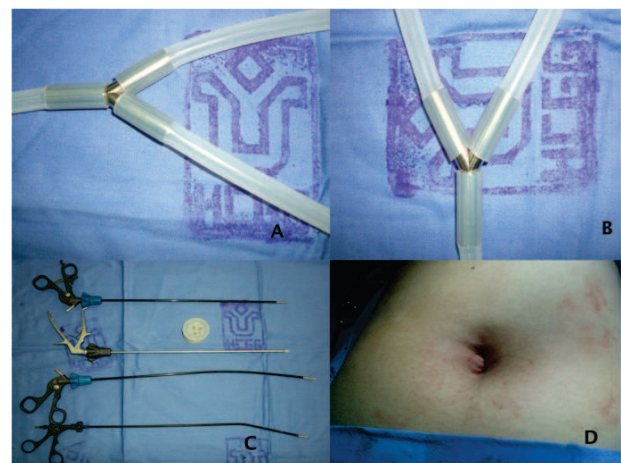
The final technical change to the apparatus was the use of only a curved forceps in the surgeon's left hand, presenting the gallbladder infundibulum, and traditional straight laparoscopy instruments (hook, Maryland, clip applicator, and suction canula) in the right hand. This configuration – which is very similar to the conventional laparoscopic platform – was comfortable and was used successfully in fifteen operations with no conversions. The mean operative time was 60.5 minutes.



**Figure 1**

*A and B - crossed hands*

*C and D - special curved instruments*



**Figure 2**

*A and B - Y-shaped silicon tube*

*C - curved forceps*

*D - cosmetic results*

In summary, this configuration consisted of a 10 mm 30° optic, curved forceps in the left hand, and a regular 5 mm instrument/instrumental (including clip applicator) in the right hand, with the gallbladder bottom retracted through the intercostal area. (Figure 2)

## DISCUSSION

We attempted to standardize the LESS cholecystectomy to make it more ergonomic and similar to LC. The proposed configuration requires only the adaptation of a low cost forceps, which must be curved. Single ports vary in price, but would not exceed the cost of multiple disposable LC portals. A full discussion of the advantages and disadvantages of LESS cholecystectomy is beyond the scope of this technical note, which is based on preliminary data.

We achieved comparable surgical times, return of diet, conversion rates, and discharge times.<sup>21-23</sup> LESS surgery has the advantage that conversion to conventional laparoscopy when necessary merely requires additional trocars. There are no technical reasons for considering LESS procedures unsafe; on the contrary, many studies refer to them as safer.<sup>24-29</sup>

The umbilical skin incision can be round, transverse or vertical, and made at supra, infra, or transumbilical sites. We chose the vertical transumbilical pathway because a wider skin incision can be obtained with better cosmesis (Figure 2). The umbilicus is an inverted cone shaped scar; when using the lower and upper parts symmetrically, a 3-4 cm skin incision can be made inside the umbilicus. Furthermore, a transumbilical incision permits rapid and effortless removal of the gallbladder and promotes synthesis of the aponeurosis.

The emergence of a new generation of single ports (Gelpoint®, Applied Medical, CA, USA, for example) represents both a breakthrough and a paradox. These portals are extremely flexible in the external and internal rings, can be adapted to smaller incisions, and can be expanded from 1.5 to 7.0 cm.<sup>30,31</sup> Paradoxically, these materials are very useful in procedures such as splenectomy, nephrectomy, and colectomy that require larger incisions in the skin and wall to extract the specimen. Unlike in VL, if this larger incision is made at the beginning of the procedure, it accommodates a wider portal and offers a larger work area and easier triangulation. We

anticipate that further development of LESS will highlight additional benefits and risks, and foster/accelerate new technological advances.<sup>32</sup>

## CONCLUSION

LESS is a feasible and viable procedure which requires acquisition of fewer VL instruments than the conventional procedures currently performed in general hospitals. The standardization reported here is low-cost and achieves surgical times, morbidity rates, and discharge times comparable to conventional VL.

## REFERENCES

1. Allemann P, Schafer M, Demartines N. Critical appraisal of single port access cholecystectomy. *British Journal of Surgery* 2010; 97: 1476-1480.
2. Canes D, Desai MM, Aron M, Haber GP, Goel RK, Stein RJ, Kaouk JH, Gill IS. Transumbilical single-port surgery: evolution and current status. *European Urology*. 2008; 54(5):1020-9.
3. Gill IS, Canes D, Aron M, Haber GP, Goldfarb DA, Flechner S, Desai MR, Kaouk JH, Desai MM. Single port transumbilical (E-NOTES) donor nephrectomy. *Journal of Urology*. 2008; 180(2):637-41; discussion 641.
4. Msezane LP, Mushtaq I, Gundeti MS, BJU International. An update on experience with the single-instrument port laparoscopic nephrectomy. 2009; 103(10):1406-9;
5. Aron M, Canes D, Desai MM, Haber GP, Kaouk JH, Gill IS. Transumbilical single- port laparoscopic partial nephrectomy. *BJU International*. 2009; 103(4):516-21.
6. Leroy J, Cahill RA, Peretta S, Marescaux J. Single port sigmoidectomy in an experimental model with survival. *Surgical Innovation*. 2008; 15(4):260-5.
7. Kaouk JH, Goel RK, Haber GP, Crouzet S, Stein RJ. Robotic single-port transumbilical surgery in humans: initial report. *BJU International*. 2009; 103(3):366-9.
8. Remzi FH, Kirat HT, Kaouk JH, Geisler DP. Single-port laparoscopy in colorectal surgery *Colorectal Disease*. 2008; 10(8):823-6.
9. Kaouk JH, Goel RK, Haber GP, Crouzet S, Desai MM, Gill IS. Single-port laparoscopic radical prostatectomy. *Urology*. 2008; 72(6):1190-3.
10. Bucher P, Pugin F, Morel P, Single port access laparoscopic right hemicolectomy. *International Journal of Colorectal Disease*. 2008; 23(10):1013-6.
11. Romanelli JR, Mark L, Omotosho PA. Single port laparoscopic cholecystectomy with the TriPort system: a case report. *Surgical Innovation*. 2008; 15(3):223-8.
12. Castellucci SA, Curcillo PG, Ginsberg PC, Saba SC, Jaffe JS, Harmon JD. Single port access adrenalectomy. *Journal of Endourology*. 2008; 22(8):1573-6.

13. Hirano D, Minei S, Yamaguchi K, Yoshikawa T, Hachiya T, Yoshida T, Ishida H, Takimoto Y, Saitoh T, Kiyotaki S, Okada K. Retroperitoneoscopic adrenalectomy for adrenal tumors via a single large port. *Journal of Endourology*. 2005; 19(7):788-92.
14. Gill IS, Canes D, Aron M, Haber G-P, Goldfarb DA, Flechner S, Desai MR, Kaouk JH, Desai MM. Single port transumbilical (E-NOTES) donor nephrectomy *J Urol* 2008; 180: 637-641.[comment]. Raman JD. *Journal of Urology*. 2009; 181(1):418-9; author reply 2009; 419.
15. Guo W, Zhang ZT, Han W, Li JS, Jin L, Liu J, Zhao XM, Wang Y. Transumbilical single-port laparoscopic cholecystectomy: a case report. *Chinese Medical Journal*. 2008; 121(23):2463-4.
16. Mutter D, Leroy J, Cahill R, Marescaux J. A simple technical option for single-port cholecystectomy. *Surgical Innovation*. 2008; 15(4):332-3.
17. Karpelowsky J, Numanoglu A, Rode H. Single-port laparoscopic gastrotomy. *European Journal of Pediatric Surgery*. 2008; 18(4):285-6.
18. Kravetz AJ, Iddings D, Basson MD, Kia MA. The learning curve with single-port cholecystectomy. *JSLs*. 2009; 13: 332-336.
19. Rao PP, Bhagwat SM, Rane A, Rao PP. The feasibility of single port laparoscopic cholecystectomy: a pilot study of 20 cases. *HPB(Oxford)* 2008; 10:336-340.
20. Tsai AY, Selzer DJ. Single-Port Laparoscopic Surgery. *Advances in Surgery*. 2010; 44:1-27.
21. Roberts KE, Solomon D, Duffy AJ, Bell RL. Single-incision laparoscopic cholecystectomy: a surgeon's initial experience with 56 consecutive cases and a review of the literature. *J Gastrointest Surg* 2001; 14: 506-510.
22. Kuon Lee S, You YK, Park JH, Kim HJ, Lee KK, Kim DG. Single-port transumbilical laparoscopic cholecystectomy: a preliminary study in 37 patients with gallbladder disease. *J Laparoendosc Adv Surg Tech A*. 2009; 19: 495-499.
23. Hodgett SE, Hernandez JM, Morton CA, Ross SB, Albrink M, Rosemurgy AS. Laparoendoscopic single site (LESS) cholecystectomy. *J Gastrointest Surg* 2009; 13: 188-192.
24. Connor S. Single-port-access cholecystectomy: history should not be allowed to repeat. *World J Surg*. 2009; 33: 1020-1021.
25. Curcillo PG II, Wu AS, Podolsky ER, Graybeal C, Katkhouda N, Saenz A et al. Single-port-access (SPA) cholecystectomy: a multi-institutional report of the first 297 cases. *Surg Endosc* 2010; 24: 1854-1860.
26. Erbella J Jr, Bunch GM. Single-incision laparoscopic cholecystectomy: the first 100 outpatients. *Surg Endosc* 2010; 24: 1958-1961.
27. Rivas H, Varela E, Scott D. Single-incision laparoscopic cholecystectomy: initial evaluation of a large series of patients. *Surg Endosc*. 2009; 24: 1403-1412.
28. Philipp SR, Miedema BW, Thaler K. Single-incision laparoscopic cholecystectomy using conventional instruments: early experience in comparison with the gold standard. *J Am Coll Surg* 2009; 209:632-637.
29. Romanelli JR, Roshek TB III, Lynn DC, Earle DB. Single-port laparoscopic cholecystectomy: initial experience. *Surg Endosc* 2010; 24: 1474-1379. β one of these is wrong
30. Merchant AM, Cook MW, White BC, Davis SS, Sweeney JF, Lin E. Transumbilical Gelport access technique for performing single incision laparoscopic surgery (SILS). *J Gastrointest Surg*. 2009; 13:159-162.
31. GelPOINT Access Platforms. Available from URL: [http://www.appliedmedical.com/Products/GelPoint\\_Overview.aspx](http://www.appliedmedical.com/Products/GelPoint_Overview.aspx) [accessed on 11/28/2011].
32. Vidal O, Valentini M, Espert JJ, Ginesta C, Jimeno J, Martinez A et al. Laparoendoscopic single-site cholecystectomy: a safe and reproducible alternative. *JLaparoendosc Adv Surg Tech A*. 2009; 19:599-602.

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# Ovarian Ablation as Adjuvant Therapy in Advanced Breast Cancer. Comparison Between Conventional and Single Port Laparoscopic Surgery at One Brazilian Oncology Center

## Ablação Ovariana como Terapia Adjuvante no Câncer de Mama Avançado. Comparação entre Laparoscopia Convencional e por Portal Único em Centro de Residência Oncológica no Brasil

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### ABSTRACT

**INTRODUCTION:** With the intra- and post-operative benefits of laparoscopic surgery compared to traditional open procedures well established, single port laparoscopic surgery has been increasingly employed because of its potential to reduce the morbidity of minimally invasive techniques. **OBJECTIVES:** compare variables such as surgical time, complications, and intraoperative bleeding in patients undergoing ovarian ablation performed by conventional and by single port laparoscopic surgery. **MATERIALS AND METHODS:** A prospective analysis of 44 women undergoing bilateral salpingo-oophorectomy, 25 of them by conventional laparoscopic and 19 by single-port access between March 2011 and April 2012 at the Barretos Cancer Hospital. **RESULTS:** Age, body mass index and intraoperative blood loss were comparable between the groups, mean blood loss in conventional laparoscopy: 28 ml versus 5 ml in single-port; median blood loss: 10 ml in traditional surgery vs. 2.5 ml in single port;  $p = 0.112$ ). The operative time was the only variable for which there was a statistically significant difference between groups: women who underwent traditional laparoscopy had longer surgical times (mean = 65 minutes in traditional laparoscopy vs. 40 minutes with single-port laparoscopy; median = 50 minutes in traditional laparoscopy vs. 30 minutes in single-port laparoscopy;  $p = 0.006$ ). **CONCLUSION:** Once beyond the learning curve, the shorter surgical time for single-port laparoscopy is a benefit of this new surgical approach for bilateral salpingo-oophorectomy for hormonal castration when compared to traditional laparoscopy.

**Key words:** Laparoscopy. Single site surgery. Single-port. Oophorectomy.

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### INTRODUCTION

Laparoscopic surgery has been gradually gaining support over open surgery due to advantages such as reduction of pain symptoms, quicker return to activities of daily living, better cosmetic results, and shorter hospital stays. It is believed that reducing the number of surgical trocars is possible and will increase the benefits of laparoscopic procedures.<sup>1</sup>

Although valued by patients and affirmed by several authors, the unquestionable esthetic benefit of single-port laparoscopic surgery is not the only and should not be seen as the principal rationale for this approach.<sup>5,6,10,11</sup> When intra-operative and immediate postoperative parameters of laparoscopic hysterectomy were compared with single-port laparoscopy (SPL) there were no significant differences, although less postoperative pain had

already been reported with the use of single trocar in cholecystectomy and in assisting in vaginal hysterectomy when compared with the use of more trocars.<sup>1, 12,13</sup>

The first single-port laparoscopic surgery reported was a tubal ligation performed in 1969<sup>2</sup> and in 1991 the first SPL hysterectomy was described, establishing the safety and effectiveness of this surgical approach.<sup>3</sup> Advances in laparoscopic instrumentation and techniques have permitted greater surgical versatility,<sup>4,5</sup> drawing attention to the potential advantages of single-port over traditional laparoscopic surgery.<sup>5</sup>

Whereas most complications of traditional laparoscopy occur with the placement of the first trocar, the need to insert the single-port device using Hasson's (open) technique constitutes an advantage over laparoscopy by puncture, which ensures greater safety for surgeons during procedure, especially in patients who have undergone previous abdominal surgeries.<sup>4,14</sup>

It is estimated that over 3,000 gynecological procedures have already been carried out using this new approach, which attests to its great suitability for such surgical procedures. Thus, the single-port approach is now considered suitable for hysterectomies, salpingo-oophorectomies and, more recently, in oncologic surgeries.<sup>5,8,15,16</sup>

The use of single-port laparoscopy in oophorectomies offers advantages such as facilitating the removal of adnexas through the same incision used to introduce the access device to the abdominal cavity. Furthermore, there is the proximity of the single umbilical trocar relatives to the adnexas, safety in the insertion of the trocar under direct view and psychological and esthetic benefits for women.<sup>4,6,8-10</sup>

Despite the advances, the disadvantages of this new route of access are still experienced routinely.<sup>1</sup> The restriction of surgical mobility of instruments that occurs due their proximity to one another prevents ideal triangulation causing inconvenience when using traditional (straight) laparoscopic forceps.<sup>1,4,5,9,15</sup> This difficulty makes the learning curve steeper.<sup>5</sup>

To evaluate the applicability of SPL as a new surgical approach in salpingo-oophorectomy in women with breast cancer requiring hormonal suppression, we analyzed the first 19 surgical castrations using this surgical approach and compared them with the same procedure performed by traditional laparoscopy, which was the surgical route used until that time in a surgical

oncology teaching center in the Brazilian state of São Paulo.

## MATERIALS AND METHODS

Data of patients undergoing bilateral salpingo-oophorectomy for advanced breast cancer between March 2011 and April 2012 at the Barretos Cancer Hospital were collected prospectively. The data collection instrument was a standardized form that was completed at the end of each surgery.

The criterion for use of SPL was temporal. Until August 2011 all salpingo-oophorectomies were performed by conventional laparoscopy. From then on SPL was introduced as the new surgical approach used by this service.

The surgeries were performed with a 30° optic, unarticulated (straight) forceps and bipolar type cautery.

All surgeries were performed by the gynecologic oncology team of the Barretos Cancer Hospital, composed of three or four surgeons, including one attending and two or three 3rd to 5th year surgical residents. In all surgeries, the residents performed the entire bilateral salpingo-oophorectomy procedure.

General anesthesia was used in all cases and all patients were placed in Trendelenburg on egg crate mattresses and Allen padded stirrups. Pneumoperitoneum was achieved with carbon dioxide inflating the abdominal cavity to a maximum pressure of 15 mmHg and a mean pressure of 12 mmHg.

The traditional laparoscopic salpingo-oophorectomy was performed with use of four trocars: one 10mm trocar in the umbilical scar and three 5mm trocars (right and left iliac fossa and supra-pubic). The surgical technique used followed the steps described below.

1. A 1.5 to 2 cm arciform incision is made in the umbilical scar
2. Veres needle puncture to establish the pneumoperitoneum using medical CO<sub>2</sub>.
3. Insertion of a 10mm umbilical trocar and then, under direct vision, three 5 mm trocars in both flanks and in the suprapubic region.
4. Suspension of the ovaries using clinch forceps and identification of each ureter by transparency in the peritoneum.
5. Cauterization and ligation of the pelvic infundibulum and broad ligament, laterally to medially,

1 cm below the uterine tube so that each ovary and uterine tube are delivered as a single specimen.

6. Placement of the specimens in “endobags”.

7. Specimens are withdrawn through the umbilical trocar incision.

8. Withdrawal of 5mm trocars under direct vision.

9. Deflation of the pneumoperitoneum and simultaneous withdrawal of the 10mm trocar and optic (while viewing hemostasis of the incision).

10. Suturing of the aponeurosis of the umbilical scar with 1 Vicryl and, continuous sutures of the skin with 4-0 Vicryl inverted intradermal sutures.

11. The patient is observed for 24 hours with a cotton compress over the operative wound.

The technique employed in single-port laparoscopy involves the following steps:

1. A 2.0 to 2.5 cm wide surgical opening to left at the umbilical scar is made by dissecting the planes under direct view and insertion of properly lubricated access device into the abdominal cavity with the aid of Mixer forceps.

2. Insertion of the optic through the largest (12mm) trocar; laparoscopic clinch forceps are placed through one 5mm trocar and the cautery is passed through by another 5mm trocar.

3. Suspension of the ovaries using clinch forceps and identification of each ureter by transparency in the peritoneum.

4. Cauterization and ligation of the pelvic infundibulum and broad ligament, laterally to medially, 1 cm below the uterine tube so that each ovary and uterine tube are delivered as a single specimen.

5. Placement of the specimens in “endobags”.

6. Grabbing the “endobags” with the clinch forceps

7. Withdrawal of the access device.

8. Withdrawal of the surgical specimens through the umbilical incision.

9. The aponeurosis is sutured with continuous 1-0 Vicryl sutures and the skin is sutured with inverted intradermal 4-0 Vicryl sutures

The intraoperative variables recorded included: blood loss, surgical time and intraoperative complications. All blood aspirated during the procedure was quantified in an appropriate collector bag at the end of surgery, before washing the cavity. The surgical time was measured from the insertion of the trocar until the placement of the final wound dressing.

Because these variables had values that do not follow a normal distribution, we chose to compare the medians by using the Mann-Whitney nonparametric test with p value significance set at < 0.05.

## RESULTS

We analyzed 44 women with advanced stage (III and IV) breast cancer referred by the Clinical Oncology Department of Barretos Cancer Hospital for surgical castration.

For 25 cases traditional laparoscopy was used; with the subsequent 19 cases SPL was used. The traditional laparoscopy and single-port laparoscopy groups were not statistically different with respect to mean age and body mass index (BMI).

No statistical difference was noted in median blood loss between the groups by the Mann-Whitney test (median = 10ml of for conventional laparoscopy and 2.5 ml with SPL;  $p = 0.112$ ). The average blood loss with traditional laparoscopy was 28 ml and 5 ml with single portal laparoscopy.

One of conventional laparoscopic procedures was converted to laparotomy due to injury of the external iliac artery, requiring arteriorrhaphy for correction. This was the only intraoperative complication observed in either group; this case was not excluded from our analysis.

According to the Mann-Whitney test, surgical time was significantly longer in the group that underwent conventional laparoscopy (median 50 vs. 30 minutes,  $p = 0.006$ ). The mean surgical time was 65 minutes for traditional laparoscopy and 40 minutes for the SPL. No postoperative complication was recorded in this series. The patients were discharged 12 to 24 hours after surgery.

## DISCUSSION

Currently there are several devices for single-port laparoscopy on the market. The safety and functionality of the equipment were found to be excellent when used for surgical castration, with virtually no limitations in terms of their feasibility as was reported in previous studies.<sup>9,10, 17</sup>

A review of the literature found studies that describe the applicability of SPL in oophorectomy in a total of 233 cases.<sup>4, 6, 8-10,16-19</sup> In only one study was there a comparison between salpingo-oophorectomy

by traditional laparoscopy and by SPL suggesting the benefits of the latter.<sup>19</sup>

With the 19 cases of single-port laparoscopic salpingo-oophorectomy we observed promising initial results. Even though the one complication in the traditional laparoscopy group contributed to this group's increase in average blood loss, it did not cause a statistically significant difference according to the Mann-Whitney test.

To date no complications have been reported with the use of SPL, and no patient required conversion to conventional laparoscopy or laparotomy.

The similar or prolonged surgical time required by SPL reported in earlier studies was not observed in our study; indeed the surgical time was shorter with SPL, and the difference was statistically significant. It is possible that the ease of removing the specimens from the cavity and closure of a single incision contributed to the shorter surgical time. Moreover, the studies that reported a longer surgical time with the use of SPL involved more complex procedures because most of the patients had adnexal lesions.<sup>4,8,9,19</sup>

Oophorectomy in patients without adnexal lesions is a procedure indicated primarily for surgical hormonal castration. The technical simplicity of the procedure ensures a quick learning curve when compared with the literature, both for surgeons already familiar with traditional laparoscopy, and for surgical oncology residents with incipient laparoscopic experience. Surgeons already familiar with conventional laparoscopy apparently have fewer difficulties adapting to this new modality, requiring around 15 cases to achieve proficiency.<sup>9,10,20,21</sup>

In previous studies, the participation of residents, when described, was limited to minor supportive roles.<sup>4</sup> In our study, the execution of the entire surgery by residents did not increase the rate of complications nor the operative time. While the use of three trocars in the traditional laparoscopic procedure is appropriate and feasible, in order to better aid the residents and avoid intraoperative complications four trocars were used.

Articulated forceps may facilitate the execution of single trocar surgeries, but the high cost

of such equipment hinders universal implementation. It is believed that the experience of the surgeon can overcome the technical difficulties of carrying out SPL with traditional forceps when the surgical indication is compatible with this surgical approach.<sup>1</sup>

In this study we used traditional laparoscopic forceps and not articulated forceps designed specifically for SPL. The difficulty presented by the proximity of forceps was overcome by the technique of apprehension and traction of the structures (ovaries and uterine tubes) to be resected, maintaining one forceps static, and with the other hand in carrying out horizontal movements/motions for the cauterization and resection of the structures. This simple maneuver greatly facilitated the procedure.

The device used in our SPL surgeries is available in the domestic (Brazilian) market at an accessible cost, roughly the same cost as a set of three 5 mm trocars. The low reimbursement paid by the National Health System (known as the *Sistema Único de Saúde* or SUS) for salpingo-oophorectomy hinders the large scale implementation of SPL in Brazil's public healthcare system.

Only one prior study specifically evaluated oophorectomy indicated for surgical castration,<sup>18</sup> but without a control group. Our study highlights the safe application of SPL in salpingo-oophorectomies by demonstrating a transition from traditional laparoscopy to this new surgical approach without the occurrence of perioperative complications. Its application in a teaching setting by surgical residents, moreover with the benefit of shorter operative time, demonstrates the rapid learning of this technique when the clinical team is already familiar with traditional laparoscopy. Randomized studies and larger cohorts are needed to validate these findings.

