ISSN 1983-9901
ISSN ONLINE 1983-991X

Brazilian Journal of Videoendoscopic Surgery

OFFICIAL JOURNAL OF BRAZILIAN SOCIETY OF VIDEOSURGERY
Vol 6 - nº2 - April / June 2013

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Year 6

Vol. 6
Number 2

Brazilian Journal of Videoendoscopic Surgery
Periodicity: Trimestral
Circulation: 3.500 exemplares
Free Distribuiton to:
SOBRACIL Associate Members

Subscription and Contact:

revista@sobracil.org.br

ISSN 1983-9901 (press) / 1983-991X (on-line)
Eletronic version at:
www.sobracil.org.br

Brazilian Journal of Videoendoscopic Surgery

April / June 2013

Official Journal of the Brazilian Society of Videosurgery

Production and Distribution - Brazilian Society of Videosurgery
Headquarters: Avenida das Américas n. 4801, s/ 308
Centro Médico Richet - Barra da Tijuca - Rio de Janeiro, RJ - Brasil
CEP: 22.631-004
Telephone and Fax: + 55 21 3325-7724 - sobracil@sobracil.org.br

Printing and Publishing: ***Press Graphic & Publishing Ltd***
Rua João Alves, 27 - Saúde - Rio de Janeiro - RJ - Brasil
CEP: 20220-330
Phone: + 55 21 2253-8343 edprensa@uol.com.br

Grafic Design and Production
Márcio Alvim de Almeida
alvimtrabalhos@hotmail.com

References Norms Standardization
Luciana Danielli de Araújo
CRB-7 5024
ldanielli@uol.com.br

Cataloging-in-Publication Data

Brazilian Journal of Videoendoscopic Surgery. Brazilian Society of Videosurgery. Sobracil -- v.6, n2, apr./jun. 2013 --- Rio de Janeiro: Brazilian Journal of Videoendoscopic Surgery. 2013.

Published Quaterly
Abstract

n. 1; 28 cm.

1. Medicine, Videosurgery - Periodicals I. Brazilian Society of Videosurgery.

CDD 617

Brazilian Journal of Videoendoscopic Surgery

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Brazilian Journal of Videoendoscopic Surgery

Continuing Medical Education: the Role of the Specialty Societies and Journals

The Brazilian Journal of Videoendoscopic Surgery is the scientific journal of the Brazilian Society of Videosurgery (SOBRACIL), and a forum for reflecting about the future direction of medical education and dissemination of knowledge. Since the late 1980s, when the surgeries employing laparoscopy attained crucial importance in medical practice in various specialties, the world has experienced striking transformations, especially technological.

In the 2002 film *Minority Report*, directed by Steven Spielberg, Tom Cruise, the main protagonist, commands his computer by touching the screen and gesturing, something that seemed highly advanced at the time, but now routinely is used in the living rooms of our homes. In the 1960s animated television series *The Jetsons*, which projected life in 2062, family members spoke on the telephone while seeing the image of the other person, something now commonplace in the era of smartphones. These changes also have been incorporated in our professional life: we conduct virtual meetings, communicate intensively with colleagues and patients by e-mail, and do research and study with the aid of virtual libraries.

Seeing patients, making accurate diagnoses, and obtaining good results with the medical or surgical interventions each call upon special knowledge and skills, but constant updating and learning alongside our peers are among the pillars of good medical practice. Let us turn to some data that relate to these issues. Starting in the mid-seventeenth century, the first scientific journals emerged in England (Philosophical Transactions of the Royal Society) precisely to disseminate and share research findings and treatments. In 1812, the first issue of the *New England Journal of Medicine* was published; it has been published continuously since, and today its electronic edition has 2 million readers. Two hundred years later there are now more than 25,000 scientific journals in the world, with the number growing about 3.5% per year. Approximately 1.5 million scientific articles are published each year. Technology enables easy access to this bombardment of information: the free Pubmed database includes more than 20 million citations. Indeed, we live in an age of super-specialization, but it would be utopian to keep up.

Brazil's scientific output has been growing solidly, with a four-fold increase in the number of articles published as compared to ten years ago. In 2011, Brazilian researchers published nearly 50,000 articles in scientific journals with impact factors; ten years earlier the number was 13,000 articles in a year. These data show that Brazil has great potential for scientific output.

The Brazilian Society of Videoendoscopic Surgery has several missions, among which are to promote and disseminate the teaching of minimally invasive surgery. It is in this context that the journal should contribute, disseminating new techniques, as well as those already established; presenting the results, complications, rare cases, and the unusual clinical presentations; and by sharing knowledge and experience. As the new Editor-in-Chief, and with the staff of the magazine and the Society, we aspire to grow and extend the reach of the Brazilian Journal of Surgery Videoendoscopic. We will actively solicit the collaboration of all those who are interested to submit original articles, case reports, and review articles of subjects relevant to various specialties considered within the scope of Videosurgery.

Editorial and graphic changes, updating of norms and the way manuscripts are submitted, among other changes, are being and will be implemented over the coming months. Undoubtedly, we will seek the path of excellence to improve the continuing medical education of our domestic and international readerships. A scientific journal that is specialized and of quality can and should further this endeavor.

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Brazilian Journal of Videoendoscopic Surgery

Educação Médica: o papel das Sociedades de Especialidades e Revistas Científicas

O Brazilian Journal of Videoendoscopic Surgery é a revista científica da SOBRACIL, Sociedade Brasileira de Videocirurgia, binômio base para a reflexão das próximas linhas a respeito de educação médica e comunicação. Desde o final da década de 80, quando as cirurgias utilizando a via laparoscópica assumiram importância crucial na prática médica de diferentes especialidades, o mundo passou por transformações impressionantes, principalmente tecnológicas. No filme Minority Report de 2002, dirigido por Steven Spielberg com Tom Cruise como ator principal, ele comandava sua tela de computador com gestos e toques, algo que parecia avançadíssimo, mas que já pode ser usado na sala da nossa casa. Isso para não falar dos Jetsons, desenho da década de 60, em que se falava pelo telefone vendo a imagem da outra pessoa, algo que virou banal nos smartphones. Na nossa vida profissional, essas mudanças também foram incorporadas: fazemos reuniões não presenciais, nos comunicamos intensamente por emails (com colegas e pacientes) e fazemos pesquisas e estudamos com auxílio das bibliotecas virtuais, entre tantas outras atividades.

Atender pacientes, fazer diagnósticos precisos e ter bons resultados nos tratamentos clínicos e cirúrgicos tem suas particularidades, mas a atualização constante e o ensino próximo aos nossos pares estão entre os pilares da boa prática médica. Vamos à alguns dados que entrelaçam essas questões. A partir de meados do século XVII surgiram as primeiras revistas científicas na Inglaterra (Philosofical Transactions of the Royal Society) justamente para divulgar e compartilhar resultados de pesquisas e tratamentos. Em 1812 foi publicado o primeiro número do New England Jounal of Medicine, que desde então permanece sendo editado ininterruptamente e hoje tem 2 milhões de assinantes em sua edição eletrônica. Com o passar desses 200 anos, atualmente existem mais de 25.000 revistas científicas no mundo, com número crescendo algo em torno de 3.5% ao ano e são publicados, em média, 1.5 milhões de artigos científicos por ano. A tecnologia permite acesso à esse bombardeio de informação, o Pubmed mantém mais de 20 milhões de artigos em suas citações e, é fato, que vivemos uma época de super especialização, mas seria utópico acompanhar isso

Em outra frente, a produção científica brasileira vem crescendo de forma sólida, com multiplicação de quase quatro vezes em relação ao numero de artigos publicados, comparando-se os últimos dez anos. Com dados de 2011, pesquisadores brasileiros tiveram quase 50 mil artigos publicados em revistas científicas com fator de impacto, numero que dez anos antes era de 13 mil artigos em um ano. Essas informações mostram que temos um grande potencial para a comunicação científica.

Nossa sociedade tem diversas missões, dentre as quais estimular e divulgar o ensino das cirurgias minimamente invasivas. Nesse contexto que a revista científica deve colaborar, disseminando técnicas novas, assim como aquelas já estabelecidas, mostrando os resultados, as complicações, os casos raros e de apresentação clínica incomum, compartilhando conhecimento e experiência. Como novo Editor-Chefe e com a equipe da revista e da Sociedade, vamos estimular de forma construtiva o crescimento do Brazilian Journal of VIdeoendoscopic Surgery. Precisamos e vamos solicitar ativamente a colaboração de todos com envio de artigos originais, relatos de caso e revisões de assuntos relevantes às diferentes especialidades contempladas no escopo da Videocirurgia.

Reformas editoriais e gráficas, renovação das normas e forma de envio dos artigos, entre outras mudanças, estão sendo e serão implementadas ao longo dos próximos meses. Sem dúvida, vamos procurar o caminho da excelência para melhorar a educação médica em nosso pais e uma revista científica especializada e de qualidade pode e deve auxiliar esse projeto.

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Brazilian Journal of Videoendoscopic Surgery

Original Article

Laparoscopic Radical Hysterectomy and Pelvic Lymphadenectomy in the Treatment of Cancer of the Cervix

Histerectomia Radical e Linfadenectomia Pélvica Laparoscópica no Tratamento do Câncer de Colo do Útero

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ABSTRACT

Radical hysterectomy remains the treatment of choice for most patients with early stage cancer of the cervix. Several studies have shown the equivalence – in terms of local control and survival – of laparoscopic surgery compared to the open technique. The benefits of laparoscopy compared to the open surgery are based on the general benefits of laparoscopy, such as less blood loss, less postoperative pain, reduced length of stay and lower hospital costs, and earlier return to work. In this article we describe in detail the techniques of radical hysterectomy and pelvic lymphadenectomy used in the treatment of cancer of the cervix and discuss the results.

Key words: Radical hysterectomy. Pelvic lymphadenectomy. Cancer of the cervix. Laparoscopy.

Braz. J. Video-Sur, 2013, v. 6, n. 2: 060-069

Accepted after revision: february, 13, 2013.

INTRODUCTION

Radical hysterectomy remains the treatment of choice for most patients with early stage cervical cancer. The expected benefits of laparoscopic radical hysterectomy (LRH) instead of open surgery are based on the general benefits of laparoscopic surgery such as less blood loss, less postoperative pain, reduced length of stay and lower hospital costs, and an earlier return to work.[1,2]

The first radical hysterectomy with laparoscopic pelvic and paraortic lymphadenectomy was performed in 1989 by Nezhat et al and published in 1992.[3] Since then the number and quality of scientific reports published has increased gradually, progressing from case series and case-control studies,[4] to cohort studies,[5-7] and finally randomized trials.[8] The results of these studies – in terms of local and systemic control of cervical carcinoma – are at least equivalent to open surgery.

Although there are some technical variations in radical hysterectomy, these surgeries are now well standardized. Our objectives are to describe the techniques in detail and discuss their results.

TYPES OF RADICAL HISTERECTOMY

Although there are variations in the surgical techniques used in hysterectomies, radical hysterectomy and modified radical hysterectomy are the most utilized in the treatment of patients with cervical cancer. In recent years, the nerve-sparing radical hysterectomy has been used with increasing frequency because it appears to reduce substantially complications related to urinary retention.

Radical hysterectomy (RH) consists of the resection of the uterus and the parametria along the pelvic wall, with ligation of the uterine artery at its origin. The surgery, called Piver III according to the Piver Classification,[9] has changed over time.

The modified radical hysterectomy (MRH) – also known as Piver II – consists of the removal of the uterus and parametria at a position just medial to its intersection with the ureters (see below). The

nerve-sparing radical hysterectomy (NSRH) consists of resection of the uterus and the entire parametria, but with preservation of the pelvic splanchnic nerve, hypogastric nerve, and the bladder branch of the inferior hypogastric plexus.

SURGICAL TECHNIQUE

Positioning

The patient, under general anesthesia, is placed in dorsal decubitus. The legs are positioned at 30 degrees of flexion relative to the thigh. There should be sufficient space between the legs to allow complete manipulation of the uterus (Figure 1). The buttocks should extend off the operating table. Improper positioning is one of the most common errors and makes the surgery very difficult.

Both arms should be positioned along the body, so that the surgeon and first assistant may assume ergonomic positions during the surgery. Figure 2 illustrates the positions of the staff and equipment in relation to the patient.

PREPARATION OF THE PATIENT

Preoperative preparation of the patient includes antithrombotic prophylaxis and antibiotic prophylaxis. Randomized studies have demonstrated the benefits of antibiotic prophylaxis in hysterectomies for benign disease.[10] The antibiotic should be administered at least 30 minutes and no more than two hours before the first incision, and continued for no more than 24 hours.

Because dissection of the parametria often results in urinary retention in the immediate postoperative period, once the patient is positioned on the operating table, a Foley catheter is placed in the bladder. Bladder catheterization also helps prevent injuries to the bladder.

Catheterizing the ureters – although not routine in most services – can be done at the beginning of the surgery in cases where the dissection of the ureters is expected to be difficult.

Finally, the surgeon proceeds with the placement of the uterine manipulator. There are various types of manipulators on the market. The uterine manipulator employed should allow ample manipulation of the uterus and vagina, without hindering complete access to the pararectal and paravesicular spaces, rectum, or parametria. The uterine manipulators equipped to expose the vaginal vault can facilitate the dissection of the vagina.

PLACEMENT OF THE TROCARS

After establishing the pneumoperitoneum according to the surgeon's preferences, four trocars are placed. A 10 mm umbilical trocar, through which a 30° or 0° optic will be used, is introduced first. After placement of this trocar the patient is placed in Trendelenburg and the other three trocars are introduced under direct vision. Two lateral 5 mm trocars are inserted about 2 to 3 cm medial and superior to the anterior superior iliac crest. The final 5 mm trocar is placed in the midline about 8 cm below the umbilical trocar (Figure 3). For short patients or those with a bulky uterus, the optic can be placed in a epigastric position in order to have additional space to the placement of the other trocars and to minimize contact between the instruments.

Once the trocars are positioned, it is important to conduct a thorough inspection of the abdominal cavity, with special attention to the presence of peritoneal implants and lymphadenopathy.

