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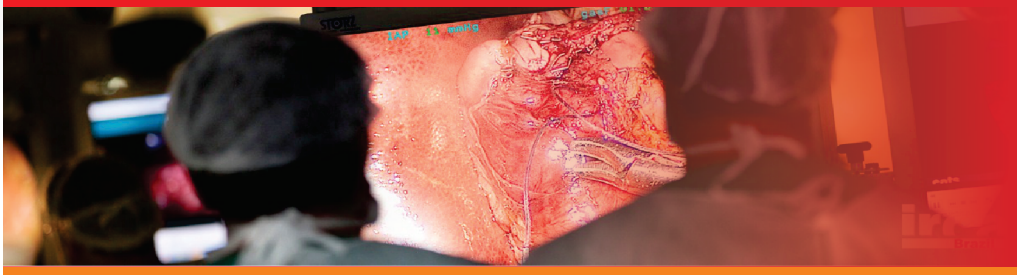

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concurso melhor artigo

Brazilian Journal of Videoendoscopic Surgery

Participe do concurso que vai premiar o melhor artigo de cada uma das próximas três edições do Brazilian Journal of Videoendoscopic Surgery (BJVS), a revista científica da SOBRACIL.

Com patrocínio da Covidien, cada artigo vencedor será contemplado com um curso no IRCAD, em Barretos/SP, o maior centro de treinamento em cirurgia laparoscópica da América Latina, um dos três maiores do mundo e o maior da rede IRCAD.

Envie seu artigo e aproveite esta oportunidade para entrar em contato com o que há de mais contemporâneo no mercado global da videocirurgia.

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Regulamento: Serão premiados os três melhores artigos dos três próximos números do Brazilian Journal of Videoendoscopic Surgery, sendo que, de cada revista, será escolhido o melhor artigo. Somente um autor de cada artigo receberá o prêmio. Caberá aos autores do artigo premiado em cada edição indicarem qual autor será agraciado com o prêmio. A Comissão Julgadora será composta por membros do Corpo Editorial do Brazilian Journal of Videoendoscopic Surgery. Membros da Comissão Julgadora não são elegíveis aos prêmios.

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Brazilian Journal of Videoendoscopic Surgery

The BJVS encourages the submission of scientific papers!

One of the major challenges faced by medical journals is to provide the scientific community with a steady stream of a broad range of novel and interesting content, with data demonstrating the evolution of science, both the basic science of cells, molecules, genes, and the like, and issues in clinical and surgical practice.

Among various metrics, we consider indexation as one method that peers use to recognize the maturation of the output of magazines, and, the impact that the articles published in a particular journal stimulate on the research community. This impact is measured by the number of times that an article is cited in studies of the same area of interest, demonstrating that its methods and results, influenced the advancement of science.

It is thought that the more an article is cited, the more influence the study exerted in its research field. Impact scores seek to measures the collective influence of a journal's collection of articles in order to gauge the importance of the publication as a whole.

This is the lifecycle of the scientific journal! The investigators who carry out studies that generate articles seek recognition and want, deservedly, to disseminate their findings. High impact publications receive a vastly larger number of items than they can publish, generating a rejection rate around 95%. This is undoubtedly because it is the dream of most researchers to have accepted their studies accepted by Nature, Science or Lancet, among others.

The fact is that, as with many other activities, there is space for everyone, and this is the subject and spirit of this editorial. The Brazilian Journal of Videoendoscopic Surgery is consolidated, and today has a solid base of readers. Planning is underway to better position the journal within the contemporary social and scientific milieu in which magazine circulates.

In medicine, our country still has gaps, or rather craters on basic issues of medical care and a few islands of excellence in technology and advanced studies. This disparity is reflected in the national scientific production, as some colleagues, whether tied to universities or not, do not have the habit of disclosing their practice by writing for medical journals. An example of this are the graduate theses – often excellent intellectual contributions – that end up bound on the shelves of the libraries of universities, read only by examination committees that evaluated their content.

However, it is true that this scenario is changing and we intend to contribute. We have simplified the instructions for preparation of scientific contributions and divided the articles into just four types: Original Articles, which encompass original clinical or experimental research; Case Reports, that includes a brief description of the case, a review of the literature, and a discussion of the topic; Case Series with the same structure; and Review Articles, which includes an introduction to the subject and a critical systemic review of the literature.

In addition, we created an award for best article of the edition that provides one of the co-authors with a video-laparoscopy course at IRCAD, a center of medical education of the highest quality in Barretos, in interior of the state of São Paulo. The first recipient of this award is the group of Dr. Marco de Melo Cezario for their contribution: Laparoscopic treatment of choledocolithiasis – a retrospective study of 84 patients (Laparoscopic treatment of choledocolithiasis: a retrospective study of 84 patients). This is just one of many interesting studies submitted in recent months, including those published in this issue in the areas of General and Digestive System Surgery, Gynecology and Urology. Good reading!

Sérgio Podgaec
Editor-in-Chief - Brazilian Journal of Videoendoscopic Surgery
E-mail: revista@sobracil.org.br

O BJVS estimula o envio de artigos científicos!

Um dos grandes desafios das revistas especializadas na área médica é apresentar-se à comunidade científica com artigos de conteúdo inédito, abrangente e interessante, com dados que mostrem a evolução da ciência, tanto nos aspectos básicos das células, moléculas, genes e afins, como nas questões das práticas clínicas e cirúrgicas. Dentre diversas métricas, aceitamos a indexação como um método que reconhece o crescimento dessa apresentação das revistas à seus pares e, a partir disso, cria-se o impacto que os artigos publicados em um determinado periódico gera nos rumos das pesquisas. Esse impacto é avaliado pelo número de citações que um artigo é referido em estudos da mesma área de interesse, mostrando que trata-se de métodos e resultados que, de alguma forma, influenciam o avanço da ciência. Conclui-se que quanto mais um artigo é citado, mais influência esse estudo provocou na área da pesquisa. Para a revista, avalia-se o conjunto de artigos para designar a importância da publicação como um todo.

Esse é o ciclo da vida da revista científica! Os autores que produzem estudos que geram artigos buscam reconhecimento e querem, com toda razão, divulgar seus resultados. Publicações de alto impacto recebem um número enormemente maior de artigos do que conseguem publicar, gerando um índice de rejeição em torno de 95%: isso ocorre, sem dúvida, porque é o sonho de grande parte dos pesquisadores ter seus estudos aceitos pela Nature, Science ou Lancet, entre outras.

O fato é que, assim como em diversas outras atividades, há espaço para todos e é esse o título e o assunto desse editorial. O Brazilian Journal of Videoendoscopic Surgery organizou-se, tem uma base sólida e está em fase de novo planejamento e inserção na realidade social e científica do meio em que a revista circula. Na Medicina, nosso país ainda tem lacunas, ou melhor, crateras em questões básicas de assistência e algumas poucas ilhas de excelência em tecnologia e estudos avançados. Da mesma forma, essa disparidade aparece na produção científica nacional, pois parte dos colegas, ligados ou não à centros universitários, não tem o hábito de divulgar sua prática, escrevendo para revistas médicas. Um exemplo disso são as teses de pós graduação que muitas vezes têm excelente contribuição intelectual, porém terminam encadernadas nas estantes das bibliotecas das faculdades, lidas apenas pela banca que avaliou o conteúdo.

Porém, é verdade que esse cenário vem mudando e pretendemos contribuir com isso. Simplificamos a orientação para confecção dos artigos científicos e dividimos os tipos de artigos em apenas quatro: Artigo Original que contempla pesquisa clínica ou experimental original, Relato de Caso que inclui descrição breve do caso, revisão da literatura e discussão do tema, Relato de Série de Casos com essa mesma estrutura e Artigo de Revisão que inclui introdução ao tema e revisão crítica e sistematizada da literatura. Além disso, criamos o prêmio de melhor artigo da edição que contempla um dos autores com um treinamento em video-laparoscopia no IRCAD, centro de educação médica de altíssima qualidade instalado em Barretos, no interior de São Paulo. O primeiro vencedor foi o grupo do Dr Marco Cezario de Melo com Laparoscopic treatment of choledocolithiasis – a retrospective study of 84 patients (Tratamento laparoscópico da coledocolitíase: um estudo retrospectivo de 84 pacientes). Assim, recebemos estudos interessantes nos últimos meses, como os publicados nessa edição nas áreas de Cirurgia Geral e do Aparelho Digestivo, Ginecologia e Urologia. Boa leitura!

Sérgio Podgaec

Editor-Chefe - Brazilian Journal of Videoendoscopic Surgery

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Brazilian Journal of Videoendoscopic Surgery

Original Article

Vagus nerve integrity in patients who underwent laparoscopic esophagectomy for the treatment of megaesophagus

Integridade Vagal em Pacientes Submetidos à Esofagectomia Laparoscópica no Tratamento do Megaesôfago

EDUARDO CREMA[1]; LUCIANA GARCIA PEREIRA CASTRO[2]; IRACEMA SALDANHA JUNQUEIRA[3]; ROSELI APARECIDA DA SILVA GOMES[4]; GUILHERME AZEVEDO TERRA[5]; JUVERSON ALVES TERRA JUNIOR[6]; ALEX AUGUSTO SILVA[7]

Study developed by the Division of Digestive Tract Surgery of the Federal University, Triângulo Mineiro (UFTM), Uberaba, Minas Gerais, Brazil.

[1.] Chair, Division of Digestive Tract Surgery; [2.] Medical student; [3.] Physician, Endoscopy Service; [4.] Chair, Biochemistry Department; [5.] Medical student; [6.] Assistent Professor, Division of General Surgery; [7.] Associate Professor, Division of Digestive Tract Surgery Digestivo.

ABSTRACT

Introduction: During a subtotal esophagectomy and esophagogastroplasty for the treatment of grade IV megaesophagus, partial or total damage to the vagus nerve can occur. Vagal excitation observed in normal controls is altered. The measurement of plasma pancreatic polypeptide (PP), whose secretion is induced by hypoglycemia, is an indicator of vagal integrity. **Methods:** Twenty-two patients who underwent laparoscopic transhiatal subtotal esophagectomy were divided into groups: A) 11 patients with vagal preservation, and B) 11 patients without preservation of the vagus nerve. The following procedure was performed before and after surgery in group A and during the late postoperative period in group B: a blood sample was collected, regular human insulin was administered intravenously, and collection of a new blood sample after 45 and 90 minutes. The serum PP measured in the six specimens of each subject. **Results:** In group A, mean PP levels were higher during the postoperative period before stimulation when compared to the preoperative period. A small variation in preoperative PP levels was observed in this group 45 and 90 min after the stimulus, probably because of the high baseline value. After surgery, PP levels were markedly lower in vagotomized patients before stimulation when compared to the group with vagal preservation. Comparison of mean postoperative PP levels 45 min after stimulation showed higher concentrations in the group with vagal preservation compared to vagotomized patients, suggesting anatomical and functional preservation of the vagus nerve. **Discussion:** Regarding treatment of advanced idiopathic megaesophagus, preservation of vagus nerve integrity seems to be important for the maintenance of gastric emptying, since parasympathetic innervation of the stomach is preserved in these cases. **Conclusion:** Anatomical preservation maintains the function of the vagus nerve evaluated based on PP levels after laparoscopic subtotal esophagectomy for the treatment of advanced megaesophagus.

Key words: Esophagectomy. Pancreatic Polypeptide. Vagus Nerve.

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INTRODUCTION

In the chronic phase of Chagas disease, 6% to 7% of patients develop megaesophagus ou megacolon, represented by muscle hypertrophy and dilation of the esophagus and/or colon, due to the destruction of the myoenteric and submucosal plexuses. [11] Megaesophagus is manifested in advanced phases of the disease and is classified into types I to IV.

Classically the treatment of achalasia types I, II and III, is Heller's modified cardiomyotomy associated with an anterolateral partial antireflux valve. The treatment of type IV megaesophagus is esophagectomy with esophagogastroplasty.[4,5,13] During surgery, we consider the possibility of partial or total severing of the vagus nerve, with consequent delay in gastric emptying, reduction of pancreatic secretions and gastric acid secretion. Truncal

vagotomy completely denervates the stomach and pylorus. Thus, the electrical activity of the distal stomach is disorganized for a period of days or weeks after total gastric vagotomy.[9,12,17,20,9] The vagal excitation induced by the hypoglycemia induced with the administration of insulin observed in healthy controls is abolished after gastric vagotomy.[9, 20]

Measurement of pancreatic polypeptide (PP) affords a reliable way of monitoring the integrity of the vagus nerve, without the need for intragastric monitoring. The main regulatory mechanism of nerve activity is the cholinergic vagal stimulation of the gastric antrum.[6,8]

Pancreatic polypeptide release is a marker of vagal efferent activity that plays a role in glucose homeostasis. Stimulation of the secretion of PP by hypoglycemia and its inhibition by hyperglycemia are mediated as well through an efferent vagal mechanism. In the basal state, this secretion is under oscillating cholinergic tone.

Pancreatic polypeptide release has been shown to be biphasic.[1, 7] In the first 30 minutes after a meal, its release appears to be mediated exclusively by the vagus nerves, as it is abolished by truncal vagotomy[1,15] and is increased in response to insulin-induced hypoglycemia[1,16] and sham meals. The second, longer-lasting phase persists for several hours after meals and is maintained after vagotomy.[18,19]

The aim of this study was to evaluate the functional integrity of the vagus nerve through the measurement of pancreatic polypeptide, whose secretion is induced by hypoglycemia, in the periods before and after laparoscopic subtotal esophagectomy for the treatment of Chagasic or idiopathic megaesophagus.

METHODS

We evaluated 22 individuals with advanced megaesophagus who underwent laparoscopic transhiatal esophagectomy and esophagogastric reconstruction at the cervical level. Fifteen patients (68.2%) were male and seven (31.8%) were female. Mean age was 53 years. There were 14 patients with Chagasic megaesophagus (63.6%) and eight patients with idiopathic achalasia (36.4%). All the patients evaluated postoperatively were asymptomatic and in good physical condition. Patients with Chagasic megaesophagus had at least two serological tests for *T. cruzi* and an histopathologic diagnosis characteristic of the disease. (Figure 1 - Chagas megaesophagus).

Patients classified as idiopathic did not have a positive serologic reaction to *T. Cruzi*, but the histopathology diagnosis confirmed idiopathic megaesophagus. (Figure 2)

In all cases the barium radiograph of the esophagus showed an advanced form of megaesophagus. Upper endoscopy, performed in all patients as mechanical preparation of the esophagus, did not detect esophageal neoplasia in any of the patients included in this study. In all cases electromanometry detected synchronous contraction waves of the esophagus body with low amplitude (<20 mmHg). Scintigraphy of the stomach and duodenum of Chagas cases preoperatively detected, in all patients, decreased gastric emptying of solids.