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## RESUMO

**INTRODUÇÃO:** Uma vez consolidados os benefícios intra e pós-operatórios da cirurgia laparoscópica tradicional em relação à cirurgia aberta, a cirurgia laparoscópica por portal único vem sendo cada vez mais empregada por apresentar potencial de reduzir ainda mais a morbidade das técnicas minimamente invasivas. **OBJETIVOS:** comparação de variáveis como tempo cirúrgico, complicações e sangramento intraoperatórios entre pacientes submetidas à ablação ovariana realizada por laparoscopia convencional e por portal único. **MATERIAIS E MÉTODOS:** coleta prospectiva de dados de 44 mulheres submetidas à salpingooforectomia bilateral, sendo 25 delas por via laparoscópica convencional e 19 por portal único entre o período de março/2011 a abril/2012 no Hospital de Câncer de Barretos. **RESULTADOS:** As variáveis: idade, índice de massa corporal e perda sanguínea intra-operatória foram semelhantes entre os dois grupos (média de idade=41 anos;  $p=0,722$ ; média de IMC=27;  $p=0,787$ ; média de sangramento na laparoscopia: 28 ml; portal único= 5ml; mediana da laparoscopia = 10ml e do LPU 2,5ml;  $p=0.112$ ). Foi observada diferença estatística significativa apenas no tempo cirúrgico que foi maior no grupo que realizou laparoscopia convencional (média de 65 minutos na laparoscopia vs. 40 minutos no portal único e mediana de 50 minutos na laparoscopia vs. 30 minutos no portal único  $p=0.006$ ). **CONCLUSÃO:** Após atingido a curva de aprendizado da cirurgia por portal único, acredita-se que se pode fazer a mesma com um menor tempo quando comparada a laparoscopia tradicional, sugerindo assim benefício desta nova via de acesso cirúrgica para a salpingo-ooforectomia bilateral visando castração hormonal.

**Palavras chave:** Laparoscopia. Portal único. Ooforectomia.

## REFERENCES

- Jung YW, Lee M, Yim GW, Lee SH, Paek JH, Kwon HY, et al. A randomized prospective study of single-port and four-port approaches for hysterectomy in terms of postoperative pain. *Surg Endosc* 2011; 25(8):2462-9.
- Wheless CRA A rapid, inexpensive, and effective method of surgical sterilization by laparoscopy. *J Reprod Med* 1969; 5:255.
- Pelosi MA, Pelosi MA III Laparoscopic hysterectomy with bilateral salpingo-oophorectomy using a single umbilical puncture. *N J Med* 1991; 88:721-726.
- Lim MC, Kim TJ, Kang S, Bae DS, Park SY, Seo SS. Embryonic natural orifice transumbilical endoscopic surgery (E-NOTES) for adnexal tumors. *Surg Endosc* 2009; 23(11):2445-9.
- Jung YW, Kim SW, Kim YT. Recent advances of roboticsurgery and single-port laparoscopy in gynecologic oncology. *J Gynecol Oncol* 2009; 20:137-144.
- Takeda A, Imoto S, Mori M, Nakano T, Nakamura H. Isobaric laparoendoscopic single-site surgery with wound retractor for adnexal tumors: a single center experience with the initial 100 cases. *Eur J Obstet Gynecol Reprod Biol* 2011; 157(2):190-6.
- Romanelli JR, Earle DB. Single-port laparoscopic surgery: an overview. *Surg Endosc* 2009; 23(7):1419-27.
- Fader AN, Escobar PF. Laparoendoscopic single-site surgery (LESS) in gynecologic oncology: technique and initial report. *Gynecol Oncol* 2009; 114(2):157-61.
- Kim WC, Lee JE, Kwon YS, Koo YJ, Lee IH, Lim KT. Laparoendoscopic 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.
- Escobar PF, Bedaiwy MA, Fader AN, Falcone T. Laparoendoscopic single-site (LESS) surgery in patients with benign adnexal disease. *Fertil Steril* 2010; 93: 2074 e 7-10.
- Zhu JF Scarless endoscopic surgery: NOTES or TUES. *Surg Endosc* 2007; 21:1898-1899.
- Tsimoyiannis EC, Tsimogiannis KE, Pappas-Gogos G, Farantos C, Benetatos N, Mavridou P, et al. Different pain scores in single transumbilical incision laparoscopic cholecystectomy versus classic laparoscopic cholecystectomy: a randomized controlled trial. *Surg Endosc* 2010; 24:1842-1848.
- Chen YJ, Wang PH, Ocampo EJ, Twu NF, Yen MS, Chao KC. Single-port compared with conventional laparoscopic-assisted vaginal hysterectomy: a randomized controlled trial. *Obstet Gynecol* 2011; 117(4):906-12.
- Wang PH, Yen MS, Yuan CC, Liang SC, Lin JY Incarcerated hernia in a 5-mm cannula wound. *J Am Assoc Gynecol Laparosc* 2001; 8:449-452.
- Tsai AY, Selzer DJ. Single-port laparoscopic surgery. *Adv Surg* 2010; 44:1-27.
- Park HS, Kim TJ, Song T, Kim MK, Lee YY, Choi CH, et al. Single-port access (SPA) laparoscopic surgery in gynecology: a surgeon's experience with an initial 200 cases. *Eur J Obstet Gynecol Reprod Biol* 2011; 154(1):81-4.
- Song T, Kim TJ, Kang HJ, Choi CH, Lee JW, Bae DS, et al. Single-port access laparoscopic surgery using a novel laparoscopic port (Octo-Port). *Taiwan J Obstet Gynecol* 2011; 50(4):436-40.
- Escobar PF, Starks DC, Fader AN, Barber M, Rojas-Espalliat L. Single-port risk-reducing salpingo-oophorectomy with and without hysterectomy: surgical outcomes and learning curve analysis. *Gynecol Oncol* 2010; 119(1):43-7.
- Ichikawa M, Akira S, Mine K, Ohuchi N, Iwasaki N, Kurose K, et al. Evaluation of laparoendoscopic single-site

- gynecologic surgery with a multitrocar access system. J Nihon Med Sch 2011; 78(4):235-40.
20. Kolkman W, Wolterbeek R, Jansen FW. Implementation of advanced laparoscopy into daily gynecologic practice: difficulties and solutions. J Minim Invasive Gynecol 2006; 13:4-9.
21. Frumovitz M, Ramirez PT, Greer M, et al. Laparoscopic training and practice in gynecologic oncology among Society of Gynecologic Oncologists members and fellows-in-training. Gynecol Oncol 2004; 94: 746-753.

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# Pelvic Exenteration: Review of Conventional Technics and Advantages of Laparoscopic Approach

## Exenteração Pélvica: Revisão de Literatura da Técnica Convencional e as Vantagens da Abordagem Laparoscópica

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### ABSTRACT

**Objective:** The study aims a literature review of pelvic exenteration conventional cancer treatment and possible advantages associated with the laparoscopic approach. **Background:** Pelvic exenteration was initially described for the treatment of advanced cervical cancer and involves the removal of the female genitalia in conjunction with the bladder or rectum. Currently, this operation recommended for the treatment of various pelvic malignancies, both primary and persistent, or recurrent. Laparotomy has been the approach of choice, however, with the increasing development and experience in laparoscopy, a new field of advanced procedures in oncology has been developed. **Discussion:** Pelvic exenteration may be the only chance of cure for some patients with local recurrence after primary surgery, radiotherapy and chemotherapy. It is a safe and effective when performed by a multidisciplinary team. Larger studies are needed to confirm the benefits of laparoscopic pelvic exenteration as a safe surgical option, but recent data are promising.

**Key words:** surgical procedures in gynecology, pelvic exenteration, cancer of the female genitals, laparoscopy.

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### INTRODUCTION

Pelvic exenteration is the radical surgical treatment that removes the female genital organs such as the uterus, fallopian tubes, vagina, and in some cases the vulva, together with the bladder or rectum.<sup>1</sup> It has been indicated for the treatment of various pelvic malignancies, both primary and persistent, or even recurrent.

Although pelvic exenteration was initially described for the treatment of advanced cervical cancer, this operation has been recommended for the treatment of various tumors, including those of the bladder and rectum. In special situations, it may also be indicated for the treatment of ovarian cancer or,

occasionally, to correct complex fistulas after radiation therapy.<sup>2,3</sup>

Gynecologic cancers that persist or recur after primary treatment have unfavorable prognoses and limited therapeutic options. Patients who experience recurrence after surgical treatment are generally treated with sensitizing chemotherapy and radiation therapy. For those who relapse after chemoradiation, however, radical surgery may be the only chance for cure or local control of the disease. Historically, has been the method of choice.<sup>4,5</sup>

With the growing experience in laparoscopy, a new field of advanced procedures in oncology has developed. The first series comparing laparoscopy and laparotomy in pelvic exenteration and its

immediate reconstruction have had a limited number of cases, but demonstrated an absence of significant adverse effects.<sup>6-8</sup>

## CLASSIFICATION AND TECHNIQUES

Brunschwig first described a multi-visceral pelvic resection for the treatment of advanced pelvic neoplasms in 1948.<sup>2</sup> Once the exenteration was completed, a phase of reconstruction follows, which at that time was performed by a terminal cutaneous ureterosigmoidostomy. A priori, this procedure was considered palliative and was little used at the time, due to its significant morbimortality. The complications most frequently described were recurrent pyelonephritis and ureteral stenosis. Nevertheless, during the next 20 years, with significant improvements in operative technique and postoperative and supportive care, as well as more selective indications, this therapeutic modality resurfaces with curative intent, for both locally advanced pelvic malignancies and isolated pelvic recurrence. It may offer satisfactory control of symptoms and a five-year survival rate of ~20% to 60%.<sup>2, 9-13</sup>

Pelvic exenteration is classified as anterior, posterior, and total. In anterior exenteration the resection of the female genitals is performed as a monoblock with the lower urinary tract (bladder and urethra).<sup>2,4,12,14</sup> One of the remarkable advances with this type of surgery has been the urinary reconstruction technique which, in the early days, had high rates of morbidity. In 1950, Bricker described a new technique, which uses a segment of the ileum to make a cutaneous ureteroileostomy. This reconstruction greatly reduces metabolic complications and infections of the cutaneous ureterosigmoidostomy previously advocated by Brunschwig.<sup>2</sup> It is still the gold standard for reconstruction of the urinary tract at most gynecologic oncology referral centers.<sup>13</sup>

Recent studies have demonstrated that the implementation of new surgical techniques with continent urinary diversion, even in previously irradiated patients, achieve results – especially with regard to renal function – comparable to those obtain with the classic Bricker technique.<sup>15</sup>

The use of the cecum as a continent urinary diversion was first described in 1908 by Verhoogen, but Rowland, Bejany and Thuroff, in the 1980s, refined and popularized the ileocolonic pouch (Miami pouch). Other variants have been described, such as the ileal

pouch (Kockpouch) and the supracecal colonic continent urostomy. The ileocolonic pouch was widely adopted because it is easy to perform, has low reoperation rates, and higher continence rates when compared to other techniques. Constructing a neobladder with an ileal conduit is not recommended. Pelvic exenteration encompasses structures that should be preserved during this procedure, such as the anterior vaginal wall, urethra, pubo-urethral ligaments, and the endopelvic fascia. The high risk of urinary fistulas after pelvic irradiation and the high rate of recurrence of gynecologic malignancies, argue against it.<sup>13,16</sup>

For the posterior exenteration, the resection of the female genitals is performed together with rectosigmoid. The exenteration can be subdivided into supralelevator or infralelevator procedures depending on whether the sphincter apparatus is preserved. With supralelevator exenteration the pelvic floor is preserved, enabling an end-to-end anastomosis. In the infralelevator technique, the sphincter apparatus, anus, the lower portion of the vagina, vulva, and perineum are resected, requiring a Hartman colostomy.

Total pelvic exenteration entails the simultaneous performance of anterior and posterior exenterations.<sup>2,4,14</sup> In these cases reconstruction can be carried out to create two stomata: a Bricker urostomy, located in the right flank, and a Hartman colostomy in the left flank. An alternative is creating a single stoma using a loop of sigmoid colon with implantation of the ureters into the distal segment, called a “wet colostomy”.

## Laparoscopic Pelvic Exenteration

It has been demonstrated that laparoscopy can be accomplished in these situations and when associated with a combined vaginal approach, it is even more feasible.

The benefits of laparoscopic exenteration include less blood loss, less postoperative pain and adhesion formation, earlier ambulation, and a more favorable aesthetic result.

The mean duration of hospitalization for the laparoscopic procedures did not, however, differ when compared with the length of stay for the conventional technique. The justification is that the duration of the hospitalization was not associated with the size of the surgical incision, but rather with the pelvic trauma caused by the dissection and with the post-operative care required because of the urinary diversion and colostomy.<sup>6-8</sup>

In a series of 16 cases, Puntambekar (2006), reported a mean blood loss of 200 ml (range 100-500 ml), less pain and fewer postoperative adhesions, earlier ambulation, and a better aesthetic result.<sup>8</sup> Ferron (2006), in five cases, like Puntambekar, had blood loss of less than 500 ml. In Ferron's small series, however, the duration of the hospitalization for the laparoscopic technique and for laparotomy were comparable.<sup>6</sup>

As part of the preoperative evaluation for pelvic exenteration, especially when total pelvic exenteration is planned or possible, vaginal reconstruction should be discussed with the patient. Such discussions are associated with better postoperative satisfaction, increased self-confidence, and continuity of sexual function in more than 50% of cases. The use of a myocutaneous flap derived from the rectus abdominis is the most widely used technique, with anatomical and functional restoration and complete filling of the dead space in the pelvic cavity.<sup>17-20</sup>

Laparoscopy has limited the number of techniques for vaginal reconstruction, with the omentum flap and the sigmoid loop procedures most frequently used to create a neovagina.<sup>6</sup>

### Limits of Pelvic Exenteration

A review of the literature encompassing 932 patients who had undergone pelvic exenteration found that this surgery was not well tolerated by individuals with limiting comorbidities. Emotional stability and a positive attitude are essential, as are good family and psychological support.<sup>2,11,21</sup>

Physical, psychological and social disorders inherent to the procedure are quite common. Studies show that fear, depression, and lack of self-confidence due to changes in body image, are most frequent psychological consequences. Neovagina reconstruction directly influences these psychological changes, and can offer many benefits.<sup>18</sup>

Although obesity and advanced age were considered relative contraindications for the procedure, other medical conditions such as arterial vascular invasion, bilateral ureteral involvement, invasion of nerve structures (sciatic nerve and sacral structures) or lymph node metastases distance have been considered formal contraindications to this type of surgery.<sup>2, 11,21</sup>

Höckel described a technique of pelvic exenteration with lateral extension, indicated in neoplastic recurrence with invasion of pelvic wall. In this initial series of 36 cases, the five-year survival rate was 49%. Viera et al. evaluated 100 patients with recurrent tumors with lateral extension who underwent resection. At follow-up averaging 30 months, 62% showed no recurrence. The morbidity rate, however, was 70%.<sup>4</sup>

## DISCUSSION

Pelvic exenteration remains the only chance for cure for patients with local recurrence after initial surgery, irradiation and chemotherapy. It is a safe and effective option when performed by a multidisciplinary team. When tumor recurrence occurs, the patient's understanding of the situation is of utmost importance. Whenever possible, patients should be encouraged to participate in support groups with patients who have gone through similar experiences and can convey the consequences of the procedure.<sup>12,19</sup>

Studies involving a larger number of cases are needed to confirm the benefits of laparoscopic pelvic exenteration as a safe surgical option.<sup>7</sup> The case series studied to date suggest that laparoscopy is a promising and feasible therapeutic modality, despite the high complexity of the procedure and the long learning curve.

## RESUMO

**Objetivo:** O estudo realizado teve como objetivo uma revisão bibliográfica da exenteração pélvica convencional e as possíveis vantagens associadas à técnica laparoscópica. **Síntese Histórica:** A exenteração pélvica foi descrita inicialmente para o tratamento do câncer do colo uterino avançado e consiste na remoção dos órgãos genitais femininos em conjunto com a bexiga ou o reto. Atualmente, esta operação tem sido indicada para o tratamento de diferentes neoplasias pélvicas, tanto primárias quanto persistentes, ou ainda recorrentes. A laparotomia é a abordagem de eleição, porém, com o crescente desenvolvimento e experiência em laparoscopia, um novo campo de procedimentos avançados em oncologia vem sendo desenvolvido. **Discussão:** A exenteração pélvica pode ser a única possibilidade de cura para algumas pacientes com recorrência local após cirurgia primária, radioterapia e quimioterapia. É uma opção segura e eficaz, quando realizada por uma equipe multidisciplinar. Estudos mais amplos são necessários para confirmar as vantagens da exenteração pélvica laparoscópica como uma opção cirúrgica segura, mas os dados recentes são promissores.

**Descritores:** procedimentos cirúrgicos em ginecologia, exenteração pélvica, neoplasias dos genitais femininos, laparoscopia.

## REFERENCES

1. Wikipédia: a enciclopédia livre. 2008. [http://pt.wikipedia.org/wiki/Exenteração\\_pélvica](http://pt.wikipedia.org/wiki/Exenteração_pélvica). Accessed on August 20, 2011.
2. Costa SRP, Antunes RCP, Lupinacci RA. A exenteração pélvica para tratamento da neoplasia pélvica localmente avançada e recorrente: experiência de 54 casos operados. *Einstein*. 2008; 6(3): 302-10
3. Kecmanovic DM, Pavlov MJ, Kovacevic PA, Sepetkovski AV, Ceranic MS, Stamenkovic AB. Management of advanced pelvic cancer by exenteration. *European Journal of Surgical Oncology*. 2003 Aug; 29:743-746
4. Vieira SC, Costa DR, Meneses AD, Silva JB, Oliveira AKS, Souza RB. Exenteração pélvica para câncer do colo uterino recidivado pós-radioterapia: experiência de um centro terciário do Nordeste brasileiro. *Ver Bras Ginecol Obstet*. 2009; 31(1):22-7
5. Ho YH, Cheng C, Tay SK. Total pelvic exenteration: results from a multispecialty team approach to complex cancer surgery. *Int Surg*. 2001 Apr-Jun; 86(2):107-11
6. Ferron G, Querleu D, Martel P, Letourneur B, Soulié M. Laparoscopy-assisted vaginal pelvic exenteration. *Gynecol Oncol*. 2005 Oct 24; 100: 551-555.
7. Pomel C, Rouzier R, Pocard M, Thoury M, Sideris L, Morice P, Duvillard P, Bourgain JL, Castaigne D. *Gynecol Oncol*. 2003 Mar 24; 91: 616-618.
8. Puntambekar S, Kudchadkar RJ, Gurjar AM, Sathe RM, Chaudhari YC, Agarwal GA, Rayate NV. Laparoscopic pelvic exenteration for advanced pelvic cancers: a review of 16 cases. *Gynecol Oncol*. 2006 Sep;102(3):513-6.
9. Costa SRP, Teixeira ACP, Lupinacci RA. A exenteração pélvica para o câncer de reto: avaliação dos fatores prognósticos de sobrevida em 27 pacientes operados. *Ver Bras Coloproct*. 2008; 28(1): 7-18.
10. Chiva LM, Lapuente F, González-Cortijo L, González-Martín A, Rojo A, García JF, Carballo N. Surgical treatment of recurrent cervical cancer: state of the art and new achievements. *Gynecol Oncol*. 2008 Sep; 110 (3 Suppl 2): S60-6. Epub 2008 Jul 21
11. Instituto Ciências da Saúde – ICS/FUNORTE – Montes Claros/MG. 2011. [http://www.spr.org.br/jpr2011\\_resumos/1005/1005.swf](http://www.spr.org.br/jpr2011_resumos/1005/1005.swf). Accessed on August 11, 2011.
12. Roos EJ, Graeff A, Eijkeren MA, Boon TA, Heintz APM. Quality of life after pelvic exenteration. *Gynecol Oncol*. 2004 Apr 9; 93: 610-614
13. Karsenty G, Moutardier V, Lelong B, Guiramand J, Houvenaeghel G, Delperro JR, Bladou F. Long-term follow up of continent urinary diversion after pelvic exenteration for gynecologic malignancies. *Gynecol Oncol*. 2005 Mar 17; 97: 524-528.
14. Fotopoulou C, Neumann U, Kraetschell R, Schefold JC, Weidemann H, Lichtenegger W, Schouli J. Long-term clinical outcome of pelvic exenteration in patients with advanced gynecological malignancies. *J Surg Oncol*. 2010 May 1; 101(6):507-12
15. Spahn M, Weis C, Bader P, Frohneberg D, Studer UE, Burkhard FC. The role of exenterative surgery and urinary diversion in persistent or locally recurrent gynecological malignancy: complications and survival. *Urol Int*. 2010; 85(1):16-22. Epub 2010 Mar 17
16. Silver DF, Ashwell TR. Choices in creating continent urostomies following pelvic exenteration for gynecologic malignancies. *Gynecol Oncol*. 2001 Mar 1; 82: 510-515
17. Mirhashemi R, Averette HE, Lambrou N, Penalver MA, Mendez L, Ghurani G, Salome E. Vaginal reconstruction at the time of pelvic exenteration: a surgical and psychosexual analysis of techniques. *Gynecol Oncol*. 2002 Sep 6; 87: 39-45
18. Goldberg GL, Sukumvanich P, Einstein MH, Smith HO, Anderson PS, Fields AL. Total pelvic exenteration: the Albert Einstein College of Medicine/Montefiore Medical Center Experience (1987 to 2003). *Gynecol Oncol*. 2006 May;101(2):261-8
19. Berek JS, Howe C, Lagasse LD, Hacker NF. Pelvic exenteration for recurrent gynecologic malignancy: survival and morbidity analysis of the 45 year experience at UCLA. *Gynecol Oncol*. 2005 Jul 28; 99:153-159
20. Nguyen DQA, McGregor AD, Freitas O, Carr ND, Beynon J, El-Sharkawi AMM, Lucas MG. Exenterative pelvic surgery – eleven year experience of the Swansea pelvic oncology group. *European Journal of Surgical Oncology*. 2005 Aug 26; 31:1180-1184
21. Ferenschild FT, Vermaas M, Verhoef C, Ansink AC, Kirkels WJ, Eggemont AM, de Wilt JH. Total pelvic exenteration for primary and recurrent malignancies. *World J Surg*. 2009 Jul; 33(7):1502-8.

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# Initial Two-Year Experience with Laparoscopic Colorectal Surgery in a Service in Salvador, Bahia, Brazil: A Critical Analysis

## Experiência Inicial de Dois Anos em Cirurgia Colorretal Videolaparoscópica em um Serviço em Salvador: Uma Análise Crítica

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### ABSTRACT

Introduction: Since the first reports by Jacobs in 1990, colorectal surgery is increasingly performed via videolaparoscopic access, shortening hospital stays, and offering patients better esthetic results, less postoperative pain, and an earlier resumption of their work and leisure activities. Objective: to report a case series of a team using videolaparoscopic access. Methods: Retrospective, descriptive study cases performed from April 2010 to May 2012 in Salvador, Bahia, Brazil. Results: 81 procedures were analyzed, 59.3% of the patients were female. Mean age was 58.3 years. Benign disorders were treated in 48.1% of the cases. Rectosigmoidectomy was performed in 41.5% and right colectomy in 21% of cases. The intraoperative complication rate was 3.7%; the postoperative rate 21%. The conversion rate was 6.2%. Conclusions: Videolaparoscopic procedures are safe and the training of the surgeons has yielded better results in this case series.

**Key words:** Laparoscopic colorectal surgery. Colectomy. Laparoscopic.

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### INTRODUCTION

Since 1990, when the first videolaparoscopic surgical procedures of the colon were performed by Moises Jacobs,<sup>1</sup> the feasibility of this approach has become well established. In 1992, Regadas et al<sup>2</sup> marked the beginning of use of this surgical approach in Brazil. The good outcomes with reduction in the duration of hospital stays, earlier return to normal activities, better cosmetic results, and less postoperative pain have led to an increase in the number of laparoscopic resections. Data published in the literature have demonstrated results comparable to conventional colectomy in the treatment of colorectal cancer.<sup>3,4,9,19</sup> Mastering this technique requires good training of the surgeon in the operative techniques and the special instruments to be used.<sup>5-8</sup> To date, there is limited data reported in the literature about laparoscopic

colorectal surgery performed in the Brazilian state of Bahia.