PELVIC LYMPHADENECTOMY (ILIAC AND OBTURATOR CHAINS)

The first step of the radical hysterectomy with pelvic lymphadenectomy is the dissection of the paravesical and pararectal spaces (Figure 4). The round ligament is exposed by uterine manipulation and traction, and then sectioned, after cauterization, along the pelvic wall. Once the round ligament is sectioned, the peritoneum is opened – laterally to the gonadal vessels – for about 5 cm. Some surgeons prefer to keep the round ligament intact during this part of the procedure.

This is followed by the dissection of paravesical space by blunt dissection between the medial aspect of the iliac vessels and lateral aspect of the obliterated umbilical artery. As an avascular virtual space, if bleeding occurs it is likely that the dissection is being conducted in the wrong plane.

The dissection of the paravesical space is extended until the internal obturator muscle is visualized. The same process of traction and countertraction is used in the dissection of the pararectal space (Figure 4D), taking care so that the ureter is drawn along with the peritoneum medially; this is the medial

Figure 1 - *Positioning of the patient, with arms along the body, protected from contact with metal parts of the operating table. Thighs abducted to allow manipulation of the uterus.*

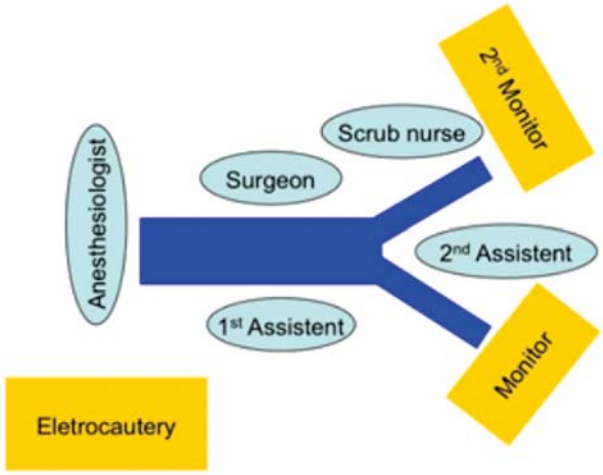

Figure 2 - *Layout of the staff and equipment used to perform a LRH with pelvic lymphadenectomy. If is an auxiliary monitor is used, it is positioned next to the patient's left foot.*

Figure 3 - *Positioning of the trocars in radical hysterectomies.*

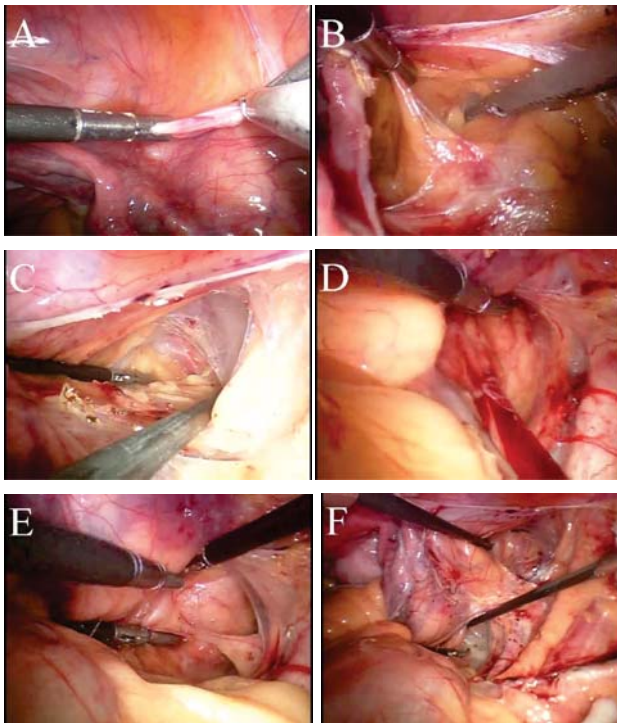

Figure 4 - (A) *Sectioning of the round ligament close to the pelvic wall.* ***(B)*** *Traction of the superior vesical artery.* ***(C)*** *Paravesical space dissected, allowing visualization of the internal obturator muscle.* ***(D)*** *Beginning of the dissection of the pararectal space with the internal iliac vessels defining the lateral border.* ***(E)*** *Dissection of the pararectal space by traction and counter-traction while keeping the ureter displaced medially.* ***(F)*** *Paravesical and pararectal spaces dissected.*

border of the dissection of this space and the internal iliac vessels constitute the lateral border.

After the creation of these spaces, the pelvic lymphadenectomy is started. Uterine manipulation is used to laterally displace the uterus to the side opposite the lymphadenectomy. Dissection begins with the external iliac artery, continuing laterally to the anterior aspect of the genito-crural nerve (lateral border) (Figure 5A) and distally to Cloquet's node, located internally to the hypogastric vein and superiorly to the internal iliac circumflex vein. Dissection continues over Cooper's ligament by displacing the medial wall of the iliac vein laterally. Retracting the vessels medially and laterally, the obturator fossa and the obturator nerve are exposed. The dissection of the external iliac vessels is then carried out. On the medial side of the external iliac vein one should be careful not to injure the *corona mortis* vein (Figure 5I).

Once the lymphadenectomy of the external iliac vessels is completed, progressing across the inner portion of the pelvic wall, along Cooper's ligament,

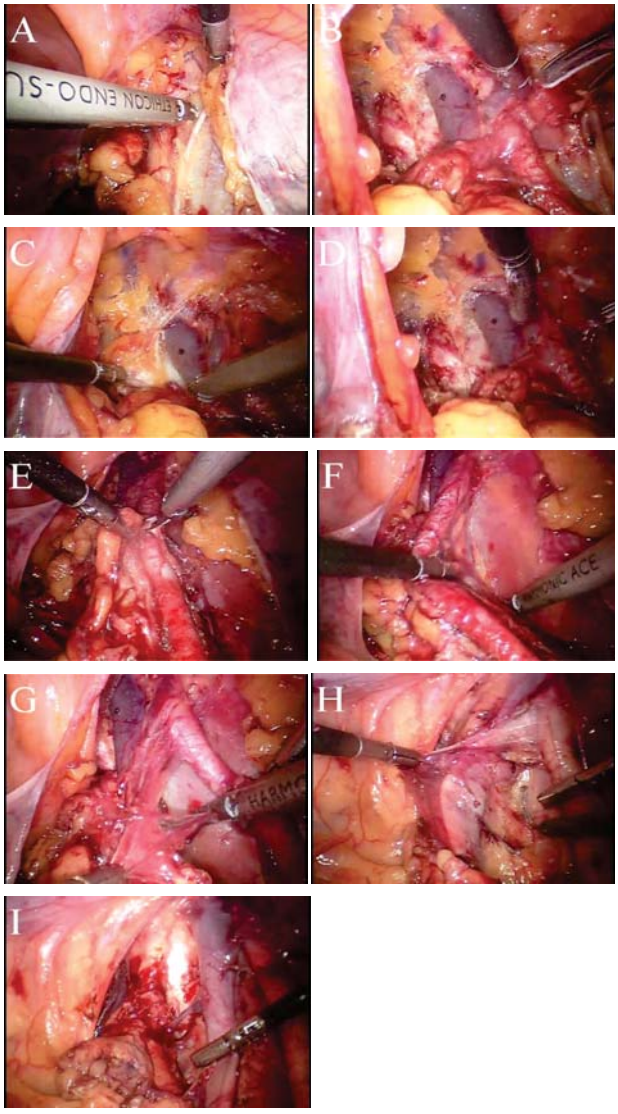

Figure 5 - (A) *Dissection lateral to the external iliac artery with preservation of the genito-crural nerve.* ***(B)*** *Right deep iliac circumflex vein marking the distal limit of the lymphadenectomy.* ***(C and D)*** *Cooper's ligament being dissected by medial traction on the lymphatic chain and lateral traction of the right external iliac vein.* ***(E)*** *Dissection of the external iliac artery.* ***(F)*** *Dissection of the lateral aspect of the lymphadenectomy by medial traction on the external iliac vessels and exposure of the greater psoas muscle.* ***(G)*** *Dissection of the internal face of the external iliac artery.* ***(H)*** *Dissection of the lateral face of the vein.* ***(I)*** *External iliac vein dissected revealing the* corona mortis *vein.*

the obturator nerve is identified and lymphatic chain is sectioned. Using traction it is possible to separate the lymphatic tissue of the obturator nerve with minimal bleeding, taking care not to damage the obdurator vessels. (Figure 6)

The bifurcation of the iliac artery is identified, lymph nodes in this region are dissected and continuing

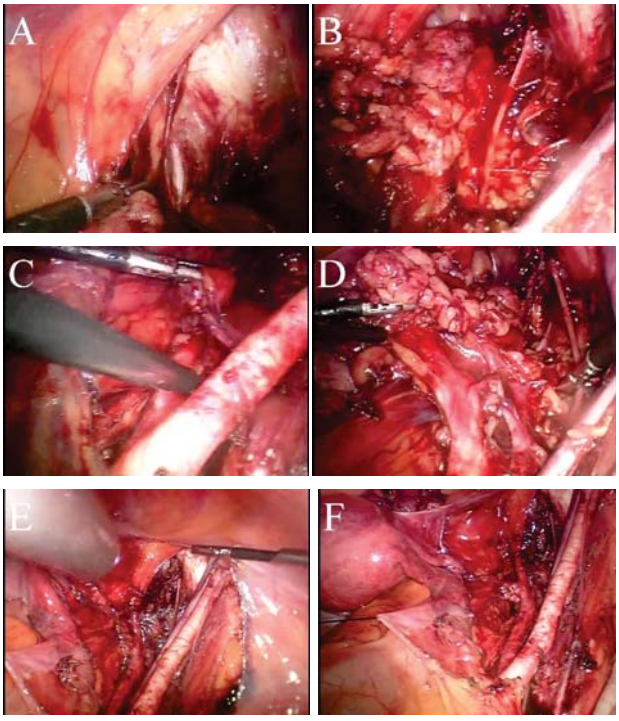

Figure 6 - (A) *Identification of the obturator nerve and sectioning of the lymphatic chain.* ***(B)*** *Right obdurator nerve dissected.* ***(C)*** *Lymphadenectomy of the bifurcation of the right iliac artery.* ***(D)*** *Lymphadenectomy of the internal iliac vessels.* ***(E)*** *Complete internal iliac lymphadenectomy with identification of the origin of the right uterine vessels and the umbilical artery.* ***(F)*** *Complete pelvic lymphadenectomy after isolated dissection of the small group of lymph nodes under the ureter and along the common iliac vessels.*

distally, the lymph nodes of the internal iliac vessels are dissected until the origin of the uterine vessels is identified (Figure 6D). The lymphadenectomy is then completed by dissection of the lymph nodes of the common iliac vessels, by medial traction of the peritoneum with the ureter and dissection of the region. Occasionally, a stitch in the peritoneum that invests the ureter in this region may assist in the exposure of the vessels (Figure 6F)

The surgical specimens of the lymphadenectomy should be placed inside the fingers of gloves or endobags for later removal with the uterus.

RADICAL HISTERECTOMY

Laparoscopic Radical Hysterectomy (LRH) begins with the sealing and sectioning of vessels of the infundibulopelvic ligament (Figure 7), aided by lateralization of the uterus by uterine manipulation. Sealing can be accomplished by common bipolar cautery, or

sealing instruments such as an ultrasonic scalpel. The sectioning of the posterior peritoneum of the broad ligament extends until close to the ureter (Figure 7C).

The uterus is pushed cranially in the midline in order to separate the bladder from the vaginal wall to the point at which the ureters enter the bladder (Figure 7D and 7E). At this point the uterine artery and vein are sectioned at their origins (Figure 7F) as are the parametria along the pelvic wall. Usually, the uterine vessels can be cauterized with bipolar cautery and sectioned, but the use of clips is an option.

The ureter is then completely dissected along its parametrial course to the point where it penetrates the bladder wall. The ureter can be manipulated with atraumatic forceps, tape, or a penrose drain (Figure 8B). Next the paracolpo, a portion of the lateral external parametrial tissue, inferior and laterally external to the ureter and posterior to the bladder wall are dissected, allowing complete release of the parametrium and the lateral wall of the vagina.

The dissection of both the ureter and the paracolpo are facilitated by the use of a harmonic scalpel or a similar form of energy that avoids thermal damage to the ureter, and at the same time can ensure adequate hemostasis.

The same steps are performed contralaterally, and then the uterosacral ligaments are sectioned along their complete length and the rectum is freed from the posterior vaginal wall by applying posterior traction to the rectum and anterior traction to the peritoneum lining the pouch of Douglas (Figures 8D to 8F).

We then proceed to the sectioning of the vagina, beginning preferably from the posterior wall, because of possible loss of the pneumoperitoneum, which could interfere with the sectioning (Figure 9A and 9B). Once the vagina is sectioned the uterus is extracted (Figure 9C) followed by the lymph nodes.

After removal of the surgical specimens from the cavity, vaginal suturing can be performed laparoscopically (Figure 10) or vaginally.