Patients were divided into two groups according to the surgical technique used in esophagectomy: the first group consisted of 11 patients with vagus nerve preservation and the second

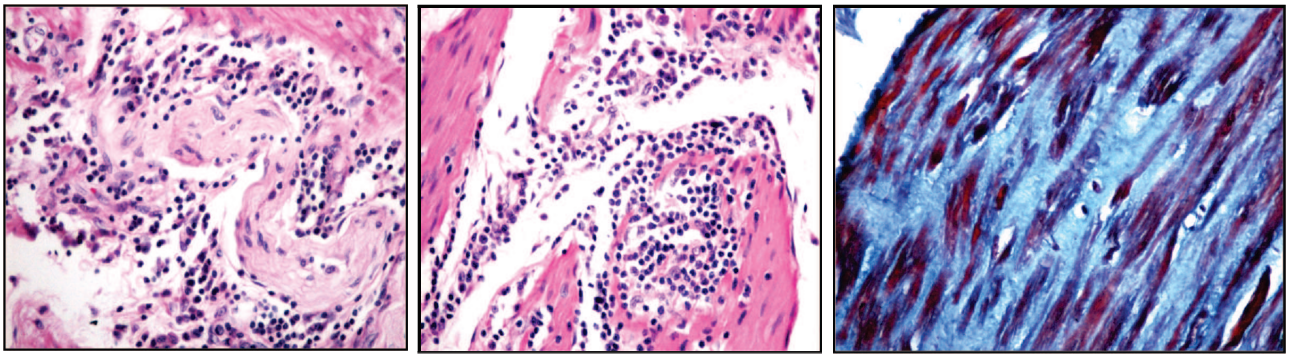

Figure 1 – *The photomicrographs above show the hypertrophic muscular layer of the esophagus with gangliositis, myositis and hypoganglionose, which characterizes, in of the pathological terms, the Chagasic megaesophagus.*

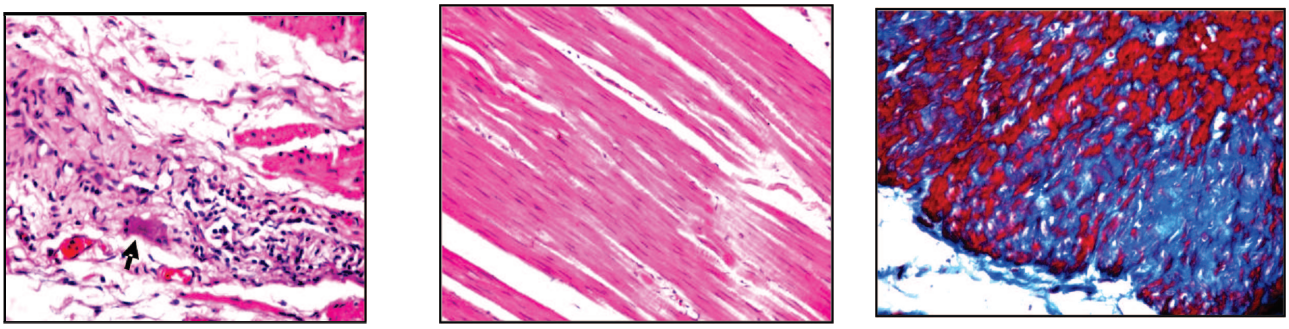

Figure 2 - *Photomicrographs of cases of idiopathic achalasia, characterized by the absence of gangliositis, myositis and hypoganglionosis.*

consisted of 11 patients without preservation of the vagus nerve.

In the vagal preservation group, the procedures to measure PP was performed in the preoperative period and again at least 3 months after surgery. Samples were collected from 10 ml of venous blood from the upper limb. Next, regular human insulin at a dose of 0.2 U/kg body weight, was administered intravenously in order to induce hypoglycemia. After 45 and 90 minutes, new blood samples were collected. Throughout the procedure, the patient remained in the supine position, with monitoring of heart rate, blood pressure and pulse oximetry. The material collected for each patient was centrifuged at 4°C, fractionated into plasma and cellular portions. The serum obtained was stored and maintained at an average temperature of -70º C for later assaying at one time. Thus six enzyme immunoassay (ELISA) tests to quantify PP were performed for each patient. The same process was carried out with the other group which consisting of the vagotomized patients, but the procedure took place only in the late post-operative period. The laboratory assays of pancreatic polypeptide were performed by UFTM's Department of Biochemistry.

Regarding statistical analysis, patients were grouped according to whether they underwent vagotomy or had preservation of the vagus nerve. The data exhibited a non-normal distribution and thus were analyzed using nonparametric methods. The Mann Whitney test was used for analyses between patients and control subjects. For analysis of variables comparing three or more groups, we applied the Kruskal Wallis test. Pairwise comparisons of differences indicated by the Kruskal Wallis test were analyzed using Dunn's post hoc test. The statistical significance of the Mann Whitney and Kruskal Wallis teste was determined using SigmaStat applications at a p-value of < 0.05 and the Dunn's test $Q > 2.5$.

RESULTS

During laparoscopic subtotal esophagectomy with esophagogastroplasty for the treatment of benign disorders, the dissection of the thoracic and abdominal esophagus is performed close to the muscle layer to prevent injuries to the pleural and adjacent organs or sectioning of the vagal trunks.

Esophagectomy with preservation of the vagal trunks has been employed in the treatment of Chagasic megaesophagus,[4,5] although with this condition there is denervation of the entire parasympathetic autonomic nervous system (digestive tract myoenteric and submucosal plexuses). It is known that the chronically denervated stomach develops intrinsic mechanisms that maintain motility and emptying. In patients with idiopathic megaesophagus who undergo vagotomy, there is impairment of gastric emptying during the first months after surgery.

Within the group in which the vagal nerve was preserved, we compared the mean baseline pancreatic polypeptide (PP) values with values of specimens obtained 45 and 90 minutes after the preoperative stimulus. The mean baseline value was 263.95. An impressive increase in the mean PP 45 minutes after the stimulus (392.4) was noted. After 90 minutes, the mean value was 316.28 (Figure 3), probably due to the initially elevated baseline. A statistical analysis of these means determined that differences were not statistically significant.

The mean postoperative baseline value in the group with vagal preservation was 231.82; 45 minutes after the stimulus the mean value was 249.82. A statistical comparison of these values was not significant, which probably denotes the functional preservation of vagus nerve.

In the group with vagal preservation, the mean preoperative value before the stimulus (263.95)

was higher than the postoperative mean value in the same group also before the stimulus (231.82). The same was observed when analyzing the mean of the values obtained 45 minutes after the stimulus preoperatively (392.94) and postoperatively (249.82). The differences among these values were not statistically significant.

In the vagotomized group, the mean of the values obtained before the stimulus was 150.14 and 45 minutes after the stimulus (111.01); the difference did not attain statistical significance.

The mean of the values obtained postoperatively before the stimulus in the group with vagal nerve preservation (231.82) was notably higher than the mean in the group that had undergone vagotomy (150.14); this difference was statistically significant (p = 0.008).

It was noted that the mean of the values obtained postoperatively after 45 minutes of the stimulus in the group with vagal preservation (249.82) was significantly higher than the mean of the values after 45 minutes of the stimulus in the vagotomized group (111.01); this difference was significantly significant (p = 0.006). These data suggest the functional preservation of the vagus nerve.

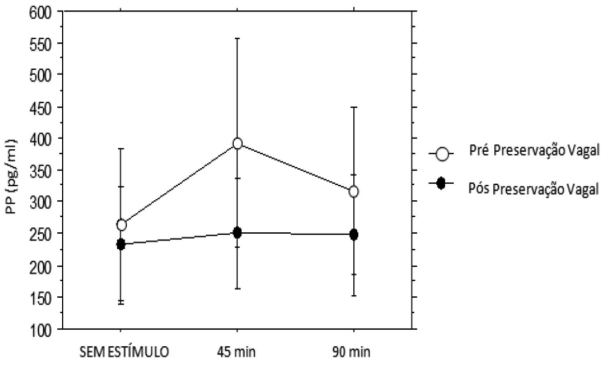

Figure 3 *- PP serum levels in patients who underwent esophagectomy with vagal nerve preservation before and 45 and 90 minutes after the stimulation in the pre-and postoperative periods.*

DISCUSSION

There was no statistically significant difference between the mean of the values before and after the stimulus, both pre- and post-operatively, in the group with vagal preservation. Based on these data, it can be inferred that the anatomic presence of the vagus nerves was effective in the functional preservation of the same nerves.

Findings similar to the results we present were reported by BANKI *et al*, 2002; they showed baseline values for patients with vagal preservation higher than those found in the group without vagal preservation, before the stimulus.[2] These authors also reported increases in serum PP 30 minutes after a food stimulus, used in patients who had undergone vagal-sparing esophagectomy. This increase was considered similar to normal controls and was statistically higher than in vagotomized patients, suggesting functional preservation of the vagus nerve. There was no elevation of PP in patients who had undergone esophagectomy with vagotomy.

Koop H. et al (1979) noted that three months after truncal vagotomy there was slight increase in postprandial levels of PP after the stimulus, and that five years after truncal vagotomy the stimulation response had returned to normal values . The authors concluded that the measurement of serum PP levels is not a good marker for studying effectiveness of vagotomias in the long term.[10] Insulin-induced hypoglycemia in humans can be blocked by truncal vagotomy, suggesting that vagal mechanisms are important in the release of PP.

Camilleri et al observed suppression of the increase of PP after the stimulus in patients after 12 weeks of intermittent vagal blockade employing VBLOC therapy.[3]

In earlier studies esophagectomies were performed without concern for the preservation of the vagus nerve and without any type of gastric drainage; nevertheless there was no reported impairment – in the medium term – in gastric emptying.[4,5,14]

In the treatment of advanced idiopathic achalasia, it is possible that the preservation of the vagus nerve has – at least during the first few months after surgery – major importance in maintaining gastric emptying, because in these cases the parasympathetic innervation of the stomach is preserved, which can be inferred after analysis and comparison of the peak release of PP 45 minutes after the stimulus between groups of esophagectomized patients with and without preservation of the vagus nerve (Figure 4).

Despite the small series (in the present study) and the limited number of studies that address the functional evaluation of the vagus nerve using the release of pancreatic polypeptide, in patients who have undergone laparoscopic subtotal esophagectomy with

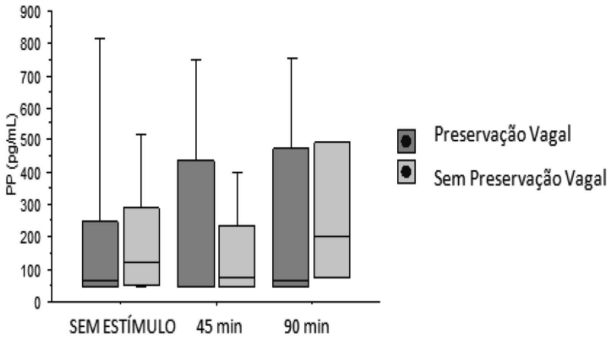

Figure 4 *- PP serum levels of patients who underwent esophagectomy with and without vagal nerve preservation; samples before the stimulus and 45 and 90 minutes after the stimulus. Data are expressed in pg/ml. The horizontal line represents the median. The bar represents the range between the 25% and 75% percentiles. The vertical line represents the range between the 10% and 90% percentiles. There was no statistical difference between the groups (Mann-Whitney test).*

esophagogastroplasty, the results suggest that there is functional preservation of the vagus nerves. Still, further studies should be conducted to evaluate and corroborate these findings.

CONCLUSION

Based on this material, we can infer that anatomical preservation of the vagus nerve maintains vagal nerve function, as assessed by pancreatic polypeptide levels, after esophagectomy for the treatment of advanced megaesophagus.

ACKNOWLEDGEMENTS

We thank the Departments of Digestive Tract Surgery and Biochemistry of the Federal University of the Triangulo Mineiro for making available supervision, equipment, laboratories and for making this study possible. We also thank everyone who contributed and dedicated to the execution of the procedures, supported the idea, and believed in the seriousness of the work. We especially thank every patient who volunteered and was a great collaborator, as a human being, in making possible this step in the advancement of science.

RESUMO

Introdução: Durante a esofagectomia subtotal no tratamento do megaesôfago avançado considera-se possibilidade de lesão vagal, com alteração da secreção do Polipeptídeo Pancreático (PP). A dosagem plasmática do PP, cuja secreção é induzida por hipoglicemia, traduz a integridade nervosa. **Métodos:** Avaliaram-se 22 indivíduos submetidos à esofagectomia subtotal transhiatal laparoscópica: (A) 11 pacientes com preservação vagal e (B) 11 pacientes sem preservação. O procedimento foi realizado no pré e pós-operatório da cirurgia em (A) e no pós-operatório tardio em (B): coletou-se amostra de sangue, administrou-se Insulina Regular Humana e, após 45 e 90 minutos, novas amostras foram coletadas. O material foi submetido à dosagem do PP. **Resultados:** Em A, os valores antes do estímulo, no pós-operatório, foram superiores aos do pré-operatório. No pré-operatório, houve pequena variação dos valores após 45 minutos e 90 minutos do estímulo, provavelmente pelo elevado valor basal apresentado inicialmente. Notaram-se valores de PP antes do estímulo no pós-operatório dos pacientes vagotomizados expressivamente menores do que no grupo com preservação vagal antes do estímulo no pós-operatório. A comparação dos valores do PP após 45 minutos do estímulo no pós-operatório entre grupo vagotomizado (B) e com preservação vagal detectou concentrações maiores no grupo com preservação, sugerindo preservação anatômica e funcional dos nervos vagos. **Discussão:** No tratamento do megaesôfago avançado, a preservação vagal pode ter importância na manutenção do esvaziamento gástrico, pois, nesses casos, o estômago tem inervação parassimpática preservada. **Conclusão:** A preservação anatômica vagal mantém a função dos nervos vagos, avaliada pelos níveis de PP, após esofagectomia subtotal laparoscópica no tratamento do megaesôfago avançado.

Palavras chave: Polipeptídeo Pancreático. Esofagectomia. Nervo Vago.

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Original Article

Laparoscopic Surgical Treatment of Gastric Cancer – Standardization of a Completely Intracorporeal Lymphadenectomy and Reconstruction Technique

Tratamento Cirúrgico do Câncer Gástrico por Videocirurgia – Padronização Técnica da Linfadenectomia e Reconstrução Totalmente Intra-Corpórea

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ABSTRACT

INTRODUCTION: Laparoscopic gastrectomy is a relatively new techique, first reported in 1992. This is mainly due to the challenges of lymphadenectomy and reconstruction, especially in advanced stage gastric cancer. **METHODS:** We present our experience with laparoscopic subtotal gastrectomy (37 cases) and total gastrectomy (115 cases) for oncological purposes performed by our group at the Barretos Cancer Hospital since 2009. We describe the technical details of the D2 lymphadenectomy, as well as the proper technique of reconstruction after total gastrectomy, using completely intra-corporeal "reverse anvil". Most patients presented with advanced stage disease. **CONCLUSION:** One of the major challenges of laparoscopic gastrectomy is the reconstruction. The "reverse anvil" technique described by Lacerda and Torres facilitates reconstruction after total gastrectomy. It is safe, inexpensive, reproducible and can be performed rapidly, even in the advanced stage cases,. It constitutes an important contribution to addressing the challenge of reconstruction after total gastrectomy.

Key words: Gastric Cancer. Surgery. Laparoscopy.