### OBJECTIVE

Present and analyze the initial case series – accumulated over two years – of a surgical team that uses laparoscopic access in the treatment of colorectal diseases.

### METHODS

This retrospective, descriptive study was conducted at the Santa Izabel Hospital in Salvador, Bahia by reviewing the database of the surgical service for the period from April 2010 to May 2012. We included all patients who underwent laparoscopic colorectal surgery in this period.

The variables studied included age, gender, length of the hospitalization in days, procedure performed, the type of condition treated, complications, and reason for the conversion. The data were collected and analyzed using version 17.0 of the Statistical Package for the Social Sciences (SPSS) for Windows.

## RESULTS

Of a total of 81 laparoscopic colorectal procedures performed, 48 (59.3%) were in female patients and 33 (40.7%) were male patients (Figure 1). The mean age was 58.2 years (range 1-88 years). The mean duration of hospitalization was 5.78 days, and ranged from 1 to 31 days. Brazil's public health system paid for 17.3% of the procedures; 82.7% were reimbursed by private health plans.

48.1% of the patients treated with the laparoscopic approach had benign disease. The frequency distribution of the benign pathologies were diverticular disease (19.8%), rectal prolapse (2.5%), megacolon (3.7%), and colonic polyposis (14.8%). Malignancies constituted 51.9% of the cases and were distributed as follows: 18.5% were located in the rectum, 7.4% in the sigmoid colon, 6.2% were in the cecum and descending colon, 1.2% in the anal canal and synchronous disease, and 2.5% in the transverse colon, and 8.6% in the ascending colon. (Figure 2)

Malignancies constituted 51.9% of the cases and were distributed as follows: 6.2% were in the cecum and ascending colon, 2.5% in the transverse colon, 8.6% in the descending colon, 7.4% in the sigmoid colon, 18.5% in the rectum, and 1.2% in the anal canal and synchronous disease.

Figure 3 presents the frequency distribution of the 81 laparoscopies procedures performed: 40.7% were rectosigmoidectomies, followed by right colectomy at 21%, total colectomy at 9.9%, left colectomy at 7.4%, Milles' surgery at 4.9%, Duhamel's surgery at 4.9%, transversectomy at 3.7%, sacro-promontory fixation of the rectum and bowel reconstruction each accounting for 2.5%, and total proctocolectomy at 1.2%.

Complications occurred in 24.7% of cases; 3.7% were intraoperative and 21% post-operative. Intraoperative complications included an opening of the bladder wall, due to an advanced tumor of the cecum, which was corrected with simple suture repair; and a small bowel injury due to adhesion of the ileum to a rectal tumor.

Postoperative complications included three instances of dehiscence of an anastomosis (3.7% of the 81 patients). One occurred on the third postoperative day in a patient with Crohn's Disease who underwent right colectomy for cancer of the cecum, requiring another procedure to reinforce the suturing. Another dehiscence occurred after a total colectomy with a latero-lateral ileorrectal anastomosis. Two patients (2.5%) presented with an intra-abdominal abscess; both were resolved by drainage guided by interventional radiology. Respiratory infections and ileus occurred in 6.2% and 7.4% respectively, and we reported one case (1.2%) of postoperative pulmonary embolism (Figure 4).

In this series, there were five (6.2%) conversions, four because of peritoneal adhesions, and one (1.2%) for CO<sub>2</sub> retention at the beginning of the surgical procedure, which was converted immediately.

There were two deaths (2.4%), one due to an episode of bronchoaspiration on the third postoperative day resulting in respiratory failure, and the

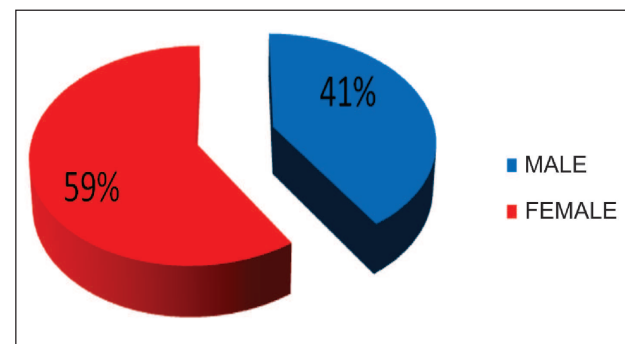


Figure 1 – Frequency Distribution by gender.

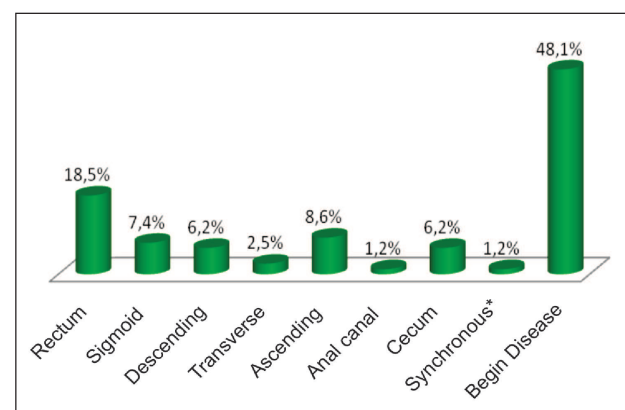


Figure 2 – Location of the tumor.

\*synchronous colorectal carcinomas

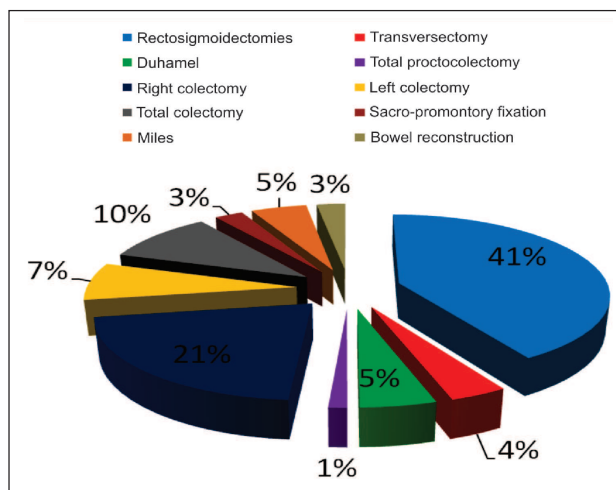


Figure 3 – Procedures performed.

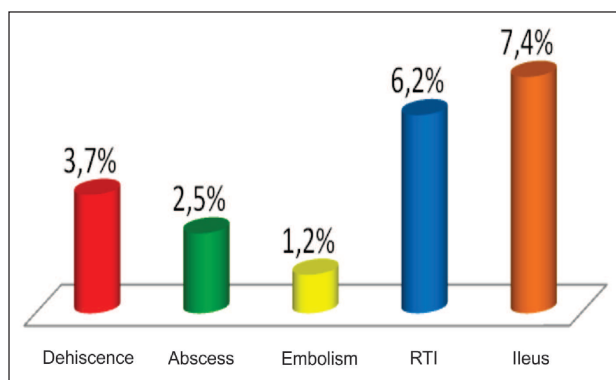


Figure 4 – Postoperative complications.  
RTI = Respiratory Tract Infection

second due to a respiratory infection which evolved to multi-organ and system failure.

## DISCUSSION

Laparoscopic Colorectal Surgery may be performed on all patients regardless of their age or gender. Published studies have demonstrated benefits of the laparoscopic approach. Most of these published studies involve patients with benign disease; in our initial series such patients constituted 48.1% of cases. Patients undergoing surgery for treatment of cancer accounted for 51.9%. All oncologic measures used in open surgery were maintained, such as ligation of the artery at its origin, removal of the surgical specimen with protection of the abdominal wall and fixation of the trocars.

In relation to the literature, we note the study of Queiroz and cols.<sup>10</sup> that reported 42.5% of patients

who underwent laparoscopic colorectal surgery in the state of Minas Gerais were operated for cancer. A female predominance was observed in all studies presented.

There are several benefits of laparoscopic colorectal surgery. Among them is a shorter hospital stay; Regadas et al<sup>5</sup> reported a mean duration of hospitalization of 4.3 days, quite close to the average in our series.

As for the procedures performed, Campos et al, in a national survey, reported rectosigmoidectomy was the most frequently performed at 40.7%, identical to our study (also 40.7%), followed by the right colectomy at 8%. In our series right colectomies represented 21% of the case volume.

The complication rate reported in the literature – as presented by Campos et al<sup>7</sup> and Regadas et al.<sup>5</sup> – varies from 8% to 29.6%. Our series had a complication rate of 24.7%, and an intraoperative complication rate of 3.7%, somewhat lower than range in the literature of 5.1% to 14%.<sup>5</sup>

Regarding postoperative complications, it is clear that there are differences among the publications reviewed, ranging from 14.7% reported by Bennett et al.,<sup>11</sup> and reaching 29.6%, as reported in a national survey in 2001. In Regadas et al's series of 102 cases,<sup>12</sup> the complication rate approached 24.5%, very similar to our rate of 21%. But in a new survey by the same author, with 401 cases,<sup>5</sup> there was a decline in the complication rate to 17%, demonstrating a reduction in the complication rate as the case series grew.

The mortality rate described in the literature ranges from zero to five percent; our mortality was 2.4%. Of the two deaths reported in our series, one was a patient with COPD who had an episode of vomiting on the third postoperative day, aspirated, and evolved to respiratory insufficiency. The second case was also a smoker who developed CO<sub>2</sub> retention at the onset of the pneumoperitoneum progressing to respiratory insufficiency and death.

Given that the conversion rates reported in the literature include a 6% rate reported by Lumlet et al,<sup>13</sup> 7.9% reported by Boulez et al,<sup>14</sup> and 9% reported by Coelho et al,<sup>4</sup> our conversion rate of 6.2% was quite close to these rates.

## CONCLUSION

It may be noted that the videolaparoscopic colorectal procedures have proven safe, permitting

oncologic resections, shorter hospital stays, less postoperative pain, and better cosmetic results. With the surgeon's training and team training, the complications and surgical time tend to improve.

Future studies building on the experience of this case series are needed to provide a national perspective and in order to stimulate new teams to undertake the laparoscopic treatment of colorectal diseases.

## RESUMO

**Introdução:** A cirurgia colorretal videolaparoscópica tem se tornado um via de acesso viável, desde o início de 1990, por Jacobs. Tem-se obtido redução dos dias de internamento, retorno precoce as atividades, melhor resultado estético e menor dor pós-operatória. **Objetivo:** relatar a casuística de uma equipe utilizando o acesso videolaparoscópico. **Matérias e métodos:** Estudo retrospectivo, descritivo realizado em Salvador, de abril de 2010 a maio de 2012. **Resultados:** 81 procedimentos foram analisados, com 59,3% do sexo feminino, média de idade de 58,3 anos. Tratado doença benigna em 48,1% dos pacientes. A retossigmoidectomia foi realizada em 40,7% e a colectomia direita em 21%. Das complicações encontradas 3,7% foram transoperatórias e 21% pós-operatórias com uma taxa de conversão de 6,2%. **Conclusão:** O procedimento videolaparoscópico tem-se mostrado seguro e a capacitação do cirurgião tem trazido melhores resultados na casuística.

**Descritores:** Cirurgia laparoscópica colorretal. Colectomia. Laparoscopia.

## REFERENCES

1. Jacobs M, Verdeja JC, Goldstein HS. Minimally invasive colon resection (laparoscopic colectomy). *Surg Laparosc Endosc* 1991; 1(3):144-50.
2. Regadas FSP; Nicodemo AM; Rodrigues LV; Garcia JHP; Nobrega AGS. Anastomose colorretal por via laparoscópica – apresentação de dois casos e descrição da técnica operatória. *Rev Bras Coloproct.* 1992; 12: 21-23.
3. Regadas FSP, Ramos JR, Souza JV, Neto JA, Gama AH, Campos F, Pandini LC, Marchiori M, Cutait R, Neto JÁ, Neto TS, Regadas SM. Laparoscopic colorectal procedures: a multicenter brazilian experience. *Surg Laparosc Endosc Percut Tech* 1993; 9: 295-98.
4. Coelho JCU; Pinho RV; Macedo JJM; Andriquetto PC; Campos ACL. Colectomia laparoscópica: revisão retrospectiva de 120 casos. *Rev Col Bras Cir.* 2009; 36(2): 144-147.
5. Regadas FSP; Regadas, SMM; Rodrigues LV; Lima, D; Regadas Filho, FSP; Cirurgia laparoscópica. Experiência com 401 casos. *Rev Bras Videocir.* 2005; 3(4): 191-195
6. Habr Gama A; Análise crítica das intervenções laparoscópicas sobre o colon. In: *Videocirurgia C.B.C. São Paulo. Robe Editorial* 1993: 277-389
7. Campos FG; Souza Jr AH; Carmel APW, Habr-Gama A, et al. Cirurgia laparoscópica colo-retal: resultados do inquérito nacional brasileiro. *Rev Bras Coloproct* 2001; 21(3): 135-143.
8. Araujo SEAR; et al. Conversão em cirurgia laparoscópica colorretal. *Rev Bras Coloproct* 2003; 23(10): 47-52.
9. Campos FG. Perspectiva e vantagens da videocirurgia no tratamento do câncer colo-retal. *Rev Bras Videocir* 2004; 2(1): 39-42.
10. Queiroz FI, et al. Resultados do Registro de Cirurgias Colorretais videolaparoscópicas realizadas no estado de Minas Gerais – Brasil de 1996-2009. *Rev Bras Coloproct.* 2010; 30(1): 61-67.
11. Bennett CL; Stryker SJ, Ferira MR et al. The learning curve for laparoscopic colorectal surgery. Preliminary results from a prospective analysis of 1194 laparoscopic-assisted colectomies. *Arch Surg.* 1997; 132(7): 781.
12. Regadas FSP, Rodrigues LV, Nicodemo AM, Siebra JA. Intervenções colorretais videolaparoscópicas. Experiência de 102 casos. *Rev Bras Coloproct.* 1995; 15(3): 110-113.
13. Lumley JW, Fielding GA, Nathanson LK, Siu S, Stitz RW. Laparoscopic assisted colorectal surgery. Lessons learned from 240 consecutive patients. *Dis Colon Rectum.* 1996; 39(2): 155-9.
14. Boulez J, Espalineu P, Fontaumard E, Meeus P. Laparoscopic colorectal surgery analysis of 113 cases. *Hepatogastroenterology.* 1997; 44(13): 40-4.
15. Shah PR, Joseph A, Haray PN. Laparoscopic colorectal surgery: learning curve and training implications. *Postgrad Med J* 2005; 81: 537-540.
16. Senagore AJ, Delaney CP. A critical analysis of laparoscopic colectomy at a single institution: lessons learned after 1000 cases. *The American J of Surg* 2006; 191: 377-380.
17. Reis Neto JA, Quilici FA, Cordeiro F, Pinto OL, Reis Jr JA. Cirurgia videolaparoscópica colorretal. *Rev Bras Coloproct* 1995; 15(2): 58-64.
18. Pedroso AMG, Marubayashi L, Gori R, Pedroso MA, Lupinacci RA. Aspectos relevantes da anestesia na videocirurgia colorretal. *Rev Bras Coloproct.* 2007; 27(3): 284-287.

19. Melani AGF, Campos FG. Ressecção laparoscópica pos terapia neoadjuvante no tratamento do câncer no reto médio e baixo. Rev Bras Coloproct, 2006; 26(1): 89-96.
20. Souza Jr AHS, Scanavini Neto A, Habr-Gama A. Acesso vídeo-laparoscópico no tratamento cirúrgico da diverticulite aguda. Rev Bras Coloproct. 2006; 26(3): 341-347.
21. Valarini R, Campos FGCM. Resultados do registro nacional brasileiro em vídeo-cirurgia colorretal- 2007. Rev Bras Coloproct. 2008; 28(2): 145-155.
22. Souza JVS. Visão atual da cirurgia colorretal laparoscópica. Rev Bras Coloproct. 1996; 16(3): 151-54.

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# Laparoscopic Treatment of Deep Infiltrating Endometriosis of the Intestine - Technical Aspects

## Tratamento Cirúrgico de Endometriose Profunda Infiltrativa Intestinal por Laparoscopia - Aspectos Técnicos

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### ABSTRACT

Surgery remains the best long-term treatment for deep infiltrating endometriosis affecting the bowel. Several surgical procedures (rectal shaving, mucosal skinning, discoid resection, and segmental bowel resection) have been performed with heterogeneous outcomes. In this article we discuss the indications of each procedure as well as the technical details.

**Key words:** Deep infiltrating endometriosis. Laparoscopy. Surgery. Colorectal. Bowel.

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### INTRODUCTION

Endometriosis is a chronic inflammatory disease characterized by the growth of stroma and/or endometrial glands in areas outside the endometrial cavity. The prevalence of endometriosis in women of reproductive age is estimated at about 10%.<sup>1</sup> Infiltrative forms of the disease, called **deep infiltrating endometriosis (DIE)**, are responsible for painful symptoms whose intensity is correlated to the depth of lesions<sup>2</sup> and seem to affect about 20% of women with endometriosis.<sup>3</sup>

One of the basic characteristics of DIE is the multifocal pattern of distribution of lesions, which is of fundamental importance in both the diagnosis and treatment of the disease. There is a “preference” of the disease for the posterior pelvic compartment (uterosacral ligaments, retrocervical region, posterior vaginal fornix, rectosigmoid and ureter) over the anterior pelvic compartment (round ligament, anterior uterine wall/anterior peritoneal reflection, and bladder) and the remainder of the abdomen (small bowel, omentum, right colon and appendix).<sup>4,5</sup> In addition, there is a direct association between the presence of cystic lesions of

endometriosis in the ovary (ovarian endometrioma) and DIE.<sup>6</sup>

Intestinal DIE is defined as a lesion of endometriosis that infiltrates at least the muscularis propria layer of the intestinal wall<sup>7</sup> and has great preference for the rectosigmoid.<sup>5,8,9</sup> There appears to be intestinal involvement in about 45% to 56% of patients with DIE<sup>5,8</sup> and 57.1% of women with ovarian endometrioma.<sup>6</sup> When it affects the rectosigmoid colon, the intestinal involvement usually occurs by contiguity and, over time, successive inflammatory processes triggered by cyclic bleeding of the lesions promote the “infiltration” of the lesion into the intestinal wall. Some characteristic findings of DIE in intestinal imaging are due this pathophysiological process, which promotes proliferation of the smooth muscle tissue and a fibrotic reaction, resulting in the formation of a solid **nodule**.<sup>10</sup>

The high rate of intestinal involvement by DIE has lead to the popularization and ongoing improvement of surgical techniques used to address this disease. In this article we describe in detail the surgical principles and operative tactics used by our group when approaching intestinal DIE.

## PRE-OPERATIVE DIAGNOSIS

The preoperative evaluation of patients with endometriosis begins with a good history and a thorough physical examination.

Symptoms that should raise suspicion of the likely presence of the endometriosis include dysmenorrhea, dyspareunia, and chronic pelvic pain. Beside these, it is important to investigate digestive symptoms and menstrual or peri-menstrual urinary symptoms. In a retrospective study, FAUCONNIER and cols.<sup>11</sup> demonstrated that painful symptomatology was specific to an anatomic site or organ affected by the DIE implant.

Dyspareunia was associated with DIE involving the uterosacral ligaments; painful bowel movements during menstruation were associated with DIE involving the posterior wall of the vagina; non-cyclic pelvic pain and functional bowel symptoms were associated with intestinal involvement; and functional urinary symptoms were associated with DIE involvement of the bladder. In a prospective study of CHAPRON and cols.<sup>12</sup> observed that painful defecation during menses and severe dyspareunia are specifically related to the presence of DIE compromising the posterior pelvic compartment.

Recently, BALLESTER and cols.<sup>13</sup> have shown that there is also an increased incidence of urinary symptoms in women with posterior DIE and that parametrial involvement is associated with changes in urinary function. In the case of intestinal DIE, there is greater likelihood of the presence of symptoms such as cyclic painful defecation, cyclical constipation, and longer evacuation time.<sup>14</sup>

These symptoms, however, may be absent; thus infiltrative lesions should be sought in all women who present with complaints of severe dysmenorrhea that alter their quality of life significantly (causing them to miss work, school, etc.) or that require use of potent analgesics. The questioning of patients regarding menstrual history during adolescence can identify markers associated with DIE.<sup>15</sup> Patients with DIE have a positive family history of endometriosis, increased absenteeism from school during menstruation, and greater use of oral contraceptives for the treatment of severe primary dysmenorrhea.

The physical examination is a fundamental step in the preoperative evaluation of deep endometriosis lesions (Figure 1). On vaginal examination, one looks for a zone that is hardened, retracted, and extremely



**Figure 1** - Speculum examination showing an endometriotic gland in the posterior vaginal fornix.

tender in the posterior fornix of the vagina and/or in the topography of the uterosacral ligaments. One should assess the volume and limits (inferior, posterior, and lateral) of the lesion. On rectal examination, one must determine the relationships between the lesion and the wall of the rectum, assessing the mobility of the layers of the rectal wall.

Vaginal examination alone, however, may be insufficient to accurately detect endometriosis prior to laparoscopy. The use of transvaginal pelvic ultrasound, performed by a well-trained radiologist, improves the diagnostic accuracy of the examination, especially in patients with ovarian endometrioma or DIE involving the uterosacral ligaments, the bladder, or the rectosigmoid.<sup>16</sup> Several studies have shown that transvaginal pelvic ultrasound is of utmost importance for the preoperative mapping of endometriosis involving the ovaries, the region retrocervical region, or the rectosigmoid.<sup>6,8,10,16-19</sup>

The objective of preoperative imaging, therefore, is to map more precisely the areas affected by the disease, identifying especially those lesions that affect the gastrointestinal and urinary tracts. Specifically in the case of intestinal DIE lesions, the preoperative mapping should contain the following information:<sup>10,18,19</sup>

- size of the lesion;
- the depth of infiltration of the lesion in the layers of the intestinal wall;
- distance of the lesion from the anal verge;
- percentage of intestinal circumference involved;
- presence of multifocal lesions.

Ultrasonography of the urinary tract is also indispensable during the preoperative evaluation of bulky (> 30 mm) retrocervical DIE lesions and of lateral DIE lesions to exclude ureteral involvement by the disease.<sup>20,21</sup>

Some authors<sup>22,23</sup> have shown that magnetic resonance imaging (MRI) of the pelvis with opacification of the vagina and rectum with ultrasound gel has a high sensitivity for detection of DIE lesions. In our experience, MRI is important for assessing ovarian endometriomas and multifocal intestinal DIE lesions; it does not, however, replace ultrasound. The depth of infiltration of a lesion in the intestinal wall is best assessed by ultrasonography (Figure 2).

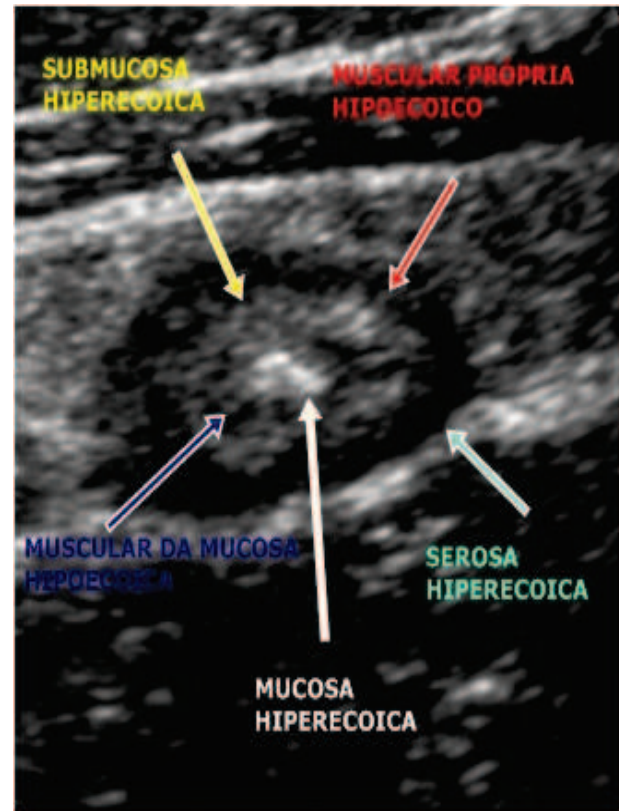
Some groups have experience with the use of barium enema as part of the preoperative evaluation and surgical planning of patients with intestinal DIE,<sup>24</sup> but transvaginal pelvic ultrasound has a higher sensitivity in detecting the presence of posterior DIE lesions.<sup>25</sup>

As the predilection of the DIE implants is for the outer layers of the intestinal wall,<sup>26</sup> colonoscopy – which better evaluates the mucosa of the intestine – has a limited role in identifying intestinal DIE lesions. Still, colonoscopy may be able to identify extrinsic compression by deep endometriosis nodules and involvement of the intestinal mucosa in cases with complete infiltration of all intestinal layers (Figure 3).