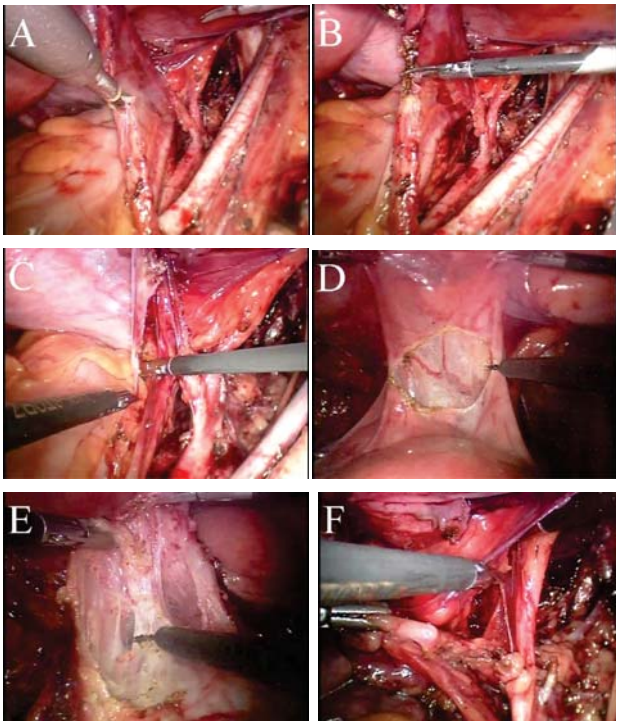

Figure 7 - (A) *Bipolar cauterization of the right infundibulopelvic ligament.* ***(B)*** *Sectioning of the infundibulopelvic ligament, with visualization of the right ureter attached to the peritoneum, the internal iliac artery, and the origin of the right uterine artery, as well as the superior vesicular artery and external iliac vessels.* ***(C)*** *Sectioning of the posterior peritoneum of the broad ligament while protecting the ureter.* ***(D)*** *Traction and sectioning of the vesicouterine peritoneum close to the uterus.* ***(E)*** *Dissection of the vesicouterine space.* ***(F)*** *The uterine artery clipped and sectioned at its confluence with the hypogastric artery. In the same figure the sealed and sectioned uterine vein is visible.*

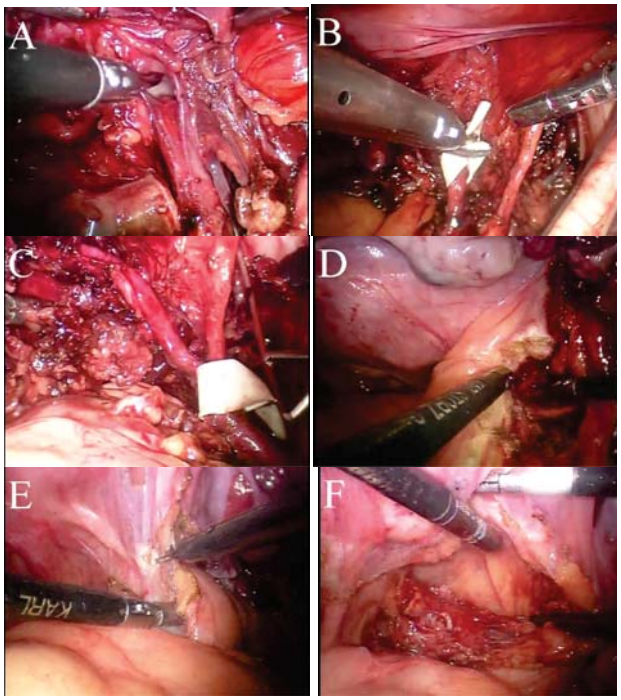

Figure 8 - (A) *Freeing of the right ureteral tunnel.* ***(B)*** *Placement of Penrose drain fixed with a clip for manipulation of the ureter.* ***(C)*** *Right ureter freed up to the bladder and the parametrium resected along the pelvic wall.* ***(D)*** *Sectioning of the uterosacral ligament.* ***(E)*** *Sectioning of the peritoneum lining the pouch of Douglas and freed of the rectum.* ***(F)*** *Posterior dissection completed with the rectum released.*

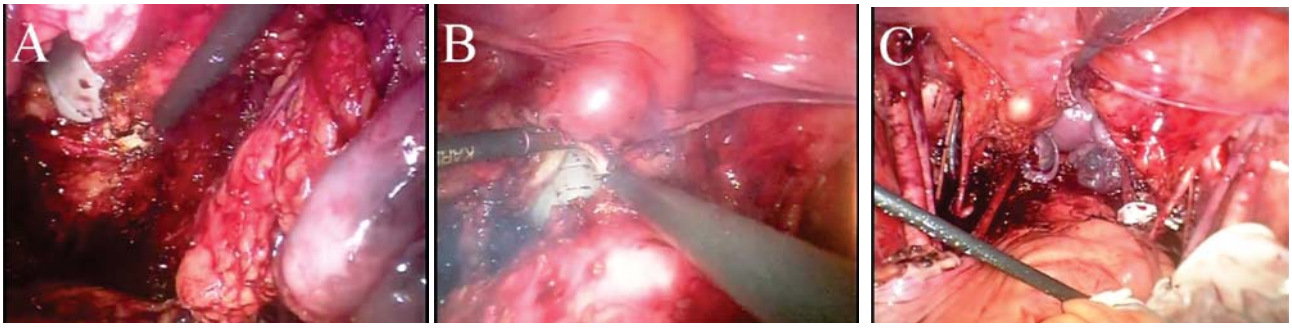

Figure 9 - (A and B) *Sectioning of the posterior and anterior walls of the vagina, with a manipulator with a cone to prevent air leakage.* ***(C)*** *Removal of the uterus through the vagina, with the* bag *containing the lymphadenectomy specimens ready to be removed immediately after.*

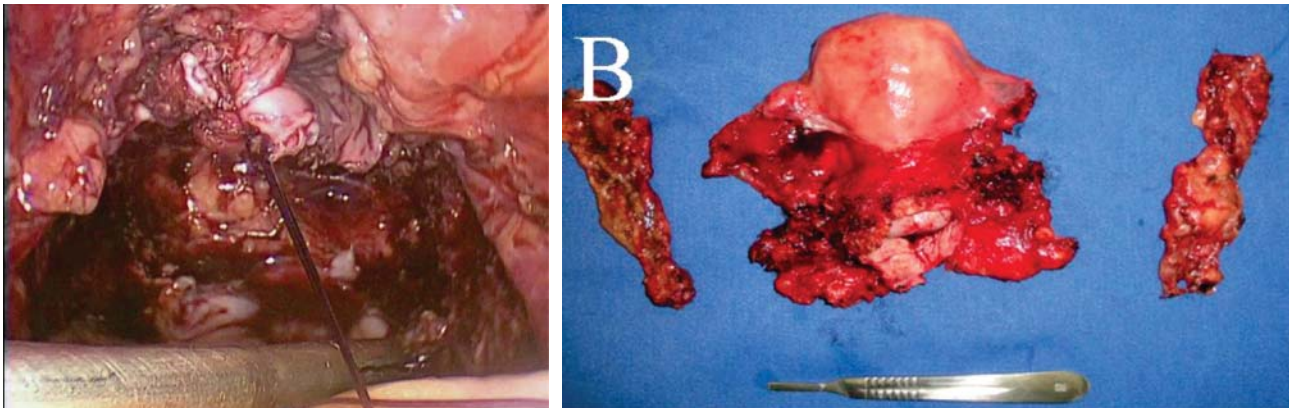

Figure 10 - (A) *Suturing of the left angle of the vagina with cross sutures. (B) The surgical specimen from radical hysterectomy with the lymphadenectomies.*

The laparoscopic suturing of the vagina requires the obliteration of the vagina to prevent the escape of gas. For oncologic reasons, the uterus should not be left in the vagina. The suturing can be performed with simple interrupted, cross sutures, or continuous sutures, preferably with slowly absorbed absorbable 0 monofilament.

The closure of the pelvic peritoneum is not necessary, and may be associated with an increased risk of febrile morbidity in the postoperative period and lymphocysts, as seen in an open surgery study.[20]

Once the surgery is completed, lavage and thorough review of the cavity and pelvic structures is performed. The use of drains is not recommended.

The conversion rate of LRH is around 5%. Pellegrino et al in their series of 107 patients operated between 2001 and 2007 required conversion in 6 patients (5.6%).[6] In three cases conversion was due to the presence of bulky lymph node metastases; the other three were due to the presence of a large quantity of adhesions.

OVARIAN TRANSPOSITION

For patients with cervical cancer who are premenopausal, preservation of the ovaries (Figure 11) and their transposition out of the pelvis is recommended. After performing the hysterectomy, the transposition begins with the detachment of the gonadal vessels. This detachment is extended long enough so that the ovary can be positioned outside the pelvis, preferably near the lower pole of the ipsilateral kidney in the parietocolic gutter. The ovaries are then clipped or sutured to the peritoneum.

The placement of clips, in addition to anchoring the ovaries, allows their identification by a radiation oncologist, so that radiotherapy fields can be planned in order to protect the ovaries.

RADICAL HISTERECTOMY WITH NERVE PRESERVATION (RHNP)

Bladder dysfunction can affect up to 80% of patients who have undergone Piver III radical

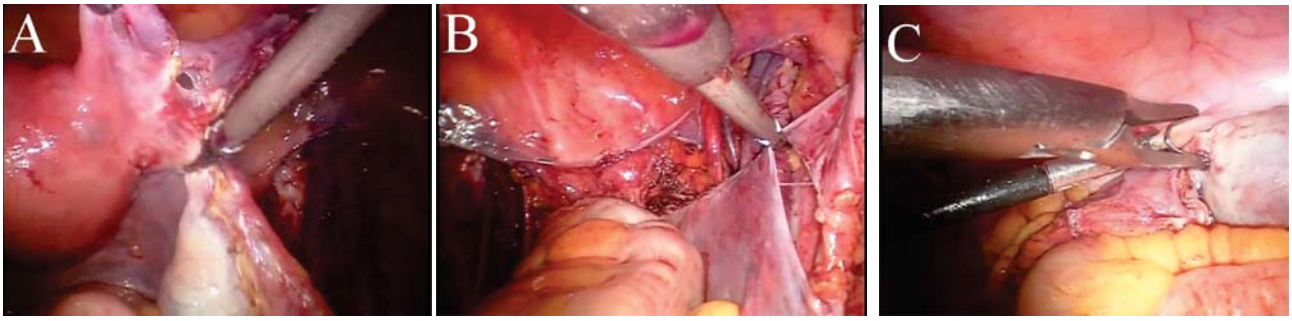

Figure 11 - (A) *Sectioning of the right utero-ovarian ligament to preserve the ovary.* ***(B)*** *Mobilization of the right ovary by sectioning the peritoneum that invests the gonadal vessels, after removal of the uterus.* ***(C)*** *Suturing of the right ovary in the right parietocolic gutter with clips.*

hysterectomies.[11] This obstacle to radical surgery has generated great interest in the preservation of autonomic innervation of the bladder. Japanese surgeons were the pioneers in the study of innervation and preservation of autonomic innervation of the bladder. They were the first to divide the cardinal ligament in two parts: the vascular part and "neural" part, making the sectioning of the cardinal ligament one of the critical moments of the nerve-sparing radical hysterectomy.[12] This concern with preserving the autonomic innervation of the bladder while maintaining the curability of radical surgery is called the "Tokyo method".

In general, the nerve-sparing surgery proceeds identically to the surgery without nerve preservation until the dissection of the pararectal space, where the hypogastric nerve is situated near the rectum and runs parallel to the uterosacral ligament.[13] The peritoneum is incised longitudinally along the uterosacral ligament, with the hypogastric nerve plexus identified under the peritoneum.

The nerve is isolated and retracted laterally to then proceed with the dissection of the colorectal space. Next, the uterine artery is ligated and sectioned at its origin.

The distal stump of the artery is lifted dissected from the connective tissue of the ureter, which then will release the superficial layer of the cardinal ligament. The ureter is freed up to where it enters the vesico-cervical ligament.

Traction on the hypogastric nerve and its dissection up to the cardinal ligament will guide the identification of the pelvic splanchnic nerve. The two unite to form the inferior hypogastric plexus, which along the posterior surface of the uterus gives rise to uterine and bladder branches of this plexus. After identification of the bladder branch, it can be dissected and preserved even with the radical resection of the paracervix.

In terms of outcomes, the mean number of days that elapse before post-void residual urine volumes (after catheter removal) are less than 50 ml, is about 50% shorter for patients undergoing NSRH (7.4 versus 16.5 days).[14] The return of urinary function for Stages 0 and I is close to 90% with nerve-sparing surgery and is 70% without nerve preservation.[1]

NSRH proved safe and effective in the context of cancer of the cervix and may be considered a less morbid alternative for patients who are candidates for radical hysterectomy.[15]

MODIFIED RADICAL HISTERECTOMY (MRH)

The MRH consists of the removal of the uterus and parametria at a position just medial to where they cross the ureters. It is often said that the MRH is equivalent to the Piver class II Extended Hysterectomy,[9] as described by the author himself: "The Class II extended hysterectomy is a moderately extended radical hysterectomy. The purpose is to remove more paracervical tissue, while still preserving the blood supply to the distal ureter and the bladder. The ureters are released from their paracervical position, but are not dissected from pubo-vescular ligament. Ligation of the uterine vessels just medial to the ureters ensures the preservation of the distal ureteral blood supply."[9] (Figure 12) The preservation of periureteral tissue reduces ureteral ischemia-related complications such as fistulas and stenosis. Moreover, the complications related to autonomic nerve injury of the bladder (see NSRH above) are reduced.

Likewise, in the MRH the resection of the vagina need not be so extensive, with the removal of

1 to 2 cm of the distal vagina sufficient for early stage tumors.[16]

POST-OPERATIVE CARE

Patients can eat as soon as they recover from anesthesia. Early ambulation should be encouraged, and physical and respiratory therapy provided as well. As soon as the patient is eating normally and has their pain adequately controlled with an oral analgesic – usually by the first or second post-operative day – they can be discharged. It is important to educate patients about the signs that may suggest complications so that they can return promptly to the hospital.

After radical hysterectomy the catheter should be kept in place for 5 to 7 days, and the patient should be instructed how to transition to self-catheterization. Measuring the post-void residue is important for determining when bladder function returns and self-catheterization can be discontinued.

DISCUSSION

Patients with FIGO clinical stage IA2 or IB1 cervical cancer should be treated with radical hysterectomy with pelvic lymphadenectomy – also known as the Wertheim-Meigs operation – with or without adjuvant radiotherapy as indicated by the histopathology findings.[17,18] The same treatment should be considered for patients with IA1 tumors with invasion of lymphovascular space.[19] The remaining IA1 carcinomas may be treated with a Piver II hysterectomy with pelvic lymphadenectomy.

There is some controversy regarding the appropriateness of radical hysterectomy for patients with stage IB2 tumors. Although surgery alone has never been compared to chemoradiation, the appearance of superior results with chemoradiation compared to radiotherapy alone led to the favoring of chemoradiation instead of surgery for patients with stage IB2 tumors.[20] Minor lesions, but which extend into the vagina (clinical stage IIA) can also undergo radical hysterectomy.

Although currently most agree that MRH should be restricted to the tumors of the cervix not exceeding 2 cm, the MRH can apparently be safely used in more advanced tumors. A randomized study published in 2001 showed comparable results between RH (Piver III) and MRH (Piver II) in terms of overall survival at 5 years (81% versus 77%), cause-specific mortality (18% versus 20%), and 5-year disease-free survival (75% versus 73%).[16] Less radical surgery had a shorter mean surgical time (135 versus 180 minutes) and lower late urinary morbidity (13% versus 28%).