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INTRODUCTION

The official history of laparoscopic gastric resection began in Singapore in 1992, when Goh et al., performed the first totally intra-abdominal laparoscopic distal gastrectomy with Billroth II reconstruction, in an elderly patient with a chronic gastric ulcer.[1] In 1993, in Belgium, Azagra et al., performed the first minimally invasive total gastrectomy for gastric cancer treatment and, in 1999, reported their experience with thirteen patients. They concluded that laparoscopy for the treatment of gastric cancer was feasible, oncologically safe, and should be used for patients with early lesions, reserving combined (video-assisted) surgery for more advanced lesions.[2, 3]

In 2006, these same authors participated in a multicenter study, which analyzed 130 patients with gastric adenocarcinoma, with a mean follow-up of 49 months, concluding that laparoscopic gastrectomy with any type of lymphadenectomy and even as a palliative method is a safe procedure, with acceptable morbidity and mortality rates in patients with advanced gastric cancer. They concluded that these patients typically present in poor clinical conditions, and that laparoscopy for localized disease is equivalent to laparotomy in terms of oncological results, but with the well established benefits of laparoscopy.[4] In 2007, Kitano et al., published a multicenter study in Japan of early stage gastric cancer which demonstrated that laparoscopic surgery is associated with shorter hospital stays, less postoperative pain, better esthetic outcomes, and disease-free survival at 5 years comparable to open surgery for stages I and II.[5]

An Italian study comparing video-assisted gastrectomy with open surgery also found no difference in survival. The average number of lymph nodes resected was higher, the surgical time was shorter, and morbidity was less with the video-assisted technique.[6]

Seventeen years after the first laparoscopic resection for gastric cancer, the Japanese Society of Gastric Cancer included laparoscopic surgery for stage 1A and 1B tumors in their 2010 treatment guidelines, taking care to emphasize the parsimony with which this method should be indicated for the treatment of this type of tumor.[7-9]

In 2010, Kodera et al. published a meta-analysis that tried to address existing controversies. They concluded that laparoscopic surgery with D2 lymphadenectomy is feasible, safe, adheres to the oncologic principles, and should be performed in centers with considerable case volume by surgeons with appropriate training and sufficient experience to perform the procedure.[8] The meta-analysis found no significant differences in morbidity and mortality and oncologic safety in the studies – randomized or not – of early stage gastric cancer.[5,8] Experience in the West is limited due to the small number of gastric cancer cases detected early; for this reason there are few studies reporting the use of laparoscopic surgery in advanced gastric cancer.[10-12]

METHODS

We present a case series obtained by a retrospective review of the medical records of patients treated by our service, and the standardization of the D2 lymphadenectomy with reconstruction in laparoscopic subtotal and total gastrectomy first described by Torres & Lacerda.

The initial surgical steps of subtotal and total gastrectomy are similar, following the same technical standards of the conventional laparotomy procedure. The patient is placed in the lithotomy position with legs extended and separated, and properly supported in appropriate leggings. The surgeon is positioned between the patient's legs with the assistants for the camera and surgical assistance to the left of the surgeon. The laparoscopic set (including the monitor, when there is only one) is positioned at the head, to the right of the operating table. The positions of the six ports are identical for the two procedures: A. 11 mm trocar in the umbilicus (10 mm optic at 30 degrees); B and C: 12 mm trocars in the right and left flanks, at the mid-clavicular lines (used by the surgeon); D and E: 12 mm trocars in the right and left costal margins at the mid-clavicular lines (also for the surgeon's work); and E: 5 mm trocar in the midline sub-xiphoid (for the retractor) figure 1.

After inspection of the abdominal cavity, the procedure and staging begin with omentectomy at the level of the middle third of the transverse colon in the direction of the splenic flexure up to the beginning of the short vessels near the lower pole of the spleen, leaving the stomach to be prepared to be sectioned, in the case of the subtotal gastrectomy, at this point. Returning to the transverse colon, we complete the omentectomy until the release of the hepatic flexure, following the branch of the middle colic artery toward the right gastroepiploic vein and artery, isolating and separately ligating them with double ligature using LT 300 clips. At this time, lymph node dissection of chains 6, 14v, and 15 is completed (Figure 2).

The next surgical step consists of exposing the liver (left lobe and hilum) with a 5 or 10 mm retractor inserted through the sub-xiphoid port. The hepatogastric ligament is sectioned and lymph node chains 5 and 12A are dissected with a harmonic scalpel (Figure 3).

In this same presentation, the dissection and ligation of the pyloric vessels is performed, leaving the duodenum prepared for subsequent stapling. Lymph node dissection of the common hepatic, anterior aspect, left gastric, and celiac trunk arteries (chains 8A, 8P, 7 and 9) is completed, proceeding along the superior aspect of the pancreas to lymph node chain 11P, leaving the proximal segment of splenic artery denuded (Figure 4). The common hepatic artery is dissected and mended with thick surgical suture or cardiac tape to facilitate the presentation and dissection of the posterior ganglia (8P), taking care not to damage the vein.

The left gastric artery and vein are both ligated at their origins with LT400 or LT300 clips and/or a **Hem-O-Lok**. The presentation is maintained – without sectioning the duodenum – to facilitate the dissection of the right branch of the right pillar of the diaphragm. From this point, the peri-esophageal tissue around the distal esophagus is released, without isolating the esophagus in the case of subtotal gastrectomy. Lymph node dissection of chain 1 (Figure 5), leaves the surface of the gastric wall and cardia stripped and ready for the subsequent "stapling".

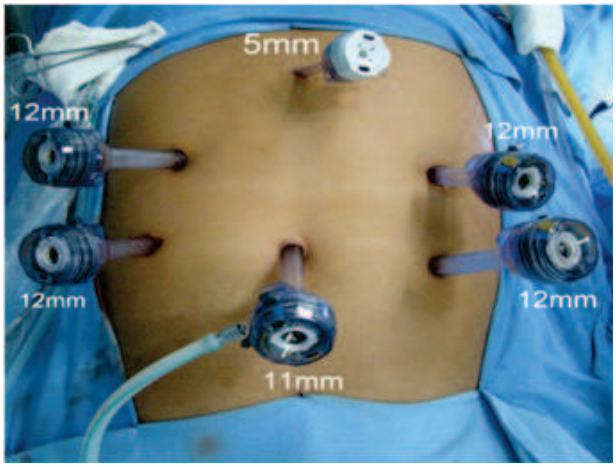


Figure 1 *– Trocar arrangement for subtotal or total gastrectomy. Four 12 mm ports are used for the staplers, 11 mm port for the liver retractor, and 5 mm umbilical port for the optic.*

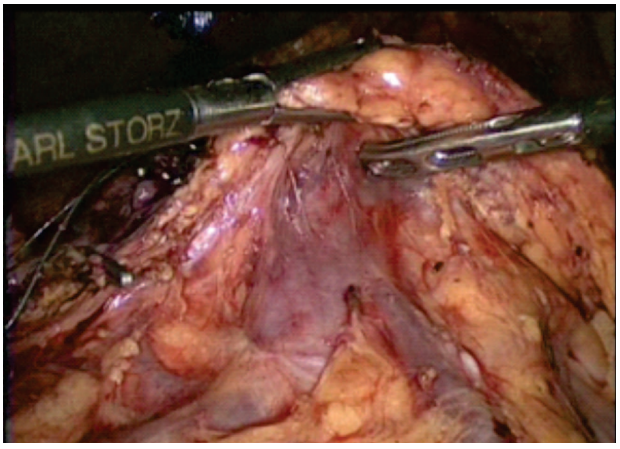


Figure 2 *- Lymphadenectomy of lymph node chain 14v (along the superior mesenteric vein) and chain 15 (along the middle colic vein).*

The duodenum is transected with a 60 mm laparoscopic stapler using blue loads. Reinforcement is not necessary as three lines of staples make this suture secure. The resection of the stomach is completed, from the greater curvature, near the inferior pole of the spleen toward the contra-lateral cardia, using two 60 mm laparoscopic stapler blue loads, taking care not to staple the esophagus. After complete resection of the stomach, the reconstruction of the 4/5 subtotal gastrectomy is carried out; it may be a Billroth II (gastrojejunostomy anastomosis with blue load and intra-corporeal suturing of the "gap" using continuous 3-0 polypropylene sutures) or a "Roux-en Y".

In the case of total gastrectomy, the initial steps are the same as for the subtotal gastrectomy

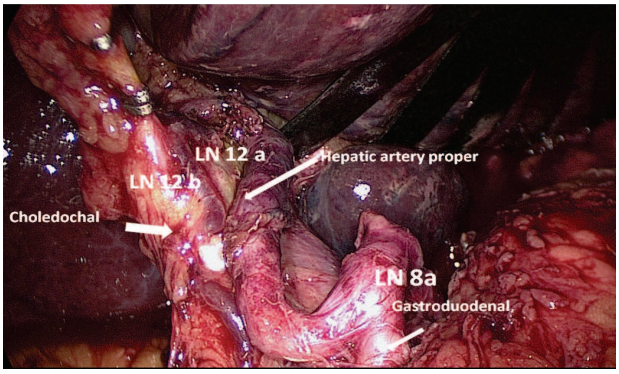


Figure 3 *- Lymphadenectomy of the hepatic hilum (chains 8a, 12a,12b and 12d). The common hepatic artery and the portal vein are shown.*

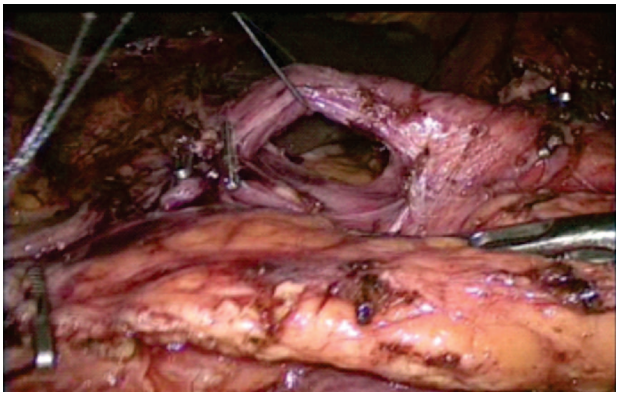


Figure 4 *- Lymphadenectomy of the chains along the common hepatic artery (8a and 8p). The hepatic artery, dissected and mended, and the pancreas without its capsule (bursectomy) are shown.*

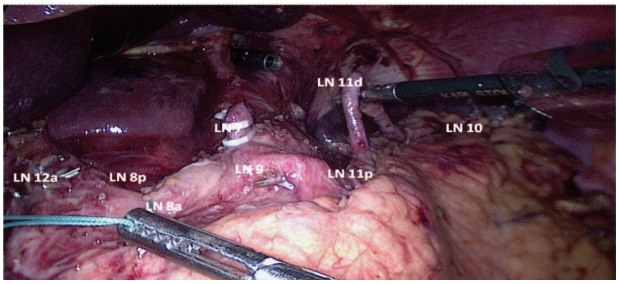


Figure 5 *– Complete lymphadenectomy (chains 1, 2, 3, 4SA, 4SB, 4d, 5, 6, 7, 8a, 8p, 9, 10, 11p, 11d, 12a, 12c, 14v, and 15). The main hepatic artery is identified with thread and the splenic artery in the background of the photo is raised with forceps.*

described above. The esophagus is isolated with dissection of the esophagogastric junction and the abdominal esophagus is anchored with "cardiac tape" or using a flexible retractor (endoflex). An ultrasonic scalpel or LigaSure Atlas can be used to section the small vessels, combined with ligation using LT400 clips

during the lymph node dissection of chains 2 and 11D and the completion of the gastrectomy (Figure 5).

The reconstruction starts with the preparation of the intra-abdominal esophagus, with a transverse section near the esophagogastric transition (EGT) leaving 60% of it. We prepared the "anvil" with an 8 cm 14 gauge Levine catheter with a 10 cm needled 3-0 prolene suture, so that the graded probes (Figure 6) facilitate the passage through the esophageal wall when traction is applied, without penetrating the esophagus and placing the anvil snugly within the esophageal wall.

The anvil is introduced in reverse (Figure 7), i.e., after transverse section of 60% of the distal esophagus close to the gastric cardia. We identify the esophageal lumen, introduce the anvil into the lumen, and soon after, we pass the needle 1 cm from the edge of the sectioned esophagus, previously positioned on the anvil prepared with the catheters.

We section the esophageal "stump" with a 60 mm laparoscopic linear stapler blue load (Figure 8), then pull the Prolene suture with gentle traction, previously transfixed in the distal esophagus in order to position the anvil in the distal esophagus, and promptly cut the sutures that secure the catheter in the anvil of the stapler (Figures 9 A, B and C).

We section the jejunum, 20 cm to 30 cm from the angle of Traitz. After widening the left flank trocar incision we introduce the circular stapler. The jejunum (feeding loop – the distal stump sectioned 20 cm to 30 cm from the angle of Treitz) is opened near the staple line, so that a size 25 stapler head can be inserted through this opening in the jejunum ("crook" jejunum). We connect the anvil – already positioned in the esophagus – and perform the stapling (Figure 10). We use a 60 mm blue load to close the "stump of the crook" and a 45 mm blue load for the enteroenteroanastomosis and close the "gap" with continuous sutures of 3-0 PDS in two planes.

We test the anastomosis with methylene blue, pass a nasogastric feeding tube, and place a silicone abdominal drain. We expand the left flank trocar incision to 5 cm and protect the wall (with a wound protector) so that the surgical specimen can be withdrawn (Figure 11).

The entire procedure – including the resection and the reconstruction and all anastomoses – is performed intracorporeally. One of the biggest challenges of laparoscopic total gastrectomy is the reconstruction, because there is no technique that is really effective, reproducible, inexpensive, and that can be perfomed quickly. The "reverse anvil" technique used by the authors (Lacerda and Torres), however, permits a reconstruction with these attributes post total gastrectomy with good esthetic results (Figure 12).