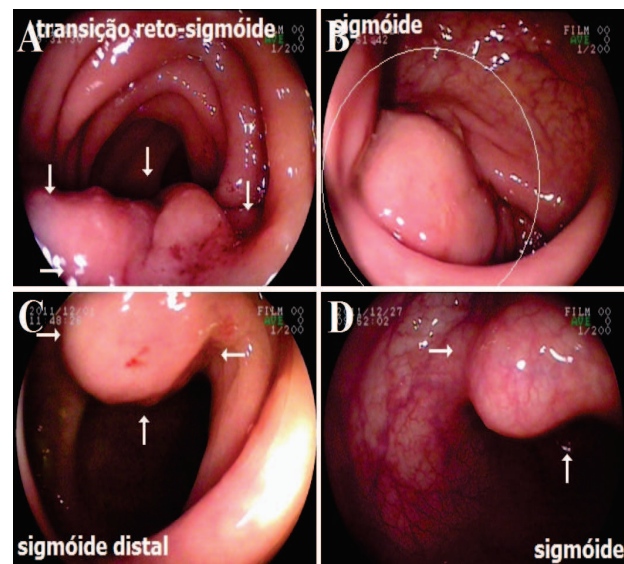
## CLINICAL TREATMENT

Medical management has an important role in controlling the painful symptoms resulting from DIE involving the bowel. In the review by VERCELLINI and cols.<sup>27</sup>, pharmacological treatment of patients with rectovaginal endometriosis achieved good pain relief, reduced lesions during therapy, improved health-related quality of life, and patient satisfaction. The analgesic effect of the medications evaluated (GnRH agonists, danazol, intrauterine contraceptive with progestin, oral progestin, and combined oral contraceptive) was significant for the entire treatment period (from 6 to 12 months), with 60% to 90% of

patients reporting substantial reduction or complete relief of pain symptoms.



**Figure 2** - Transvaginal pelvic ultrasound showing a cross section of the intestinal wall, with all its layers. From outside to inside: serosa, muscularis propria, submucosa, muscularis mucosa, and mucosa.



**Figure 3** - Four DIE lesions causing extrinsic compression and infiltration of the intestinal wall.

FERRERO and cols.<sup>28</sup> evaluated six women with colorectal endometriosis infiltrating at least the muscular layer of the bowel, without stenosis exceeding 60% of the lumen, with painful symptoms and infections. They were treated with letrozole (2.5 mg/d) and norethisterone acetate (2.5 mg/d) continuously for six months and had improvement of pain symptoms, non-cyclic pelvic pain, deep dyspareunia, dyschezia, intestinal colic, abdominal distension, and the presence of mucus in the stool. Gastrointestinal symptoms improved in 67% of women.

Recently a prospective study<sup>29</sup> evaluated the efficacy of continuous use of low-dose oral contraceptive (15µg 60µg ethinyl estradiol and gestodene for 12 months) in the treatment of pain and other symptoms associated with colorectal endometriosis nodules. Twenty-six women of reproductive age with colorectal nodules infiltrating at least the intestinal muscularis propria and without intestinal stenosis exceeding 50% were evaluated. A significant improvement in the intensity of all symptoms (dysmenorrhea, non-menstrual pelvic pain, deep dyspareunia, and painful defecation) rated using a visual analog scale was observed. There was a reduction in diameter (mean reduction 26%) and volume (mean reduction of 62%) of the nodules after a period of 12 months of treatment.

Although the aforementioned studies show that medical management has an important role in controlling pain symptoms, it is important to understand that there may be progression of the lesion over the long term, even when patients' pain symptoms are controlled. When opting for medical management of endometriosis, monitoring with annual imaging studies should be performed, because the presence of obstruction of the urinary tract or gastrointestinal tract is an absolute indication for surgery. Furthermore, medical management has no benefit in the treatment of endometriosis-related infertility.

## SURGICAL TREATMENT

Surgical treatment of deep infiltrating endometrial lesions of the intestinal is reserved for patients who have failed clinical treatment, have recurrent symptoms after stopping medical treatment, infertility related to endometriosis, obstruction of the urinary tract or gastrointestinal tract, or the presence of cyclic rectorrhagia.

We describe our surgical approach for DIE lesions located in the rectum and sigmoid colon, which represent more than 80% of DIE bowel lesions.<sup>4</sup> For didactic purposes, we discuss the lesions affecting the rectum and rectosigmoid (up to 15cm from the anal margin) separately from those affecting the sigmoid.

### Lesions of the rectum and rectosigmoid

Intestinal DIE involving the rectum and rectosigmoid can be treated in variety of ways.<sup>30-36</sup> Surgical planning is performed in accordance with the preoperative diagnostic imaging findings as described above.<sup>10,18,19</sup>

The techniques described in the literature to address these intestinal lesions of DIE include rectal shaving, rectal shaving with mucosal skinning, discoid resection and segmental resection. Each technique has its peculiarities in terms of surgical principles, risks of intraoperative and postoperative complications, recurrence rate, and postoperative fertility.

### Rectal Shaving and mucosal skinning

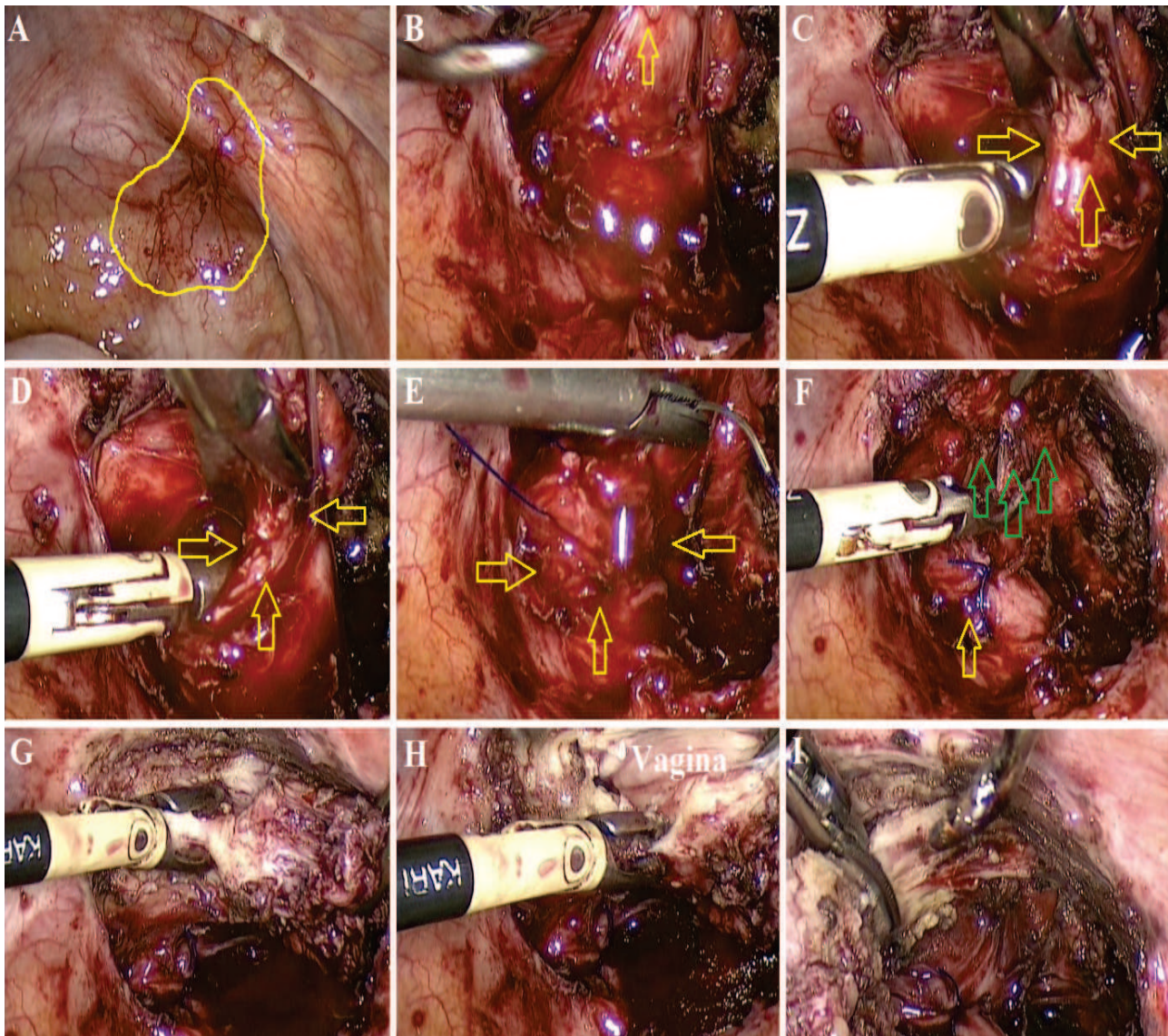
Rectal shaving and mucosal skinning require finding – in the thickness of the muscular layer of the intestinal wall – a clean plane beyond which there are no more endometriosis lesions. This procedure is performed accepting a risk of opening the intestinal lumen. According to Donnez and cols.,<sup>37</sup> this resection should avoid as much as possible the risk of opening the intestinal lumen. For others, the resection should be complete (mucosal skinning = preservation only of the intact mucosal layer with manual suturing of the sectioned bowel wall), accepting the risk of an opening the lumen of the intestine in a certain number of patients,<sup>38</sup> at the expense of systematic attainment of a segmental resection of the intestine.<sup>39,40</sup>

Two surgical tactics can be used:<sup>35</sup>

- Traditional technique;
- Reverse technique.

Traditionally, gynecologists first separate the posterior surface of the nodule from the anterior wall of the rectum, and then perform the separation of the lesion from the posterior vaginal fornix and from the retrocervical region (Figure 4). It is important to remember that the lower the dissection, the more anterior the axis of scissors should be to avoid injuries to the rectum.

The retraction induced by the nodule causes the rectum to envelop the nodule; therefore the axis of the cut is not constant throughout the



**Figure 4 -** (A) Deep endometriotic lesion involving the right uterosacral ligament, posterior vaginal fornix and the anterior wall of the rectum (to the muscle layer). (B) The arrow identifies the superior retraction of the rectum caused by the endometriosis lesion. (C and D) Opening of the fibers of the muscle layer of the rectum (arrows) for the removal of the endometriosis lesion. (E) Suturing with 3-0 polypropylene of the area of the defect in the muscle layer of the rectum (arrows). (F) Sutura da área de defeito na camada muscular do reto (setas) com fio de polipropileno 3-0. (F) Rectal suture (yellow arrow) and the area to be dissected in the rectovaginal septum (green arrows). (G to I) Separation of the endometriosis lesion from the retrocervical region and from the rectovaginal septum, and resection of the posterior vaginal fornix.

dissection. The surgeon should follow the contour of the rectum around the endometriotic nodule. The goal is to free the nodule completely from the bowel wall to identify the healthy vagina distal to the nodule. This dissection can be aided by a digital rectal and vaginal examination, by positioning a gauze compress or a malleable valve in the posterior or vaginal fornix or by the insertion of a rectal probe. After freeing the posterior face of the

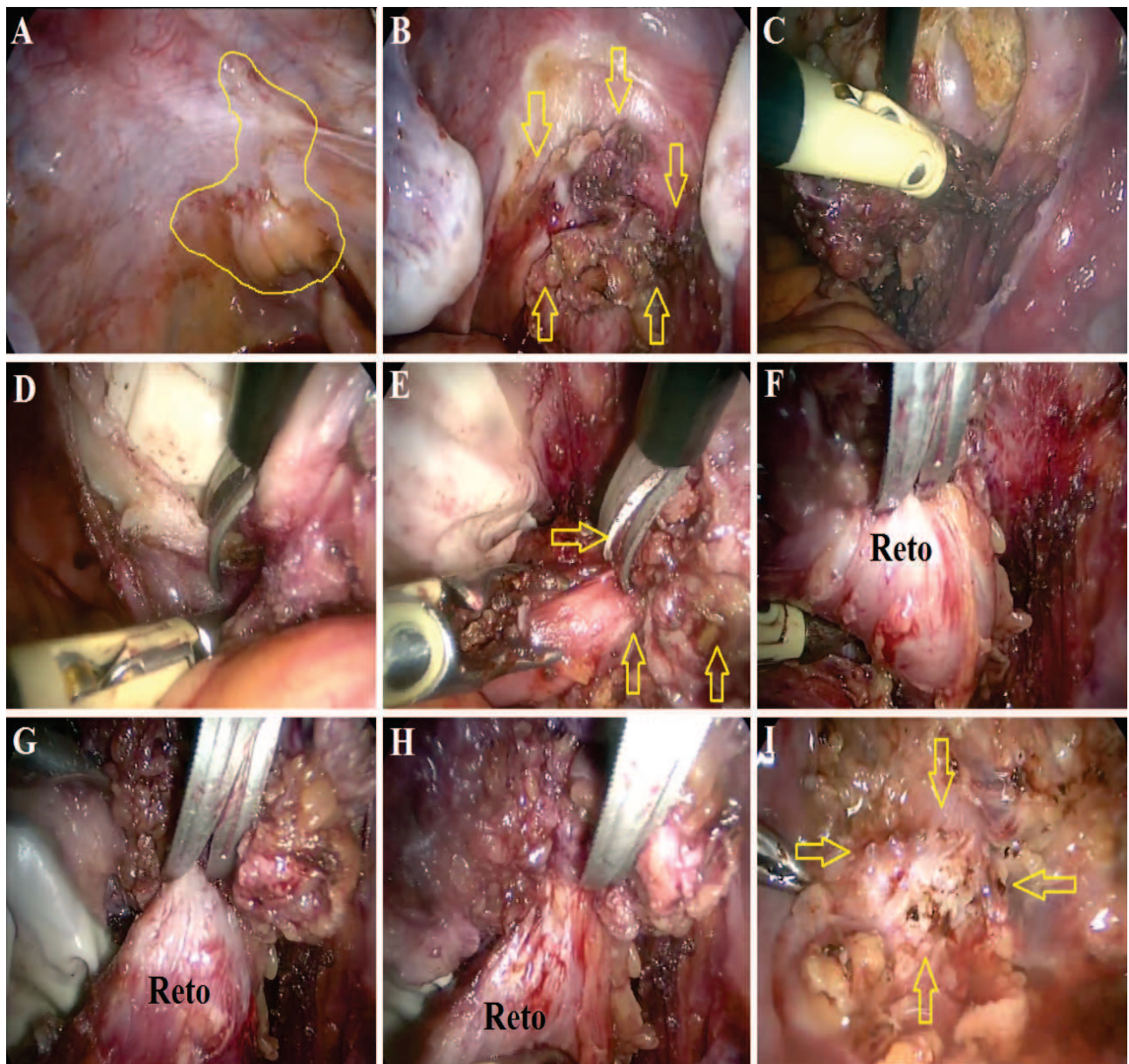
nodule, it should be freed from the posterior aspect of the uterus, from the base of the broad ligament, and from the vagina.

When the case requires resection of the vagina, cold scissors or fine (1 mm diameter) monopolar tip with pue cutting current is used. Whenever opening a cyst containing chocolate-colored contents or if you see the appearance of small blackened points, resection is not sufficient, and the excision should be

expanded. Avoid the loss of CO<sub>2</sub> during this surgical time by placing a surgical glove containing two or three gauzes into the vagina.

Alternatively, one may use a surgical approach called a “reverse” (Figure 5). In this technique, first the anterior surface of the nodule is freed from the posterior surface of the uterus and vagina. The mobility obtained after freeing the anterior face of the nodule allows better exposure of the nodule during the dissection of the most difficult area to be treated,

which is in contact with the rectum. When the nodule infiltrates the vagina, the vagina is opened at its superior segment, near the cervix, and then laterally to disease-free zones. The distal limit of vaginal sectioning is identified through the vagina, distal to the nodule. After sectioning the distal limit of the lesion, one identifies a healthy rectovaginal plane. In this way the nodule can easily be pulled with a grasping forceps to expose its posterior surface adhered to the anterior wall of the rectum, followed by the progressive



**Figure 5** – (A) DIE lesion involving the intestine (in yellow). (B) Resection of the right uterosacral ligament and separation of lesion from the retrocervical region (arrows). (C and D) Resection of the posterior vaginal fornix with identification of the healthy area in rectovaginal septum. (E to H) Separation of DIE lesion (arrows) from the rectal wall progressively sectioning the muscle layer from the intestinal wall. (I) Thin appearance of the rectum (arrows).

separation of the lesion from the anterior wall of the rectum.

At the end of the procedure, if the shaving was deeper, with opening of the muscular layer or below, suturing is done with 3-0 or 4-0 monofilament (polypropylene) suture in a single plane with continuous or separated stitches.

### **Discoid Resection**

Discoid Resection entails wedge resection of the anterior wall of the rectum, in total thickness. Here we describe two techniques that can be used:<sup>32,41</sup>

- Resection of the endometrial nodule with the cold scissors, followed by rectal repair by manual suturing;

- Resection of the endometrial nodule using a circular stapler inserted transanally.

Most authors who use this technique reserve it for single lesions of DIE located on the anterior wall of the rectosigmoid colon, with deep infiltration beyond the muscle layer, that are smaller than 30mm in diameter and occupying less than one-third of the intestinal circumference.<sup>41</sup> Some authors, however, have described an alternative technique of double stapling for resection of bulkier lesions, with promising results.<sup>42</sup>

In the technique with manual suturing, two repair sutures are placed adjacent to the lesion, in healthy intestinal wall, and the anterior intestinal wall is resected in a wedge with a transverse incision into the intestinal lumen using cold scissors or ultrasonic energy. The defect area in the anterior intestinal wall is then repaired in two planes : one, the total plane, encompasses the full wall thickness with continuous sutures ; and the other, the sero-muscular plane, uses continuous or separated 3-0 or 4-0 monofilament (polypropylene) sutures.<sup>42</sup>

We prefer to perform the discoid resection using the 29 or 33 mm circular intraluminal stapler (Ethicon Endosurgery Inc., Cincinnati, OH, USA) introduced transanally because the technique is quicker and there is no contact between the intestinal lumen and the abdominal-pelvic cavity during the procedure (Figure 6). After freeing the intestinal lesion from the retrocervical region, from the posterior vaginal fornix, and from the rectovaginal septum, as described above for the reverse technique, the endometriotic lesion remain attached only to the anterior wall of the rectum. A superficial shaving is performed to separate the posterior wall of the lesion

from the anterior wall of the rectum, leaving only the fibrotic area of deep infiltration by the endometriosis in the intestinal wall.

A monofilament (2-0 mononylon) suture is passed into the lesion laparoscopically and left free in the cavity with the long ends. Guided laparoscopically, the circular stapler is inserted transanally, until it is beyond the lesion. It is gently opened, observing the formation of a groove between the anvil and the stapler. The two ends of the suture are grasped with a needle holder and pulled vertically downward in order to introduce the fibrotic area of the anterior wall of the rectum into the groove of the circular stapler.

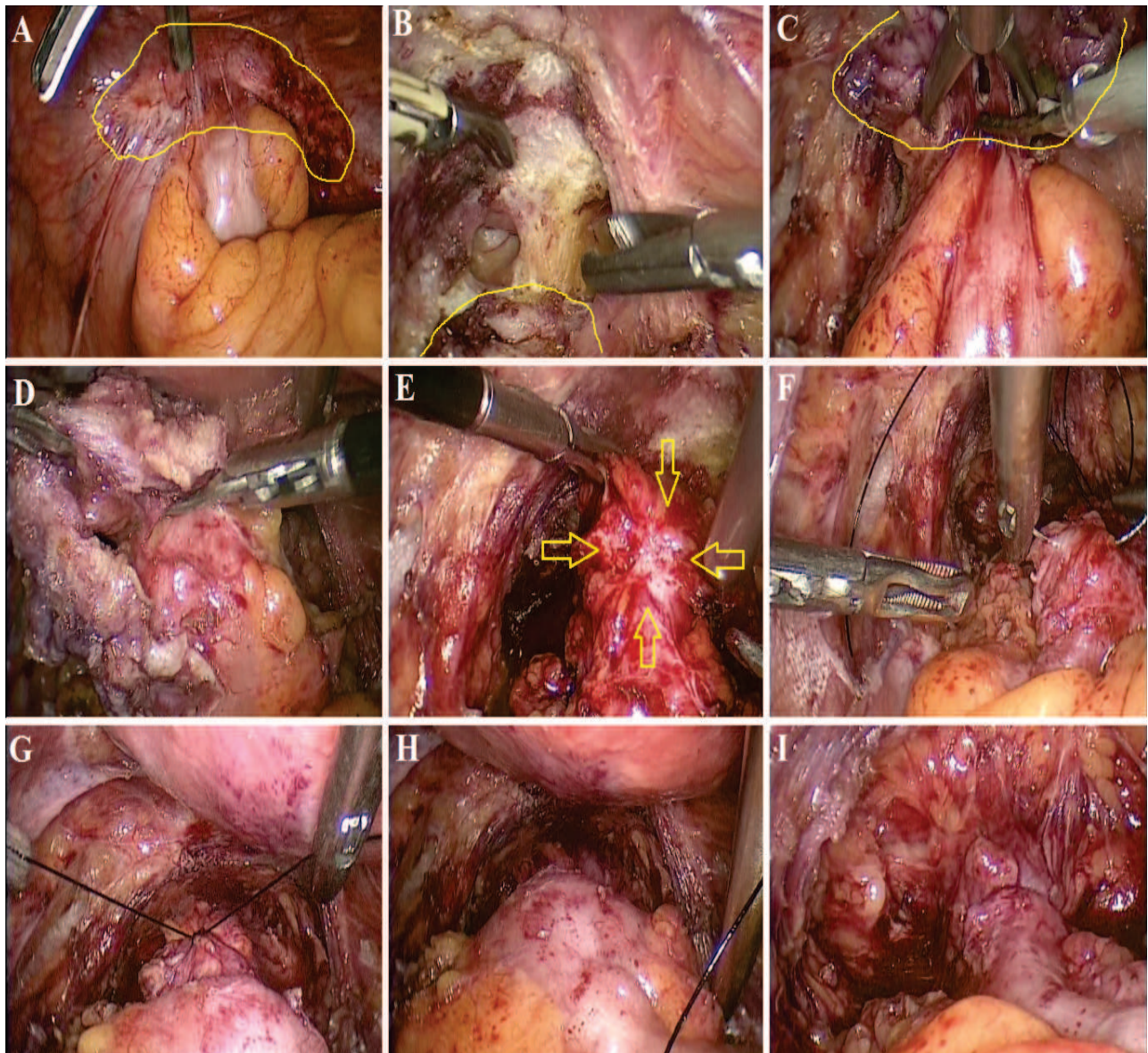
When the lesion is ideally positioned, the circular stapler is closed with the anterior wall of the rectum inside. During this closure, the stapler should be lowered so that its end is anteriorized, thereby avoiding the stapling of the posterior intestinal wall. The stapler is fired, and the anterior wall of the rectum is stapled and cut. After careful removal of the stapler, one can view the discoid of anterior rectal wall inside the circular stapler.