When compared to conventional surgery, LRH results in less blood loss, shorter duration of bladder catheterization, reduced need for opioids, and shorter hospital stays.[21] Complication rates vary considerably in the literature. A European study of 234 patients had a perioperative mortality of less than 1%; urinary infections occurred in 42%, deep vein thrombosis in 3%, and urinary fistulas in 2%.[22] Infections are common in radical hysterectomies. The main causes of fever in the postoperative period are urinary tract, surgical wound, and pelvic infections.[22, 23]

About 7% of patients undergoing laparoscopic pelvic lymphadenectomy develop lymphocysts.[24] Most patients who develop lymphocysts are asymptomatic; major complications are rare.[25]

Certainly the surgical complications that most challenge surgeons are injuries of the urinary tract, and their associated dysfunctions. Urinary dysfunction – including incontinence or urinary or fecal retention – within the one year of radical hysterectomy, without

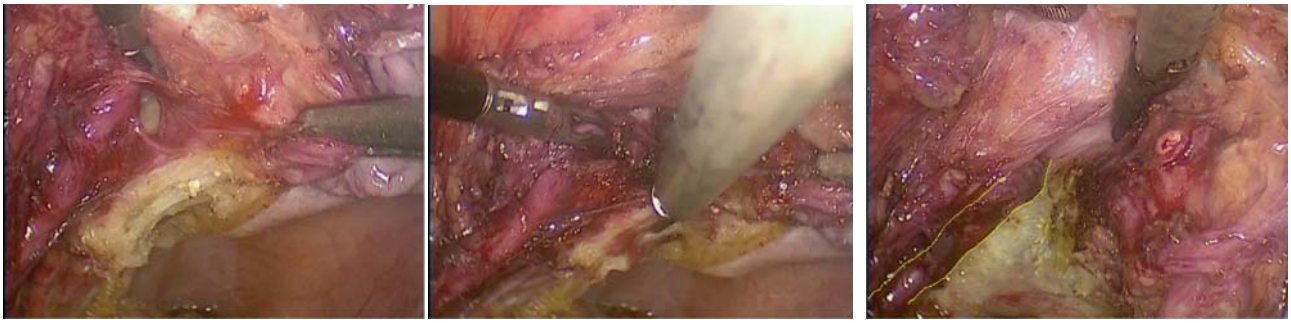

Figure 12 - (A) *Dissection forceps drawing the left ureter laterally exposing the medial aspect of the ureter in the Modified Radical Hysterectomy.* ***(B)*** *Forceps rolling the left ureter laterally distancing it from the heat generated in the sectioning of the parametrium medial to the ureter.* ***(C)*** *Left ureter (marked) completely released after sectioning of the parametrium.*

nerve sparing, occurs in 70% to 85% of women.[26] Bladder dysfunction is attributed to injuries of the motor and sensory innervation of the bladder that occur during resection of the parametrium and the vagina.[26] Patients often report difficulty initiating urination, the absence of an urge to void, or incomplete voiding, resulting in recurrent urinary infections.

Bladder fistulas normally develop by the fourth postoperative day, whereas ureteral fistulas usually occur up to the fourteenth post-operative day.

Complications such as atelectasis, deep vein thrombosis, pulmonary embolism, acute myocardial infarction, pneumonia, among others, are common to all large abdominal or pelvic surgeries.

CONCLUSION

In addition to the benefits in terms of reduced postoperative pain, less blood loss, and earlier resumption of activities, the use of laparoscopic surgery in the treatment of tumors of the cervix has demonstrated its safety in oncologic terms, and therefore should always be considered.

RESUMO

A histerectomia radical continua sendo o tratamento de escolha para a maioria das pacientes com câncer de colo do útero inicial. Vários trabalhos já mostraram a equivalência em termos de controle local e sobrevida com o uso da cirurgia laparoscópica em comparação à técnica aberta. Os benefícios da técnica laparoscópica em comparação à aberta estão baseados nos benefícios gerais da laparoscopia como menor perda sanguínea, menor dor pós-operatória tempo de internação reduzido e menor custo hospitalar, e retorno precoce ao trabalho. Neste artigo descrevemos em detalhes as técnicas de histerectomia radical e linfadenectomia pélvica utilizadas no tratamento do câncer de colo do útero e discutimos os resultados.

Palavras-chave: Histerectomia radical. Linfadenectomia pelvic. Câncer de colo do útero. Laparoscopia.

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Brazilian Journal of Videoendoscopic Surgery

Original Article

Surgical Treatment of Esophageal Cancer by Videosurgery: Standardized Technique for Prone Thoracoscopy and Laparoscopy

Tratamento Cirúrgico do Câncer de Esôfago por Videocirurgia: Padronização Técnica por Toracoscopia em Prona e Laparoscopia

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ABSTRACT

This article reports the Barretos Cancer Hospital experience treating esophageal cancer by videosurgery. The transmediastinal and transthoracic approach – the latter in the prone position first reported by Cadière – are described in detail. Following a brief literature review, this series reports 83 cases operated from 2009 to 2012, emphasizing the laparoscopic techniques, the indications for each technique, as well as the sequence of steps that are followed when using this treatment modality.

Key words: Videosurgery. Esophagectomy. Thoracoscopy. Transhiatal esophagectomy.

Braz. J. Video-Sur, 2013, v. 6, n. 2: 070-075

Accepted after revision: february, 13, 2013.

INTRODUCTION

The treatment of esophageal cancer is increasingly carried out by video-endoscopic surgery, whether by a transmediastinal approach, or by combining laparoscopy, thoracoscopy, and intrathoracic or cervical anastomoses. The laparoscopic approach has the advantage of offering the surgeon a wide field of view, which enables the surgeon to dissect the esophagus and surrounding structures with absolute safety, as well as perform a full lymphadenectomy, including the intrathoracic lymph nodes and the lymph nodes of the celiac trunk.

In a cases series of 222 patients with esophageal adenocarcinoma who underwent laparoscopy and thoracoscopy with cervical anastomosis Luketich et al., reported that mortality was 1.4%, anastomotic dehiscence 11%, and respiratory complications, mainly pneumonia, 7.7%, which constitute excellent results, outcomes superior to open surgery. (1)

One should take into account, however, that the patients in this series are different from those found in our midst, who usually present with more advanced stage tumors, the vast majority unresectable, many with nutritional deficits so severe (weight loss often exceeding 30%), that some are unable to even tolerate palliative treatment. (1)

The same investigators published another analysis with a smaller number of patients (n=50) who had undergone intrathoracic anastomosis; there was a lower incidence of fistulas, 6%, but a higher mortality rate, 6%.(1) The fistulas, which were intrathoracic, were evidently more serious, explaining the higher mortality and a rate of pneumonia almost comparable to the 8% rate of the previous cohort. In a 2008 prospective study with 104 patients undergoing minimally invasive surgery, Nguyen et al. also demonstrated good results, suggesting that laparoscopic esophagectomy is a feasible, safe procedure with acceptable morbidity and mortality. (2)

MATERIALS AND METHODS

Esophagectomies have been performed at Barretos Cancer Hospital since 2009 through a transmediastinal approach with cervical anastomosis with dissection of the celiac trunk and periesophageal

lymph nodes, or the combination of thoracoscopy and laparoscopy, with lymph node dissection of the celiac trunk, periesophageal and subcarinal lymph nodes, depending on the location of the tumor.

The first technique is indicated for tumors of the lower third of the esophagus, in patients who are debilitated, but whose performance scores suggest they are still candidates for surgery. The second technique is indicated for tumors of the middle third of the esophagus or for younger patients in good general health who can tolerate a longer and more aggressive surgery. Lymphadenectomy in three fields (mediastinum, celiac trunk and cervical), may also be indicated in selected cases, especially for tumors higher in the esophagus.

When we employ the transmediastinal approach, the patient is positioned supine, bolstered with cushions at the level of the xiphoid process and shoulders. When we employ the combined approach, we first perform a thoracoscopy through which the entire thoracic esophagus is freed and the periesophageal and subcarinal lymph node chains are resected. The patient is then in placed in the prone position as described by Cadière and collegues,(3) bolstered with cushions and tilted slightly to the left. The lung falls posteriorly and out of the field of interest, which facilitates visualization of the esophagus and mediastinal structures. Occasional bleeding does not obscure the visual field, because the camera is always above it.

The surgical specimen is withdrawn through an umbilical trocar incision enlarged to a 4 cm "W" shaped incision, protected by a wound guard. The intracavitary stapling is done laparoscopically. The surgical specimens of early stage upper esophageal tumors without lymph node involvement can also be removed through the cervical region. The cervical anastomosis is made with a 21mm circular stapler.

TRANSMEDIASTINAL ESOPHAGECTOMY: SURGICAL TECHNIQUE

We present a description of esophagectomy for the treatment of distal esophageal tumors using a laparoscopic and transmediastinal approach. The technique involves preparation of the stomach, creation of an intra-abdominal gastric tube, and left cervicotomy so that the esophagogastric anastomosis and lymphadenectomy of the celiac trunk can be performed.

The patient is placed in lithotomy position with the legs – supported in appropriate leggings – extended and separated. The surgeon stands between the legs, with the assistants to the left of the patient. Six ports are used: A. 11 mm trocar with a 10 mm optic at 30 degrees just above the umbilicus, approximately 15 cm from the xiphoid process; B and C: 12 mm trocars in the left and right flanks, in the mid-clavicular line (these are the working ports of the surgeon); D and E: 12 mm trocars in the right and left hypochondria, a little more medial and cephalic to facilitate access to the mediastinum; E: 5 mm trocar in the midline subxiphoid (for the retractor).

With the pneumoperitoneum pressure at 12 mmHg, the procedure is initiated with the opening of the phrenoesophageal membrane and the greater omentum, which provides access to the right branch of the right diaphragmatic pillar. From this point the peri-esophageal tissue around the terminal esophagus is released, isolating the esophagus by dissecting the esophagogastric transition while securing the abdominal esophagus with a Penrose drain or flexible retractor (Endo-Flex GmbH**,** Voerde, Germany). Celiac lymphadenectomy is performed during this approach (Figure 1).

At this point, the surgeon proceeds to the dissection, under direct visualization, of the body of the esophagus, being careful to identify the pleura, pericardium, azygos vein and vagal trunks across the entire breadth of thorax (Figure 2).

Hemostasis is achieved with monopolar cautery and/or clipping of larger esophageal branches or, preferably, with the use of an ultrasonic scalpel. For better access to the mediastinum during the dissection of the thoracic esophagus, a median transection of the diaphragm is performed (Figure 3).

After complete dissection of the abdominal and thoracic esophagus, the stomach is prepared by mobilizing its greater curvature. Monopolar or bipolar electrocautery can be used, or preferably, an ultrasonic scalpel or LigaSuture Atlas to section short vessels and the gastrocolic omentum, taking care not to damage the greater curvature arterial arcade.

Double clipping is used to ligate the left gastroepiploic and left gastric arteries and veins; the right gastroepiploic artery is preserved to supply the arcade of the greater curvature. Pyloroplasty is not performed. The preparation of the stomach is completed by creating an intra-abdominal tube (Figu-

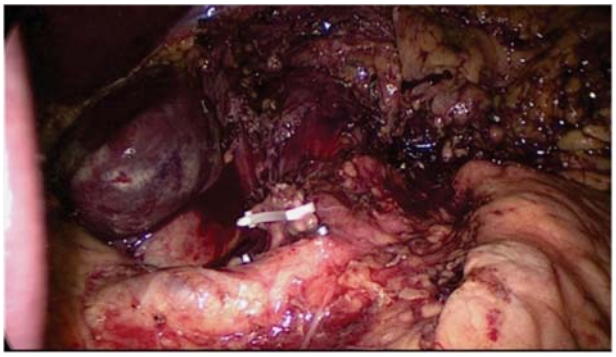

Figure 1 – *Lymphadenectomy of the celiac trunk, 11p chain, and left gastric artery sectioned with clips.*

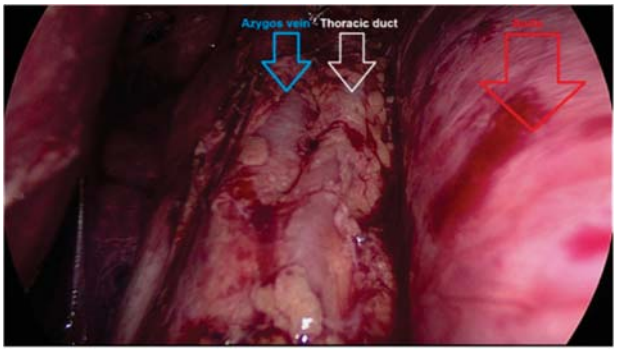

Figure 2 – *Dissection with mediastinal lymphadenectomy; arrows identify the azygos vein, thoracic duct and aorta.*

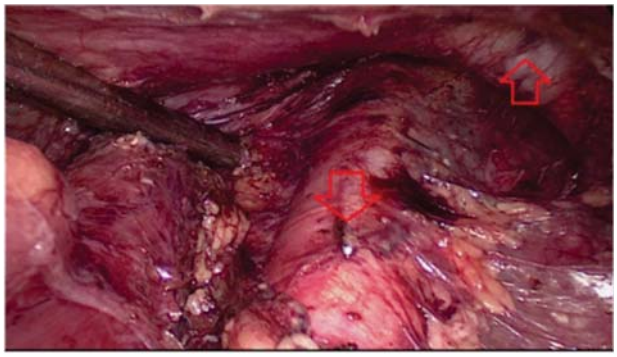

Figure 3 – *Thoracic esophagus dissected and pulled aside by suction. The red arrows point to the aorta and pericardium superiorly.*

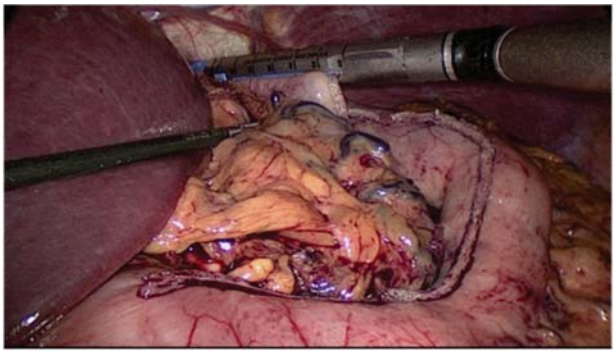

Figure 4 – *Creating the intra-corporeal gastric tube using with a linear cartridge; typically six 60 mm blue cartridges are required. Starting 4 cm from the pylorus, the gastric tube has a diameter of 3 to 4 cm and is 30 to 35 cm in length.*

re 4) with a laparoscopic blue cartridge linear stapler. The surgical specimen is removed through a small "W" shaped umbilical laparotomy.