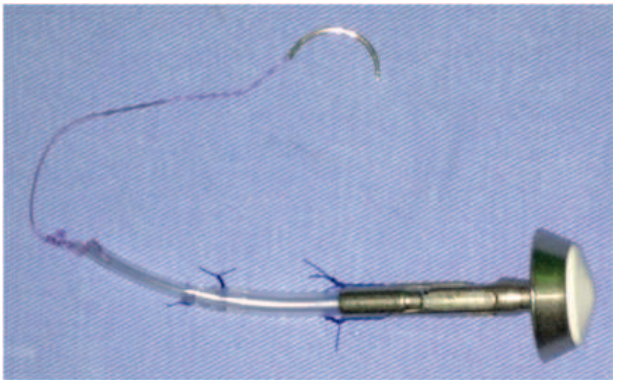


Figure 6 – *Anvil of a number 25 circular stapler, with 3 cm No. 14 and 8 catheters connected and fixed with 3-0 Prolene sutures to the anvil and between them. Observe that at the beveled tip of the number 8 catheter, a 5 cm needled Prolene 3-0 suture is attached, so that it can be transfixed to the distal esophagus.*

Figure 7 - *Presentation with the introduction of the anvil in reverse (caudal to cranial), previously prepared with the catheters, with a needled suture at the tip.*

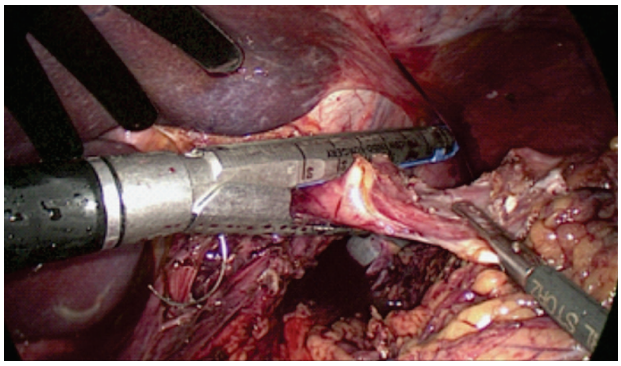
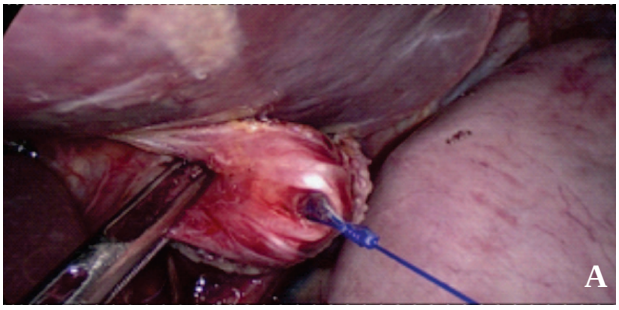
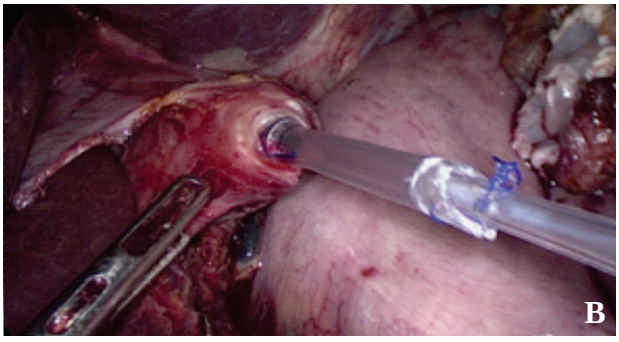


Figure 8 - *Section and closure of the esophageal stump with a 60 mm linear stapler blue load, taking care not to cut the exisitng suture.*





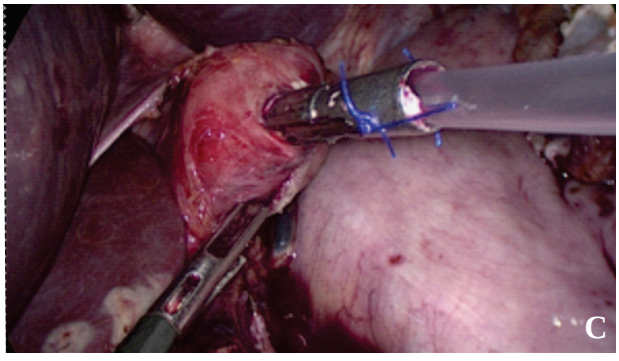


Figure 9 - *In Figure **A**, the suture being pulled with the emergence of the thinner catheter. In Figure **B**, the second catheter fully exposed, showing the tip of the anvil. In Figure **C**, the anvil is well positioned in the esophagus.*

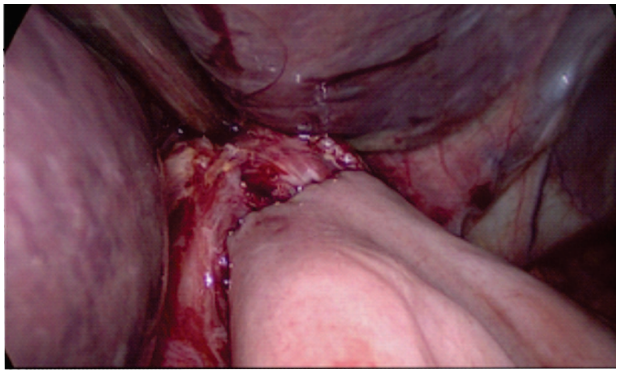


Figure 10 - *Esophagojejunal anastomosis.*

Figure 11 - *Surgical specimen (D2 total gastrectomy).*

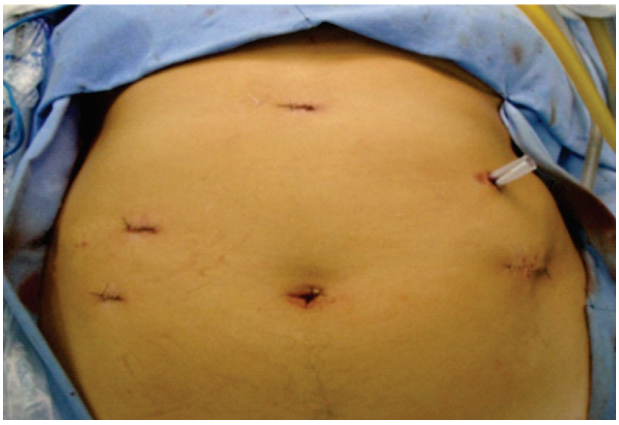


Figure 12 - *Final result of a patient who underwent D2 total gastrectomy, with the six ports. The left flank port incision is widened to permit passage of the circular stapler used to establish the esophagojejunal anastomosis and to enable removal of the surgical specimen. A silicone drain is positioned in the left costal margin port close to the esophagojejunal anastomosis.*

RESULTS

Since 2009, a single team at the Barretos Cancer Hospital has performed laparoscopic gastrectomies for the treatment of gastric cancer, regardless of stage, principally advanced cases and for palliation (Graph 1).

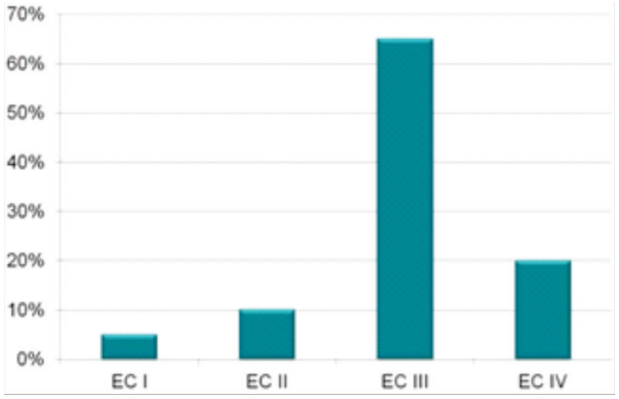
However, due to the difficulty of reconstruction, and because there is no standard technique for reconstruction, we developed a method of intracorporeal esophagojejunal anastomosis that does not require a mini-laparotomy and that is absolutely safe for the patient. Our series of gastrectomies for the treatment of gastric cancer included 152 procedures: 37 subtotal gastrectomies and 115 total gastrectomies. The first five were video-assisted; the

rest were completely laparoscopic. The surgeon must know how to perform conventional surgery.

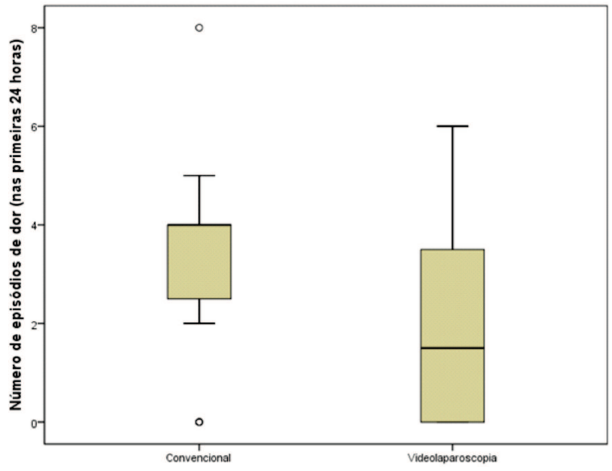
Laparoscopic D2 lymphadenectomy – sometimes facilitated by image magnification – follow all the steps of conventional surgery (laparotomy) respects oncologic principles, and is perfectly feasible. On average 26 lymph nodes were dissected in a subtotal gastrectomy, and 34 in a total gastrectomy. Lymph node chains 14v and 10 were dissected when indicated, not in all cases; the same applies to bursectomy.

Operative time varied from 3 to 4 hours. The esthetic results was quite favorable. Enteral feeding started on the first postoperative day and an oral liquid diet is instituted on the second postoperative day. Patients experienced less pain, require fewer analgesics (Graph 2), and ambulated sooner in the immediate postoperative period. This significantly reduced the hospital stay, with discharge (without complications), on average, on the seventh day. The quickest discharge was on the third day.

Blood loss was minimal, and the need for observation in the ICU, indicated for patients who are elderly or who have comorbidities, was infrequent. Patients returned to their normal activities quickly and, when indicated, adjuvant treatment (chemotherapy and/or radiotherapy) could be initiated promptly. The morbidity and mortality was not higher than that observed in conventional surgery in our service, respecting all oncologic principles.



Graph 1 *- The large majority of patients in this series (85%) correspond to clinical stages (EC) advanced stages (III and IV).*



Graph 2 *- Comparison of the pain – measured as the number of episodes in the first 24 hours – experienced by the patients who underwent conventional open versus laparoscopic total gastrectomy.*

DISCUSSION

Totally laparoscopic surgery is superior to video-assisted. It is safer and has better esthetic results. Conversion, when necessary, should not be made by small incisions, trying to justify the laparoscopic procedure. Laparoscopic gastric surgery, as with the laparoscopic surgery of any organ, is a completely safe procedure. It should be performed by professionals trained in open surgery, with ample experience in both techniques (open and laparoscopic). The team consisting of a circulating nurse, instrumentation nurse, and two surgeons should be should be trained and attuned, so that the roles of the surgeon and the assistant can be swapped, depending on who has the best angle and visual field at particular moments of the surgery. They should have suitable materials, from the instruments to the laparoscopic equipment, and especially, the certainty that they are doing the best for our patients.

RESUMO

INTRODUÇÃO: Gastrectomia laparoscópica é uma técnica relativamente nova, descrita pela primeira vez em 1992. Isso ocorre principalmente devido à linfadenectomia e à reconstrução, em particular nos casos de câncer gástrico avançado. **MÉTODO:** Apresentamos nossa experiência com gastrectomia subtotal laparoscópica (37 casos) e gastrectomia total (115 casos) para casos oncológicos realizados por nosso grupo no Hospital de Câncer de Barretos desde 2009. Descrevemos os detalhes técnicos da linfadenectomia D2, assim como a técnica apropriada da reconstrução após a gastrectomia total, utilizando a ogiva reversa completamente intra-corpórea. A maioria dos pacientes apresentava doença em estádios avançados. **CONCLUSÃO:** Um dos maiores desafios da gastrectomia laparoscópica é a reconstrução. A técnica da ogiva reversa descrita por Lacerda e Torres facilita a reconstrução após a gastrectomia total. É segura, de custo acessível, reprodutível e pode ser realizada rapidamente, mesmo na doença em estádios avançados. Constitui importante contribuição no desafio da reconstrução após a gastrectomia total.

Palavras chave: Cancer Gástrico. Cirurgia. Laparoscopia.

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Original Article

Laparoscopic pelvic lymph node dissection in the management of penile cancer: how to do it

Linfadenectomia pélvica laparoscópica no tratamento do câncer de pênis: como realizar

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ABSTRACT

There is a greater incidence of penis cancer in the underdeveloped countries. The lymph nodes are the principal site of metastasis. Patients with lymph nodes involvement undergo lymphadenectomy in most of cases. The laparoscopic access for the lymph node dissection is an attempt to minimize the surgical trauma without compromising the oncologic safety/completeness. There is no consensus regarding the timing and extent of the lymph node dissection in the penile cancer. **Objectives:** 1) Review the indications in the literature for laparoscopic pelvic lymphadenectomy in the comprehensive treatment of penile cancer, and 2) describe the surgical technique of lymphadenectomy using the laparoscopic approach demonstrating the possibility of preserving the radical quality of the surgery with a minimally invasive approach. **Discussion:** Because of pelvic lymphadenectomy in the treatment of cancer of the penis is performed in a isolated way, i.e. not associated with resection of the bladder or prostate, this surgery has several technical peculiarities. Laparoscopic pelvic lymphadenectomy permit replication of the open technique with the advantages of a minimally invasive procedure, making it an alternative for the treatment of penile cancer. **Conclusion:** The laparoscopic approach for the realization of pelvic lymphadenectomy has been shown to be feasible. There is a need to answer several questions about the treatment of penile cancer based on studies with a good level of evidence.

Key words: Penile cancer. Lymphadenectomy. Laparoscopy.

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INTRODUCTION

There is a high incidence of penile cancer in many developing countries. Twenty to thirty percent of patients with squamous cell carcinoma of the penis and inguinal lymph node involvement have in pelvic lymph nodes metastases.[1] Imaging methods to define the lymph node staging have low sensitivity and specificity; thus in many patients pelvic lymphadenectomy is performed to assess the presence of nodal metastatic disease.[1]

In 1932, Godard and Kaliopoulus reported the first case of pelvic lymphadenectomy performed in conjunction with cystectomy. Since then, pelvic lymphadenectomy has become indicated in various genitourinary tract tumors. The presence of lymph node metastases almost always implies important therapeutic decisions. Patients with cancer of the penis and local lymph node involvement should undergo regional (pelvic) lymph node dissection. How extensive and radical the surgery should be are, however, controversial.

The laparoscopic approach for performing pelvic lymphadenectomy – as an attempt to minimize surgical trauma without compromising the oncological radicality – was first described in 1991 by Schuessler, in the treatment of prostate cancer. Despite the existence in the literature of large series of pelvic lymphadenectomy in patients with bladder cancer and prostate cancer, there still are few reports of laparoscopic pelvic lymphadenectomy in the treatment of cancer of the penis. Surgery for patients with penile cancer has particularities that deserve to be described.

Because the survival of patients with pelvic lymph node involvement is limited, there are authors who have questioned its indication.[2] Some reports,

however, indicate a therapeutic potential approaching 20%, especially in young patients, who are more likely to have micrometastases.[3] Furthermore, in selected cases, pelvic lymphadenectomy may be indicated in the staging of cancer of the penis before inguinal lymphadenectomy.[3]

The principal objectives of this paper are to describe the surgical technique of lymphadenectomy using the laparoscopic approach and to demonstrate the feasibility of preserving the radicalness of the surgery with a minimally invasive approach. We also review the literature regarding the indications for laparoscopic pelvic lymphadenectomy as complete surgical treatment of cancer of the penis.

SURGICAL TECHNIQUE

As in bladder and urethral cancer, extended pelvic lymph node dissection is indicated in cases of penile cancer.[4] Unlike the standard or modified pelvic lymphadenectomy, which removes only the obturator and hypogastric lymph nodes, extended lymphadenectomy also removes the lymph nodes of the common and external iliac chains. The limits of dissection are identical to those already established in open surgery: starting from the common iliac vessels, they are the genitofemoral nerve laterally, the inguinal ring distally, and the obturator fossa and hypogastric vessels inferiorly. The dissection is always initiated on the side with the greater likelihood of lymph node involvement.[5,6]

1 – Positioning of the surgical team and equipment

The surgeon is positioned behind the patient's head and the first assistant to surgeon's right. The video equipment is placed at the end of the surgical table opposite the surgeon.