In attempting to expand the use of discoid resection several authors<sup>42</sup> have developed the same technique with double stapling (Figure 7). In this way single lesions with lengths of up to 60mm and involving up to 40% the intestinal circumference can be removed. In this technique, the first suture is passed from the proximal free edge to the middle of the lesion. The first firing of the circular stapler removes part of the intestinal lesion. Another suture is passed including the staple line of the intestine and distal free edge of the lesion. The second firing of the circular stapler results in the removal of the rest of the intestinal DIE lesion.

We can call the three above-mentioned surgical techniques (rectal shaving, mucosal skinning, and discoid resection) “nodulectomies,” since all have the goal of removing only the intestinal DIE nodule from the intestinal wall.

### **Segmental resection of the intestine**

Segmental resection of the bowel entails resecting the segment of the bowel affected by DIE. In theory, this technique offers “certainty” – once the margins of the resection are free of disease – that the lesion has been completely resected,<sup>39,40</sup> but it has an immediate operative morbidity, and a more significant long-term morbidity.<sup>30,34,43,44</sup> For some authors, this action should be systematic whenever the DIE infiltrates the muscle.<sup>39,45</sup>

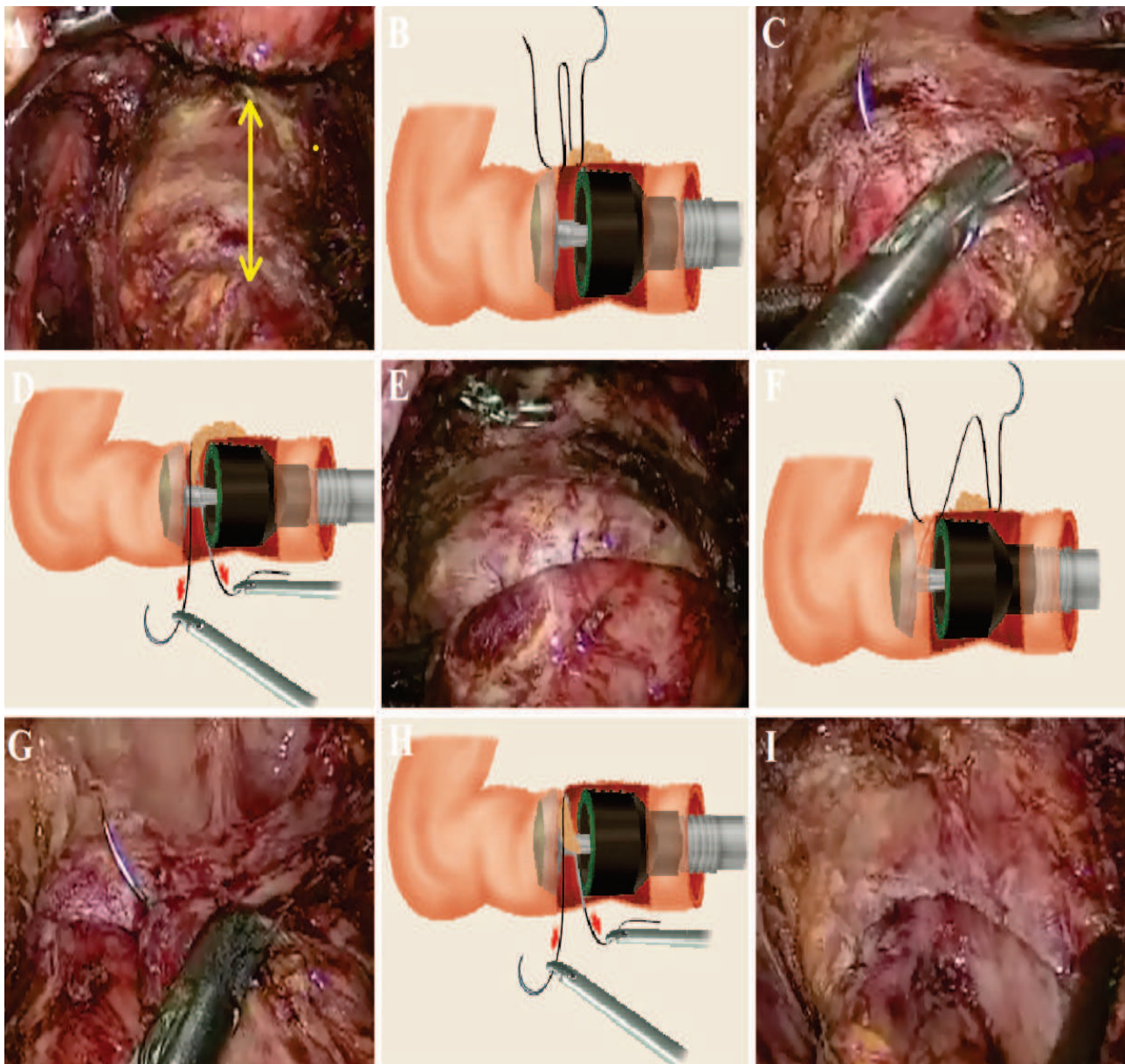


**Figure 6 -** (A and B) Separation of the lesion (in yellow) from the retrocervical region, leaving it attached to the anterior wall of the rectum. (C and D) Separation of the DIE lesion from the anterior wall of the rectum. (E) Residual area of infiltration of DIE in the intestinal wall (yellow arrows). (F) Passing the suture through healthy edges of the lesion. (G to I) Adjustment of the lesion within the circular stapler introduced transanally, finalizing the discoid resection.

One of the important arguments in favor of this more aggressive “attitude” would be the certainty of complete treatment of the disease, as REMORGIDA and cols.<sup>46</sup> showed that the histological examination of the surgical specimen of the intestine resected after a “nodulectomy” was performed found residual lesions of endometriosis involving the muscle layer of the intestine in 43.8% of cases. This is a strong argument in favor of intestinal segmental resection, about which we can also offer some counter-arguments:

- The “nodulectomy” performed in cases where one knows that the segmental resection of the intestine will be performed during the same surgical procedure is probably not the same “nodulectomy” that gets performed under other circumstances;

- The segmental resection is not always a guarantee of disease-free margins. There is histological evidence of positive margins after segmental resection for treatment of intestinal DIE in up to 22% of cases;<sup>47,48</sup>



**Figure 7** - Length of the DIE implant in the rectum. (B and C) Passing the first suture through the proximal end of the lesion. (D and E) Stapling of the proximal end of the lesion. (F and G) Passing the second suture encompassing the previous stapling area and the distal end of the lesion. (H and I) Second stapling, finalizing the double discoid resection.

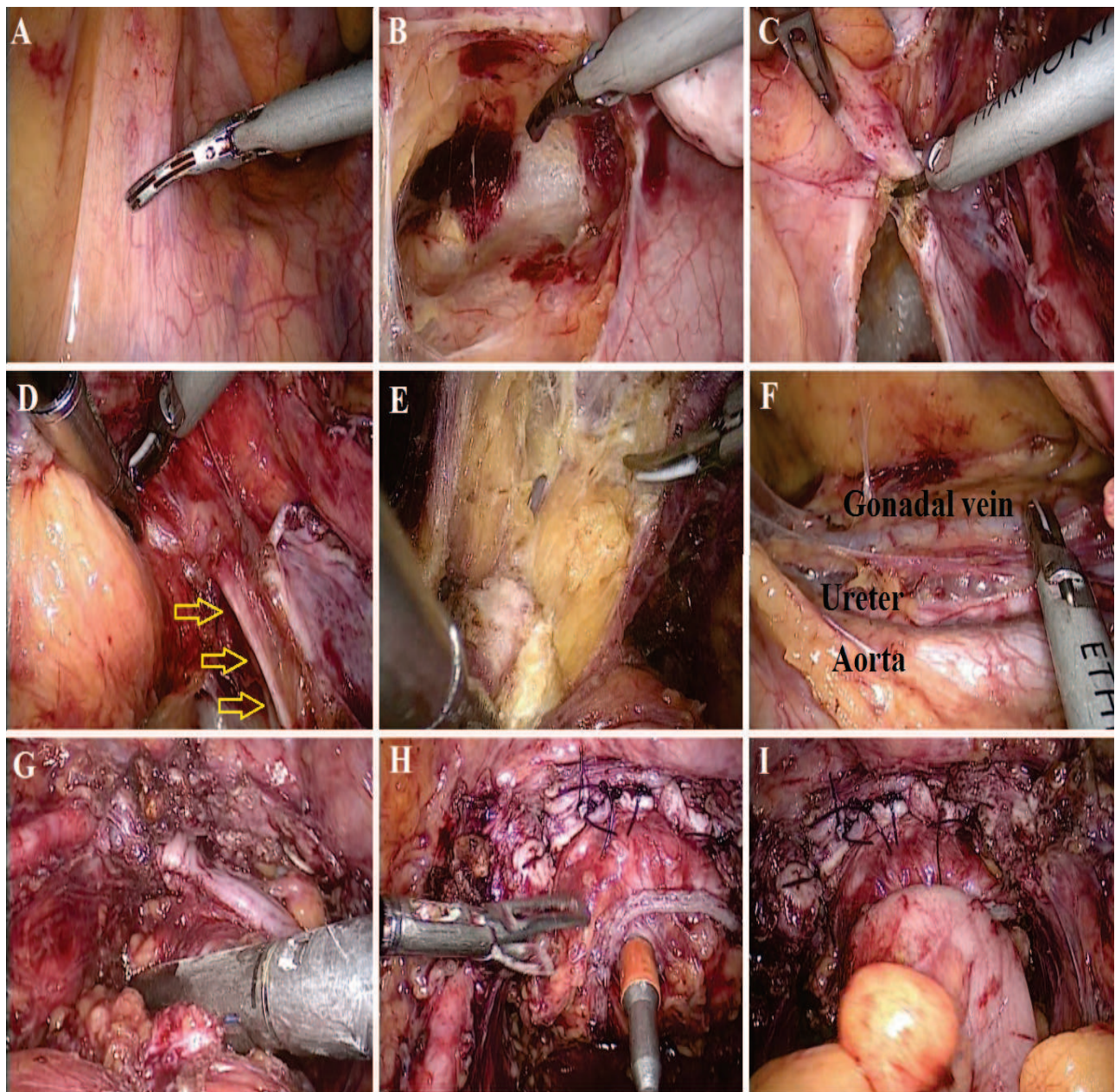
· There is not always evidence of intestinal DIE (involvement beyond the muscle layer) in surgical specimens of segmental resections; 0.8% of the time the intestinal segment may not have histological evidence of transmural invasion by the disease;<sup>47</sup>

· It is not clear that the radicality of resecting the full thickness of the rectal muscle confers a real clinical benefit to patients. Recently, MABROUK and cols.<sup>49</sup> demonstrated that there is no statistical difference in terms of recurrence, pain symptoms, or improvement in quality of life in patients with and

without positive margins after segmental resection of the bowel.

We reserve the segmental resection of the intestine for cases of bulky lesions of the rectosigmoid exceeding 30mm, stenotic lesions (that block advancing the circular stapler into position), lesions in the sigmoid colon (which are beyond the reach of the circular stapler), and multifocal lesions.

The opening of the left parietocolic gutter in Toldt's fascia allows mobilization of the descending colon (Figure 8). Rarely, it is necessary to completely



**Figure 8** - (A and B) Opening of the mesorectum adjacent to the sacral promontory and dissection in a caudal direction. (C) Opening the peritoneal layer lateral to the rectum on the right side. (D) Nerve preservation is identified by yellow arrows. (E) Identification of the healthy area in the rectovaginal septum, distal to the intestinal DIE lesion. (F) Cranial dissection of mesorectum and mobilization of left parietocolic gutter. You can identify retroperitoneal structures: aorta, left ureter, and left gonadal vein. (G) Stapling distal to the intestinal DIE lesion. (H and I) End-to-end anastomosis using a circular stapler inserted transanally.

mobilize the left colon by the opening the gastrocolic ligament, entering the epiploic retrocavity, freeing of the splenic flexure of the colon, and separated the colon from the omentum.

The rectosigmoid is pulled vertically by the assistant, up and toward the left pelvic wall, exposing the mesorectum and the sacral promontory. The mesorectum is dissected over the sacral promontory,

first caudally to the level of the elevators and then cranially. The peritoneum layer lateral to the rectum is incised bilaterally and the peritoneal reflection of the posterior fornix is opened.

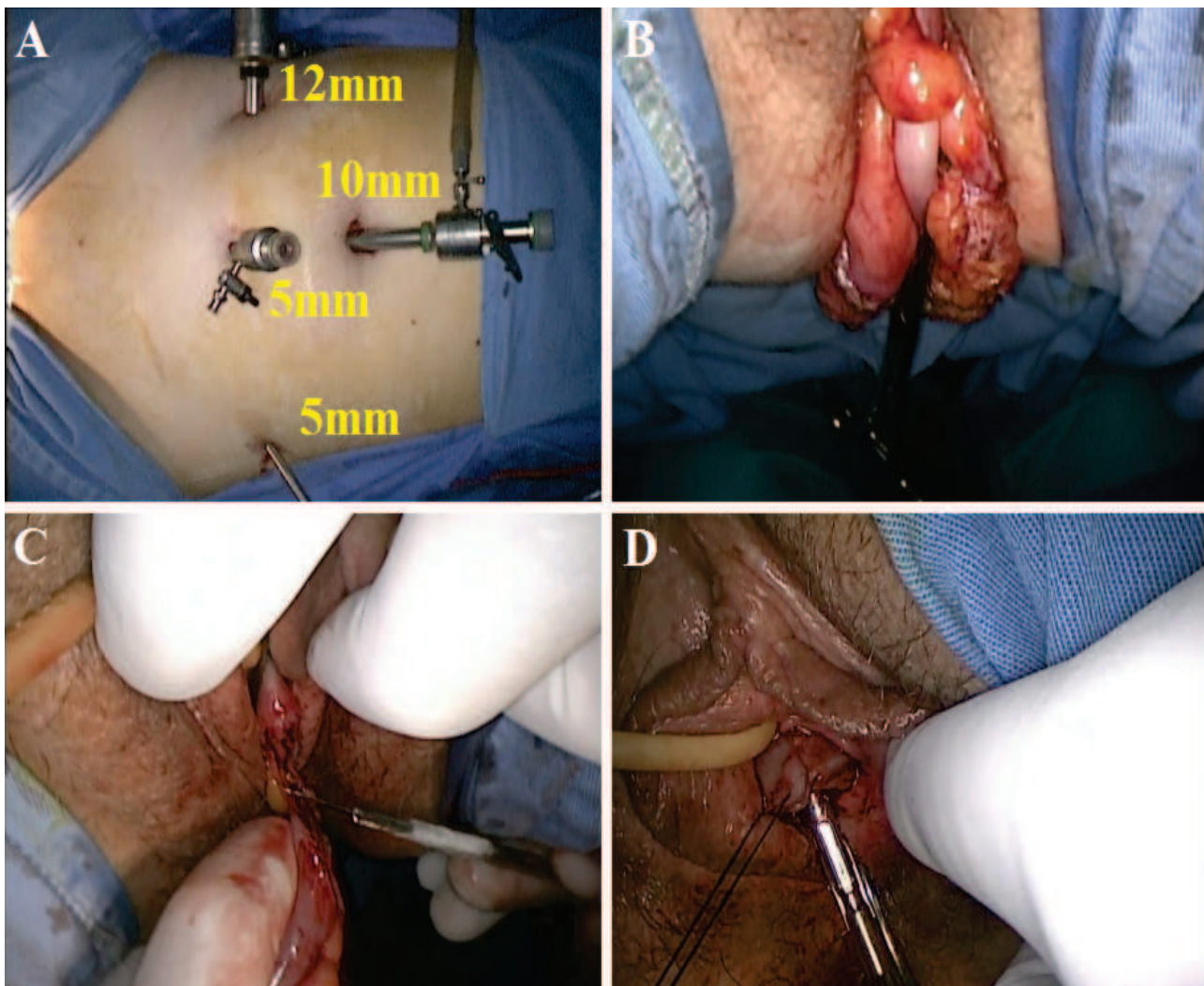
The dissection proceeds until a healthy area in rectovaginal septum is reached, which has been previously dissected using the reverse technique mentioned above. The rectum is mobilized at least 2

cm below the endometriosis nodule. The 45mm articulated linear cutting endostapler (Ethicon Endosurgery, Inc., Cincinnati, OH, USA) is introduced into the cavity through a 12mm trocar positioned in right iliac fossa and the rectum is cut distal to the lesion (Figure 8G). At this point, there are some options for resection of the rectum or the rectosigmoid:

- A transverse minilaparotomy is performed in suprapubic region (Pfannenstiel). After extraction of the intestine through the incision, the rectum or rectosigmoid (depending on the length of the lesion) proximal to the lesion is cut using a cold scalpel. A purse string suture is performed on the end of the sigmoid with 2-0 mononylon and the anvil of the 29 mm or 33 mm intraluminal circular stapler (Ethicon Endosurgery, Inc., Cincinnati, OH, USA) is positioned and secured with the previously placed suture. The

intestine is repositioned inside the abdominal cavity, the abdominal wall is sutured, the pneumoperitoneum is reestablished, and the transanal end-to-end colorectal anastomosis is performed guided laparoscopically;

- In cases where it was necessary to resect the posterior vaginal fornix or perform a hysterectomy, the rectosigmoid can be extracted transvaginally.<sup>50</sup> The resection of the rectum or rectosigmoid is performed, followed by purse-string suturing of the end of the sigmoid and positioning of the anvil of the intraluminal circular stapler. The sigmoid is reintroduced into the abdominal cavity, a glove containing air and gauzes is introduced into the vagina to prevent the leakage of CO<sub>2</sub>, the pneumoperitoneum is reestablished, and the transanal end-to-end colorectal anastomosis is performed (Figure 9).



**Figure 9** - (A) Positioning of trocars for segmental resection of the intestine with transvaginal extraction of the surgical specimen. (B) Transvaginal extraction of the rectosigmoid. (C) Sectioning of the sigmoid colon. (D) Purse string suturing and positioning the anvil inside the sigmoid colon.

## SURGICAL TREATMENT OF ENDOMETRIOSIS LESIONS OF THE SIGMOID COLON

In cases of high lesions of the sigmoid colon (more than 15 cm from the anal margin), without evidence of multifocal lesions involving the rectum or rectosigmoid, one can opt for an isolated resection of intestinal DIE implant.

Because a circular stapler cannot be used to perform an anastomosis more than 15 cm from the anal margin, we avoid an extensive bowel resection performing the intestinal resection through a mini-Pfannenstiel incision (3 to 4 cm). In this way we can perform an economical bowel resection (remember we are dealing with a benign disease!) and preserve the rectum, which can reduce the chance of functional bowel changes postoperatively.

After treatment of the pelvic endometriosis lesions and complete mobilization of the sigmoid colon, a mini-Pfannenstiel incision of approximately 4 to 5 cm is made and the sigmoid colon is exteriorized through the incision. Two procedures can be performed:

### Discoid resection

Discoid resection allows the maintenance of vascularization along the entire mesenteric margin of the intestinal wall (Figure 10). Two clamps are positioned on the loop of the sigmoid colon, one proximal and one distal to the lesion. The intestinal DIE lesion is resected with electrocautery (full thickness) giving rise to a defect in the anti-mesenteric margin of the sigmoid colon wall. The intestinal wall is sutured in two layers using continuous absorbable sutures of 3-0 polyglactin 910 (Vicryl®) or nonabsorbable 3-0 polypropylene (Prolene®).

### Segmental resection of the intestine

Two intestinal clamps are positioned on the loop of the sigmoid colon, one proximal and one distal to the lesion. The vessels of the meso-sigmoid are ligated close to the intestinal wall with 3-0 cotton suture and the intestinal segment to be removed is cut with the cold scalpel. The end-to-end anastomosis is made in two planes: (1) through the total thickness of the bowel wall with a running suture using absorbable 3-0 polyglactin 910 (Vicryl®) or nonabsorbable 3-0 polypropylene (Prolene®), and (2) through the

seromuscular layers using running or separate sutures using the same suture material (Figure 11).

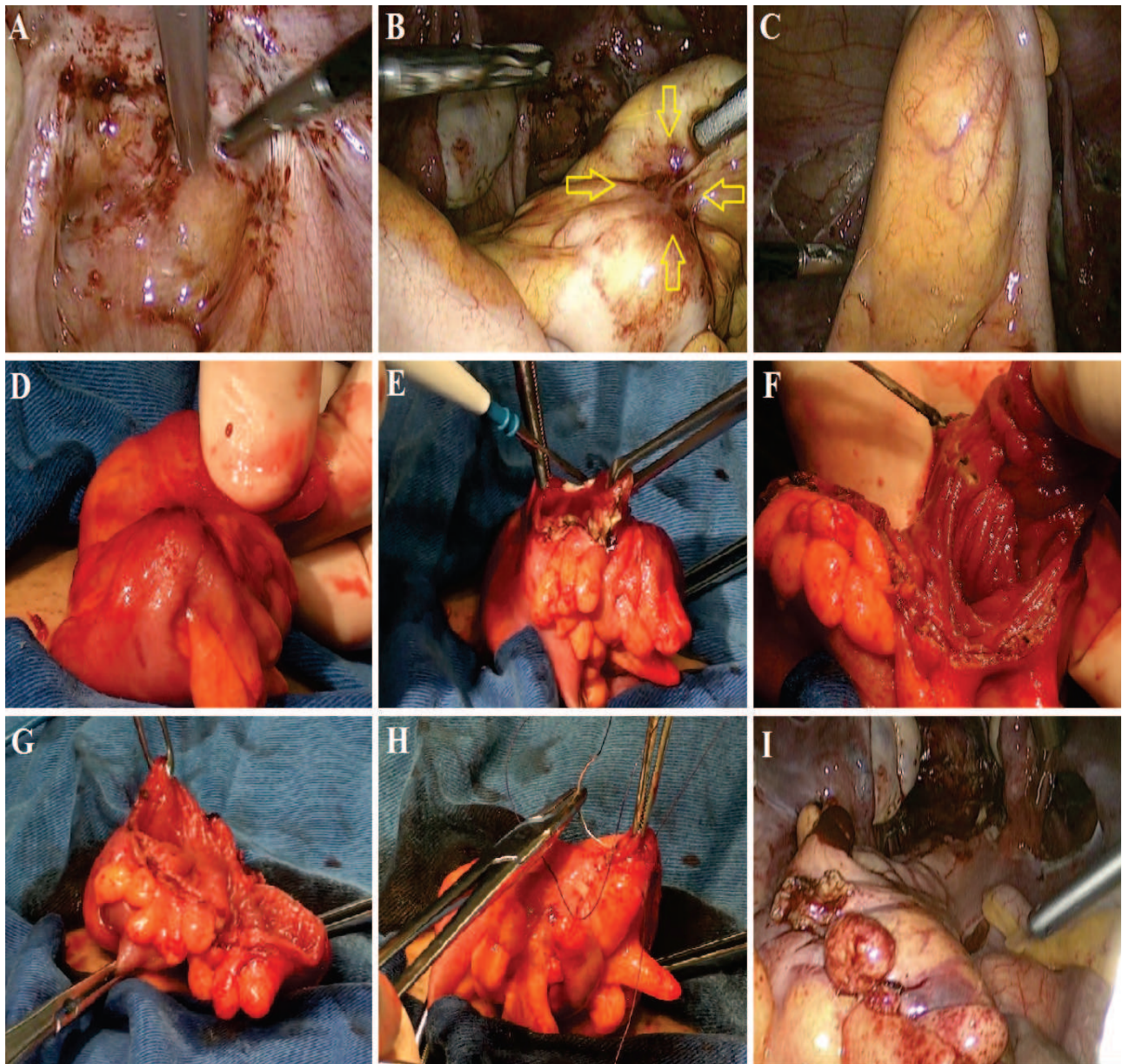
After the segmental resection of the intestine, the sigmoid colon is repositioned within the abdominal cavity. The incision in the aponeurosis is sutured with 0 or 1 polyglactin 910 (Vicryl®) and the pneumoperitoneum is restored. Hemostasis is verified, and the test of tubal permeability is performed using methylene blue, when indicated. Both in the setting of discoid resection and in the case of segmental resection, we usually do not test the integrity of the anastomosis with the "tire-fitter's" maneuver because the air injected transanally normally cannot reach the area of the anastomosis.

