

# Transabdominal Pre-Peritoneal (TAPP) Inguinal Hernioplasty by Laparoendoscopic Single Site Surgery (LESS). Is it Feasible and Safe?

## Hernioplastia Inguinal Transabdominal Pré-Peritoneal por Cirurgia Laparoscópica de Acesso Único. É Viável e Segura?

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### ABSTRACT

**Objectives:** To present the first transabdominal pre-peritoneal (TAPP) Laparo-Endoscopic Single-Site Surgery (LESS) inguinal hernioplasties series. **Patients and Methods:** From June to December 2011 the first six LESS TAPP inguinal hernioplasties, were performed at the Red Cross University Hospital in Curitiba, Paraná, Brazil. The Single Trocar Access (SITRACC) Platform (EDLO, Brazil) was used in 5 cases, while the SILS Platform (Covidien, USA) was used in one case. All patients were male; their ages ranged from 18 to 45. Five had NYHUS II hernias and one had a NYHUS IIIa hernia. **Results:** The mean operative time was 44 minutes. None of the surgeries required an extra trocar or conversion to a conventional laparoscopic procedure. All patients were discharged within 24 hours. **Conclusions:** The TAPP inguinal hernioplasty using a LESS approach is feasible and safe. It constitutes a new option in the scarless surgery field, as well as a new technique in the ongoing pursuit of surgical innovation that benefits our patients.

**Key words:** Minimally Invasive Surgery. LESS. Inguinal Hernioplasty. SITRACC.

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## INTRODUCTION

Since the introduction in 1987 of videosurgery and the concept of minimally invasive surgery, the benefits of less discomfort, milder metabolic alterations, faster recovery, and good aesthetic results have been amply demonstrated, and the techniques have disseminated through the operating rooms of the world quickly and enthusiastically.

Ongoing improvements in optical equipment and refinements in the instrumentations employed in videosurgery have made it possible for increasingly complex procedures to be performed by minimally invasive methods.

Over the same period new technologies and approaches have emerged, such as Natural Orifice Transluminal Endoscopic Surgery (NOTES), Needlescopy, and Laparo-Endoscopic Single-Site Surgery (LESS).

Several platforms to perform LESS have become available in recent years. Two of them are the Single Trocar Access (SITRACC), a disposable multiport trocar (EDLO, Brazil – Figure 1) that uses instruments specially designed for this approach, and the Single Incision Laparoscopic Surgery (SILS) platform (Covidien, USA).

Laparo-Endoscopic Single-Site Surgery (LESS), now with several variations, has emerged as an alternative to NOTES. One multichannel

input device is inserted in a single incision through which specialized instruments are introduced for the proposed procedure. Several surgical procedures – from cholecystectomy to bariatric surgery – are being performed using this approach.<sup>1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16</sup>

This paper presents the initial experience with TAPP (transabdominal pre- peritoneal) laparoscopic hernioplasty using the Laparo-Endoscopic Single-Site Surgery (LESS) approach.

## PATIENTS AND METHODS

The protocol was approved by the Red Cross - Positivo University Hospital Ethics Committee. From June to December, 2011, the first six TAPP inguinal hernioplasties, were performed by LESS at the Red Cross University Hospital, in Curitiba, Paraná, Brazil.

The SITRACC<sup>®</sup> platform (EDLO, Brazil) was used in five procedures. This new device consists of a four channel trocar, through which special articulated instruments and a 5 mm optical device are



**Figure 1** – SITRACC LESS System, Edlo, Brazil.

introduced. Articulated graspers, scissors, hook and clip appliers have been developed for this approach. In the sixth case the SILS<sup>®</sup> three channel platform supplied by Covidien (USA) was used.

All patients were male; ages ranged from 18 to 45. Five patients had unilateral NYHUS II inguinal hernias; one was a NYHUS III hernia.

All patients underwent a classic Trans-Abdominal Pre-Peritoneal (TAPP) Inguinal Hernioplasty using light polypropylene meshes anchored with the Protack<sup>®</sup> endofixating system (both manufactured by Covidien, USA), Figures 2a,b,c.

## RESULTS

The mean surgical time was 44 minutes. No additional trocars were necessary.

All patients were discharged from the hospital within 24 hours with standard analgesics.

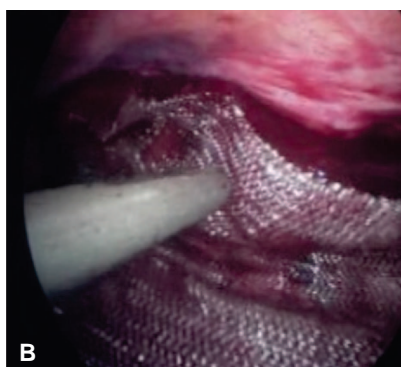
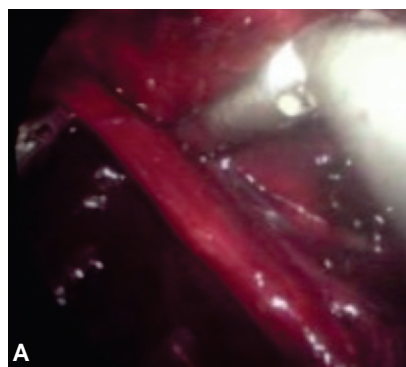
All patients were seen one week and one month after the procedures. There were no major post-operative complications.