2 – Positioning of the patient and trocars

The patient, after induction of general anesthesia and Foley catheter placement, is positioned supine with arms close to the body in Trendelenburg. Five trocars are placed in an inverted "V" pattern. They include a 10mm supraumbilical optic trocar, two 10mm trocars located on the right and left margins of the rectus abdominis muscle, and two 5mm trocars placed 2 cm medial to the right and left anterior superior iliac spines. In the literature there are variations in the positioning of the surgical team and of the trocars (Figure 1).

3 – Identification of anatomic landmarks

The medial umbilical ligament, iliac vessels, internal inguinal rings, vas deferens, and spermatic cords are identified. Traction can be applied to each testicle to facilitate identification of the spermatic cord where it enters the internal inguinal ring (Figure 2).

4 – Opening the peritoneum and dissection of the external iliac artery and vein

Begin the incision of the parietal peritoneum in the region of the internal inguinal ring. The opening of the peritoneum is extended cranially along the white line of Toldt above the psoas muscle to where the ureter intersects the common iliac veins. The small branches of the common iliac vessels that feed the psoas muscle should be ligated. After opening the peritoneum, the tissue over the psoas muscle is

Figure 1 *- Trocar Placement.*

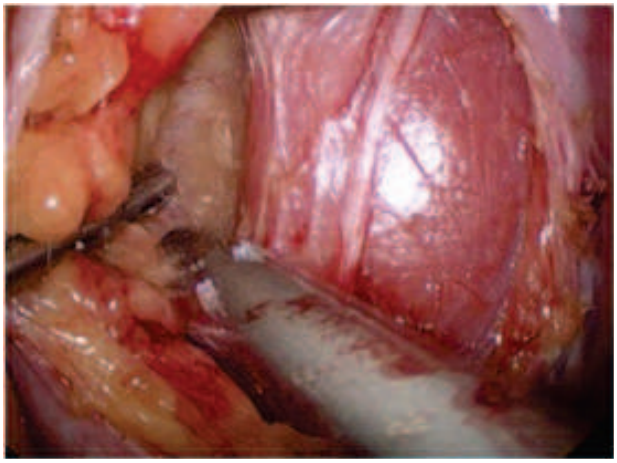

Figure 2 *- Psoas muscle, genitofemoral nerve, and spermatic cord.*

dissected medially to the genitofemoral nerve and the spermatic cord up to the external iliac vessels, which can be easily identified by the pulsation of the artery. Proceed with blunt dissection of the tissue overlying the external iliac vessels. Medial traction on these vessels exposes the lymph nodes located beneath them. The dissection continues, carefully, medially to the external iliac vein over the pelvic muscles until identification of the obturator nerve. The sectioned tissues should be ligated in order to prevent lymphocele formation (Figure 3).

5 – Dissection of the ureter and the internal iliac artery

The cranial limit of the dissection is the common iliac artery. Continuing the dissection from the bifurcation of this artery, the ureter is identified as it crosses over the artery. Once isolated, the ureter can be displaced medially or anteriorly with the aid of forceps handled by the second assistant in order to decrease the chance of inadvertent injury. Initiate the dissection over the internal iliac artery, where one identifies the obliterated umbilical artery and the bladder branches (Figures 4 and 5).

6 – Dissection of the external iliac vein to the Cooper ligament and isolation of the vas deferens

The dissection of the external iliac vein proceeds caudally toward the pubic bone. During dissection, the obturator vein that accompanies the corresponding nerve, can be identified. Next to the pubic bone one often encounters the accessory obturator vein, with which one must be careful to avoid bleeding. During the opening of the peritoneum toward the pubic bone, one identifies the vas deferens; it should be preserved or ligated in accordance with the patient's intention or not to preserve fertility. Next, the external iliac vein is dissected cephalically to the point where the internal iliac vein is identified (Figures 6 and 11).

7 – Dissection of the obturator nerve

The posterior limit of the dissection is the obturator nerve and the internal iliac vessels. The dissection of the nerve from Cooper's ligament should be done parallel to it, keeping it in view. The obturator nerve should be identified before performing clipping or sectioning of the lymph node tissue, thus preventing its accidental injury. Blunt dissection almost always achieves the release of the nerve, but occasionally ligation and sectioning of the obturator veins may be necessary. The lymphatic tissue is freed from the

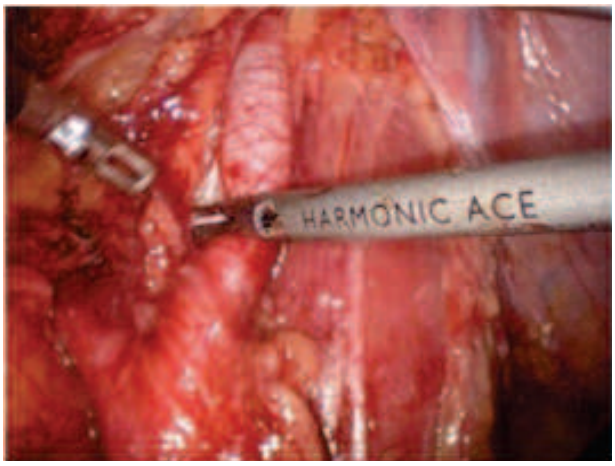

Figure 3 - *Dissection of the external iliac artery to the point where it bifurcates.*

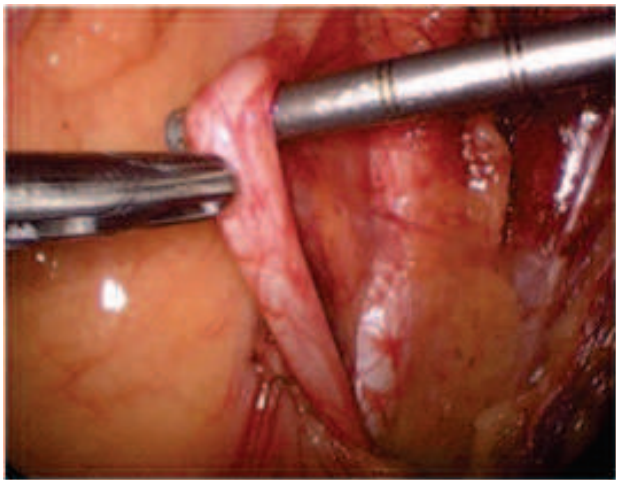

Figure 4 - *Identification of the ureter.*

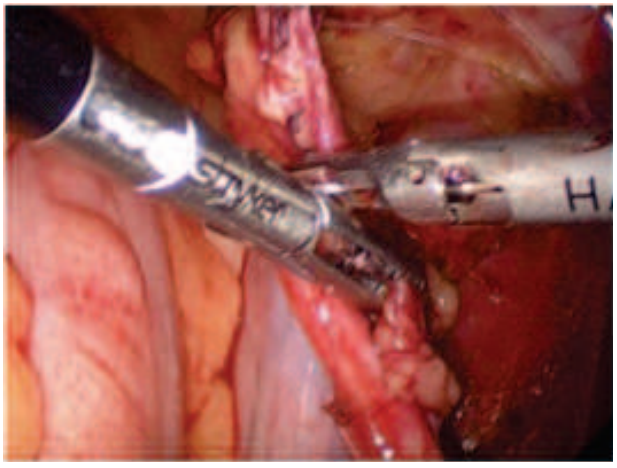

Figure 5 - *Folding the ureter.*

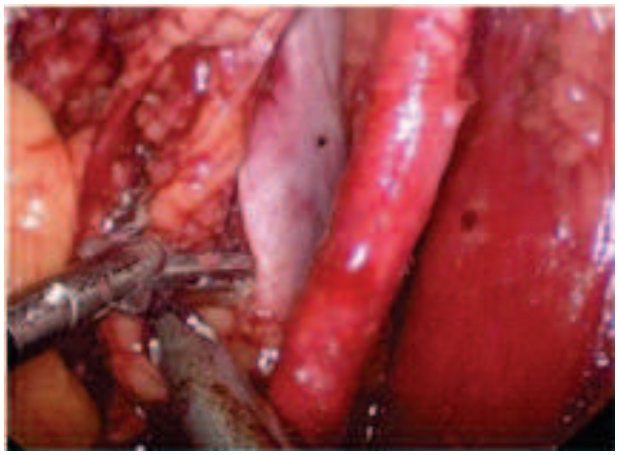

Figure 6 - *Dissection of the external iliac vein.*

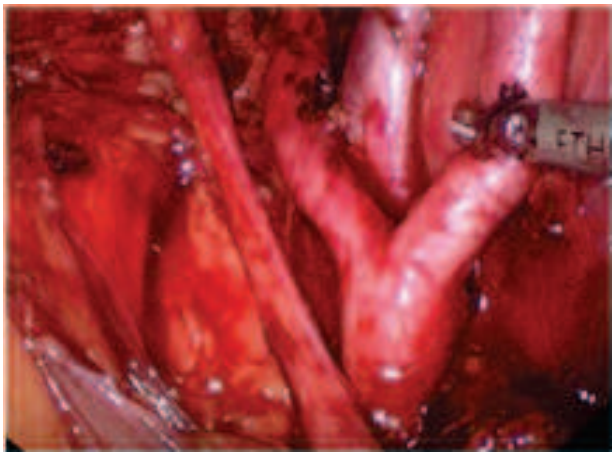

Figure 9 - *Dissection of the Common and Internal Iliac Arteries.*

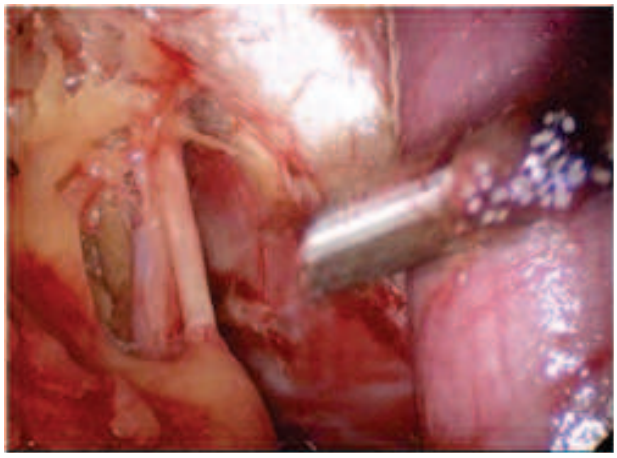

Figure 7 - *Identification of the obturator artery and nerve.*

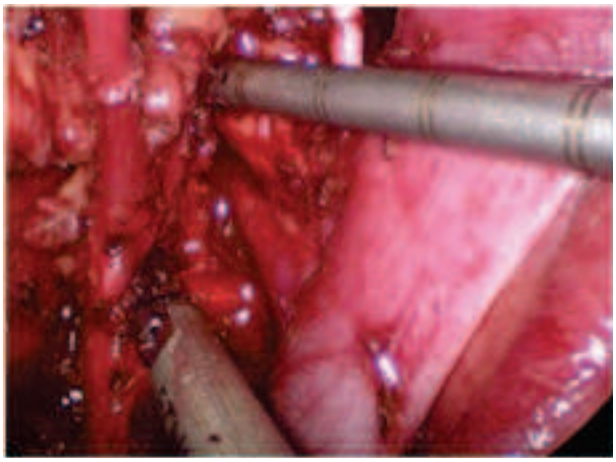

Figure 10 - *Dissection of the Internal Iliac Vein.*

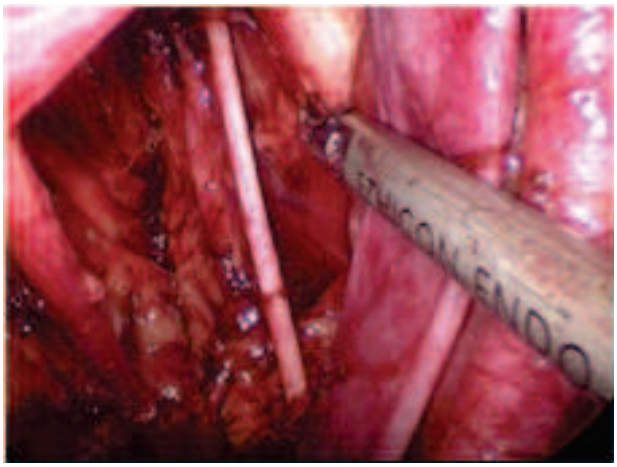

Figure 8 - *Emptying the obturator fossa.*

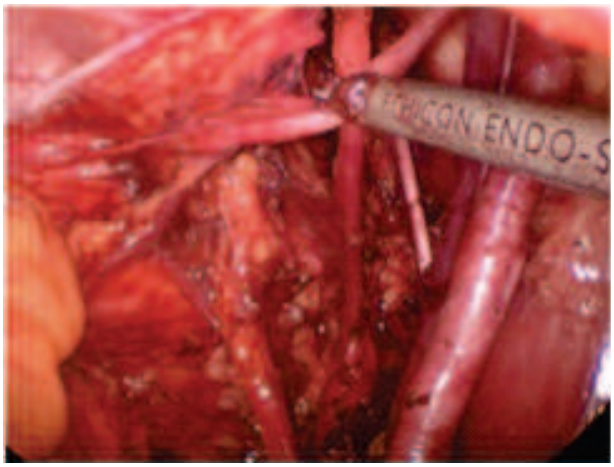

Figure 11 - *Preservation of the deferens.*

obturator nerve up to the point where the nerve passes behind the iliac vein. During this dissection electrocautery should be avoided; it can provoke nerve stimulation triggering a brusque adduction of the lower extremity, which can cause a vascular injury (Figures 7, 8, 9, 10, 11, 12).

8 – Contralateral lymphadenectomy

After complete lymphadenectomy of the side considered most suspicious, contralateral lymph node dissection is performed using the same technique (Figure 13).

9 – Bagging and withdrawal of the surgical specimen

The lymphatic tissue is removed through the 10 mm portal in the umbilical region after being properly bagged within the cavity, thus preventing the seeding of tumor cells in the port (Figure 15).

10 – Drain placement and closing of ports

At the end of procedure, the abdominal pressure is lowered to 5 mmHg and is hemostasis is carefully reviewed. A full inspection of the pelvic structures is performed to visualize/identify a possible injury of viscera or vessels. A Drain is positioned in the pelvic cavity and the aponeuroses of the 10 mm ports are closed (Figure 14).