## DISCUSSION

As previously mentioned, DIE involving the intestine can be treated using different surgical techniques. The choice of surgical technique depends on a number of factors including: the patient's symptoms, characteristics of the endometriosis lesions, the surgical team's experience with the different procedures, the patient's aspirations to have children, and the patient's consent after being informed of the risks of each procedure. All authors agree that an indication for surgery exists when the stenosis exceed 50% of the intestinal lumen, the urinary tract is obstructed, or in the presence of rectorrhagia.<sup>21,51,52</sup>

With nodulectomy or the segmental resection of the intestine there is the possibility of complications. The postoperative results of the different surgical techniques have been compared for various services and there seems to be a tendency to choose less aggressive techniques when possible. In a prospective analysis of 500 cases of DIE nodules treated by rectal shaving,<sup>31</sup> major complications included 7 cases (1.4%) of rectal perforation, 4 cases (0.8%) of ureteral injury, one case (0.2%) where bleeding exceeded 300 ml, and urinary retention in 4 patients (0.8%). Of the 388 women who wanted to get pregnant, 221 (57%), conceived naturally, and 107 (28%) through *in vitro* fertilization. The recurrence rate was 8% and was significantly lower ( $p < 0.05$ ) in women who became pregnant (3.6%) than in women who did not become pregnant (15%).

In the experience of MOHR and cols.<sup>30</sup> encompassing 187 women treated laparoscopically for intestinal endometriosis, there was a significantly higher rate of complete pain relief in the immediate

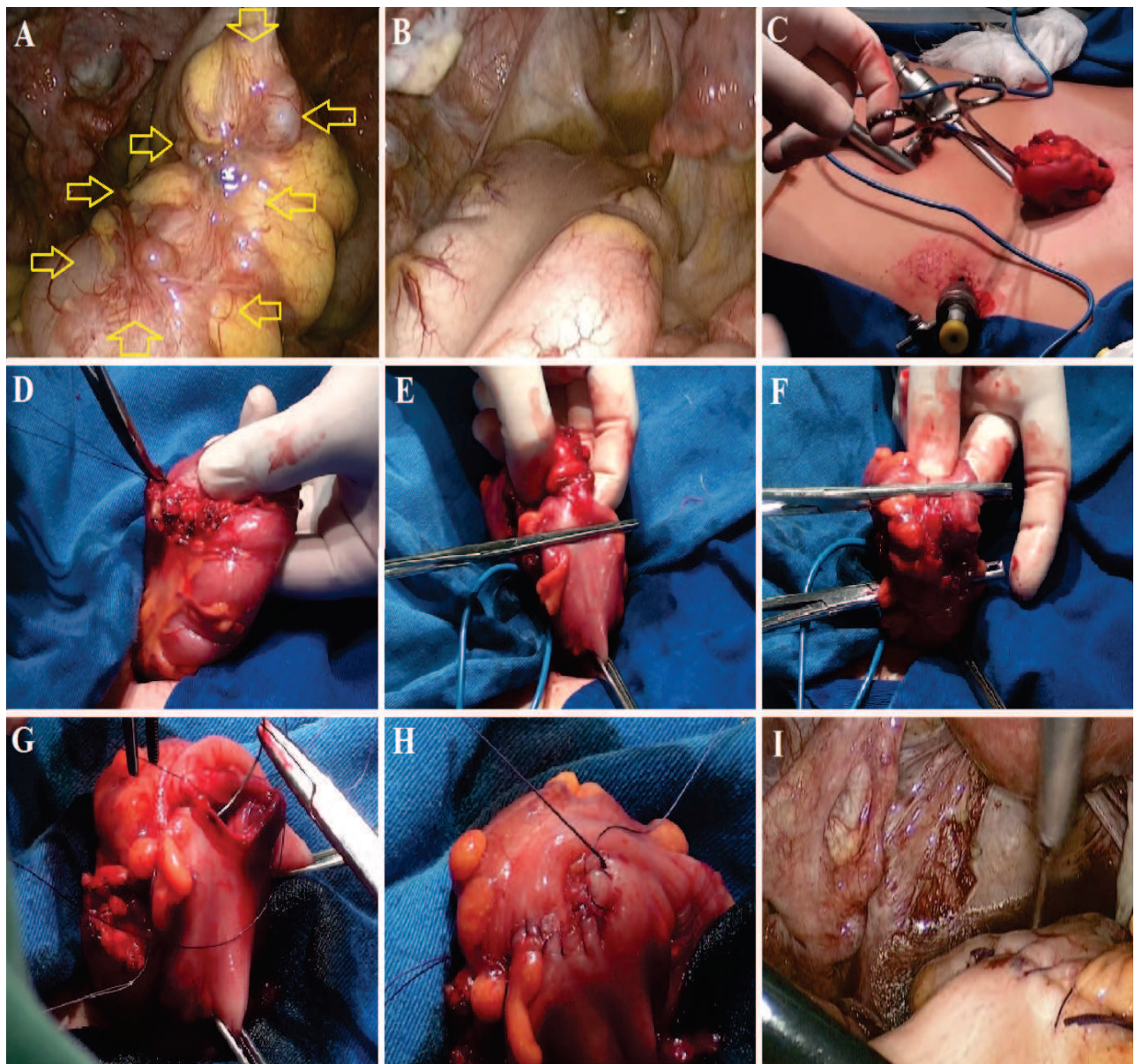


**Figure 10** - (A) Presence of several endometriosis implants in the posterior fornix and uterosacral ligaments. (B) Intestinal DIE lesion involving the sigmoid colon. (C) Mobility test of the sigmoid to evaluate the possibility extraction through Pfannenstiel incision. (D) Transperitoneal extraction of sigmoid colon. (E and F) Resection of the lesion from the anterior and lateral walls of the sigmoid colon. (G) Appearance of the sigmoid wall defect created after resection of an intestinal DIE implant. (H) Suture of the sigmoid colon in the transverse direction. (I) Appearance after returning the sigmoid colon inside the abdominal cavity.

postoperative period with segmental resection of the intestine than with isolated shaving (92% vs. 80%, respectively;  $p < 0.04$ ). Shaving, however, was associated with a lower complication rate: 6% compared to 23% for discoid resection ( $p < 0.007$ ), and 38% with intestinal resection ( $p < 0.001$ ), and a higher pregnancy rate. These findings were confirmed by the study published by the Clermont-Ferrand group<sup>34</sup> which demonstrated a postoperative

complication rate of 6.7% in women who underwent rectal shaving and a 24% rate in those who underwent segmental resection of the intestine.

In a case-control study by the experienced Negrar group<sup>32</sup> comparing discoid resection and segmental resection of the intestine, this was associated with increased operative time, and higher rates of temporary ileostomy, postoperative fever, and long-term bladder dysfunction. The rate of early



**Figure 11** - (A) Large intestinal DIE lesion involving the sigmoid colon. (B) The rectum and the rectosigmoid transition do not have other DIE lesions. (C) Extraction of the sigmoid colon through Pfannenstiel incision. (D) Ligation of the vessels of the meso-sigmoid. (E and F) Clamping proximal and distal to the sigmoid colon in preparation for the resection of the area affected by intestinal DIE. (G and H) End-to-end anastomosis in two planes. (I) Laparoscopic appearance of the suturing after the repositioning of the sigmoid colon inside the abdominal cavity.

postoperative complications requiring surgical intervention in the discoid resection group was 4.16% and the recurrence rate at 33 months of median follow-up was 10.4%.

Recently, two other studies<sup>44,53</sup> compared intra- and post-operative nodulectomy outcomes and results of segmental resection for the treatment of intestinal DIE. In the first study,<sup>53</sup> “nodulectomy” was performed by discoid resection using a circular stapler. The mean operative time was shorter, blood loss was

less, hospital stays shorter, and the anastomosis stenosis rate was lower. In the second study,<sup>44</sup> the “nodulectomy” was performed with an Ultracision harmonic scalpel (Ethicon Endosurgery, Cincinnati, OH, USA). Resulting partial or full thickness defects in the rectal wall were sutured laparoscopically. In the group that underwent segmental resection 18% had bladder atony, 24% experienced chronic constipation, 6% developed an anastomotic fistula, and 13% had acute compartment syndrome with a

disturbance of peripheral nerve sensation. In the group that underwent excision of the nodule, 4% experienced transient motor paralysis of the right obturator nerve. The improvement of pain symptoms appeared to be equivalent in the two groups.<sup>54</sup>

These complication rates notwithstanding, at centers with extensive experience in segmental resection for the treatment of intestinal DIE, complication rates tend to decrease. RUFFO and cols.,<sup>36</sup> report a case series of 750 women underwent laparoscopic resection of the mid or lower rectum for DIE. The median operative time was 255 minutes, with intraoperative blood loss of 150 ml. A blood transfusion was required in 7% of cases; conversion to laparotomy occurred in 1.6% of cases. The rate of temporary ileostomy was 14.5%. The rate of

anastomotic fistula, rectovaginal fistula and intra-abdominal bleeding was 3%, 2% and 1.2%, respectively. Re-operation was required in 5.5% of patients.

## FINAL CONSIDERATIONS

With improvements in imaging techniques, deep infiltrating endometriosis with involving the intestine has been increasingly diagnosed worldwide. There is a global trend to approach this disease as conservatively as possible, because it is a benign disease. Regardless of the technique used, the ultimate goal of treatment is to improve the quality of life of patients. Prospective randomized studies are still needed to define the ideal surgical technique to address DIE of the intestine.

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## RESUMO

A cirurgia permanece o melhor tratamento a longo prazo para a endometriose profunda infiltrativa com comprometimento intestinal. Várias técnicas cirúrgicas têm sido aplicadas (*shaving* retal, *mucosal skinning*, ressecção em disco e ressecção segmentar) com resultados variados. Neste artigo abordamos as indicações de cada procedimento bem como os detalhes técnicos das mesmas.

**Palavras chave:** Endometriose profunda infiltrativa. Laparoscopia. Cirurgia. Colo-retal. Intestino.

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## REFERENCES

1. Eskenazi B, Warner ML. Epidemiology of endometriosis. *Obstet Gynecol Clin North Am* 1997; 24: 235-58.
2. Ripps BA, Martin DC. Correlation of focal pelvic tenderness with implant dimension and stage of endometriosis. *J Reprod Med* 1992; 37: 620-4.
3. Chapron C, Dubuisson JB, Fritel X, Fernandez B, Poncelet C, Béguin S, et al. Operative management of deep endometriosis infiltrating the uterosacral ligaments. *J Am Assoc Gynecol Laparosc* 1999; 6: 31-7.
4. Chapron C, Chopin N, Borghese B, Foulot H, Dousset B, Vacher-Lavenu MC, et al. Deeply infiltrating endometriosis: pathogenetic implications of the anatomical distribution. *Hum Reprod* 2006; 21: 1839-45.
5. Kondo W, Ribeiro R, Trippia C, Zomer MT. Deep infiltrating endometriosis: anatomical distribution and surgical treatment. *Rev Bras Ginecol Obstet* 2012; 34: 278-84.
6. Kondo W, Ribeiro R, Trippia C, Zomer MT. Association between ovarian endometrioma and deep infiltrating endometriosis. *Rev Bras Ginecol Obstet* 2012; in press.
7. Chapron C, Fauconnier A, Vieira M, Barakat H, Dousset B, Pansini V, et al. Anatomical distribution of deeply infiltrating endometriosis: surgical implications and proposition for a classification. *Hum Reprod* 2003; 18: 157-61.
8. Piketty M, Chopin N, Dousset B, Millischer-Bellaische AE, Roseau G, Leconte M, et al. Preoperative work-up for patients with deeply infiltrating endometriosis: transvaginal ultrasonography must definitely be the first-line imaging examination. *Hum Reprod* 2009; 24: 602-7.
9. Vercellini P, Chapron C, Fedele L, Gattei U, Daguati R, Crosignani PG. Evidence for asymmetric distribution of lower intestinal tract endometriosis. *BJOG* 2004; 111: 1213-7.
10. Kondo W, Zomer MT, Pinto EP, Ribeiro R, Ribeiro MFC, Trippia CR, et al. Deep infiltrating endometriosis: imaging features and laparoscopic correlation. *Journal of Endometriosis* 2011; 3: 197-212.
11. Fauconnier A, Chapron C, Dubuisson JB, Vieira M, Dousset B, Bréart G. Relation between pain symptoms and the anatomic location of deep infiltrating endometriosis. *Fertil Steril* 2002; 78: 719-26.
12. Chapron C, Barakat H, Fritel X, Dubuisson JB, Bréart G, Fauconnier A. Presurgical diagnosis of posterior deep infiltrating endometriosis based on a standardized questionnaire. *Hum Reprod* 2005; 20: 507-13.
13. Ballester M, Santulli P, Bazot M, Coutant C, Rouzier R, Daraï E. Preoperative evaluation of posterior deep-infiltrating endometriosis demonstrates a relationship with urinary dysfunction and parametrial involvement. *J Minim Invasive Gynecol* 2011; 18: 36-42.

14. Roman H, Ness J, Suciu N, Bridoux V, Gourcerol G, Leroi AM, et al. Are digestive symptoms in women presenting with pelvic endometriosis specific to lesion localizations? A preliminary prospective study. *Hum Reprod* 2012; in press.
15. Chapron C, Lafay-Pillet MC, Monceau E, Borghese B, Ngô C, Souza C, et al. Questioning patients about their adolescent history can identify markers associated with deep infiltrating endometriosis. *Fertil Steril* 2011; 95: 877-81.
16. Hudelist G, Ballard K, English J, Wright J, Banerjee S, Mastoroudes H, et al. Transvaginal sonography vs. clinical examination in the preoperative diagnosis of deep infiltrating endometriosis. *Ultrasound Obstet Gynecol* 2011; 37: 480-7.
17. Abrao MS, Gonçalves MO, Dias JA Jr, Podgaec S, Chamie LP, Blasbalg R. Comparison between clinical examination, transvaginal sonography and magnetic resonance imaging for the diagnosis of deep endometriosis. *Hum Reprod* 2007; 22: 3092-7.
18. Goncalves MO, Podgaec S, Dias JA Jr, Gonzalez M, Abrao MS. Transvaginal ultrasonography with bowel preparation is able to predict the number of lesions and rectosigmoid layers affected in cases of deep endometriosis, defining surgical strategy. *Hum Reprod* 2010; 25: 665-71.
19. Chamié LP, Pereira RM, Zanatta A, Serafini PC. Transvaginal US after bowel preparation for deeply infiltrating endometriosis: protocol, imaging appearances, and laparoscopic correlation. *Radiographics* 2010; 30: 1235-49.
20. Donnez J, Nisolle M, Squifflet J. Ureteral endometriosis: a complication of rectovaginal endometriotic (adenomyotic) nodules. *Fertil Steril* 2002; 77: 32-7.
21. Kondo W, Branco AW, Trippia CH, Ribeiro R, Zomer MT. Retrocervical deep infiltrating endometriotic lesions larger than 30mm are associated with an increased rate of ureteral involvement. *J Minim Invasive Gynecol* 2012; in press.
22. Takeuchi H, Kuwatsuru R, Kitade M, Sakurai A, Kikuchi I, Shimanuki H, et al. A novel technique using magnetic resonance imaging jelly for evaluation of rectovaginal endometriosis. *Fertil Steril* 2005; 83: 442-7.
23. Chassang M, Novellas S, Bloch-Marcotte C, Delotte J, Toullalan O, Bongain A, et al. Utility of vaginal and rectal contrast medium in MRI for the detection of deep pelvic endometriosis. *Eur Radiol* 2010; 20: 1003-10.
24. Landi S, Barbieri F, Fiaccavento A, Mainardi P, Ruffo G, Selvaggi L, et al. Preoperative double-contrast barium enema in patients with suspected intestinal endometriosis. *J Am Assoc Gynecol Laparosc* 2004; 11: 223-8.
25. Savelli L, Manuzzi L, Coe M, Mabrouk M, Di Donato N, Venturoli S, et al. Comparison of transvaginal sonography and double-contrast barium enema for diagnosing deep infiltrating endometriosis of the posterior compartment. *Ultrasound Obstet Gynecol* 2011; 38: 466-71.
26. Levitt MD, Hodby KJ, van Merwyk AJ, Glancy RJ. Cyclical rectal bleeding in colorectal endometriosis. *Aust N Z J Surg* 1989; 59: 941-3.
27. Vercellini P, Crosignani PG, Somigliana E, Berlanda N, Barbara G, Fedele L. Medical treatment for rectovaginal endometriosis: what is the evidence? *Hum Reprod* 2009; 24: 2504-14.
28. Ferrero S, Camerini G, Ragni N, Venturini PL, Biscaldi E, Seracchioli R, et al. Letrozole and norethisterone acetate in colorectal endometriosis. *Eur J Obstet Gynecol Reprod Biol* 2010; 150: 199-202.
29. Ferrari S, Persico P, DI Puppo F, Vigano' P, Tandoi I, Garavaglia E, et al. Continuous low-dose oral contraceptive in the treatment of colorectal endometriosis evaluated by rectal endoscopic ultrasonography. *Acta Obstet Gynecol Scand* 2012; 91: 699-703.
30. Mohr C, Nezhat FR, Nezhat CH, Seidman DS, Nezhat CR. Fertility considerations in laparoscopic treatment of infiltrative bowel endometriosis. *JSLS* 2005; 9: 16-24.
31. Donnez J, Squifflet J. Complications, pregnancy and recurrence in a prospective series of 500 patients operated on by the shaving technique for deep rectovaginal endometriotic nodules. *Hum Reprod* 2010; 25: 1949-58.
32. Fanfani F, Fagotti A, Gagliardi ML, Ruffo G, Ceccaroni M, Scambia G, et al. Discoid or segmental rectosigmoid resection for deep infiltrating endometriosis: a case-control study. *Fertil Steril* 2010; 94: 444-9.
33. Kössi J, Setälä M, Enholm B, Luostarinen M. The early outcome of laparoscopic sigmoid and rectal resection for endometriosis. *Colorectal Dis* 2010; 12: 232-5.
34. Kondo W, Bourdel N, Tamburro S, Cavoli D, Jardon K, Rabischong B, et al. Complications after surgery for deeply infiltrating pelvic endometriosis. *BJOG* 2011; 118: 292-8.
35. Kondo W, Bourdel N, Jardon K, Tamburro S, Cavoli D, Matsuzaki S, et al. Comparison between standard and reverse laparoscopic techniques for rectovaginal endometriosis. *Surg Endosc* 2011; 25: 2711-7.
36. Ruffo G, Sartori A, Crippa S, Partelli S, Barugola G, Manzoni A, et al. Laparoscopic rectal resection for severe endometriosis of the mid and low rectum: technique and operative results. *Surg Endosc* 2012; 26: 1035-40.
37. Donnez J, Nisolle M, Gillerot S, Smets M, Bassil S, Casanas-Roux F. Rectovaginal septum adenomyotic nodules: a series of 500 cases. *Br J Obstet Gynaecol* 1997; 104: 1014-8.
38. Koninckx PR, Ussia A, Adamyan L, Wattiez A, Donnez J. Deep endometriosis: definition, diagnosis, and treatment. *Fertil Steril* 2012; 98: 564-71.
39. Darai E, Ackerman G, Bazot M, Rouzier R, Dubernard G. Laparoscopic segmental colorectal resection for endometriosis: limits and complications. *Surg Endosc* 2007; 21: 1572-7.
40. Leconte M, Chapron C, Dousset B. Surgical treatment of rectal endometriosis. *J Chir (Paris)* 2007; 144: 5-10.
41. Woods RJ, Heriot AG, Chen FC. Anterior rectal wall excision for endometriosis using the circular stapler. *ANZ J Surg* 2003; 73: 647-8.

42. Crispi CP, Schor E, Oliveira MAP, Abraão M, Ribeiro PAAG. Endometriose. In: Crispi CP, Oliveira FMM, Damian Jr JC, Oliveira MAP, Ribeiro PAGR, editors. *Tratado de endoscopia ginecológica: cirurgia minimamente invasiva*. 3rd ed. Rio de Janeiro: Revinter; 2012. p.233-79.
43. Daraï E, Bazot M, Rouzier R, Houry S, Dubernard G. Outcome of laparoscopic colorectal resection for endometriosis. *Curr Opin Obstet Gynecol* 2007; 19: 308-13.
44. Roman H, Rozsnay F, Puscasiu L, Resch B, Belhiba H, Lefebure B, et al. Complications associated with two laparoscopic procedures used in the management of rectal endometriosis. *JSLs* 2010; 14: 169-77.
45. Keckstein J, Wiesinger H. Deep endometriosis, including intestinal involvement—the interdisciplinary approach. *Minim Invasive Ther Allied Technol* 2005; 14: 160-6.
46. Remorgida V, Ragni N, Ferrero S, Anserini P, Torelli P, Fulcheri E. How complete is full thickness discoid resection of bowel endometriotic lesions? A prospective surgical and histological study. *Hum Reprod* 2005; 20: 2317-20.
47. Meuleman C, Tomassetti C, D'Hoore A, Van Cleynenbreugel B, Penninckx F, Vergote I, et al. Surgical treatment of deeply infiltrating endometriosis with colorectal involvement. *Hum Reprod Update* 2011; 17: 311-26.
48. Meuleman C, Tomassetti C, D'Hoore A, Buyens A, Van Cleynenbreugel B, Fieuws S, et al. Clinical outcome after CO<sub>2</sub> laser laparoscopic radical excision of endometriosis with colorectal wall invasion combined with laparoscopic segmental bowel resection and reanastomosis. *Hum Reprod* 2011; 26: 2336-43.
49. Mabrouk M, Spagnolo E, Raimondo D, D'Errico A, Caprara G, Malvi D, et al. Segmental bowel resection for colorectal endometriosis: is there a correlation between histological pattern and clinical outcomes? *Hum Reprod* 2012; 27: 1314-9.
50. Boni L, Tenconi S, Beretta P, Cromi A, Dionigi G, Rovera F, et al. Laparoscopic colorectal resections with transvaginal specimen extraction for severe endometriosis. *Surg Oncol* 2007;16 Suppl 1: S157-60.
51. Abrão MS, Podgaec S, Dias JA Jr, Averbach M, Silva LF, Marino de Carvalho F. Endometriosis lesions that compromise the rectum deeper than the inner muscularis layer have more than 40% of the circumference of the rectum affected by the disease. *J Minim Invasive Gynecol* 2008; 15: 280-5.
52. Canis M, Botchorishvili R, Slim K, Pezet D, Pouly JL, Wattiez A, et al. Bowel endometriosis. Eight cases of colorectal resection. *J Gynecol Obstet Biol Reprod (Paris)* 1996; 25: 699-709.
53. Moawad NS, Guido R, Ramanathan R, Mansuria S, Lee T. Comparison of laparoscopic anterior discoid resection and laparoscopic low anterior resection of deep infiltrating rectosigmoid endometriosis. *JSLs* 2011; 15: 331-8.
54. Roman H, Loisel C, Resch B, Tuech JJ, Hochain P, Leroi AM, et al. Delayed functional outcomes associated with surgical management of deep rectovaginal endometriosis with rectal involvement: giving patients an informed choice. *Hum Reprod* 2010; 25: 890-9.

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# Perceptual-Motor Adaptation in Laparoscopic Surgery

## Adaptação Perceptivo-Motora na Cirurgia Laparoscópica

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### ABSTRACT

In the face of experience with the training center in video-surgery of Recife, based by specific literature, is considered the physiology of human perception and perceptual changes, found in laparoscopic surgery, being provided guidelines to facilitate the work in these new perceptual circumstances. It is concluded by the need for change in the structure of teaching this surgical approach characterized by an initial period of adaptation to the new environment perceptual-motor created, followed by the transposition of the learning curve of each procedure to be run.