Dissection of the cervical esophagus and the upper thoracic esophagus is performed through a left neck incision by blunt dissection, with attention to isolating the left recurrent laryngeal nerve. We proceed to esophageal transection using a purse string forceps, transfixing the distal esophageal stump with 0-vicryl. At this point, we afix cardiac tape to the esophageal stump in order to draw the gastric tube to the cervical region, where the mechanical anastomosis is closed using a 21 mm circular stapler. The passage of the gastric "tube" through the mediastinum is observed under direct vision by positioning the optic in the lower mediastinum.

A nasogastric tube is positioned below the cervical anastomosis, in the duodenum when possible, or in the jejunostomy in cases of doubtful anastomoses, or high risk patients such as those with Chronic Obstructive Pulmonary Disease or those recovering after radiation therapy and/or chemotherapy. We employ cervical and abdominal drainage. The esophagogastric tube anastomosis should be kept in the cervical region. This placement avoids gastric fluid reflux into the esophagus and thus consequent esophagitis. By not having the anastomosis in an intrathoracic position, fistual-related mediastinitis is avoided. Cervical fistulas, should they occur, are easier to treat with drainage where the pressure is positive.

We routinely drain the chest, with radiographic control, postoperatively. The lymphadenectomy, and the number of lymph nodes dissected, are similar to the conventional technique (Figure 5). We found that the laparoscopic technique is safe and has excellent postoperative results (Figure 6).

ESOPHAGECTOMY BY THORACOSCOPY AND LAPAROSCOPY

We used thoracoscopic access for tumors in the proximal and middle thirds of the thoracic esophagus, to facilitate dissection of the esophagus and mediastinal lymph nodes, and because it is the

best oncologic practice in these cases. The laparoscopy, which follows, is performed as described above with preparation of the stomach and lymphadenectomy of the celiac trunk and cervical lymph node chains 1 and 3, with creation of an intracorporeal gastric tube, and the left posterior cervicotomy in order to perform the esophagogastric anastomosis.

For the thoracoscopy, the patient is placed in the prone position bolstered with a large cushion under the chest which is tilted slightly to the left side to optimize the ergonomics and, in the case of complications, to facilitate a thoracotomy (Figure 7).

The procedure begins with the introduction of four trocars: one 11 mm and three 5 mm. A 12 mm trocar may be used, so that the azygos vein can be ligated with a vascular stapler. Mini-laparoscopic trocars or conventional trocars used in laparoscopies can be used in the chest wall; we do not use special trocars designed for the chest. We used low volume CO_2 at 8 mmHg to maintain the lung collapsed and to minimize minor bleeding during dissection. The position of the ports is just below the angle of the scapula forming a diamond (Figure 8).

It is common for patients who are smokers or have a history of a pulmonary infection to have pleural adhesions. The right lung is "collapsed" with an appropriate retractor, while the left lung receives selective mechanical ventilation. The dissection of the pleura is carried out close to the esophagus upwardly with dissection and ligation of the azygos vein using sutures, metal clips, Hemolock, and/or a vascular stapler (Figure 9).

The esophagus is completely dissected – with mediastinal, periesophageal, supra and subcarinal lymphadenectomy and posterior dissection of the pulmonary veins (Figure 10) – until the distal esophagus

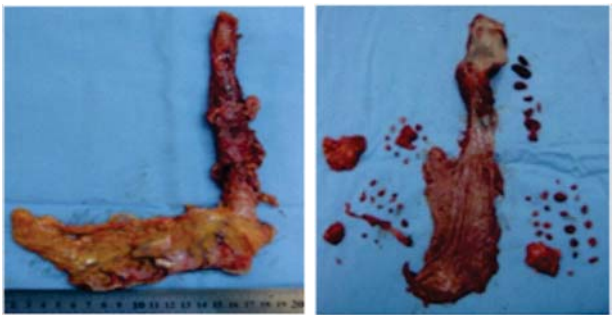

Figure 5 (A) – *Closed surgical specimen from the esophagectomy.* ***(B)*** *– Surgical specimen opened in the operating suite with the lymph node dissection organized into chains.*

Figure 6 (A) – *Final result of a transhiatal esophagectomy, with left neck incision. (B) – Final result of an esophagectomy carried out in three fields (thoracoscopy, laparoscopy and bilateral neck incision).*

Figure 7 – *Patient in the prone position, with a large cushion placed under the chest.*

Figure 8 – *Left: Patient in ventral position, using mini-forceps on the superior ports. Right: the four thoracoscopy incisions, with a chest tube in the mid-axillary line.*

is reached near the diaphragmatic pillars. The thoracic duct is ligated inferiorly with metal clips.

There are critical points that require caution during dissection of the esophagus: the underside of the esophagus (to avoid injuring the atrium), the trachea just above the carina, and the right and left main bronchi. Close to the spine, along the course of the azygos vein, be wary of the thoracic duct, because it should not be in the surgical specimen, as part of lymphadenectomy (Figure 11).

The chest tube is placed under direct vision through a counter opening below the optic trocar, in the right mid-clavicular line. The trocar orifice is not used – because it is extremely posterior and postoperatively has a risk of bending – to avoid such complications. The patient is repositioned in the lithotomy (prone) position to prepare the abdominal phase by laparoscopy, which is similar to the phase described for the transhiatal esophagectomy. The thoracic phase is safe, with an average duration of one hour.

CONCLUSION

Our case series included 83 transhiatal and thoracoscopic esophagectomies performed over a three year period; the surgeries were entirely laparoscopic. We had a high proportion of advanced tumors, an operative mortality rate of 5%, an incidence rate of "benign" cervical fistulas of 15%, and conversion rate of 2.4%.

In this series, five cases of esophagogastrectomies for advanced tumors of the cardia with invasion of the distal esophagus, required retrosternal reconstruction using the colon. The segment of the colon that ascends to the cervical region is placed into either isoperistaltic or anisoperistaltic position depending on which will provide the best blood supply arcade.

Because with an experienced team we consider it extremely safe, whenever possible, the esophagectomy is performed laparoscopically. Our length-of-stay is about seven days. We do not routinely perform jejunostomies, except in complex cases or when faced with challenging anastomoses. We reinforce the entire suture line, except for the tubal anastomosis, which has three rows of staples. We do not perform pyloroplasties.

For tumors deemed unresectable, such as those that have tracheoesophageal or esophagobronchial fistulas, or in the setting of complete stenosis, we opt for gastric bypass by constructing a retrosternal isoperistaltic gastric tube, the so-called Postlethwait surgery (4), as modified by Lacerda and colleagues, with their own completely laparoscopic technique. (5, 6)

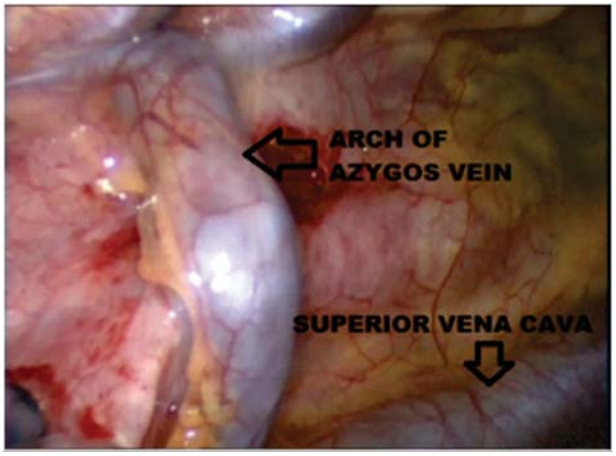

Figure 9 – *Anatomical detail, as seen through the thoracoscope, of the arch of the azygos vein. It should be ligated to have better access to the esophagus.*

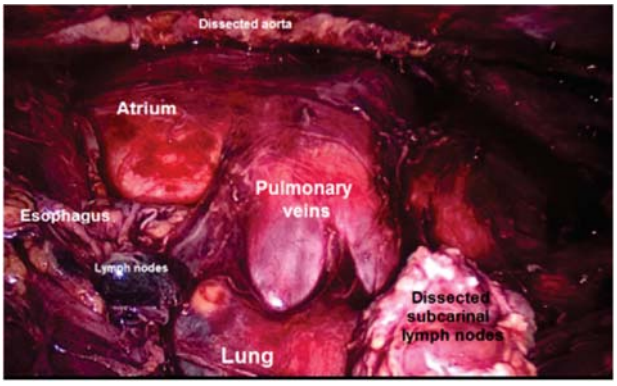

Figure 10 – *Thoracoscopic esophagectomy with mediastinal lymphadenectomy; the atrium, pulmonary vessels, and completely dissected esophagus are identified.*

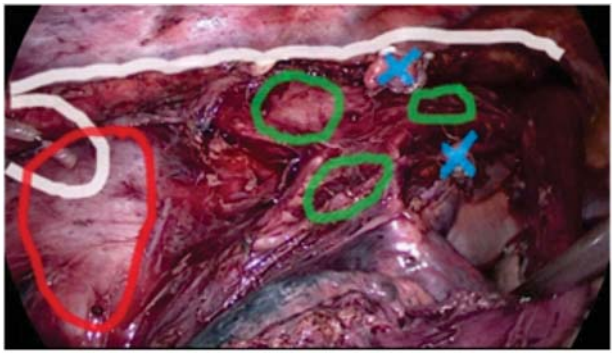

Figure 11 – *Thoracoscopy for esophagectomy, with structures exposed, with points of risk of injury identified. White: thoracic duct, red: atrium, green: bronchus and trachea, blue: azygos vein.*

RESUMO

O presente artigo tem por objetivo demonstrar a experiência do hospital de câncer de Barretos no tratamento cirúrgico do câncer de esôfago por videocirurgia. São descritas em detalhes a abordagem transmediastinal e a abordagem transtorácica, esta última utilizando a posição prona como relatado por Cadière. A presente série relata 83 casos operados de 2009 a 2012, dando ênfase à técnica videolaparoscópica com breve revisão da literatura, as indicações para cada técnica, bem como a sequência de passos que devem ser seguidos quando se usa esta modalidade de tratamento.

Palavras-chave: Videocirurgia. Esofagectomia. Toracoscopia. Esofagectomia trans-hiatal.

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Brazilian Journal of Videoendoscopic Surgery

Original Article

Laparoscopic Treatment of Choledocolithiasis – A Retrospective Studyof 84 Patients

Tratamento Laparoscópico da Coledocolitíase: Um Estudo Retrospectivo de 84 Pacientes

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This study was carried out with casesfrom DIGEST (a private practice specializing in the digestive system in Recife, Pernambuco, Brazil) with the participation of surgeons from DIGEST and the Advanced Videosurgery Unit (AVU).

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[3.] Surgeon,Surgical Team of DIGEST and of the AVU; *[4.] Surgeon, Surgical Team of the* AVU.

ABSTRACT

Introduction: With the advent of laparoscopic bile duct exploration (LEBD) was introduced the trans-cystic access (TC) using monitoring by cholangiography or choledochoscope. Soon was perceived that the TC approach was not always possible, forcing an action strategy discussed and approved in national meeting. **Objective:** Evaluate the results of LEBD in local reality and the efficacy obtained by following the algorithm suggested. **Method:** Retrospective study of 84 patients treated by DIGEST team, with general data analyzed globally and others specifics dates divided by the complexity of the approach: trans-cystic, choledochotomy (CDT) or CDT supplemented by bile-digestive anastomosis (BDA). **Results:** The patients studied had an average of 66 years and 40.5% were male. Among the 52 "in situ" gallbladder 36% had TC approach, with a resolution of 83%. Of CDT, 60% did not BDA with 90% resolution, which reached 100% among those who underwent BDA. Overall morbidity of 12.9% and mortality of 1.2%. **Conclusion:** It was proved the feasibility of the ELVB in our midst with resolution, morbidity and mortality similar to the literature and reaffirmed the effectiveness of the strategy suggested by the algorithm developed by the surgical community in Brazil. The TC approach seems to depend on the local structure.

Key words: Choledocholithiasis, Common Bile Duct, Cholangiography, Choledochoscopy Laparoscopic Surgery, Laparoscopy.

Bras. J. Video-Sur, 2013, v. 6, n. 2: 076-082

Accepted after revision: february, 13, 2013.

INTRODUCTION

With the advent of laparoscopic exploration of the bile ducts (LEBD), the transcystic approachemerged; it was appealing because it avoidedcholedocotomy and offereda postoperative course similar to that of laparoscopic cholecystectomy (LC). In the first publications that demonstrated the feasibility of LEBD, the transcysticapproach was used exclusively. What varied, however, was the imaging method used to monitor the manipulation of the common bile duct (CBD). Intraoperative cholangiography was used to identify the Dormia basket as it was introduced through the cystic duct[2],or a direct image of the CBD is provided by the choledoscope introduced through the cystic duct, to accompany the clearance of the common bile duct (CBD) performed using its workingchannel.[3,4]

Subsequent studies,however, showed that not all cases could be resolved trascystically. Strategies were developed in which the transcystic path would be preferred in feasible cases. In practice, this access is reserved for the removal of small calculi, in limited quantities, located below of the cystic implantation.[5,6,7,8]With the possibility of stenosis in a smaller caliber common bile ducts, choledocotomy has only been considered safe when performed in bile ductswith diametersexceeding 7 mm.[9]

In the literature, there is such a great variation in the percentage of cases performed using atranscysticapproach, that it seems to depend on the local infrastructure available to perform the LEBD.Regardless, however, of the rate of the transcysticapproach, published studies always report a very high resolution rate (Table 1).

Based on the data in the literature and the experience of participants in a Consensus Group coordinated by Dr. Renam Catharina Tinoco, during the XXV Congress of the Brazilian College of Surgeons, in 2003 in Porto Alegre city, a consensusregarding an action strategy represented by the algorithm in the accompanying Figure was discussed and approved at the time by all members of the group.

The main objective of this analysis was to examine the results of LEBD in the local context, and to evaluate the effectiveness of the strategy suggested by the algorithm designed by the Brazilian College of SurgeonsGroup Consensus. The primary author has followed this algorithm since the beginning of his experience.

