

Transumbilical Laparoscopic Surgery: An Option Without Visible Scars

Cirurgia Laparoscópica Transumbilical: Uma Opção sem Cicatrizes Visíveis

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ABSTRACT

Objective: To describe the results of transumbilical laparoscopy surgery using standard laparoscopic instruments. **Patients and methods:** Twenty six patients underwent cholecystectomy, inguinal and umbilical herniorrhaphy, liver biopsy and appendectomy using a transumbilical approach as the main and/or single access. The mean age was 42.32; average body mass index (BMI) was 27.92. A 10mm trocar (with 30° optic) and 3mm and 5mm trocars were introduced in umbilical scar. A 2mm trocar was introduced in right flank in cholecystectomies when necessary. **Results:** Single-port transumbilical laparoscopic surgery was performed in 17 patients. In nine, two ports were used. One patient with BMI of 44.01 required conversion to a conventional laparoscopic cholecystectomy. No major complication was observed. All patients had excellent postoperative outcomes and cosmetic results. **Discussion:** Transumbilical Endoscopic Surgery (TUES) procedures have been conducted in an attempt to reduce postoperative pain, and to promote satisfaction with the cosmetic result and a faster recovery. **Conclusions:** Transumbilical laparoscopy is a promising surgical option still under development; we expect future studies will confirm it as safe and reproducible. This procedure offers patients a better cosmetic result, with fewer, smaller and even imperceptible scars.

Key words: Laparoscopic surgery, NOTES, TUES, Umbilical Scar.

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INTRODUCTION

Since they were introduced into surgical practice, videolaparoscopic procedures have become widely used around the world. The rapid integration of these procedures into routine practice reflects the fact that when compared to surgeries performed via laparotomy these procedures offer less surgical injury, a reduction in post-operative pain, and a good aesthetic result.¹⁻³

In this context of videolaparoscopic surgery, minimally invasive surgery through natural orifices, as known as Natural Orifice Transluminal Endoscopic Surgery (NOTES), arose as a surgical

innovation to provide a smaller surgical wound for the patient, with a reduction in the size and number of access ports.^{4,5}

ZORRÓN and cols⁶, in March 2007, performed the first cholecystectomy using natural orifices, in humans, using a transvaginal route. The next month, JACQUES MARESCAUX¹, in France, carried out a similar procedure with success in a 30 year old patient. Thereafter other procedures have been performed as NOTES procedures, even using other natural orifices such as the mouth and anus.⁷

Besides the natural orifices, the umbilical scar also has been used for surgical access. With

transumbilical surgery – known as Single-Port Access (SPA) or Transumbilical Endoscopic Surgery (TUES) – only one incision in the umbilicus – which is already a natural scar – is usually necessary. In this way, the transumbilical approach is used as the principal and sometimes only access; as a result of the procedure, there is only one scar that is barely visible or even imperceptible.^{1,5}

Surgical procedures using the transumbilical approach have been performed with success.⁷⁻⁹ Since October 2008, Dr. Antônio Alves Junior, has performed these procedures at the University Hospital of the Federal University of Sergipe using conventional videolaparoscopic surgery instruments.

In this study, we report the initial experience with patients undergoing various surgical procedures using the transumbilical approach and conventional videolaparoscopy equipment.

PATIENTS AND METHODS

The study was carried out with 26 patients who underwent: cholecystectomy, inguinal herniorrhaphy, umbilical herniorrhaphy, liver biopsy and appendectomy. The transumbilical approach was used as the principal and often only access. Eleven were men and 15 women. Ages ranged from 20 to 77 years (mean: 42.32). Body mass index (BMI) ranged from 18.73 to 44.01 (mean: 27.92), with only one patient exceeding a BMI of 35 (Table 1).

The research protocol was presented to and approved by the Ethics Committee for Research Involving Human Subjects of the Prof. João Cardoso Nascimento Jr Health Campus of the Federal

University of Sergipe (CAAE number: 0031.0.107.000-09).

Surgical technique

The patient was placed in dorsal decubitus in reverse Trendelenburg position and left lateralization with the lower extremities in leg holders. After general anesthesia, the surgeon positions himself between the legs of the patient with the assistant to the left of the patient. The monitor was positioned at the level of the right shoulder of the patient and, the instruments, to the right.