**Key words:** Learning. Perception. Motion. Surgery. Laparoscopy. Video-assisted surgery.

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Basic courses on laparoscopic surgery, conducted at the Videosurgery Training Center of Recife in the 1990s, allowed us to observe *trainees* overcoming the challenges arising from the execution of movements, through ports in an environment perceived by two-dimensional vision and limited haptic sensation. This difficulty of perceptual-motor adaptation in the manipulation of structures seen on a video monitor, led us to seek, in the relevant literature, a comprehension of several issues fundamental to its understanding:

- a) How do human beings perceive the world around them
- b) What changes in perception occur in laparoscopic surgery
- c) Adaptation of manipulation in this new perceptual environment

### HUMAN PERCEPTION

Perception is a human brain function that assigns meaning to sensory stimuli based on previous experiences.<sup>1</sup> Human beings use the brain to organize and interpret the sensory information arriving from its surroundings and from its own body, assigning meaning to this information. Perception is viewed by SEKULER and BLAKE as a biological process whereby the information captured by the sensory

nervous system is analyzed by the perceptual process, so that one can interact with the world, facilitating the planning of appropriate attitudes or movements, although with limitations.<sup>2,3</sup> It is understood that perception is not that same as reality, but is its representation.<sup>4</sup> Selective attention determines a range of perception subject to external and internal factors, of which motivation, experience, and emotion are extremely important.<sup>5</sup>

Charles Sherrington, an English neurophysiologist, classified the senses as surface (or exteroceptive), deep (or proprioceptive), and visceral (or intraceptive). The surface senses (vision, hearing, taste, olfaction, and touch) are each related to specific organ, the deep senses depend on existing specialized sensors in the muscles, tendons and joints, while the visceral sensations are latent, only perceived when the organs are diseased.<sup>6</sup>

Kinesiology, the science which studies how humans move, uses the same classification, dividing the perception of movements into proprioceptive and exteroceptive. Proprioception is the ability of humans to perceive the position and movement of their bodies in space, while exteroception evaluates the position of objects around them, a function carried out by vision.<sup>7</sup>

Proprioception depends on mechanoreceptors present in the muscle spindles that inform which

muscle groups are contracted or relaxed; on neurosensors present in joints that indicate the angle of each one of them; and on Golgi bodies, specialized sensors located in the tendons, which detect the traction exerted on the tendons.

These three groups of sensors are responsible for kinesthetic perception, and when combined with tactile sensation captured by specialized sensors located in the skin – especially the skin of the hands – establish haptic sensation, which can inform not only tactile sensation, but also other characteristics of palpated objects, including their consistency, shape, and spatial location.<sup>8</sup>

Therefore, haptic perception promotes knowledge of the surroundings perceived by sensory receptors in the skin, muscles, tendons and joints, involving an active exploration.<sup>9</sup> Following vision, haptic perception is the second most reliable that human beings have to perceive the space in which find themselves, safely analyzing their location and movement (navigation) in this space.<sup>10</sup>

The vestibular system located in the inner ear is also essential to proprioception, and is responsible for our body's equilibrium. This system contributes to the vestibular-ocular reflex by automatically sending stimuli to effect changes in the muscles responsible for eye movements, stabilizing the image on the retina, including keeping the horizon in a static position, thereby facilitating the spatial orientation.<sup>11</sup>

Within the near-body space (or micro-space) – which corresponds to that space that can be manipulated – egocentric distance (depth) is measured very accurately by binocular convergence (up to 6 meters) and by visual accommodation (up to 3 meters). With binocular vision each eye captures the image of the object in a particular axis, forming an angle between the two axes as they converge on the object. With this, the brain calculates the distance between the observer and the observed object. With the visual accommodation, contraction of the ciliary muscle generates greater or lesser curvature of the lens in order to focus on the observed object. This muscle contraction is perceived by the brain allowing/permitting it to calculate the distance of the observed object.<sup>12</sup>

In the image projected on the monitor, all the objects or structures are seen in a single plane, rendering binocular convergence and visual accommodation ineffective. In such circumstances, human beings use monocular visual or pictorial cues

to assess depth. Relative size, convergence (or perspective), the known size, what objects are obscured (or overlapped) by others, and the vision in the horizontal plane provide a limited sense of the depth, while shadows, texture, brightness or sheen, and contrast (or aerial perspective), which depend crucially on the brightness and image quality, provide a slightly more precise assessment of depth (egocentric distance).<sup>13,14</sup> For this reason, the surgeon better perceives depth (the 3rd dimension) when working in well-lit areas and with the image captured and projected by a high resolution system.

As previously stated: “perception does not correspond to reality”, varying depending on the environment or working space as well as subjective factors. The perceived visual space is the mental representation of the environment within its geometrical properties. In the real physical (or experiential) space, in the peripersonal area, egocentric distance is overestimated varying with the angle and increasing with age, due to a phenomenon called “superconstancy. In the virtual physical space (of the computer) and in the pictorial (or photographic) space, which is the image projected as video, depth is underestimated.<sup>15</sup> This is why during a laparoscopic procedure we always try to clamp a structure or grab a suture before reaching it.

From birth children experience everything through their senses; they explore their surroundings, especially through physical activity, initially by crawling, walking, jumping, and then through play, games, gymnastics, dance, sports, etc. These activities lead to the development of spatial orientation and its relation to the time needed to carry out movements in space. The construction of three-dimensional space, and the internalisation of the properties of space, accompany motor development.<sup>16</sup> These motor experiences during childhood, are responsible for the development of spatial orientation and navigation.<sup>17</sup> Obviously, failures or restrictions during this period of evolution will bring harmful consequences to future motor learning.

## PERCEPTION IN LAPAROSCOPIC SURGERY

Unlike open surgery, where the experiential space is expanded inside the patient through a generous incision, in laparoscopic surgery the maintenance of the mucocutaneous barrier, determines the need to

create two interfaces: a visual interface to promote a view of the body cavity to be manipulated during the operation, and a motor interface to permit its manipulation. Furthermore, it is imperative, that the peritoneal cavity, which is virtual, be transformed into a real space, to create an open area, suitable for viewing and manipulation.<sup>18</sup>

To establish this space the surgeon will have to learn how to access the peritoneal cavity, define which gas to use to create the appropriate environment, what pressure to maintain, and the local and general repercussions arising from this pressure, occasional leaks, or any absorption of the gas, as well as the possibility of leaks from the circuit due to the use of electric current newly created environment. The surgeon should also master how to use gravity to displace viscera and understand the importance of an adequate muscle relaxation for the maintenance of that space, a responsibility of the anesthesiologist.

The most important and challenging for the *apprentice* of laparoscopic surgery, however, is the need to experience a perceptual-motor adaptation in an environment similar to that found in this surgical approach. This can be done through the use of: inanimate simulators (black box), experimental animals, fresh cadavers, or virtual simulators. The surgeon needs to adapt to working in an environment of perception distinct from the usual, with perceptual limitations, imposed by the creation of two interfaces (visual and motor) necessary for the procedure.

The visual interface, which requires that light reaches the peritoneal cavity and of the illuminated image to be observed on the monitor be captured, divide the surgical space into: the projected space (that which is seen on the monitor) and a blind space (not seen in the projected image). In fact, the surgeon is operating in three environments with distinct visual perceptions:

a) In the living space, perceived in three dimensions, when you move outside the abdominal cavity, inserting or removing the surgical instruments through the ports.

b) In the projected space, perceived in two dimensions, when manipulating intracorporeal visceral structures seen on the video monitor.

c) In the blind space, an area without any visual dimension (zero dimension) as visceral traction is applied outside of the view captured by the camera (most of the time handled by an assistant).

The motor interface consists of the trocars which allow the passage of instruments through the abdominal wall without leakage of the pneumoperitoneum. The rubberized valves, however, reduce the haptic perception of the surgeon by about 50%. This motor interface also creates a *fulcrum* effect, which corresponds to mirrored movement, such that there is an opposite movement within the body in relation to those executed by the surgeon's hand outside of the patient's body. This fulcrum effect also modifies the force resulting from maneuvering the instruments, much as like a lever, depending on the length of the instrument outside the cavity.

Manipulation of the optic by another person (the camera operator) precludes the vestibulo-ocular reflex, responsible for equilibrium, maintenance of the horizon in its proper place, and actions to follow the object in motion. The assistant who maneuvers the camera should maintain the horizon and follow the movements of the surgeon, maintain the structure to be manipulated in the center of the monitor. In addition, the camera operator should learn to use the angulation of the optic to produce an oblique view, while maintaining the horizon and the centralization of the structure being manipulated. The camera operator should also widen the viewing area by retracting the optic whenever the surgeon withdraws or inserts an instrument into the surgical field, in order to minimize the blind space at these times. The use of a 16 x 9 ("widescreen") picture aspect ratio also decreases the blind space on each side of the manipulated area.

Besides the decrease of *haptic* perception and the *fulcrum* effect, promoted by the motor interface, ports determine fixed angles defined at the beginning of the procedure, limiting the movements of the instruments in four degrees of freedom: the opening and closing of its jaw, rotation on its axis, swinging as it passes through the fixed point, and penetration and withdrawal of the instrument.

For good traction and better exposure of the viscera, the surgeon should learn to use gravity, and thus should have an operating table with a remote control that makes it possible to change the patient's position during surgery without interrupting the procedure.

Since the beginning of perceptual-motor adaptation surgeons should be warned that the preservation of the usual working conditions is extremely important. The centralized view should be maintained as much as possible, keeping a hand on

each side of the viewing area (the situation experienced by human beings from birth). When both hands are working on one side of visual field, peripheral vision makes it difficult to sense and identify the active hand, but can be used on occasion, as long as movements are carefully executed. Working in a mirror view – when the direction of view is the inverse of the manipulation – is extremely complex and should be avoided. Therefore, the triangulation of the ports is critical for the maintenance of the centralized view. The instrumentation ports should be located on each side, permitting surgeon's right hand to work on the right of the area displayed on the monitor and the left of the left side.

Another triangulation should be respected. When exposing the viscera to be manipulated the assistant should pull the viscera to one side and the surgeon (or possibly the second hand of the assistant) to the other side, while gravity complements the triangulation. Thus the surgeon has at his disposal an suitable surgical field for safe handling.

The spatial orientation and navigation are skills that, fundamentally, depend on experiences during childhood; these skills are difficult to develop during adulthood. Childhood play, games, sports, and dance, as well as other physical activities are essential for the acquisition of a spatial sense and motor action in peripersonal space (spatial orientation and navigation).<sup>19</sup>

Another important issue related to the visual interface is that of *perceptual distortion* or *optical illusion*, often due to a phenomenon called perceptual constancy studied by aviators who use a different landing angle, depending on the geography surrounding the runway.<sup>20</sup> This may explain the greater number of biliary tract lesions with laparoscopic cholecystectomies, where the regional anatomy is seen from an angle entirely different from the conventional angle observed in open surgery.

Due to the static position for long periods and the awkward positions used by surgeons during laparoscopic surgery, a number of osteo-articular injuries, has been detected among the surgeons who perform these procedures.<sup>21,22</sup> It is important, therefore, to mention several ergonomic precautions such as: correct positioning of monitor, proper height of the operating table, types and sizes of the handles of the instruments that are appropriate for the size of the surgeon's hands, and even similar care with the placement of the

foot pedals of the electric bisturi or other forms of energy, to minimize reaching during use that may cause misalignment of the spine.

To facilitate movement within the operating room, all the connections of the equipment to the electric circuitry, the connection of the camera to the monitors, tubes or hoses to conduct various types of gases should preferably descend from the ceiling. Changing the decubitus of the patient during surgery is absolutely necessary so that the force of gravity can provide traction on the mobile viscera (e.g. bowel loops) with consequent improvement of the operative field; hence the need for an operating table with a remote control. The measures described above should be present in an appropriate structure in order to provide ergonomic positioning for the entire operating team, promoting the comfort of all during the surgery, ensuring the safety of the patient and the team, and facilitating mobility within the operating room.

## PERCEPTUAL-MOTOR ADAPTATION

Upon observing laparoscopic surgery training, the need for learning or relearning of some motor skills becomes evident. These skills should be understood as responsible for voluntary movements of the body in order to achieve goals acquired through training and practice, with the objective of attaining proficiency.<sup>23</sup>

Motor learning is reflected in the acquisition of consistency promoted by the repetition of the motor act until one attains automatization. According to psychologists Paul Fitts and Michael Posner, this adaptation can be divided into three steps or stages:

1. Initial (or cognitive) stage that is characterized by uncoordinated and inconsistent movements requiring a high degree of attention.

2. Intermediate (or associative) stage, when a small number of less serious errors occur that require less attention.

3. Advanced (or autonomous) stage, when there is greater consistency, combined with an agile skill, allowing the execution of simultaneous tasks.

At the end of these steps, when the movements become stable and precise, the learner reaches a *level of proficiency*. In this step, the motor actions become automated, no longer requiring greater concentration.

To attain this *level of proficiency* within an ethical standard, one cannot skip this adaptation period

in humans. Therefore, there are some simulations where the environment is similar to that of the future patient when performing a laparoscopic approach. With the repetition of the motor act the *apprentice* will acquire consistency, reaching his goals more efficiently. Any introduction of new techniques or technologies functions as a disturbance, accompanied by the need for a new adaptive process for the reorganization of skills.<sup>24</sup>

Only after achieving the perceptual-motor adaptation can the *learner* be authorized to face the *learning curve* through the practice of each procedure to be performed. The motor training for laparoscopic surgery can be performed in fresh cadavers, in laboratory animals (especially pigs), and with simulators: inanimate (black box), biological, and virtual (with or without *enhanced reality*).

There is evidence of the effectiveness of training in virtual reality,<sup>25</sup> although it seems clear that the level of proficiency will be different among the surgeons and that some of the *trainees* will not be able to acquire some motor skills despite the repetition of specific movements in virtual reality.<sup>26,27</sup> Surgeons experienced in video games, especially those who can achieve the best performances with this kind of game, have a greater facility in skipping the period of perceptual-motor adaptation in simulators.<sup>28</sup>

## FINAL CONSIDERATIONS

Without a doubt the teaching of laparoscopic surgery can not follow the model developed and first implemented by William Halstead at Johns Hopkins Hospital in the late nineteenth century, when the surgeon would observe once, would perform on a second occasion, would be teaching at the third opportunity. The expression “*see one – do one – teach one*”, used by so many, does not apply to the teaching of laparoscopic surgery.<sup>29</sup> With this new surgical approach there is an need to first adapt to a new work environment, where a perceptual-motor adaptation must occur, so that subsequently, at a later time, one can climb the *learning curve*, inherent with any new procedure.

The trail of technological achievements in *laparoscopic surgery* although exciting, requires a lot of dexterity and ability, besides requiring a great capacity for adaptation. It requires commitment and, above all, a certain humility to acknowledge and accept a new way of thinking and acting in the context of a new reality. This new approach to surgery requires dedicated training to allow for maximum ease in this new perceptual environment. In fact, we are striding step by step into the future, because going back to past is now inconceivable.

## RESUMO

Diante de experiência com o Centro de Treinamento em Videocirurgia do Recife, respaldada por literatura específica, é analisada a fisiologia da percepção humana e as alterações de percepção, encontradas na cirurgia laparoscópica, sendo fornecidas orientações para facilitar o trabalho nestas novas circunstâncias perceptuais. Conclui-se pela necessidade de mudança na estrutura de ensino desta abordagem cirúrgica caracterizada por um período inicial de adaptação perceptivo-motora ao novo ambiente criado, seguido pela transposição da curva de aprendizagem de cada procedimento a ser executado.

**Palavras chave:** Aprendizagem. Percepção. Movimento. Cirurgia. Laparoscopia. Cirurgia video-assistida.

## REFERENCES

1. Wikipedia: Percepção. [http://pt.wikipedia.org/wiki/Percep%C3%A7%C3%A3o#cite\\_note-0](http://pt.wikipedia.org/wiki/Percep%C3%A7%C3%A3o#cite_note-0). Accessed on March 6, 2012.
2. Souza HMRC. Percepção Humana na Visualização de Informação Crítica. Dissertação submetida ao Curso de Mestrado em Tecnologia Multimídia. Universidade do Porto, Faculdade de Engenharia – FEUP (2009) [http://paginas.fe.up.pt/~tavares/downloads/publications/teses/TeseMSc\\_HugoSouza.pdf](http://paginas.fe.up.pt/~tavares/downloads/publications/teses/TeseMSc_HugoSouza.pdf) Accessed on April 22, 2012.
3. Sekuler R, Watamaniuk SNJ, Blacke R. Perception of Visual Motion. Seven's Handbook of Experimental Psychology. J Wiley Publishers New York, (2001) <http://people.brandeis.edu/~sekuler/papers/SWBchapterJune2001.pdf> Accessed on 22/04/2012.
4. Baldo MVC and Haddad H. Ilusões: O olho mágico da percepção. Ver Bras Psiquiatr (2003) 25 (Supl. II): 6-10. <http://www.scielo.br/pdf/rbp/v25s2/a03v25s2.pdf> Accessed on April 28, 2012.
5. Dias SIS. A Percepção e seus Processos – Aula 3 – Curso de Tecnologia do Design – Dom Bosco (2009) <http://www.fag.edu.br/professores/solange/>

- T E O R I A % 2 0 D O % 2 0 D E S I G N / 03.Percep% E7% E3o&Processos.pdf Accessed on March 6, 2012.
6. Paulo Brito. O Sistema Sensitivo. Instituto Paulo Brito. [http://www.institutopaulobrito.com.br/pdf/pdf\\_programa\\_residencia/sistema\\_sensitivo/visao\\_geral\\_sistema\\_sensitivo.pdf](http://www.institutopaulobrito.com.br/pdf/pdf_programa_residencia/sistema_sensitivo/visao_geral_sistema_sensitivo.pdf) Accessed on March 5, 2012.
  7. Riemann BL and Lephart SM. The Sensorimotor System, Part I: The Physiologic Basis of Functional Joint Stability. *J Ath Train* (2002) 37(1):71-79. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC164311/> Accessed on March 6, 2012.
  8. Soledad Ballesteros. Percepción háptica de objetos y patrones. Realizados: Uma revision <http://www.psicothema.com/psicothema.asp?id=885> Accessed on March 6, 2012. Em cache - Similares
  9. Chapter 12 – Touch – Introduction – Touch Physiology – Tactile Sensitivity and Acuity – Haptic Perception. <http://fac.hsu.edu/ahmada/3%20Courses/5%20Sensation%20&%20Perception/1%20SenPercepNotes/Ch12%20Touch.pdf>
  10. Raisamo J. Haptics Research in TAUCHI: Aiding Visually Impaired Children and Enabling Haptic Interaction. Department of Computer Science – University of Tampere, Finland (2006). [http://www.dcs.gla.ac.uk/haptic/haptics%20web%20pages\\_files/Raisamo.pdf](http://www.dcs.gla.ac.uk/haptic/haptics%20web%20pages_files/Raisamo.pdf). Accessed on April 8, 2012.
  11. Cristiana Borges Pereira. Sistema vestibular e motor-ocular: Anatomia, fisiologia e propedêutica. <http://pt.scribd.com/doc/58129554/apostila> Accessed on March 6, 2012.
  12. Noriega P. Psicologia cognitiva - Ergonomia – Departamento de Ergonomia – Universidade Técnica de Lisboa. <http://areas.fmh.utl.pt/~pnoriega/teaching/psicog/matpsicog/files/01intro.pdf>. Accessed on March 6, 2012.
  13. Bruce V et Green P. Visual perception: physiology, psychology and ecology. L.E.A.: London (1985). [http://books.google.com.br/books?hl=pt-BR&lr=&id=WfajMpCZOuYC&oi=fnd&pg=PR7&dq=Bruce+V+et+Green+P.+Visual+perception:+physiology,+&ots=0IwfZ959ZB&sig=H6XBvTs9Dx\\_1J64XXIM0\\_iouA#v=onepage&q&f=false](http://books.google.com.br/books?hl=pt-BR&lr=&id=WfajMpCZOuYC&oi=fnd&pg=PR7&dq=Bruce+V+et+Green+P.+Visual+perception:+physiology,+&ots=0IwfZ959ZB&sig=H6XBvTs9Dx_1J64XXIM0_iouA#v=onepage&q&f=false). Accessed on April 30, 2012.
  14. Villafañe J and Mínguez N. Principios de teoría general de la imagen. Ediciones Pirámide (2002) <http://pt.scribd.com/doc/32183748/Principios-de-teoria-general-de-la-imagen>. Accessed on April 26, 2012.
  15. Da Silva JA, Aznar-Casanova JA, Pinto-Ribeiro N, Santillán JE. Acerca da métrica da percepção do espaço visual. *Arq Bras Oftalmol* 69(1): 127-35, (2006) <http://www.scielo.br/pdf/abo/v69n1/27738.pdf> Accessed on March 6, 2012.
  16. Castro EM. Percepção e Ação: Direções Teóricas e Experimentais Atuais. (2003) [http://sites.ffclrp.usp.br/paideia/artigos/27/07.htm#\\_ftnref1](http://sites.ffclrp.usp.br/paideia/artigos/27/07.htm#_ftnref1)
  17. Carvalho, MML. Apressamento cognitivo infantil: possíveis consequências. *Revista da ABPP*. <http://www.abpp.com.br/artigos/50.htm> Accessed on March 6, 2012.
  18. Melo MAC. A Reconfiguração da Cirurgia – Uma nova percepção através da janela bidimensional – Capítulo 5: Novo espaço de trabalho p. 107-128 - 2010
  19. Tani G. Comportamento motor: Aprendizagem e desenvolvimento. (1998) Editora Guanabara Koogan – Rio de Janeiro.
  20. Alves CV. Desenvolvimento de um sistema para quantificação da desorientação espacial. Tese de Mestrado (2008) Porto Alegre.
  21. Berguer R, Rab GT, Abu-Gaia H, Alarcon A, Jung J. A Comparison of surgeons' posture during laparoscopic and open surgical procedure. *Surg Endosc* (1987) 11:139-42
  22. Golfrit ON, Mikahail AA, Zom KC, Kagaja GP, Steinberg GD, Shalhai AL. Surgeon's perceptions and injuries during and after urologic laparoscopic surgery. *Urology* (2008) 71(3):404-7.
  23. Magill, RA. Aprendizagem motora: conceitos e aplicações. São Paulo: Edgar Blucher; 1984
  24. Ugrinowitsch H, Corrêa UC, Tani G. Perturbação Perceptiva e Processo Adaptativo na Aprendizagem de uma Tarefa de "timing" coincidente. *Rev Bras Ed Fis Esp* 19(4):277-84 (2005) <http://www.revistasusp.sibi.usp.br/pdf/rbef/v19n4/v19n4a02.pdf>
  25. Ahlbergh G, Enochsson L, Gallagher AG, Hedman L, Hogman C, McClusky DA, Ramel S, Smith CD, Arvidsson D. Proficiency-based virtual reality training significantly reduces the error rate for residents during their first 10 laparoscopic cholecystectomies. *Am J Surg* (2007) 193(6):798-804.
  26. Dinçler S, Koller MT, Steurer J, Bachmann LM, Christiem D, Buchmann P. Multidimensional analysis of learning curve in laparoscopic sigmoid resection. *Disease Colon Rectum* (2003) 46(10):1371-8.
  27. Grantcharov TP et Fuch-Jensen P. Can everyone achieve proficiency with laparoscopic technique? Learning curve patterns in technical skills acquisition. *Am J Surg* (2009)
  28. Rosser JC, Lynch PJ, Cuddihy L, Gentile DA, Klonsky J, Merrell R. The impact of video games on training surgeons in the 21st century. *Arch Surg* (2007): 142:181-6.
  29. Villegas L, Schneider BE, Callery MP, Jones DN. Laparoscopic Skills training. *Surg Endosc* (2003) 17:1879-88.