MATERIALS AND METHODOS

From June 1993 to April 2012,84 patients were operated by one of the authors, in a private clinic (DIGEST - Clinic Specializing in Digestive Tract Surgery) in the city of Recife, Pernambuco, Brazilto treat choledocholithiasisby laparoscopic approach. Data were collected retrospectively from office records and hospital charts where the procedures were performed. The following variables were analyzed: age, sex, diagnosis, operative procedure, conversion, operative time, resolution of choledocholithiasis, duration of the hospitalization, complications, and mortality.

The analyses of age, sex, diagnosis, operative procedure, conversion and mortality were made together, while the analyses of operating time, hospital stay, and complications were evaluated by the type surgical approach used, divided into: transvesicular, by choledocotomy, and choledocotomy + biliodigestive anastomosis.

Operative Technique

The patient is placed in dorsal decubitus under general anesthesia, with the pneumoperitoneum

Table 1 – *Twenty published studies with the number of cases, rate of resolution of choledocholithiasis, percentage in which the ~~transvesicular~~transcysticapproach was used, periodical, and year of publication.*

Authors	Cases	Resol	TV Access	Publication	Date
Phillips EH et al[18]	130	93%	85%	SurgEndosc	1994
Berci G et al[19]	226	95%	83%	SurgEndosc	1994
De Paula et al[20]	114	95%	89%	SurgEndosc	1994
Rhodes M et al[21]	129	96%	73%	Br J Surg	1995
Drouardet al[22]	161	96%	50%	Hepatogastroent	1977
Millat B et al[23]	247	88%	47%	Hepatogastroent	1997
Dorman JP et al[24]	148	95%	0%	SurgEndosc	1998
Paganini AM et al[25]	161	97%	66%	SurgEndosc	1998
Bertou JC et al[26]	220	95%	51%	SurgEndosc	1998
Giurgiu DI et al[27]	217	95%	100%	ArchSurg	1999
Michel J et al[28]	612	84%	57/ 16%	GastroenterolClinBiol	2000
Thompson MH et al[29]	224	96%	26%	Br J Surg	2002
Tokumura H et al[30]	217	88%	42%	J HepatobilPancrSurg	2002
Petelin JB et al[31]	326	98%	83%	SurgEndosc	2003
Riciardi R et al[32]	346	97%	78%	SurgEndosc	2003
Nathanson LK et al[33]	372	97%	77%	Ann Surg	2005
Tinoco R et al[34]	481	97%	47%	Ann Surg	2008
Savita KS et al[35]	148	100%	28%	Indian J Surg	2010
Hanif F et AL[36]	459	90%	55%	SurgEndosc	2010
Chander J et al[37]	150	98%	3%	SurgEndosc	2011

pressuremaintained at 12 mmHg. The operating table is inclined 30 to 35 degrees and tilted10 degrees left lateral.Trocar placement is according to the American technique, with the introduction of an additional 5 mm trocar in the middle of the right upper quadrant, which is then used by the surgeon's left hand, while the subcostal port in the right mid-clavicular line is reserved for the instrument manipulation ofthe CBD.

The strategy used is described in the algorithm (see Figure 1) and considers the diameter of the cystic duct and of the CBD, as well as the size, location, and number of existing calculi in the common bile duct. The transcysticapproach was used for the smallergallstones. Saline infusion, preceded by chemical dilation of the papilla by intravenous injection of hyoscine, was reserved for the removal of gallstones smaller than 4 mm.Larger gallstones – but still amenable to retrieval (usually less than 10 mm) – were grasped using aDormia basket introduced into the CBD guided by an image intensifier.

For larger gallstones (those greater than 10 mm in diameter) in CBDs with calibers exceeding 7 mm,a longitudinal choledocotomywas performed, with the gallstones removed various ways: via standard laparoscopic forceps, by milking, using the turbulence provoked by the infusion of saline introduced under pressure catheter inserted in CBD, by special "endoflex" type forceps used to remove jammed gallstones or even through special baskets or balloons introduced by choledocotomy or through the working channel of the choledoscope. This flexible endoscope was used, especially to confirm that theCBD was clear.When the biliary diameter was especially large (particularly above 20mm in diameter) the clearing of the biliary duct was complemented by a biliodigestive anastomosis, preferably a choledochoduodenostomy.

In cases of stenosis of a prior anastomosis which remained unresolved after conventional endoscopic or percutaneous dilation, an anastomoplastywas performed. In patients who had prior gastroplastywith residual calculusin the bile duct, a laparoscopic gastrotomywas performed to permit an endoscopic retrograde papillotomy (ERP).

RESULTS

Of the 84 patients treated, 34 (40.5%) were male and 50 (59.5%) were female; the meanage was 66 years,

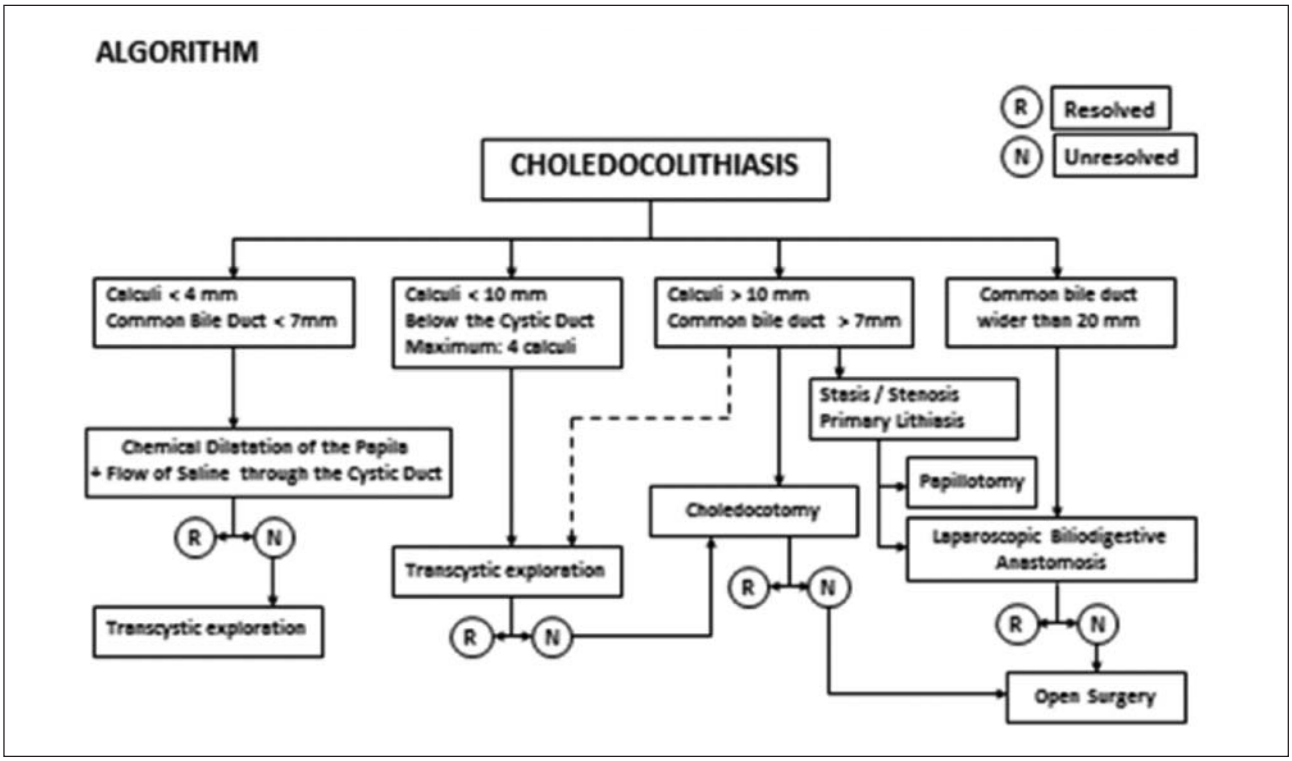

Figure 1 *– The algorithm for the treatment ofcholedocholithiasisdiscussed and approved by the Consensus Groupduring theXXVBrazilian Congress ofSurgery(2003)used in this study.*

and ranged between 18 and 91 years of age. The majority (62%) still had an "in situ" gallbladder,permitting, theoretically, atranscysticapproach. However, of these 52, only 30 (48%) were suitable candidates for this kind of approach.For the 84 cases, the approach wastranscystic in 30 (36%), by choledocotomy in 53 (63%), andlaparoscopic-endoscopic in a single patientwith prior gastroplasty and cholecystectomy, with a laparoscopic gastrotomyestablishing access that would permit an ERP.

Among the 52 patients with an"in situ" gallbladder, all had gallstones in the gallbladder, and 6 (11.5%) were diagnosed with acute cholecystitis (Table 2). Of the 32 cases that had previously undergone a cholecystectomy, all had residual or recurrent choledocholithiasis even though 23 (72%) hadundergone a prior internal drainage, 20 by ERP and three bybiliodigestiveanastomosis.

Of the 53 patients whose approach was by choledocotomy, 31 (58%) had undergone cholecystectomy. Of these, 23 (68%) had undergone some internal drainage procedure: 20 ERP (twopatients 4 times, three patients 3 times, and the other 15 a single time) and three biliodigestive anastomoses (2 choledochoduodenostomy and 1 choledochojejunostomy) afterattempts to treat with dilatation the stenosis of the anastomosis endoscopically or percutaneously, without success.

There was a single conversion (conversion rate: 1.2%) in a patient with stenosis of the choledochojejunostomy anastomosis who had bouts of cholangitis due to anastomotic stenosis and lithiasis. During the approach of the hepatic hilum major bleeding occurred that required a laparotomy to achieve hemostasis and complete the surgery.

The rate of resolution of choledocholithiasis varied in accordance with the approach.The resolution rate was lower with the transcysticapproach (83%) than with the choledocotomyapproach (94%) (Table 3).The overall resolution rate was 90%. The operative time and average length of hospitalization varied according to the complexity of the surgery performed. The mean

Table 2 – *General data and diagnoses of the patients analyzed.*

GENERAL DATA	
Mean Age (range)	66 years (18 a 91 years)
Sex(Male/Female)	M: 34 (40.5%) / F: 50 (59.5%)
DIAGNOSES	
Chronic calculous cholecystitis + Choledocholithiasis	46 (54.8%)
Acute calculouscholecystitis + Choledocholithiasis	6 (7.1%)
Residual or Recurrent Choledocholithiasis	29 (34.5%)
Stenosis of Biliodigestive Anastomosis	3 (03.6%)

Table 3 – Data about resolution, operative time, duration of hospitalization, and morbidity, analyzed for each procedure performed.

Procedure (or approach)	**No.of Cases** (percentage)	**Resolution** Absolute No. (percentage)	**OperatingTime** in minutes	**Hospitalization** average in days (minimum-maximum)	**Complications** Absolute No. (morbidity)
Cystic Path	30 (36)	25 (83)	120.2	3.0 (1-12)	3 (10)
Choledocotomy	30 (36)	27 (90)	175.4	4.5 (1-16)	3 (10)
Choledocotomy + biliodigestive anastomosis	20 (24)	20 (100)	188.1	5.2 (3-15)	4 (20)
Revision ofthe Anastomosis	3 (3)	3 (100)	195.3	6.3 (4-20)	1 (33)
Papillotomypostgastrotomy	01 (01)	1 (100)	230.0	3.0 (3-3)	0
TOTAL	84 (100)	76 (90)	165.3	5.9 (1-20)	11 (13)

overall operative time was 165.3 minutes and an average length-of-stay in the hospital was 5.9 days. Of the total of 84 patients, the transcystic approach was only possible in 30 cases (36%).

There were 11 postoperative complications (morbidity: 12.9%), of which three were at the umbilical port surgical site (two seromas and one infection); one respiratory infection;one urinary tract infection;and five bile leaks, of which three were associated with laparoscopic biliodigestiveanastomoses, one from thecystic stump, and another after KehrT-tube removal on the 20th postoperative day. One patient with cholangitis due to residual choledocholithiasis after ERP with endoscopic stent placement, who underwent a laparoscopic choledochoduodenostomy, died suddenly on the 3rd postoperative day while walking in the hospitalcorridor (mortality: 1.2%).

Three repeat operative approaches were necessary, two laparoscopically, one for T-tube drain replacement in a patient with choleperitoneum after T-tube removal, and the other to drain an area of bile leakage from the vesicular stump by endoscopic biliary drainage the next day. The third was operated by laparotomy in order to perform a transduodenalpapillotomy because of a residual calculuspost-LEBD that could not be cleared by ERPdue to a papilla implanted in a duodenal diverticulum.

Of the 8 cases in which clearing of the CBD was not achievedlaparoscopically, all were referred and resolved endoscopically, with the exception of the case described above where we had to return to the operating room to perform a transduodenalpapillotomy by open surgery.

DISCUSSION

With the beginning of LC experience, when surgeons suspectcholedocholithiasis concomitant with cholecystolithiasis, many prefer to refer their patients to the endoscopistfor clearing of CBD prior to the LC.[10] This fact, together with improvements in the capability of diagnostic imaging to confirmcholedocholithiasis in the pre-operative period,[11] resulted in a significant increase in the referral of this type of patient to the endoscopist.[12]This has resulted in a change in the profile of the patients seen by endoscopists, who began to perform more endoscopic cholangiography for therapeutic purposes.[13]

The experience with ERP revealed a 10% incidence of immediate complications, due to acute pancreatitis, perforation and bleeding, and a 10% incidence of late complications related to papillary stenosis, with a mortality of about 1%.[14] These complications were more common in non-dilated CBD where the morbidity was 37.5% and mortality 1.7%,[15]increasing the immediate complications to 14.9% and late complication to 23.4% in younger patients (younger than age 60).[16]

Even after more than 20 years of experience with LC and despite the evidence described in the literature stating that the handlingof choledocholithiasis should not be routinely recommended (Evidence 1A / Recommendation Level A) and that the choice of treatment of choledocholithiasis (endoscopic or laparoscopic) should depend on local experience (Evidence 1A / Recommendation Level A),[17] surgical teams continue routinely sending their patient with choledocholithiasis for endoscopic treatment.

The small number of attempts at transcystic resolution (30%) is notable. There may be a selection bias, as 38% of the patients studied had undergone prior cholecystectomy. Most studies published in the literature on the treatment of choledocholithiasis restrict themselves to patients with "in situ" gallbladders; the inclusion of cases of residual or recurrent calculi in the CBD is uncommon.