DISCUSSION

It is generally accepted that patients with malignant neoplasms of the penis and lymph node metastases should undergo surgery, but the timing and extent of lymphadenectomy remain controversial. Various strategies have been proposed. Some centers recommend pelvic lymphadenectomy followed by inguinal lymphadenectomy if there is no involvement of pelvic lymph nodes in the frozen sections.[8]

The philosophy that justifies this strategy is based on the prognosis of patients with pelvic metastases regardless of treatment. This fact, as evidenced in the large pelvic metastasis, cannot be applied to cases of microscopic metastases, where survival rates of 17% to 54% have been reported.[7,8]

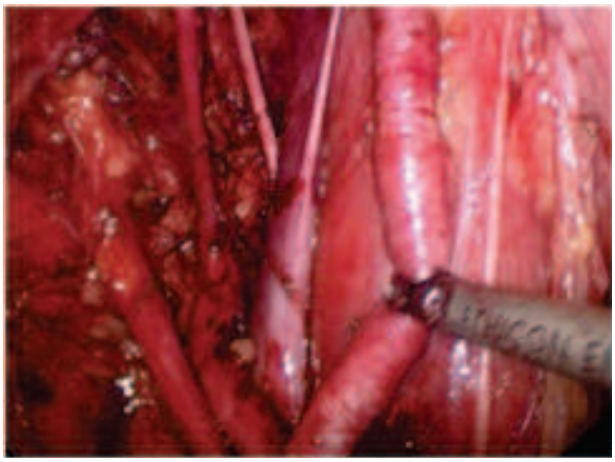

Figure 12 - *Right lymphadenectomy (Final aspect).*

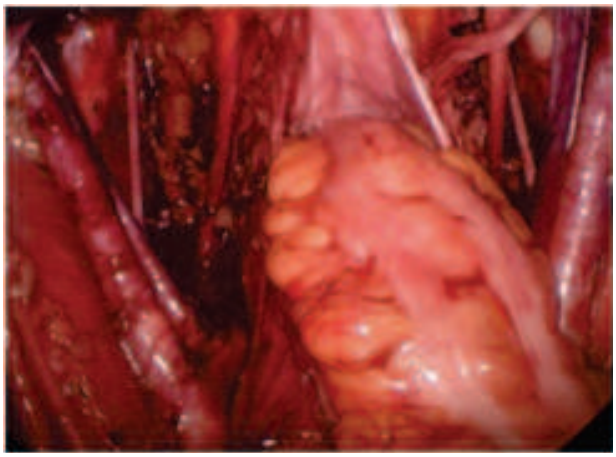

Figure 13 - *Bilateral lymphadenectomy (Final aspect).*

Figure 14 - *Final aspect of the surgery.*

Figure 15 - *Surgical specimen.*

Because of this therapeutic potential, surgery should try to achieve the complete removal of lymph nodes that drain the pelvis. Partial pelvic lymph node dissection ipsilateral to the side of involvement of the penile tumor is also controversial.

The chance of involvement of pelvic lymph nodes is associated with the number of inguinal lymph nodes affected. Patients with one affected inguinal lymph node without involvement of the lymph nodes closest to the surgical specimen have a low chance of pelvic lymph node involvement. When two or more inguinal lymph nodes are affected, the probability of pelvic lymph node involvement increases. Other features of the inguinal lymph nodes such as the presence of extranodal extension, the ratio of positive lymph nodes to the number dissected, and p53 expression, also seem to have an ability to predict pelvic involvement.[9]

Preoperative lymph node staging is accomplished through imaging studies. Computed tomography (CT) is the test most often performed for this purpose. The accuracy of this test has been evaluated in several studies of genitourinary tract cancers, especially bladder and prostate.

In the case of penile cancer, the number of studies is greater for the evaluation of inguinal lymph nodes. The sensitivity of CT for detecting metastases in pelvic lymph nodes is 48%, but the specificity ranges from 83% to 100%.[10] Approximately 40% of cases are under-staged and 5% are over- staged.[10] CT guided needle biopsies of the pelvic lymph nodes is an option for detecting nodal metastases, however, it has not been scientifically evaluated.

Patients with macroscopic pelvic lymphadenopathy due to metastases are not theoretically curable with surgery alone. The role of lymphadenectomy is being questioned and the role of adjuvant and neoadjuvant treatments is being evaluated.

There still are no prospective randomized trials to assess the effect of adjuvant treatment in increasing the survival of patients with risk factors associated with a poor prognosis. Nevertheless, based on the experience treating squamous cell carcinoma in other regions of the body, some groups have used adjuvant radiotherapy for patients with two or more metastases or extracapsular disease in inguinal lymph nodes and the presence of pelvic metastases. The main purpose of this adjuvant approach is to improve the local control.[11]

Neoadjuvant and adjuvant chemotherapy after lymphadenectomy is beneficial in patients with head and neck and gynecological tumors and seems to have some role in the presence of metastases in the pelvic lymph nodes in cancer of the penis. However, its benefit relative to radiotherapy alone is unclear.

The technique of laparoscopic pelvic lymphadenectomy, including the extended technique has been widely described, mostly associated with radical cystectomy and prostatectomy. When performed in the treatment of penile cancer, there are several important technical details, because the lymph node dissection is carried out with the ureters, bladder and the vas deferens in the surgical field. The ureter can be displaced medially or cranially with the help of forceps by the second assistant or displaced cranially during exposure of the common and internal iliac vessels. Care also needs to be taken with the vas deferens, as some patients, especially the young, want to preserve their fertility.

Recent reports have shown a complication rate of 15% in transperitoneal laparoscopic lymphadenectomies. Laparoscopic training and experience have reduced complication rates. On the other hand, articles that compare the complications of laparoscopic lymphadenectomy with open surgery use series of patients with prostate or bladder cancer, in which pelvic lymphadenectomy was performed in conjunction with a different surgical procedure, and not in the isolated way as with cancer of the penis.

Potential complications of pelvic lymphadenectomy include bleeding, injury to the bladder and ureter, bowel perforation, deep vein thrombosis, pulmonary embolism, intestinal obstruction, urinary retention, hypercarbia, obturator nerve injury, wound infection, lymphocele and lymphedema.

Most of these complications can be avoided with a careful surgical technique and immediate repair of lesions identified during surgery. The use of electrocautery should be minimized to avoid inadvertent and unrecognized injuries.

Conversion to open surgery is most commonly required when a vascular injury occurs, especially involving the iliac vein. Small injuries to the iliac artery and vein can often be addressed during via the laparoscopic access. Obviously, there can be no doubt about the quality of the repair.[12]

CONCLUSION

The laparoscopic approach for pelvic lymphadenectomy has been shown to be feasible.

Cancer of the penis is one of the tumors with the fewest studies and publications. Although the technique is not new and many leading services have established protocols, there are no randomized studies and only a small number of case reports describing the use of laparoscopic access in the treatment of penile cancer. There is a need to answer several questions about the treatment of penile cancer based on studies with a good level of evidence. The rarity of this disease, especially in developed countries, however, makes such studies difficult to organize.

RESUMO

O câncer de pênis apresenta alta incidência nos países subdesenvolvidos. O principal sítio de metástases são os linfonodos. Os pacientes com acometimento linfonodal são, na maioria das vezes, submetidos à linfadenectomia. O acesso laparoscópico para realização da dissecção linfonodal é uma tentativa de minimizar o trauma cirúrgico sem comprometer a radicalidade oncológica. Não há um consenso quanto ao momento da realização e a extensão da dissecção linfonodal no câncer de pênis. **Objetivos:** 1) Revisar na literatura as indicações da linfadenectomia pélvica laparoscópica no tratamento complementar do câncer de pênis, e 2) descrever a técnica cirúrgica da linfadenectomia utilizando o acesso laparoscópico, demonstrando a possibilidade de manter a radicalidade cirúrgica com um acesso minimamente invasivo. **Discussão:** Pelo fato da linfadenectomia pélvica no tratamento do câncer de pênis ser realizada de forma isolada, ou seja, não associada a ressecção da bexiga ou da próstata, esta cirurgia apresenta particularidades técnicas. A linfadenectomia pélvica laparoscópica permite a reprodução da técnica aberta com as vantagens de um procedimento minimamente invasivo, tornando-se uma alternativa no tratamento do câncer de pênis. **Conclusão**: O acesso laparoscópico para a realização da linfadenectomia pélvica tem se mostrado factível. Existe a necessidade de se responder a várias perguntas sobre o tratamento do câncer de pênis baseadas em trabalhos com bom nível de evidência.

Palavras chave: Câncer de pênis. Linfadenectomia. Laparoscopia.

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Original Article

Initial Experience of Robotics in General Surgery Procedures of the Gastrointestinal System

Experiência Inicial da Robótica em Procedimentos de Cirurgia Geral e do Aparelho Digestivo

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ABSTRACT

Introduction: Robotic technology is considered one of the most important innovations in abdominal surgery over the past decade. This review provides an overview of the initial experience of robotics in General Surgery in Brazil. **Methods:** Data were collected from Albert Einstein Hospital database of the robotic general surgery program and from MEDLINE in order to generate tables and identify publications. **Discussion:** The incorporation of robotic technology by Brazilian hospitals and its evolution will continue over time providing better outcome for complex surgeries and facilitating difficult surgeries.

Key words: Robotic. Surgery. Minimally invasive surgery. Pancreatectomy. Gastrectomy.

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INTRODUCTION

Since the introduction and development of laparoscopy, reduced need for analgesia, faster recovery, improved cosmesis, and reduced wound complications were reported as the principal benefits of minimally invasive surgery. These benefits are the reason for the worldwide dissemination of laparoscopic surgery, and explains why minimally invasive techniques are considered standard of care for certain operations, such as cholecystectomy, fundoplication, rectal tumors, left pancreatic tumors, and bariatric surgery.[1,2,3,4,5]

Indication for minimally invasive techniques have recently expanded, moving from simple resective procedures to more sophisticated resective/ reconstructive surgery requiring manipulation in a narrow working space or at non-ergonomic wide angles for conventional laparoscopy.[6,7] More complex laparoscopic surgeries require very skilled surgeons in order to obtain desired surgical outcomes.

Robotic technology is considered one of the most important innovations in abdominal surgery over the past decade. It has the potential to compensate for the drawbacks of conventional laparoscopy, such as limited degree of instrumentation, limited 2D vision, limited range of motion and access to anatomic areas such as the pelvis and the diaphragm. Robotic systems and instrumentation enhance surgeon comfort and reduce fatigue, as well as allow solutions including 3D view, intuitive motion, augmented reality, auxiliary innovations (fluorescein, single incision surgery) and additional degrees of instrumentation.[8,9]

OBJECTIVE

This review provides an overview of the history of medical robotics in General Surgery in Brazil.

METHODS

Data were collected from database of the Albert Einstein Hospital robotic general surgery program and MEDLINE in order to generate tables with accurate historical data and to obtain publication citations.

RESULTS

In 1995, Intuitive Surgical Inc. was founded. The company acquired the SRI Green Telepresence Surgery system, a U.S. Department of Defense funded master-slave robotic system. The company developed the system into the master-slave da Vinci® surgical system and launched it in 1999. It used true three-dimensional (3D) visualization and the EndoWrist® gear.[10] Table 1 presents robotic surgery milestones.

To overcome the drawbacks of laparoscopic surgery, the Da Vinci consists of a console, a laparoscopic tower, and a patient-side cart with four robotic arms. The Da Vinci system provides a 3D magnified view of the surgical field using a stereo endoscope with 2 cameras, one for each eye (right and left). The surgeon sits at a console and looks at two fixed monitors with high resolution providing depth perception.

The advantages and disadvantages of robotic-assisted surgery are currently being evaluated in various specialties including urology, cardiovascular surgery, gynecology, and general surgery. Each robotic system has been used for a large number of different surgical procedures, and there are now many published case reports, small series, and small randomized trials.[11,12,13,14,15]

The first robotic system in Brazil was acquired in 2007, the same year that Albert Einstein Hospital (AEH) acquired its first robotic system. A robotic general surgery program was established at AEH in 2008. Thirty robotic cholecystectomies were performed at AEH in the first 3 months. After this period, surgeons were permitted to perform a broader range of surgical procedures.

Since that time more than 400 robotic general surgeries have been performed at AEH. (Table 2). Between 2009 and 2012 Macedo and Schraibman were pioneers in Latin America, performing robotic surgeries of the digestive tract, among them, left pancreatectomy, esophagectomy, gastroduodeno-pancreatectomy, colectomy, splenectomy, total and vertical gastrectomy. Machado and Abdalla performed the first robotic hepatectomy in Latin America and Averbach, rectosigmoidectomy for deep invasive endometriosis.

DISCUSSION

As history shows, there will always be a continuing evolution of surgical techniques and

Table 1 - *Robotic Surgery Milestones.*

Year	
1985	First surgical robot used to perform brain biopsies
1989	First urologic robot for Transurethral Resection of the Prostate (Probot)
1993	First commercially available robot approved by the FDA (AESOP, Computer Motion Inc.)
1998	Zeus system (Computer Motion Inc.) made commercially available(
2000	da Vinci system for general surgery (Intuitive Surgical Inc.)

Table 2 – *Number of robotic cases performed at Albert Einstein Hospital by year.*

Speciality	2008	2009	2010	2011	2012
Head & Neck surgery	0	3	2	1	8
Thoracic surgery	0	0	6	4	10
Cardiac surgery	0	0	12	7	1
Gynecologic surgery	3	23	44	115	98
Gastrointestinal surgery	2	89	98	128	103
Urology	80	114	107	216	304
Total	**85**	**229**	**269**	**471**	**524**

technology, with the ultimate goals 'ideal' access, perfect vision, minimally aggressive instrumentation, and low cost,.

In our series the complexity of cases and the number of cases performed increased over time. Several papers have been published by our group and other Brazilian surgeons.[16-19] Our group has also made presentations abroad. As of mid-2013, we estimate that there are 10 robots in Brazil and perhaps 20 in all of Latin America. Worldwide there are almost 1800 robots currently in use, with almost 1000 in the United States. We believe that robotic surgery will increase worldwide as it enables more complex and delicate surgeries to be performed in a minimally invasive fashion.

As a developing country, expensive technology and instrumentation was first acquired by private hospitals in Brazil, which established the first robotic programs. In the past year, several public hospitals in Brazil have acquired robotic systems, making the most advanced surgical technology available to a growing number of patients treated in the public healthcare system. The sharing of knowledge and experience by public system and private practitioners is contributing to the rapid increase in the number of successfully performed cases.

In the next few years we expect more advances in the use of robotic surgery in total mesorectal excision, and esophageal, gastric, and pancreatic surgery. We expect more public hospitals acquire robotic systems, prices for the systems will be decline, knowledge will expand and public demand for robotic surgery will increase.

CONCLUSION

The incorporation of robotic technology by Brazilian hospitals and its evolution will continue over time providing better results for complex surgeries and facilitating difficult surgeries.

ACKNOWLEDGMENTS

We would like to thank Carlos Eduardo Domene for his contributions to these procedures.

RESUMO

Introdução: Tecnologia robótica é considerada uma das mais importantes inovações na cirurgia abdominal na última década. Esta avaliação fornece uma visão geral da experiência inicial da robótica em Cirurgia Geral no Brasil. Métodos: Os dados foram coletados a partir do banco de dados do programa de cirurgia geral robótica do Hospital Israelita Albert Einstein e MEDLINE, a fim de realizar mesas e corrigir os dados históricos e publicados. Discussão: O avanço da incorporação de robótica nos hospitais brasileiros e sua evolução tecnológica continuarão, a fim de proporcionar melhores desfechos para cirurgias complexas e facilitar cirurgias difíceis.

Palavras chave: Robótica. Cirurgia. Cirurgia minimamente invasive. Pancreatectomia. Gastrectomia.