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# Laparoscopic Adrenalectomy with Concurrent Retroperitoneal and Pelvic Lymphadenectomy for the Treatment of Metastatic Melanoma: A Case Report

## Adrenalectomia Videolaparoscópica Concomitante a Linfadenectomia Retroperitoneal e Pélvica para Tratamento de Metástase de Melanoma: Relato de Caso

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### ABSTRACT

**Introduction:** Melanoma with adrenal metastases constitutes advanced disease with a poor prognosis and limited therapeutic options. The use of laparoscopy in the treatment of cancer patients, be it for curative or palliative goals, is feasible and has low morbidity. Several studies support adrenalectomy as a therapeutic option with improvement, in some cases, of life expectancy. **Case report:** We describe a laparoscopic approach for treatment of metastatic melanoma using left adrenalectomy and retroperitoneal and pelvic lymphadenectomy performed without changing the patient's position. This major surgical procedure was performed without complications and with no residual disease (R0 surgery). The patient was discharged on the second postoperative day. The patient is being followed as an outpatient without signs of recurrence. **Discussion:** Performing major laparoscopic procedures is now a reality, maintaining the benefits of minimally invasive surgery. In this case, we avoid the Sims position, opting instead to perform the transperitoneal adrenalectomy with the patient supine and the surgical table tilted in order to be able to also perform the retroperitoneal and pelvic lymphadenectomy. Although surgical time of the procedure was long, the analysis of separate times was quite satisfactory, and the patient was still discharged hospital quickly/early. We believe that in the face of metastatic melanoma, the laparoscopic procedure is beneficial, improving disease control and quality of life.

**Key words:** Laparoscopic adrenalectomy. Retroperitoneal lymphadenectomy. Melanoma. Pelvic lymphadenectomy.

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### INTRODUCTION

Advanced melanoma is a disease with high mortality and with limited systemic therapeutic options for disease control or for palliative treatment of symptoms. Patients with advanced disease need palliative care with less morbidity to improve the quality of life, and even, in some cases, disease-free survival. Today, laparoscopy constitutes a feasible and effective access route for oncological procedures for cancer of small to major curative or palliative and aimed mainly extremely important tool in the

surgical staging of various pathologies. Metastatic disease in the adrenal gland secondary to melanoma is a disease with limited prognosis. The literature offers us few studies that define the best approach to take in this clinical situation.<sup>1</sup> Laparoscopic adrenalectomy was reported in a few studies as a treatment option with improved life-expectancy.<sup>2,5,6</sup> In this article we report a case where a laparoscopic approach was used to perform left adrenalectomy and retroperitoneal and pelvic lymphadenectomy in the same surgical time for the treatment of metastatic melanoma.

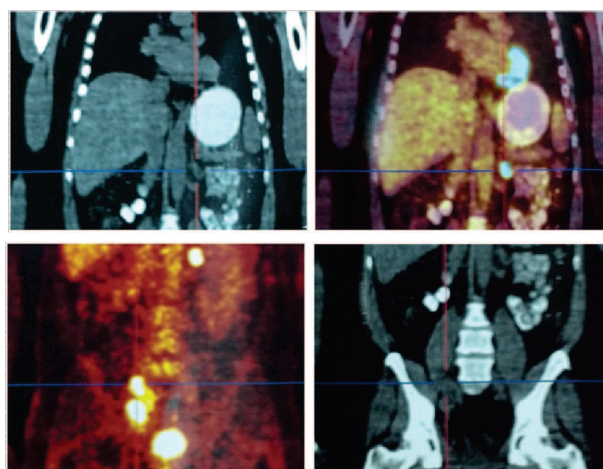
## CASE REPORT

A 49 year old male, with idiopathic vitiligo and a familial history of melanoma, presented with lymphadenomegaly in the right inguinal lymph node chain, associated with asthenia and evening fevers, without skin lesions suggestive of malignancy. Laboratory studies were remarkable for a LDH of 1074. He initially underwent right inguinal lymph node biopsy for clinical suspicion of a lymphoma. The result of the pathology analysis was consistent with metastatic melanoma, which was confirmed with immunohistochemistry and an independent review of the tissue slides. For preliminary staging purposes MRIs of the head and the entire abdomen as well as a CT of the chest were obtained. These studies revealed extensive right-sided inguinal and pelvic lymphadenopathy extending to the right common iliac compatible with lymph node metastasis, and a 3.0 cm nodule in the left adrenal suggestive of an adenoma. There were no pathologic findings in the head and chest imaging studies.

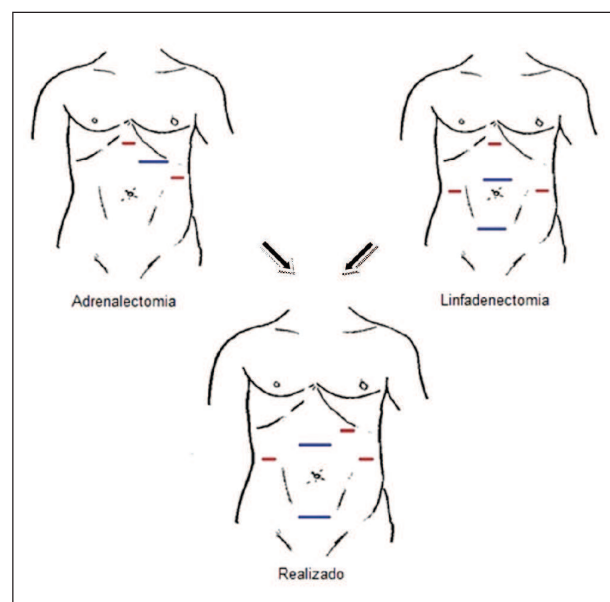
Given the extent of the disease and in order to plan adjuvant/ therapy, a PET-CT study was obtained which showed evidence of tumor activity with a SVU of 16.7 in the right inguinal and pelvic region, a subcutaneous nodule in the lower third of the right thigh, and a left juxtarenal para-aortic lymph node (Figure 1). The clinical predicament of metastatic melanoma of unknown primary was discussed in a multidisciplinary oncology case conference. Given the different findings of the PET-CT and the abdominal MRI, surgery was recommended to complete the staging by establishing whether the adrenal nodule was or was not a metastasis, and to reduce the tumor burden in case the patient was a candidate for chemotherapy.

The surgical approach chosen was left adrenalectomy associated with right retroperitoneal and pelvic lymphadenectomy through a laparoscopic approach with radical right inguinal lymphadenectomy and resection of the subcutaneous nodule in the right thigh with ample margins. The procedure began with a laparoscopic approach with the patient in dorsal decubitus and reverse Trendelenburg, the surgeon positioned between the patient's legs, and the monitor at the head of the surgical table. A 12 mm trocar for the optic was inserted 2 cm above the umbilicus and three 5 mm trocars were placed in the right flank, left flank and left upper quadrant (Figure 2).

After initial inspection, lesions in the peritoneum and left hemidiaphragm suggestive of metastasis were submitted to pathology; frozen section examination was negative for malignancy. The presence of retroperitoneal lymphadenopathy extending to the right pelvic chain was noted. No other suspicious lesions were observed. The operating table was tilted 45 degrees to the right in preparation for the approach to left adrenal. The splenic flexure of the colon was freed using ultrasonic coagulating scissors and the spleen and tail of the pancreas were



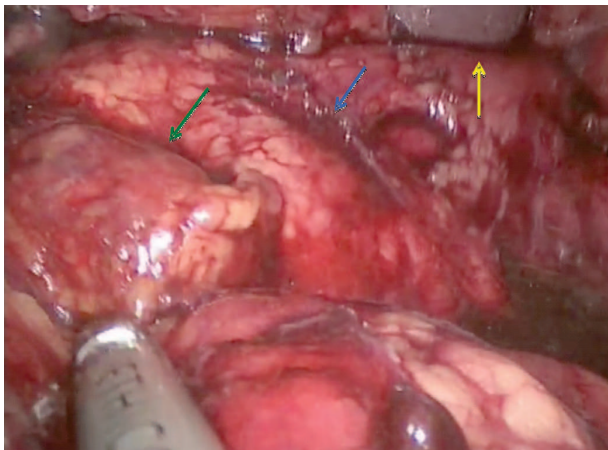
**Figure 1** - Identification of metastatic lesions by PET-CT: lesion shown in the left adrenal topography, with large uptake (top right without contrast; top left with contrast); right iliac lymph nodes (bottom right, with uptake, and lower left, without contrast).



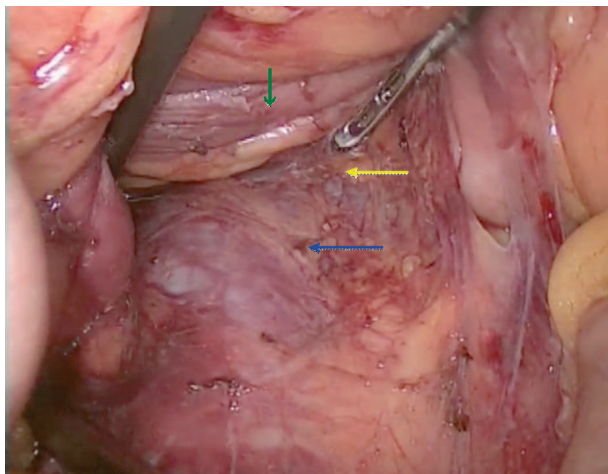
**Figure 2** - Adaptation of the placement of trocars so that the three procedures can be performed with the same approach.

dissected and pulled medially. This was followed by dissection of the left adrenal gland which had a tumor of approximately 3.0 cm in diameter with a nodular appearance (Figure 3).

The adrenal vessels were ligated with an Ultracision harmonic scalpel and the adrenalectomy was completed. The specimen was removed in the finger of a glove and sent to the pathology service. After reversing the lateral table tilt and with the patient in Trendelenburg, another 5 mm trocar was introduced in the epigastrium and another 12 mm trocar below the umbilicus to which the optic was transferred. The round ligament of the liver was transected, and the transverse colon and greater omentum as well as proximal segment of the small intestine were reflected cephally. The root of the mesentery was retracted for median exposure of the retroperitoneum.



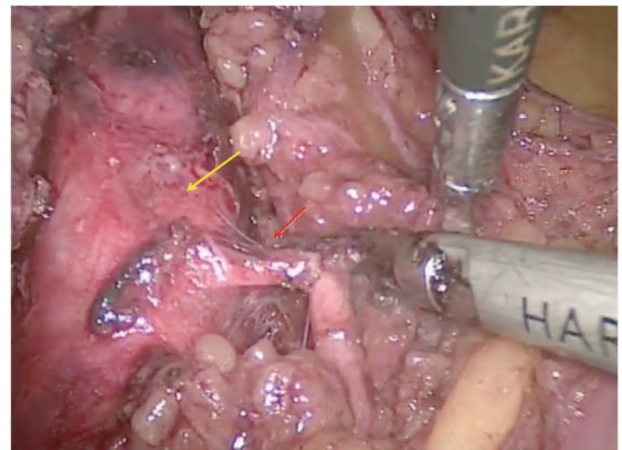
**Figure 3** – View of the left adrenal (green arrow), inferior pole of the spleen (yellow arrow) and tail of the pancreas (blue arrow).



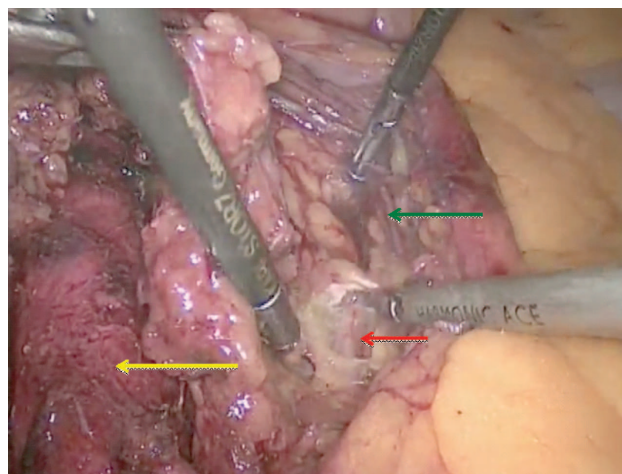
**Figure 4** – Medial retroperitoneal access with visualization of the vena cava (blue arrow) and the left renal vein (yellow arrow). The duodenal arch was folded upward (green arrow).

The retroperitoneal dissection began with medial access, close to the cecum and extending until release of duodenal arch and identification of the left renal vein (Figure 4). The paracaval space was dissected with preservation of the right ureter and gonadal vessels. All paracaval lymph node tissue was dissected to the left of the aorta, from the left renal vein to the left common iliac artery, preserving the inferior mesenteric artery (Figures 5 and 6).

The left ureter and gonadal vessels were displaced laterally. The para-aortic and aortic-intercaval lymph nodes were dissected with preservation of the nerve plexus, leaving the vena cava and aorta completely exposed; this completed the retroperitoneal lymphadenectomy (Figure 7). We opted to not ligate the lumbar vessels following nerve preservation principles adopted by our service. The



**Figure 5** – Dissected aorta (yellow arrow), with identification of the inferior mesenteric artery (red arrow).



**Figure 6** – Dissected aorta (yellow arrow), with the lateralized gonadal vessels (green arrow), and identification of the left ureter (red arrow).

surgical specimen was removed from the cavity using a 10 mm Endopouch®.

The monitor was then moved to the patient's right side, close to right foot, for better visualization of the pelvic lymph nodes. The dissection was initiated in the medial portion of the psoas muscle, close to the cecum, displacing the right ureter medially. Dissection progressed to deep inguinal ring, where Cloquet's ganglion was identified.

Medially, lymphadenectomy was performed with exposure of the common and external iliac artery and vein. The obturator fossa was accessed, exposing the obturator nerve. Pelvic lymphadenectomy was performed with preservation of the superior vesical artery. The surgical specimens were extracted inside a 10 mm Endopouch®.

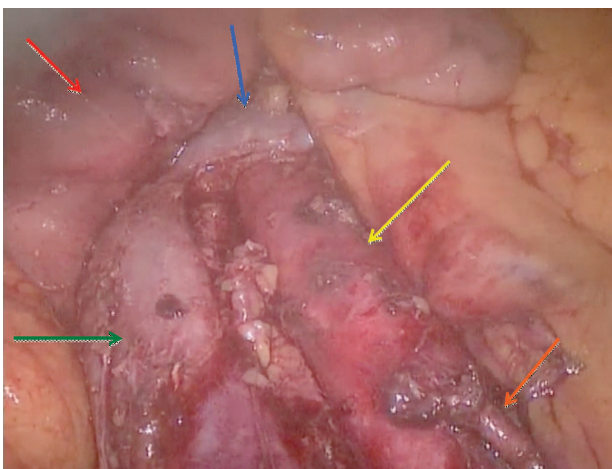
The cavity was inspected and the ports closed. With the abdominal time concluded, Trendelenburg was reversed and the patient repositioned with legs closed. Antisepsis was performed and surgical fields were prepared over the groin and right thigh. A nodular tumor in lower third of the right thigh was excised with resection of adjacent tissue to the pre-fascial plane. After closure, the right inguinal lymphadenectomy was started. A *italics* "S" shaped incision was made encompassing the previous scar (Figure 8).

A skin graft was fashioned and dissection down to the *vastus medialis* and sartorius muscle laterally, and the angle of Scarpa's triangle, inferiorly, was performed. Radical inguinal lymphadenectomy with saphenous vein ligation and complete exposure

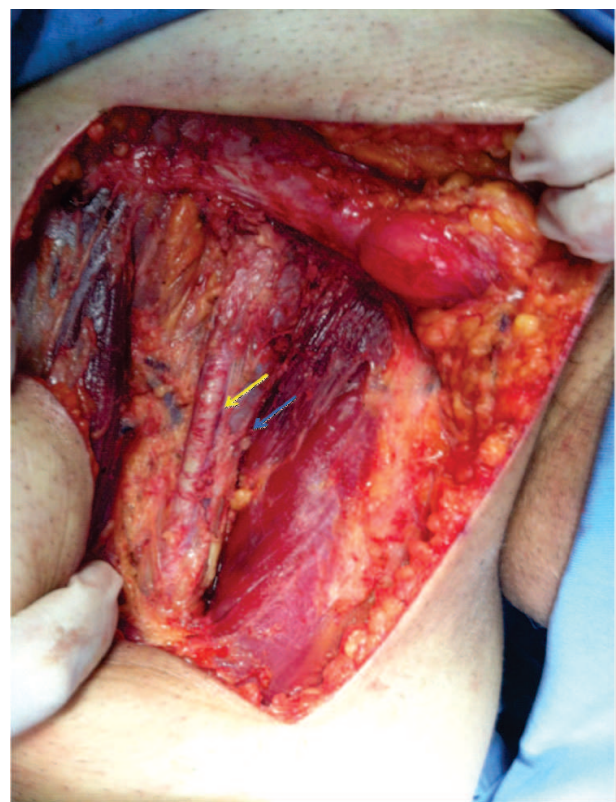
of the femoral vessels was performed (Figure 9). A 19 Fr closed drain was placed and the skin flaps were closed.



**Figure 8** – *italics* "S" shaped incision in the right inguinal region.



**Figure 7** – Final result of the retroperitoneal dissection with exposure of the vena cava (green arrow), duodenal arch (red arrow), left renal vein (blue arrow), aorta (yellow arrow) and superior mesenteric artery (orange arrow).



**Figure 9** – Right inguinal region dissected with exposure of superficial femoral vessels: femoral artery (yellow arrow) and femoral vein (blue arrow).

The total surgical time of 300 minutes was distributed as follows: 40 minutes for the left adrenalectomy; 120 minutes for the retroperitoneal lymphadenectomy; 20 minutes for changing the position of the monitor; 50 minutes for the right pelvic lymphadenectomy; 30 minutes for preparing the inguinal field; 40 minutes for the resection of the subcutaneous tumor and the inguinal lymphadenectomy. The only intraoperative complication was minor bleeding from the external iliac vein, which was controlled with a single LT 300 metallic clip. Total blood loss from surgery was estimated at 100 ml after accounting for laparoscopic vacuum residue. At the end of surgery, there were no signs of residual disease.

The patient stayed overnight in the intensive care unit for 12 hours for better monitoring and was transferred to a regular room the next day with good acceptance of diet in 24 hours. He was discharged on the second postoperative day with an inguinal drain. He was seen as an outpatient on the fourth post-operative day; he had no pain complaints, no lymphedema, and no gastrointestinal or genitourinary complaints. He returned again a week later with an uneventful course and continued asymptomatic. Pathological examination confirmed metastatic melanoma in the left adrenal and in the nodular tumor in the right thigh, but all 31 resected lymph nodes were inflammatory and negative for malignancy. Currently, the patient is being followed as an outpatient and receiving chemotherapy, without evidence of disease.

## DISCUSSION

Metastases to the adrenal are rare, but melanoma is among the principal neoplasias associated with such lesions. Several studies have shown that the prognosis of patients with adrenal metastases caused by melanoma is poorer than with other neoplasias.<sup>4,6</sup> There is no consensus in the literature regarding the surgical treatment of adrenal metastases from melanoma, nor whether there is any difference in outcomes between laparotomic or laparoscopic approaches.

One study with 154 cases of adrenal metastasis from melanoma conducted by

MITTENDORF and cols. found an average survival of 6.4 months, which correlated directly with elevated LDH and synchronicity of the lesion. Patients in this study who underwent surgery had longer disease-free survival rates. Another study, by SANCHO and cols., found that adrenalectomy was only indicated in patients with controlled local disease who had no other metastases, imaging studies compatible with adrenal metastases, and a performance status that permitted aggressive treatment.

Laparoscopic adrenalectomy is now considered a well established and safe approach — both by transperitoneal or retroperitoneal routes — with the patient in various positions for anterior, lateral and posterior access. Retroperitoneal lymphadenectomy is most commonly performed using an anterior transperitoneal approach primarily in gynecological and urological cancers, although these may also be performed using extraperitoneal access.

In our service we have performed transperitoneal adrenalectomy with 45 degrees recumbency and fixation of the hip and upper limbs as the position preferred to the Sims position. In this case, we also did not use the Sims position, opting for conducting the transperitoneal adrenalectomy with the patient supine and the surgical table tilted laterally in order to favor the major procedure which was the retroperitoneal and pelvic lymphadenectomy, while minimizing the total surgical time, since there were three procedures using the same approach.

Although we encountered considerable difficulty freeing the colon and pancreas and spleen, surgical time was still considerably reduced, as there was no need to secure the upper extremities and hips or reposition the patient in dorsal decubitus with the arms alongside, which we consider the best position for the lymphadenectomies.

Regarding the positioning of the trocars, we shifted the flank trocars 2.0 cm cephally, and we shifted the epigastrium trocar to the left upper quadrant to facilitate the adrenalectomy. Although the total procedure time was long, analysis of the separate times for each component was quite satisfactory, which we can attribute to better positioning of the trocars and the patient.

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**RESUMO**

**Introdução:** O melanoma avançado com metástase em glândula adrenal representa doença com prognóstico limitado e com terapêutica discutível. A utilização da laparoscopia no tratamento do paciente oncológico, paliativo ou curativo, é factível e com baixa morbidade. Alguns estudos defendem a realização da adrenalectomia como possibilidade terapêutica com melhora, em alguns casos, da expectativa de vida. **Relato de caso:** Neste artigo, descrevemos uma abordagem laparoscópica para realização de adrenalectomia esquerda associado à linfadenectomia retroperitoneal e pélvica no mesmo tempo cirúrgico e sem modificação no posicionamento do paciente, para tratamento de melanoma metastático. Procedimento de grande porte cirúrgico transcorrido sem intercorrências, sem doença residual (Cirurgia R0), com o paciente recebendo alta hospitalar no segundo dia pós-operatório. No momento em acompanhamento ambulatorial regular e sem sinais de recidiva. **Discussão:** A realização de procedimentos laparoscópicos de grande porte é hoje uma realidade, com manutenção dos benefícios da cirurgia minimamente invasiva. Neste caso, evitamos a posição de Sims, optando pela realização da adrenalectomia transperitoneal com decúbito horizontal e lateralização da mesa cirúrgica buscando beneficiar o procedimento de maior porte que seria a linfadenectomia retroperitoneal e pélvica. Apesar do tempo cirúrgico do procedimento ter sido longo, a análise dos tempos separados foi bastante satisfatória, e o paciente manteve alta hospitalar precoce. Acreditamos que diante de tal patologia, melanoma metastático, o procedimento laparoscópico traz benefícios, como também, melhora da qualidade de vida e controle da doença.

**Palavras chave:** Adrenalectomia laparoscópica. Linfadenectomia retroperitoneal. Melanoma. Linfadenectomia pelvica.

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**REFERENCES**

1. Sancho JJ, Triponez F, Montet X, Sitges-Serra A. Surgical management of adrenal metastases. *Langenbecks Arch Surg.* 2012 Feb; 397(2):179-94.
2. Crenn G, Delaunay B, Salloum A, Vezzosi D, Bellec L, Thoulouzan M, Bennet A, Rischmann P, Plante P, Caron P, Soulie M, Huyghe E. Carcinological results of laparoscopic adrenalectomy for adrenal metastasis. *Prog Urol.* 2011 Oct; 21(9):607-14.
3. Mittendorf EA, Lim SJ, Schacherer CW, Lucci A, Cormier JN, Mansfield PF, Gershenwald JE, Ross MI, Lee JE. Melanoma adrenal metastasis: natural history and surgical management. *Am J Surg.* 2008 Mar; 195(3):363-8; discussion 368-9.
4. Muth A, Persson F, Jansson S, Johanson V, Ahlman H, Wängberg B. Prognostic factors for survival after surgery for adrenal metastasis. *Eur J Surg Oncol.* 2010 Jul; 36(7):699-704. Epub 2010 May 7.
5. Castillo OA, Vitagliano G, Kerkebe M, Parma P, Pinto I, Diaz M. Laparoscopic adrenalectomy for suspected metastasis of adrenal glands: our experience. *Urology.* 2007 Apr; 69(4):637-41.
6. Sebag F, Calzolari F, Harding J, Sierra M, Palazzo FF, Henry JF. Isolated adrenal metastasis: the role of laparoscopic surgery. *World J Surg.* 2006 May; 30(5):888-92.

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outubro

Cirurgia Pediátrica - curso avançado  
julho • dezembro

Cirurgia Geral para Residentes - curso básico  
fevereiro • agosto

Cirurgia Minilaparoscópica - curso avançado  
abril

Cirurgia Single Port - curso básico  
março

Cirurgia de Reparo de Hérnia - curso avançado  
setembro

Endoscopia GI - curso avançado  
setembro

Sutura Laparoscópica - curso básico  
junho • outubro

Artroscopia do Joelho - curso avançado  
junho

Cirurgia de Base de Crânio - curso avançado  
junho

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