CONCLUSION

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The data presented here clearly demonstrate the possibility of performing the LEBD in our setting with rates similar to the world literature, particularly with regard to resolution and complications, even for cases of residual or recurrent choledocholithiasis. Furthermore, the data reveal that using the strategy recommended to the Brazilian surgeons by the Brazilian College of Surgeons Working Group presented publicly in 2003 constitutes a good choice for the laparoscopic treatment of choledocholithiasis, showing that the transcysticapproach can only be performed under specifics conditions,that range from no prior cholecystectomy to the presence of adequate infrastructure.

RESUMO

Introdução: Com o início da exploração laparoscópica das vias biliares (ELVB) introduziu-se o acesso via cístico (VC) usando-se o monitoramento por colangiografia ou coledocoscopia. Logo se percebeu que a VC nem sempre era possível, obrigando a uma estratégia de ação discutida e aprovada em encontro nacional. **Objetivo:** Avaliar os resultados da ELVB na realidade local e a eficácia obtida seguindo-se o algoritmo sugerido. **Método:** Estudo retrospectivo de 84 pacientes operados pela equipe da DIGEST, com dados gerais analisados globalmente e outros dados específicos divididos por três diferentes abordagens: via cístico, coledocotomia (CDT) ou CDT complementado por anastomose bilio-digestiva (ABD). **Resultados:** Os pacientes analisados tinham uma média de 66 anos sendo 40,5% do sexo masculino. Dentre as 52 vesículas "in situ", 36% tiveram abordagem VC, com resolução de 83%. Das CDT, 60% não fizeram ABD complementar com resolução de 90%, que chegou a 100% dentre os que realizaram ABD. Morbidade global de 12,9% e mortalidade de 1,2%. **Conclusão:** Ficou comprovada a possibilidade de realização da ELVB em nosso meio com resolução, morbidade e mortalidade semelhantes ao da literatura e reafirmada a efetividade da estratégia sugerida pelo algoritmo elaborado pela comunidade cirúrgica brasileira. A abordagem VC parece depender da estrutura local.

Palavras-chave: Coledocolitíase. Ducto Colédoco. Colangiografia. Coledocoscopia. Cirurgia Laparoscópica. Laparoscopia.

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Brazilian Journal of Videoendoscopic Surgery

Case Report

Robot-assisted Resection of a Retroperitoneal Schwannoma: Case report and review of the literature

Ressecção Robô – Assistida de Schwannoma Retroperitoneal: Relato de Caso e Revisão da Literatura

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ABSTRACT

BACKGROUND - Schwannomas are tumors that originate from Schwann cells; they form solitary masses in peripheral nerve sheath. CASE REPORT - A 36 year old, male patient, with a solid mass in area of the left adrenal gland identified upon routine exam. He underwent robot-assisted resection of the retroperitoneal mass; the anatomical-pathological analysis revealed a Schwannoma. CONCLUSION - The robot-assisted approach has been shown to be a safe option in abdominal surgeries, offering the patient the opportunity of a fast recovery and earlier return to normal activities.

Key words: Neuroma. Retroperitoneal neoplasms. Robotics.

Braz. J. Video-Sur, 2013, v. 6, n. 2: 083-085

Accepted after revision: february, 13, 2013.

INTRODUCTION

Schwannomas are tumors originating from Schwann cells, present in the peripheral nerve sheath. They occur as encapsulated solitary masses, usually involving cranial nerves. This type of tumor rarely recurs after local resection.[1]

About 0.5% of Schwannomas occur in the retroperitoneum. They tend to be insidious and slow growing and thus are often quite large when discovered, and even then rarely symptomatic.[2] They may be an incidental finding on a routine physical examination or found when complaints of adjacent organ are investigated.

A Schwannoma may occur sporadically or in association with Neurofibromatosis type II (von Recklinghausen's Disease). In virtually all cases, its presence is due to an alteration in or to the absence of the NF2 gene, which, in turn, is involved in the growth of Schwann cells.[3]

The diagnosis of Schwannoma is histopathological, by means of immunohistochemistry. Neurofibromatosis can often be excluded due to the absence of clinical criteria; thus genetic analysis is not indicated in most suspected cases. Complete resection of the lesion together with its capsule affords a good prognosis.[4]

CASE REPORT

The patient is a married 36 year old male, born and raised in São Paulo, who underwent an abdominal ultrasound that showed a slightly hypoechoic expansive and heterogeneous solid lesion, measuring 9.3 x 7.4 x 8.2 cm, with central cystic areas, located close to the left adrenal, displacing the left kidney inferiorly and the spleen laterally.

Prompted by the findings of the abdominal ultrasound, magnetic resonance imaging (MRI) of the abdomen with contrast was obtained. A large solid mass, measuring 9.8 X 9.0 X 8.5 cm, with areas of necrosis was identified close to the left adrenal. The MRI study showed subtle, gradual uptake of contrast by the tumor, and that it displaced the pancreatic tail anteriorly and the spleen laterally.

Given the suspicion of left adrenal tumor raised by the imaging studies, plasma metanephrine concentrations and 24-hour urinary collection for

catecholamines, vanillyl mandelic acid (VMA) and metanephrines were ordered. All values were normal.

Due to the size of the lesion and the possibility that it arose from the left adrenal gland, robot-assisted videosurgery was recommended. The patient was placed in a supine position. Five incisions were made: the first for the 12mm optic of the robot in the umbilical scar, and three 8 mm incisions for the robotic arms in the right hypochondrium, in the left hypochondrium and in the right para-umbilical region. Finally, we made a 12 mm incision to the left of the umbilicus, for the assistant, who remains beside the patient, while the surgeon sits at the robot console.

During the initial inspection, a well-defined, encapsulated mass was observed in the region posterior to the splenic flexure of the colon, between the spleen and tail of the pancreas. No other intra-abdominal lesions were seen. The left parieto-colic gutter was opened, and the splenic flexure was pulled toward the midline (Figure 1). Given the rounded appearance of the tumor, we opted strategically for cleavage along a proximal-distal plane, and rolling it cranially (Figure 2). Because of the technical characteristics of the method, we were able expose the supra-pancreatic plane, and isolate and cauterize the vessels of the region safely and effectively. (Figure 3).

Even with the tumor essentially freed from the more vascularized tissue of the splenic hilum and the cranial border of the pancreas, its removal was challenging because of its weight.

So, a small midline supra-umbilical laparotomy was performed; linear stapling of the remaining adhesions of the tumor was performed to facilitate the removal of the surgical specimen, which measured 14 cm in it greatest dimension.

The result of the histological examination was Schwannoma with diffuse immunoexpression of S-100 protein, weakly positive for vimentin, and a Ki-67 proliferative index of 5%.

The patient was discharged on the second postoperative day, with good oral intake, adequate pain control with oral analgesics, and no procedure-related morbidity.

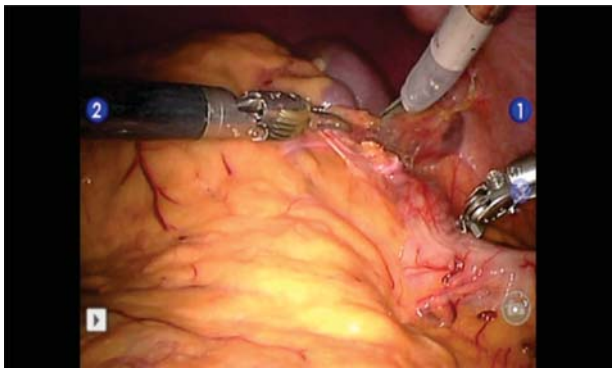

Figure 1 - *Opening of the retroperitoneal cavity to expose the tumor.*

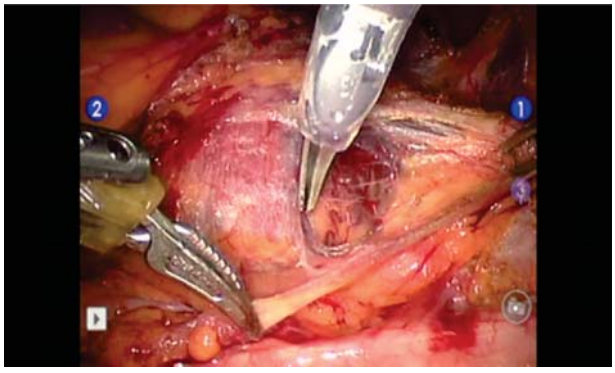

Figure 2 - *Initiating the tumor dissection by separating the visceral fat.*

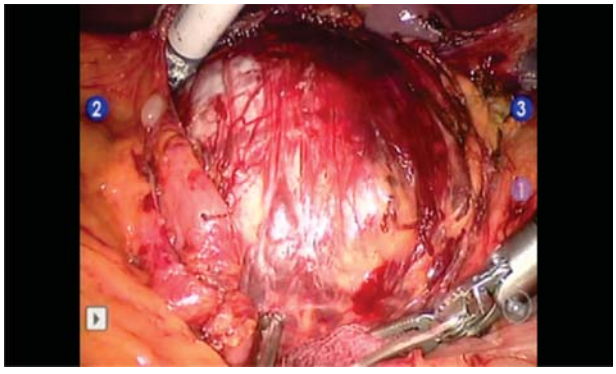

Figure 3 - *With the dissection completed, it is possible to see that the tumor is isolated from the neighboring organs, with well defined margins.*

DISCUSSION

Because it is an extremely rare tumor, the diagnosis of a retroperitoneal Schwannoma by imaging is difficult. The inclination to leave an unknown tumor intact usually supersedes any desire to obtain an image-guided biopsy. Thus, complete surgical excision of the tumor ends up being the preferred option.[5] In only one case reported in the literature was the preoperative diagnosis established by endoscopic ultrasound-guided fine-needle biopsy.[6]

In this case, surgical treatment was prompted by the belief that the mass was an adrenal tumor, a

situation in which the resection was indicated due to the tumor's size. Also weighing on the decision to use the robot was the possibility of performing a resection close to the large vessels with the advantage of steadiness of the robotic arm, a view validated to a certain extent during the procedure.

Minimally invasive surgery is becoming more popular in the treatment of retroperitoneal tumors, with reports of laparoscopic resection of Schwannomas in this region.[7,8,9] There is no report in the literature of a retroperitoneal Schwannomas removed by robot-assisted surgery; we believe this is the first such case report.

We found the robot especially useful in the dissection between the tumor and the adjacent retroperitoneal structures. It affords the surgeon a view in three dimensions (depth sensation) and the image definition is far superior to that of laparoscopy. Furthermore, the stability of the robotic arms was essential in handling a bulky and heavy tumor, enabling the resection through a minimally invasive approach.

CONCLUSION

The robotic approach has been gaining ground as a safe and effective technique in abdominal surgery. It has applicability in oncologic surgery because it 1) facilitates dissection in situations of close approximation of the tissues, 2) preserves tissues free of tumor, and 3) affords the surgeon greater freedom of movement. The panoramic and three dimensional views and superior visual quality, combined with the minimally invasive approach, benefit the procedure and confer greater confidence in the surgical technique. The patient enjoys a better and faster recovery compared to traditional methods, and the surgeon enjoys better ergonomics, comfort, and ease while operating.

RESUMO

INTRODUÇÃO - Os schwannomas são tumores que se originam das células de Schwann, formando lesões solitárias na bainha dos nervos periféricos. RELATO DO CASO - Paciente de 36 anos, do sexo masculino, com quadro de lesão sólida na topografia de glândula adrenal esquerda, identificada em exame de rotina. Foi submetido a ressecção por via robô-assistida de massa em retroperitôneo, que ao anátomo–patológico mostrou tratar-se de Schwannoma. CONCLUSÃO - A via robô-assistida mostrou ser opção segura na realização de cirurgias abdominais, trazendo ao paciente oportunidade de recuperação rápida e retorno mais cedo às atividades.

Descritores: Neuroma. Neoplasias retroperitoneais. Robótica.

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Brazilian Journal of Videoendoscopic Surgery

Case Report

Total Ressection of the Mesorectum with Laparoscopic Endo-Anal Pull-Through in the Treatment of Distal Rectal Cancer

Ressecção Total do Mesorreto com Abaixamento Endo-Anal Videolaparoscópico no Tratamento do Câncer do Reto Distal

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ABSTRACT

Objectives: To describe the technique of endo-anal pull-through of the rectum performed by a laparoscopic approach in a patient with adenocarcinoma of the distal rectum. We also present and discuss the various techniques of colon pull-through proposed to date. **Discussion**: Colo-anal anastomosis remains a challenge with implications for sphincter function. Many variations of the technique have been described and can be used provided they consider the clinical characteristics of the patient, the patient's personal choice, and the experience of the surgeon. Laparoscopy can be employed in pull through surgeries of the colon without the need for stoma or auxiliary incisions.

Key words: Laparoscopy. Rectal Neoplasms. Endo-anal pull-through.

Braz. J. Video-Sur, 2013, v. 6, n. 2: 086-091

Accepted after revision: february, 13, 2013.

INTRODUCTION

Advances in the treatment of rectal cancer have enabled the reconstruction of bowel transit, even with the most distal tumors, without compromising survival. Laparoscopic surgery has evolved so that surgical trauma is minimal and recuperation faster and less painful. There is less risk of herniations or the formation of adhesions, beyond the aesthetic and immunologic benefits.

Ultra-low anastomosis performed with staplers, colonic pull-through and intersphincter resections are technical options in sphincter preservation that are reducing the need for perineal amputation and permanent colostomy.[1] More precise data and longer follow-up, however, are still needed to evaluate the impact of these procedures in terms of the rates of local recurrence and measures of sphincter function.

The low colo-anal anastomosis has several drawbacks. The occurrence of incontinence is common and socially limiting. There is a greater technical difficulty and critical irrigation of the pulled-through colon. Fistulas occur in up to 20% of cases, and late complications include stenosis. These complications can lead to new surgeries, permanent or temporary colostomy, and increase the chance of cancer recurrence.[2] Stomata are typically considered temporary, and thus imply additional reversal surgery that is not without risks or complications. Additional hospitalizations for stenosis or anastomotic fistula are common. The impossibility of closing temporary stoma can reach 22% of cases.[3] Technical innovations, such as the colonic pouch, have contributed to reducing complications and sequelae.[4,5,6]

CASE DESCRIPTION

EMCJ, male, age 64, a native and resident of Curitiba, Paraná was treated for distal rectal adenocarcinoma first diagnosed two years ago. There

was no family history of cancer or polyps. He denied smoking and drinking. His past medical history included type II diabetes, hyperlipidemia and hypertension. He had undergone myocardial revascularization surgery and prostatectomy for benign prostatic hyperplasia; both surgeries were uneventful.