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Brazilian Journal of Videoendoscopic Surgery

Case Report

Laparoscopic Repair of Lumbar Hernia: Case Report and Review of the Literature

Hérnia Lombar - Correção Videolaparoscópica: Relato de caso e Revisão da Literatura

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ABSTRACT

Lumbar hernias are rare, the symptoms are vague and nonspecific, and usually a CT scan of the abdomen is required for diagnosis. All these factors conspire so that few surgeons have experience in correcting this type of hernia. This is suggested by the few cases reported in the literature, and is especially true for laparoscopic repair. This report describes one patient with a Petit hernia; our objective is to demonstrate the laparoscopic repair as an effective and feasible technique.

Key words: Lumbar hernia. Laparoscopic surgery. Petit hernia.

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CASE REPORT

This 57 year old female patient presented complaining of pain and bulging in the left lumbar region of five months duration, which worsened with physical activities. She denied a prior history of medical illness or use of medications. Her only surgical history was a cesarean delivery and reduction mammoplasty. Physical examination revealed good general condition, a flaccid abdomen, without pain upon palpation. A bulge was noted/present in the left lumbar region, painful on palpation; protrusion was not evident during Valsalva maneuver due to the patient's obesity.

An Abdominal CT revealed the presence of a small herniation of omental fat into the abdominal wall at the level of the left inferior lumbar region (the region of the inferior lumbar triangle of Petit) with the hernial sac measuring 3.4 x 1.6 cm (Figure 1).

Once the diagnosis was established, the patient underwent laparoscopic correction of the hernia. With the patient positioned in right lateral decubitus, three trocars were inserted: one 10 mm trocar in the left of the umbilicus for the optic, one 10mm trocar in the hypogastrium for the right hand

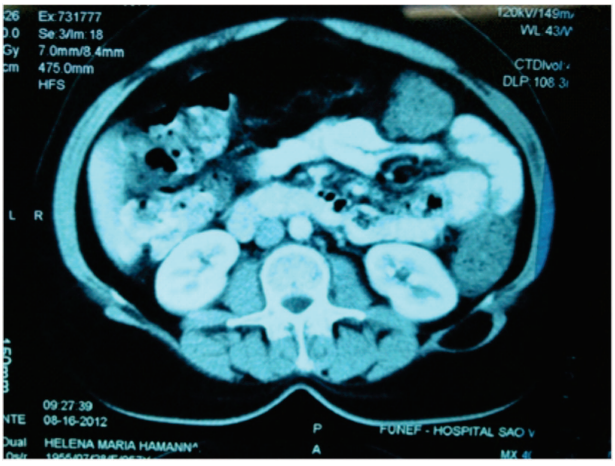

***Figure 1** - Abdominal CT scan showing defect in the left lumbar muscles.*

working forceps, and a 5 mm trocar in the epigastrum for the left hand. The descending colon was detached from abdominal wall, and a flap of peritoneum opened in the region of the hernia. The herniation of omental fat through a small defect in the muscle was identified. The hernia sac was reduced (Figure 2). A 10 x 10 cm polypropylene mesh was placed over the hernial orifice (Figure 3), which was then covered with the flap of

peritoneum, which, in turn, was closed with metal clips (Figure 4).

The patient was discharged on the same day of surgery after receiving medication for pain and tolerating food. At the three month postoperative follow-up the patient had no complaints, nor evidence of recurrence of the hernia.

DISCUSSION

Since the first description of lumbar hernia by Garengoet in 1731, this condition remains relatively rare.[1] Before 1980, fewer than 300 cases of lumbar hernias had been reported in the literature. A review by Hsu et al. others found an additional 82 cases between 1989 and 2008.[2,3] Dorsal and lumbar hernias account for less than 1% of abdominal wall hernias.[4] Hafner et al[5] suggested that a general surgeon was likely to have only one opportunity to treat a lumbar hernia in his life.

Lumbar hernias can be: spontaneous (55%), traumatic (26%), and congenital (19%)[1] and may occur in two areas of weakness in the postero-lateral abdominal wall: the superior **lumbar triangle of Grynfeltt**, which is most common site, and the inferior lumbar triangle of Petit.[6] The superior lumbar triangle is an inverted triangle with its base bounded by the 12th rib and the lower edge of the serratus muscle, its posterior aspect defined by the sacrospinal muscle, its anterior aspect defined by the internal oblique muscle, its roof defined by the external oblique and latissimus dorsi, and its floor by the transversalis fascia. The inferior lumbar triangle is bounded by the iliac crest at its base, the external oblique muscle laterally, and the latissimus dorsi muscle medially, with its floor formed by the internal oblique muscle.

The most common sign of lumbar hernia is a protrusion in the flank, which increases in size with physical activity or exertion and disappears when the patient is lying down. The patient may complain of a vague feeling of discomfort, abdominal pain and local tenderness.[1,7] The differential diagnosis of lumbar hernia includes lipoma, hematoma, or abscess after trauma or surgery, as well as renal tumor. The spontaneous hernias are more common on the left side, but there are no scientific explanations for this.[8,9]

Computed tomography is a useful diagnostic tool in the differentiation of lumbar hernias offering several advantages. With CT it is possible to detect defects between the muscle and fascial layers,

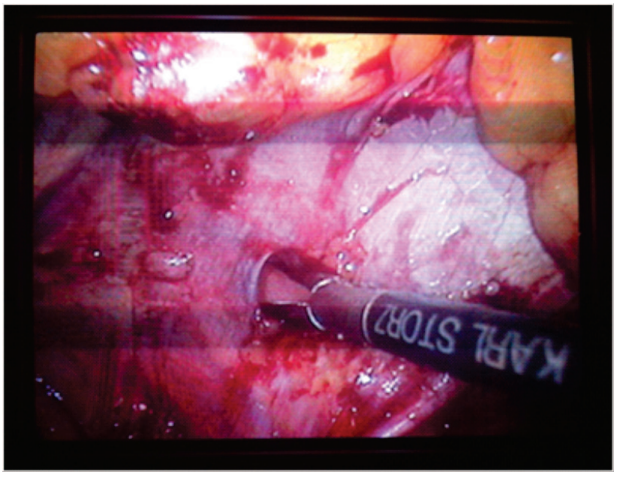

Figure 2 - *Laparoscopic view of the orifice of the left lumbar hernia after reduction of the hernial sac.*

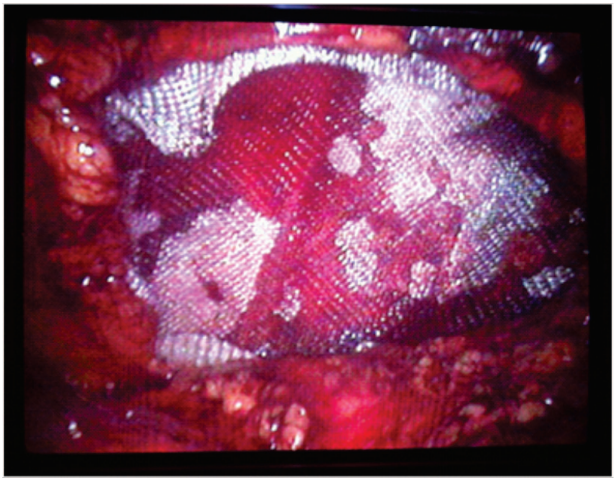

Figure 3 - *Laparoscopic view of the left lumbar hernia after placement of the polypropylene mesh.*

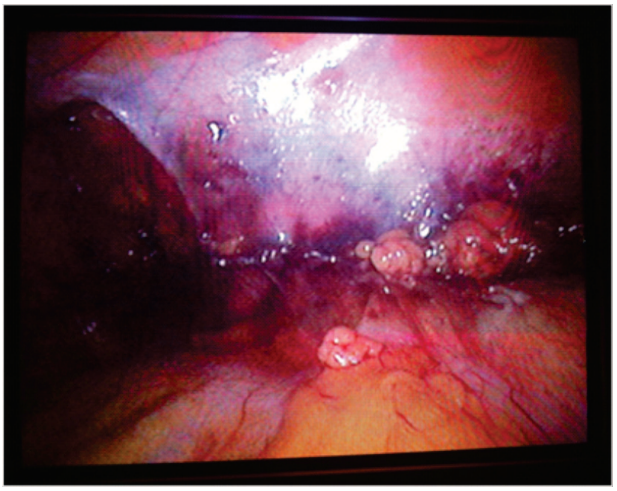

Figure 4 - *Laparoscopic view showing that the polypropylene mesh was covered with a flap of peritoneum.*

visualize the contents of the hernia, and exclude renal and other soft tissue tumors.[2,10,11]

The only available treatment is surgery laparoscopic access is an option. Since a case of laparoscopic lumbar hernia repair was described by Heniford et al. in 1997,[12] several others have been reported, either via laparoscopy or retro-peritoneoscopy.[13,14]

RESUMO

As hérnias lombares são de ocorrência rara, os sintomas são vagos e inespecíficos e normalmente a tomografia computadorizada de abdômen é imprescindível para o diagnóstico. Todos esses fatores fazem com que poucos cirurgiões tenham experiência na correção deste tipo de hérnia, a julgar pelos poucos casos relatados na literatura, especialmente se considerarmos o reparo por vídeo-laparoscopia. O presente relato refere-se a uma paciente com diagnóstico de hérnia de Petit e o objetivo é demonstrar a correção por vídeo-laparoscopia como método eficaz e factível.

Palavras chave: Hérnia lombar. Cirurgia laparoscópica. Hérnia de Petit.

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Case Report

Laparoscopy Surgical Treatment of Caesarean Scar Ectopic Pregnancy (CSEP): Case Report

Tratamento de Gestação Ectópica em Cicatriz de Cesárea por Laparoscopia: Relato de Caso

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ABSTRACT

Cesarean scar ectopic pregnancy (CSEP) is a rare condition, with serious clinical consequences, which requires fast and accurate diagnosis. The most appropriate treatment aims to reduce maternal morbidity with preservation of fertility. We present a case of Cesarean scar ectopic pregnancy in a patient with a recent history of tubal pregnancy with vaginal bleeding, sudden hemodynamic instability, and high levels of ßHCG. Ultrasonography revealed a well encapsulated gestational mass, growing from the anterior wall of the uterus. The patient underwent laparoscopic treatment, lasting 140 minutes, with complete removal of the trophoblastic tissue, repair of the scar defect, control of the blood loss, and without the need for blood transfusion. Laparoscopy using a centripetal approach was effective in the addressing the ectopic pregnancy, as well as safe in controlling the bleeding and avoiding serious complications.

Key words: Cesarean section. Laparoscopy. Ectopic Pregnancy. Diagnosis. Differential diagnosis. Ultrasonic diagnosis.

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INTRODUCTION

Caesarean scar ectopic pregnancy (CSEP) is a rare condition with varied symptoms and high morbidity, whose early and correct diagnosis requires a high level of suspicion.[1,2] It is defined as a pregnancy separate from the endometrial cavity and completely surrounded by myometrium and scar tissue. The most likely mechanism postulated for its development is the migration of gestational tissue through a microscopic tubular channel caused by previous surgical trauma.[1-3]

Although the transverse uterine section is a very common procedure, CSEP occurs rarely.[4-6] There is no relationship with maternal age or parity, and it remains unclear whether there is relationship with the number of prior Cesarean sections the woman has had or with a short interval between surgery and CSEP, suggesting that incomplete healing might have contributed to ectopic implantation.

Incidence is estimated at 1:1900 to 1:2226 pregnancies, and represents 6.1% of ectopic pregnancies among women with prior C-sections.[3] The increasing number of reports of CSEP in the literature is due to the increased number of cesarean deliveries, as well as the wide use of transvaginal ultrasound as a diagnostic method. [2,4,6]

Mild vaginal bleeding is the earliest symptom, but 37% of the cases of CSEP are asymptomatic when diagnosed.[3,6] Depending on the gestational age and the direction of growth of the gestational sac, blood loss may be more pronounced and accompanied by abdominal pain, and may lead to high risk clinical events such as uterine rupture and uncontrollable bleeding.

The initial differential diagnosis can be challenging, despite well-defined sonographic criteria such as: an empty uterine cavity and cervical canal, development of the gestational sac in the anterior part of the isthmus surrounded by myometrium and scar tissue, and absence of myometrium between the bladder and the gestational sac. Although transvaginal ultrasound and ßHCG measurement can offer a high level of suspicion, ongoing abortion and cervical pregnancy still remain in the differential diagnosis.[5]

There is general consensus that Caesarean scar ectopic pregnancies should be immediately terminated.[1-7] Due to the rarity of this situation, however, there is no scientific evidence as to what is the best method for doing so.[5, 7] Below we describe the laparoscopic procedure using a centripetal approach for the treatment of Caesarean scar ectopic pregnancies.

CASE REPORT

The patient is a 36 year old, gravida 4, para 2, ectopic tubal pregnancy 1, who presented to our service with amenorrhea for 45 days, sudden onset of vaginal bleeding, fainting, mild abdominal cramps, and a positive pregnancy test. She had undergone two cesarean deliveries 3 and 6 years earlier and a dilation and curettage followed by laparoscopic surgery for treatment of a right tubal ectopic pregnancy three months prior to presentation. Pelvic examination revealed a blood-tinged cervix, a slightly enlarged retroverted uterus, without adnexal masses.

Transvaginal ultrasound examination revealed an empty uterine cavity and cervical canal, the presence of vascularized amorphous mass implanted in the anterior wall of the uterus at the level of the isthmus. The serum beta-human chorionic gonadotropin (ßHCG) level was 4481 mIU/ml, and hemoglobin 10.5 g/dl. Hemodynamic parameters were stable.

Magnetic Resonance imaging (MRI) with the introduction of aqueous gel vaginally showed that the thickness of the uterine wall between the bladder and the gestational sac was thinner than the adjacent wall and revealed a mass invading the anterior uterine wall in the topography of scar of the previous cesarean section without involvement of the cervical canal. Doppler ultrasound revealed extensive vascularity surrounding the gestational sac. These findings were compatible with the diagnosis of Cesarean scar ectopic pregnancy.

In the course of the work-up the patient presented intense genital bleeding associated with hemodynamic instability and she was promptly taken to the operating room for urgent surgical treatment. The patient was placed in supine position with arms alongside the body; compression stockings and pneumatic boots were placed. Laparoscopy was initiated with the patient in Trendelenburg at 35 degrees under general anesthesia.

Step 1: Cystoscopy and Laparoscopy

Cystoscopy with bilateral ureteral catheterization was performed; the correct anatomic position was confirmed by transillumination (Figure 1). A Verres needle was inserted through a transumbilical incision and pneumo-peritoneum was established with CO_2 at maximum pressure of 20 mmHg. An 11 mm bladeless trocar was inserted into the abdominal cavity and the abdominal organs visualized.

A 5 mm trocar was inserted 4 cm above the pubis symphysis toward the pelvic cavity and two others were positioned at the level of the anterior superior iliac crest, lateral to the inferior epigastric vessels in the right and left iliac fossa. After placing the trocars, the intracavity pressure was stabilized at 12 mmHg. The retroverted uterus was slightly enlarged with bulging of the anterior wall at the level of the vesico-uterine reflection. A mass arising from the serosa was detected at the level of the scar of the cesarean section.