There were no wound healing complications and no early hernia recurrence. Aesthetic results were considered quite good by the patients (Figure 3).

## DISCUSSION

As noted above, in recent years interest in new minimally invasive approaches had been increasing in the surgical field around the world.

The advantages of the LESS approach are similar to those of NOTES – less pain, faster recovery, and a scarless operation – without the disadvantages of transluminal surgery.



**Figures 2a, b, c** – (a) Hernia sac dissection using distal articulated instrument, (b) mesh placement and (c) mesh fixation.



**Figure 3** – Aesthetic result immediately after the procedure.

Because of the challenges of access, orientation, and visceral closure in NOTES as well as the risk of infection, LESS may emerge as a preferred approach in scarless abdominal surgery.

Wheeless is credited as being the first to use the principles of single access surgery, in 1969, while performing a tubal ligation<sup>17</sup>.

LESS then entered in a period of latency, resurfacing in 2007, when Zhu published his first experience using the umbilical scar as the sole access to the peritoneal cavity. Zhu performed a fenestration of a hepatic cyst, followed by abdominal exploration and appendectomy, designating this new technique as *Transumbilical Endoscopic Surgery* (TUES).<sup>18,19,20</sup>

In Brazil the pioneering attempt to develop a platform for surgery by single access, called Single Trocar Access began in 2007. The SITRACC trocar (EDLO, Brazil) has four work channels (three 5 mm and one 10 mm or four 5 mm). After studies in experimental animals, the first cases of SITRACC cholecystectomy performed in humans were published in 2008 and 2009.<sup>21,22,23</sup>

In 2010 Ishikawa et al<sup>24</sup> reported the performance of laparoscopic hernioplasty using a TAPP technique, and Agrawal et al<sup>25</sup> performed a hernia repair by a totally extraperitoneal (TEP) technique, both using a multiport trocar.

The main challenge to overcome is the need to work with the instruments in parallel along a single axis. The solution to this challenge was the

development of instruments that are flexible and articulated at their distal extremity, enabling some degree of triangulation, albeit limited when compared to conventional laparoscopic surgery.<sup>26,27</sup>

The internal instrument movement, even adapted for LESS, is arduous. Because the movement of a single instrument tends to move the whole in a single axis, a team trained and experienced in the technique is required, so that the visual field is not changed. The use of optics with at least 30 degrees of angulation is strongly recommended, providing better visualization of the operative object.

The training requires patience and perseverance; it is not a simple variation of laparoscopy, but rather a new approach. Practice in courses with experimental animals, as well as in simulations are essential for good results in human surgery.

Because large surgical series using this surgical approach have not been performed, published, and validated by the worldwide surgical community, we can only reply on what the preliminary data suggests, namely that LESS is a reasonable option among minimally invasive procedures, with all the advantages associated with them: better aesthetics, milder pain, and a faster return to routine activities.<sup>28</sup>

Procedures using LESS access should be viewed as part of the surgical armamentarium, which has evolved from open surgery, videosurgery and NOTES. Because each patient is unique, it is up to the surgeon to determine the ideal surgical approach to maximize safety while obtaining the best operative and aesthetic results.

The TAPP Hernioplasty by LESS could represent an advance especially for those patients that need to undergo two procedures at the same time: inguinal and umbilical hernioplasties.

## CONCLUSION

TAPP Inguinal Hernioplasty using the LESS approach is feasible and safe, representing a new important option in the surgical arsenal. This is a new technique and should be compared to conventional laparoscopy in controlled clinical trials.

**RESUMO**

**Objetivos:** Apresentar a primeira série de hernioplastias inguinais videolaparoscópicas TAPP (trans-abdominal pré-peritoneal) LESS - Laparoendoscopic Single Site Surgery. **Pacientes e Métodos:** De junho a dezembro de 2011 foram realizadas seis hernioplastias inguinais TAPP, pela abordagem LESS, no Hospital Universitário da Cruz Vermelha - Universidade Positivo, em Curitiba - Pr. A plataforma utilizada em cinco casos foi o SITRACC - Single Trocar Access (Edlo, Brasil) e em um deles o SILS (Covidien, USA). A idade dos pacientes variou entre 18 e 45 anos e todos foram do sexo masculino. Cinco deles apresentavam hérnia unilateral tipo NYHUS II e um NYHUS III-A. **Resultados:** O tempo operatório médio foi de 44 minutos. Nenhuma cirurgia necessitou introdução de trocarter extra nem mesmo conversão para videolaparoscopia convencional. Todos os pacientes receberam alta hospitalar em até 24 horas após o procedimento. **Conclusão:** A hernioplastia inguinal TAPP pela abordagem LESS é viável e segura. Esta técnica é uma nova opção para realização da chamada scarless surgery, assim como uma nova arma no contínuo esforço para levar maiores benefícios à nossos pacientes.

**Palavras chave:** Cirurgia Minimamente Invasiva. Hernioplastia Inguinal. LESS. SITRACC.

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