The patient was initially managed by another physician who recommended radiation and chemotherapy. The lesion was then staged as uT1N0M0 and the patient underwent local resection followed by adjuvant chemotherapy. Fourteen months later, follow-up tests revealed a new lesion in the distal rectum associated with an elevated carcinoembryonic antigen (CEA) level. Colonoscopy revealed a new elevated sessile lesion in the scar of the previous local resection which was biopsied. Several small polyps were also identified in the left colon and were resected endoscopically. The anatomic pathology confirmed the lesion of the rectum as moderately differentiated adenocarcinoma and described the polyps as tubular adenomas without high-grade dysplasia. One metastatic lesion was diagnosed in the upper lobe of the left lung and another in the liver.

The patient underwent a PET-CT, which revealed hypermetabolism in the left posterolateral wall of the lower rectum and anal canal, a liver metastasis in segment VIII, and a lung metastasis in the superior segment of the left upper lobe. After administration of a new chemotherapy regimen, there was complete regression of hepatic lesion, but the left apical pulmonary nodule persisted.

In our care, the patient was staged again using endorectal ultrasonography and MRI as yT3N0M1. On examination, the patient was in good general condition, had a ruddy complexion and was well hydrated. The abdomen was flat, soft and non-tender. There were no palpable masses. Visual inspection of the anal canal was normal; on digital rectal examination, however, a hard fixed posterior lesion, located approximately 3.5 cm from the anal margin was palpable.

Surgical Procedure

The patient was placed in Lloyd-Davies position under general anesthesia. Four trocars were placed: right flank, right iliac fossa, left flank, and the optic in the umbilical position. We ligated the inferior mesenteric artery and vein at their origins and dissected the splenic flexure. This was followed by dissection of the rectum respecting the planes and sections of the Total Mesorectal Excision (TME). For this case of a male patient, with a long and narrow pelvis, a Pfannenstiel incision was necessary, so we could advance the TME to the level of elevators in all of the quadrants.

In the perineal approach we injected adrenaline solution (at a concentration of 1:200,000) into the submucosa of the distal rectum and anal canal. We dissected the submucosa in its entire circumference and sectioned the distal rectum 2 cm below the tumoral margin, aiming to preserve most of the sphincter muscles, without violating the oncologic limits.

The rectum and colon were then pulled and exteriorized transanally (Figure 1). The sigmoid colon was sectioned and attached to the anal canal with separate nonabsorbable sutures. A compressive dressing was applied to the exteriorized colonic stump.

The patient had an uneventful postoperative course despite the development of small areas and foci of necrosis in the colonic stump. The necrotic areas were debrided every other day or as needed. The patient evolved without abdominal complaints and had several pasty evacuations per day until the 30th postoperative day, when we performed the amputation of the colonic stump suturing the colon to the anal canal, with separate absorbable sutures. On the same occasion, the patient also underwent resection of the pulmonary nodule by open thoracotomy.

The patient had a favorable postoperative course. The patient reported pasty stools with an incontinence score of 15 using the **Cleveland Clinic Florida** fecal **incontinence score** system. The

Figure 1 - *Exteriorized colonic stump.*

patient uses garment liners as a precaution, but reports fecal incontinence only at night.

DISCUSSION

There are several procedures that can be used to treat cancer of the medial and distal rectum. It is up to the surgeon to choose that which is best suited to the case in question. It is therefore important that the surgeon know the different techniques available so that the treatment of each case can be individualized.

Several surgeons contributed to making the ultra-low colo-anal anastomosis feasible and safe. In the late nineteenth century, Maunsell developed a colon pull-through operation with inversion of the rectum, resulting in a delayed colorectal anastomosis. In 1902 Weir modified the Maunsell operation, using an abdominal approach. The colonic stump remains exteriorized for 12 days (on average), to then be resected and reintroduced into the pelvic cavity. The technique of rectosigmoidectomy with delayed anastomosis was modified by Turnbull (Cleveland Clinic) and by Cutait (São Paulo University) in 1961.[7,8] It is used for treatment of both rectal cancer and acquired megacolon. After mobilization of the entire colon and rectum by an abdominal approach, the rectum is everted and sectioned 3-4 cm from the pectineal line.

The pull-through is then accomplished by telescoping the colorectal segment which is attached to the edge of the sectioned rectum. After 2 to 3 weeks the stump is amputated close to the anus and the colonic mucosa is sutured to the rectum. Recent results of 67 patients who underwent the Turnbull-Cutait pull-through, report the occurrence of fistulas in 7% and failure of the surgery in 25% (16% stenosis and prolapse in 7%). [9]

In 1932, Babcock proposed the transanal pull-through and the Parks proposed the primary colo-anal anastomosis. In 1999 Baulieux described delayed colorectal anastomosis performed one week after the primary procedure.[2] In 1940, Correa Netto[10] was the first Brazilian to perform the pull-through operation after intersphincter perineal amputation of the rectum. The technique was used for the treatment of acquired megacolon.

In 1948 Swenson and Bill[11] proposed the abdominoperineal rectosigmoidectomy with removal of the colon distended by eversion and section of the rectum through a perineal approach, followed by telescoping of the colon. The anastomosis was performed through a perineal approach 2 or 3 cm from the pectineal line, followed by introduction of the colonic stump in the pelvic cavity.

In 1959 Mandache used the endoanal pull-through of the colon when a cuff of rectal mucosa extending 3 to 4 cm above the pectineal line was resected and the colon pulled-through inside this rectum devoid of mucosa, which allows adhesion of the muscle of rectum to the serosa of the pulled-through colon. The colonic stump remains exteriorized for 18 days.[12] This technique was used by several authors.

In Brazil, this technique was performed by Mendonca, Simonsen, and Raia in cases of megacolon and by Habr-Gama for rectal cancer.[13-16] Similarly Vasconcelos in 1961 performed an abdominoperineal rectosigmoidectomy through an abdominal approach, removing the rectal mucosa up to the anal canal and pulling the colon down into the rectum.[17] A similar technique was described by Soave in 1963. [18]

In 1956 Duhamel [19] introduced the retro-rectal pull-through surgery, which preserves the rectum. The operation entails the detachment of the retro-rectal space to the level of the levator muscles of the anus, sectioning and closing the rectum at the level of the peritoneal reflection, and preparing the vascular arcade of the segment of the colon to be pulled through. Using a perineal approach, a posterior submucosal detachment is performed, respecting the sphincter apparatus to the level of the puborectal ligament of the elevator muscle of the anus. Then an opening is made in the muscular wall of the rectum at this level, thus reaching the pre-sacral space through which the colon is pulled through. Altmeier and Martin (1962), Grob (1960), and Haddad (1968) proposed modifications to Duhamel's original technique.[20, 21, 22]

These are surgical techniques that were described 80 years ago, but seem to have been forgotten. They do not pose oncologic risks, do not require a protective ileostomy, and can avoid the mini-incisions typical of laparoscopic surgery.

For the patient in question, we opted for the endoanal pull-through of the colon. This technique was described by Mandache and used by Habr-Gama. [12, 16] The postoperative course was uneventful. The endo-anal pull-thorough of the colon does not require

a protective colostomy or ileostomy, because a perineal colostomy is performed. Important oncologic details such as the ligation of the inferior mesenteric artery at its origin and total mesorectal excision must be respected. The release of the splenic flexure is critical, as is the certainty of preserving a marginal arcade to assure an adequate vascularization of the segment of the colon pulled through. These are important details that impose additional technical difficulty when the operation is performed laparoscopically.

The most feared complication is necrosis of the pulled-through segment of the colon which can progress to infection of the pelvic cavity, with abscess and fistula formation. Any suggestion of such necrosis requires urgent revision of the pull-through. With a viable pulled through colon the anastomotic dehiscence rate is very low. Adhesion occurs between the serosa of the pulled-through colon and the muscle of the rectum.

The adhesion scar between the serosa of the pulled-through colon and the muscle of the rectum should be complete around the entire circumference and firm. The cutting and suturing is performed 2 to 3 cm from the anal verge.

Delaying the colo-anal anastomosis is primarily a way of avoiding the risks associated with the high rates of fistula and stenosis after primary suture, complications that frequently result in permanent colostomy. Technical advances and progress in pre-and postoperative care have decreased the incidence of complications, but the low colo-anal anastomosis continues to have disappointing statistics. In the 1960s the incidence of anastomotic leaks after a rectosigmoidectomy was as high as 42%. This rate has declined to up to 20% in recent publications.[2] To avoid severe septic complications most surgeons prefer to perform a protective ileostomy.

New techniques and materials have emerged, but most are still undergoing clinical evaluation. Anastomoses using compressive, biodegradable, or magnetic (magnoanatomosis) rings or clips; doxycycline-coated sutures; staple-line reinforcement by banding or using an electric welding anastomosis system have been described. [5, 23]

Fecal incontinence is also more common in patients who undergo resection with rectal anastomoses below 6 cm from the anal margin, occurring in up to 60% of these patients.[24] Inverted double stapling can lower the risk of incontinence caused by excessive dilation during placement of instruments with possible damage to autonomic nerves. Resection of the transitional zone, hemorrhoids, or part of the internal sphincter, as well as pre-operative radiation therapy, all can contribute to the incontinence frequently observed post-operatively. The risk of incontinence (also present in cases of primary colo-anal anastomosis) is frequently reported as temporary, especially in the first year after surgery.[25] By the 60th postoperative day the patient, using 2-4 mg of loperamide daily, reported having one bowel movement a day. Although the fecal incontinence he reports is exclusively nocturnal, he chose to use a garment liner as extra protection during the day.

We elected an anastomosis technique by second intention approximately 30 days after excision of the mesorectum. The delayed anastomosis performed on the 6th postoperative day reported anastomotic fistulae occurring in only 3% of cases.[2] Facy e cols. operated 17 patients with anastomosis performed on the 5th postoperative day. They described one case of ischemia of the pulled-through colon, two deep pelvic abscesses, and one fistula connecting the colo-anal anastomosis and the vagina.[26]

Our publication aims to demonstrate the laparoscopic application of the endo-rectal pull-through. The delayed colo-anal anastomosis is safer, since, practically speaking, there is no risk of fistula. There is also no need for protective colostomy or ileostomy. It is an alternative to perineal amputation of the distal rectum, as long as it does not increase the risk of cancer recurrence. And there is still the possibility of removing the tumor through an anal approach, completing the procedure without incisions other than the usual trocar punctures.

Preserving the oncologic principles, the laparoscopic endo-anal pull-through is technically feasible and a reasonable option, especially in patients at risk for anastomotic complications or who refuse a protective stoma.

RESUMO

Objetivos: Descrevemos a técnica do abaixamento endo-anal do reto realizado por acesso laparoscópico em um paciente portador de adenocarcinoma do reto distal. Também apresentamos e discutimos as várias técnicas de abaixamento do cólon propostas até o momento. **Discussão:** A anastomose colo-anal permanece um desafio com implicações na função esfincteriana. Muitas variações técnicas foram descritas e podem ser utilizadas desde que respeitem critérios considerando as características clínicas do paciente, opção pessoal do paciente e a experiência do cirurgião. A videocirurgia pode ser empregada também nas cirurgias de abaixamento do cólon, sem a necessidade de ostomia ou de incisões auxiliares.

Palavras chave: Laparoscopia. Neoplasia retal. Abaixamento endo-anal.

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INFORMATION FOR AUTHORS

The **BRAZILIAN JOURNAL OF VIDEOENDOSCOPIC SURGERY** (**BJVS**) (ISSN 1983-9901 print, 1983-991X online) is the official channel of the Brazilian Society of Videosurgery (SOBRACIL) for the dissemination of scientific work. The Journal is published quarterly, with the goals of recording the results of research in videosurgery and related topics, promoting the study and improvement of the research in this field, as well as stimulating the publication of updates to knowledge.

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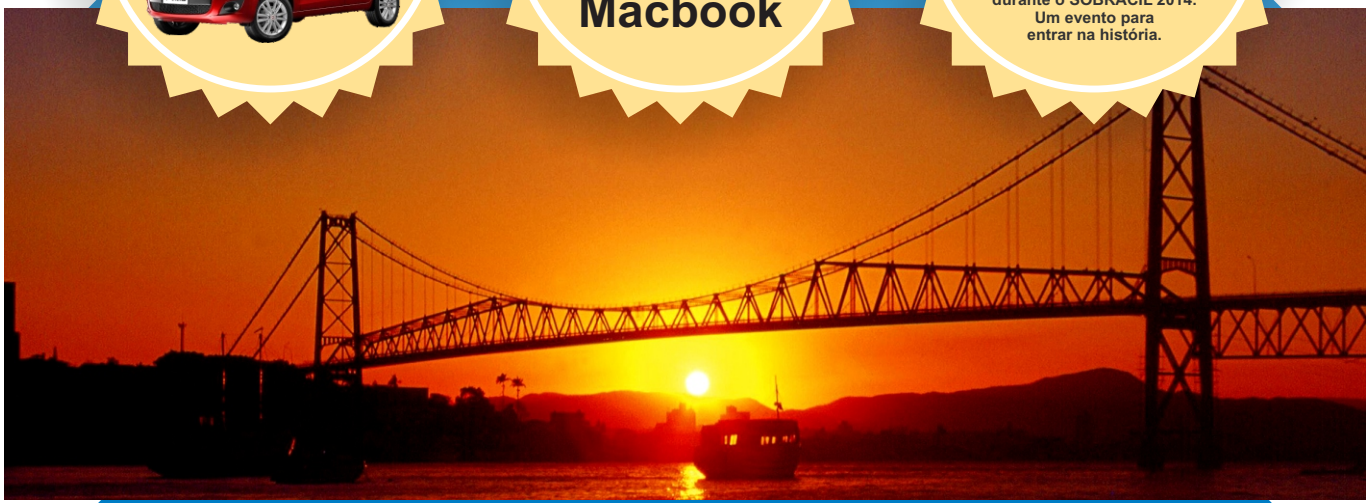

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