Step 2: Hemorrhage Control

Transient extrapelvic fixation of the ovaries with 3-0 polypropylene suture (Prolene) exposed the lateral compartment and provided access to the iliac arteries (IA). The internal iliac arteries (IIA) were identified as were the ureters by transillumination. A 4 cm longitudinal incision in the peritoneum following the path of the IIA which had been dissected was performed and at 2.5 cm from its/their bifurcation they were isolated with 0 polyglactin (Vicryl) followed by torsion of the suture secured with a 5 mm clip (Duarte Technique) (Figure 2). No medication was injected at the site.

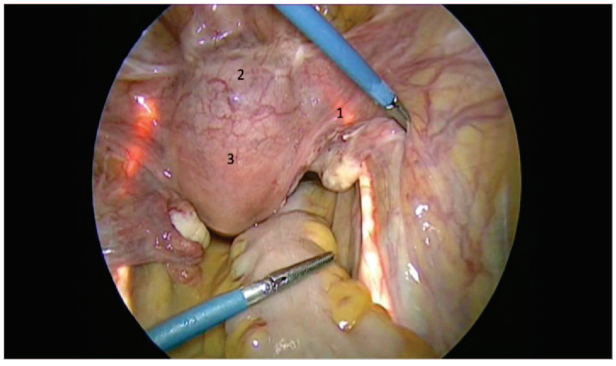

Figure 1 *- Ureters catheterized and transilluminated (1), uterine bulge (2), uterus (3).*

Step 3: Monobloc resection and correction of the scar defect

The transilluminated ureters defined the lateral anatomical borders. The peritoneum was incised to the bladder wall (previously distended with 500 ml of 0.9% saline and 1 ml of methylene blue) at the level of the isthmus-cervical transition. The uterine serosa was incised to isolate the bladder in a ventral orientation and the surgical borders (ventral bladder, broad ligaments and uterine body) around the bulging uterus were defined. Elliptical excision of the mass and the affected uterine wall werer performed, removed en bloc (centripetal approach) (Figure 3). Hemostasis was attained using bipolar energy and the uterine defect was repaired using 2-0 polyglactin (Vicryl) in two planes with continuous suture and 3-0 polydioxanone (PDS II) suture for closing the serosa (Figure 3). The gestational sac was removed in an endobag and the blood flow in the IIA was restored.

The operative time was 140 minutes. Estimated blood loss was 100 ml; there was no need for blood transfusion. Anatomic pathology revealed ovular and partially necrotic decidua remains amid fibrino-hematic material, fragments of connective tissue and smooth muscle adjacent to the remains of surgical sutures and vascular ectasias. The ßHCG decreased to 3073 mIU/ml on the first postoperative day. The patient postoperative course was uneventful and she was discharged on the third post-operative day. Her menstrual flow became regular the following month. The patient was accompanied for one year after treatment. She took an oral contraceptive use; there was no pregnancy during this period.

DISCUSSION

When compared to the large number of Cesarian sections performed, CSEP remains as a rare event. Due to serious clinical events associated, much has been discussed about the importance of early diagnosis and appropriate treatment of CSEP. The failure of initial treatment can lead to uncontrollable bleeding and hysterectomy, which increases the maternal morbidity and deprives the patient of the possibility of future pregnancy.

Although ultrasound criteria for the diagnosis of CSEP – such as non-detection of the fetus within the uterine cavity between, finding the gestational sac between the anterior uterine wall and the bladder, and the loss of continuity of the uterine wall in the sagittal

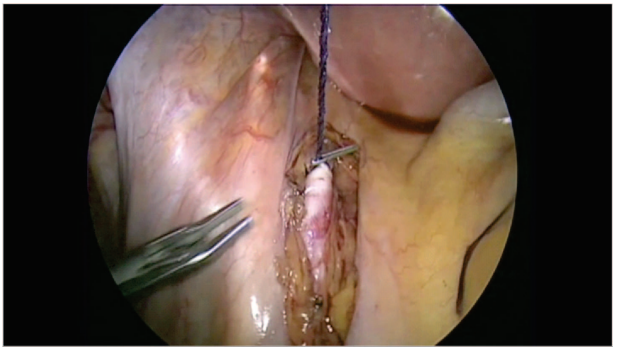

Figure 2 *- Internal Iliac Arteries (IIA) were dissected, isolated and temporarily tractioned.*

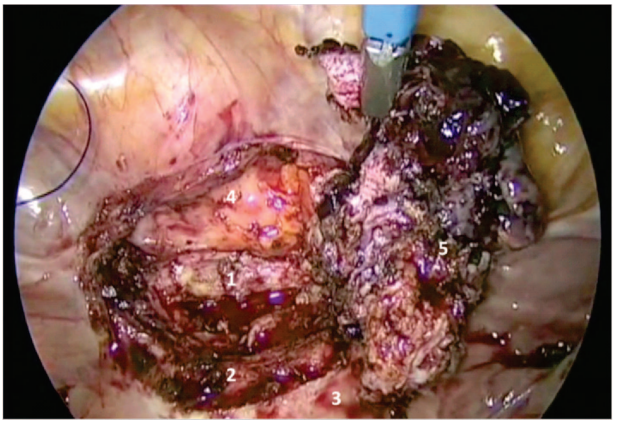

Figure 3 *- Proximal myometrium (1), distal myometrium (2), uterus (3), bladder (4) and mass with the affected uterine wall resected "en bloc" (5).*

view – are well established, the differentiating spontaneous abortion, cervical pregnancy, and CSEP still is challenging. Yang Q, et al. reported that in 39 cases of CSEP, about 16 patients were misdiagnosed and were treated incorrectly, which resulted in persistent vaginal bleeding to severe hemorrhage.[7]

The combination of two diagnostic imaging modalities can help with the early diagnosis of CSEP.[6] In the present case we used sonographic criteria for diagnosis and MRI for confirmation and a detailed understanding of the situation before operating. Ultrasound and hysteroscopy together can provide information for an early and accurate diagnosis.[1]

Transvaginal ultrasound can detail the course of growth of the gestational mass, ranging from superficial implantation with growth into the cervical space to deep implantation into the myometrium with growth to visceral serosa. Hysteroscopy has the advantage of visualizing the distribution of blood vessels in the deployment bag gestacional.[7] Due to the risk of miscarriage or injury to optic nerve of the fetus

after the tenth week of gestation, however, Khunda et al, believe that hysteroscopy should be used only after the diagnosis of CSEP has been confirmed.[8]

Medical management remains the first choice, with or without invasive procedures,[2,9-10] but has variable success and several disadvantages.[5] Local infiltration of Methotrexate (MTX) and ultrasound-guided aspiration of the embryo may be a treatment option in CSEP cases with a gestational age of six to eight weeks. Despite the local action of MTX and disappearance of the embryo, a residual placenta and gestational sac structures are still detected by ultrasound for about two months, which together with vaginal bleeding may cause physical and emotional discomfort.[10]

An unsatisfactory response to MTX may occur due to delayed absorption, caused by the very scar tissue where the gestational sac is implanted, complicating the clinical picture, resulting in persistent vaginal bleeding and increasing the risk of pelvic infection.[9] Medical management still leaves the Cesarean scar, a scar with a demonstrated predisposition to ectopic pregnancy[11] and necessitates adherence to ongoing laboratory and ultrasound monitoring. Surgical interventions are still needed if medical treatment fails, still result in a slow decline in ßHCG concentration, with the risk of uterine rupture and massive hemorrhage.[4]

Curettage is contraindicated because the trophoblastic tissue is outside the uterine cavity (and thus is not reached by the curette), may break the gestational sac, injure the myometrium, and lead to uncontrollable bleeding.[4] Catastrophic bleeding can occur with aspiration procedures or curettage, because myometrium with scar tissue and the cervix have less capacity for fibromuscular contraction to control bleeding. Yang Q et al observed a lower hemoglobin concentration in patients from other services who were misdiagnosed and treated initially with procedures that lead to major blood loss, compared those were correctly diagnosed with a CSEP. [7]

In patients with previous Cesarean section, CSEP should be excluded prior to performing procedures such as curetagge.[1] There is a suspicion that CSEP cases diagnosed after subsequent curettage may have occurred due to perforation of the prior scar tissue by the curettage, drawing/taking trophoblastic tissue outside the uterine cavity, resembling an ectopic implantation and a false positive diagnosis.[4]

Although medical management is used, surgical procedures – including laparotomy[12] or laparoscopy[1,4,5] – emerge in other reports as the first treatment option. In patients who wish to conceive later, the surgical procedure can be used alone as the first option or together and immediately following the use of MTX.[11] Surgery may correct the scar defect, however there still is no scientific evidence regarding the best approach for preserving fertility. Wang et al. reported that among 28 patients in whom pregnancy after treatment of CSEP was considered possible, seven had documented pregnancies; four had been treated surgically and three medically. [5]

Hysteroscopy in conjunction with laparoscopy proved to be a reliable method for diagnosis and treatment of CSEP with preservation of the uterus.[1] Chao et al. used hysteroscopy for diagnosis and suggested that the best treatment option for embryos growing toward the uterine cavity would be transcervical resectoscopy, with laparoscopy recommended in cases of deeper implantation or growth outside of the uterine cavity. [9]

Laparoscopy can confirm the diagnosis of CSEP and, despite being an invasive treatment, is well tolerated by patients. It affords rapid resolution of the situation, without the disadvantages of medical management, such as the persistence of high levels of âHCG and the slow absorption of the gestational mass.[4,5]

In order to preserve the uterus and diminish or avoid bleeding, Yang MJ & Jeng MH combined laparotomy and uterine artery embolization, which resulted in less intraoperative bleeding, with secure closure of the uterine damage, preservation of fertility, and removal of the entire material for pathological examination.[12] The injection of a local vasoconstrictor [4,5] or ligation of the uterine arteries, combined with the intra-abdominal pressure effect of the pneumoperitoneum may lead to less intraoperative bleeding.[5] We use the technique described by the author, here referred to as the “Duarte Technique”, which entails the isolation and traction of the internal iliac arteries, which allows control of intraoperative bleeding and permit the complete restoration of the uterine blood flow later.

Preoperative cystoscopy and catheterization of the ureters allows the identification of the ureters, making their dissection unnecessary and thereby reducing the possibility of iatrogenic injuries. Because of the anatomic distortion, directly approaching the gestational

mass may predispose to an increased risk of uncontrollable bleeding and vesico-ureteral injuries.

Only surgery offers the opportunity to remove the gestational sac and repair the defect. Although the recurrence of CSEP is rare, the resection of old scar can further reduce this possibility and (as long as there are no complications) achieve recovery of function faster than with medical management.[6]

CONCLUSION

A consensus regarding the best management for the treatment of CSEP can be achieved when we relate the initial clinical and laboratory picture, gestational age, and the direction of growth of the trophoblastic tissue, with the treatment the ahcieves the lowest maternal morbidity, preservation of fertility, and quickness in resolving the situation. The future analysis only cases with primary diagnosis of CSEP, excluding possible false positive cases or cases of prior therapeutic complications can help to design the best approach to be taken in each case.

The conservative laparoscopic treatment requires trained staff and adequate conditions, but has been shown to be an effective alternative in the treatment of patients with CSEP. Laparoscopy may be performed to confirm the diagnosis, remove gestational tissue and restore the uterine scar with good control of bleeding, while preserving the reproductive capacity of the patient.

Catheterization of the ureters prevented intraoperative complications. Similarly, the technique used to control bleeding proved to be effective and safe, allowing for the complete restoration of blood flow after the surgical procedure was completed.

RESUMO

A gestação ectópica em cicatriz de cesárea apresenta-se como uma condição rara, com sérios eventos clínicos, que requer diagnóstico rápido e preciso. O tratamento mais adequado visa diminuir a morbidade materna com preservação da fertilidade. Apresentamos um caso de gravidez ectópica em cicatriz de cesárea em uma paciente com antecedente de gravidez tubária recente, com sangramento vaginal súbito, instabilidade hemodinâmica e níveis elevados de ßHCG. A ultrassonografia revelou massa gestacional bem encapsulada, crescendo a partir da parede anterior do útero. Foi submetida a tratamento videolaparoscópico, com duração de 140 minutos, retirada completa do tecido trofoblástico, correção do defeito cicatricial, com perda sanguínea controlada e sem a necessidade de transfusão de sangue. A laparoscopia com abordagem centrípeta mostrou-se eficaz no tratamento da gravidez ectópica, assim como segura no controle de sangramento e complicações graves.

Palavras chave: Cesariana. Laparoscopia. Gravidez ectópica. Diagnóstico. Diagnóstico diferencial. Diagnóstico ultrassônico.

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INFORMATION FOR AUTHORS

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- Cirurgia Urológica (Curso Avançado) 30 de Outubro a 01 de Novembro

NOVEMBRO

- Cirurgia Geral Laparoscópica para Residentes (Curso Básico) – 24 a 26

DEZEMBRO

- Cirurgia Pediátrica Urológica (Curso Avançado) – 04 a 06
- Cirurgia Geral (Curso Básico Intensivo) – 08 a 10
- Cirurgia Colorretal (Curso Avançado) – 12 e 13

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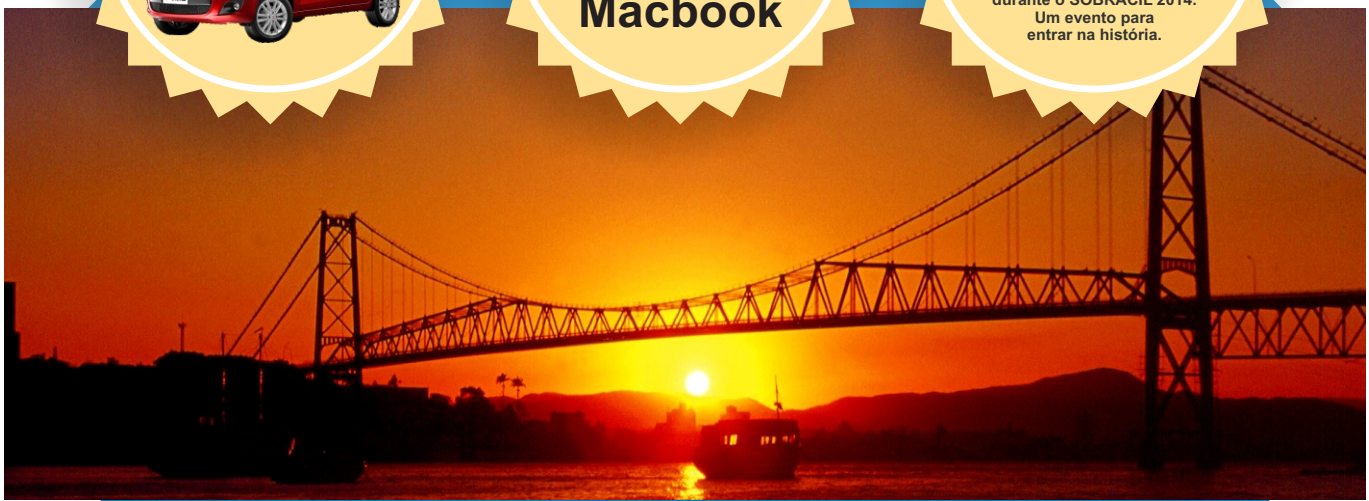

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