The umbilicus was incised approximately 1.5 cm horizontally. Next, the pneumoperitoneum was established and maintained at 14mmHg by insufflation with carbon dioxide (CO₂). A 10mm trocar was positioned into the umbilicus and a 30° optic was attached. A second trocar, this one 3mm, was introduced under the vision of the optic above and to the right of the first, approximating/broaching the fascia of the rectus abdominus for positioning of the hook or scissors, among other instruments. A third (5 mm) trocar was introduced to the left and at the same height as the second trocar for the positioning of the clamps (Figures 1 and 2).

In the cholecystectomy surgeries where it was necessary, a 2mm trocar was introduced in the right flank for positioning of pressure clamps, aiding in the exposure of the Calot's triangle and the dissection of the cystic duct and cystic artery (Figure 3).

When available, a 5mm 30° optic was used when placing clips in the cystic duct and artery, introduced through the 5mm trocar, giving passage to

Table 1 - Transumbilical Laparoscopic surgical (TUES) procedures performed using the transumbilical approach as a sole access (1 site) or as the principal access (2 sites).

	N° of sites	n	Sex (M/F)	Age(mean)	BMI(mean)
Cholecystectomy (w or w/o U.H. or Liver Bx.*)	12	106	4/12	40.46	28.17
Liver Biopsy (w or w/o U.H.+)	1	7	5/2	44.57	27.95
Inguinal Herniorrhaphy (w/ U.H.+)	2	2	1/1	43.50	28.75
Appendectomy	2	1	1/0	52	---

w = with w/o = without

* Liver Bx. = Liver biopsy

+ U.H. = umbilical herniorrhaphy

§ In one patient who underwent cholecystectomy (BMI=44.01) there was a conversion to a laparoscopic approach (from 1 to 4 access points)

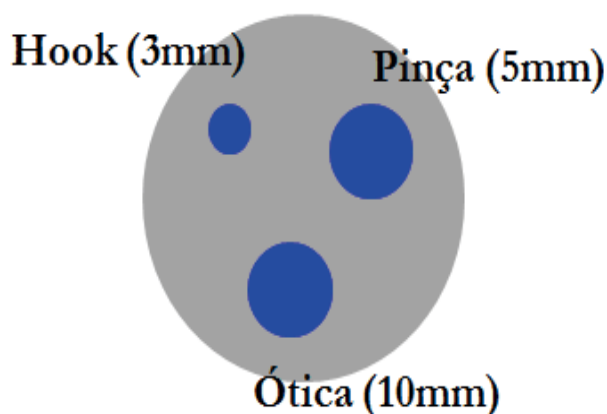


Figure 1 - Transumbilical surgical access in cholecystectomy. Schematic for placing the trocars in the umbilical scar.

Pinça (5mm) → 5mm clamp

Ótica (10mm) → 10mm optic



Figure 2 - Transumbilical Cholecystectomy with conventional videolaparoscopy instruments.

the clip applier through the 10mm trocar previously introduced in umbilical scar. When not available, a second 10 mm trocar was introduced in place of the 5mm trocar. The cystic duct was then clipped and cut, with two clips closing the proximal stump and one clip on the distal stump (near the gall bladder). The cystic artery was clipped in the same fashion. Next, the gall bladder was dissected in an antegrade manner and freed from the liver bed; the umbilical fascia was approximated and intradermal suturing performed.

For the inguinal herniorrhaphy and appendectomy cases two (a 10mm and a 5mm) intraumbilical trocars were used and one 2mm trocar in the flank opposite to the pathology. For the liver biopsy cases, two trocars (5mm and 10mm) were placed in intraumbilical positions.

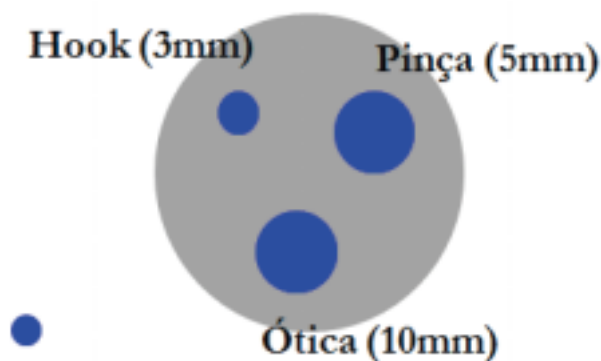


Figure 3 - 2mm Trocar accessory for mobilizing the gall bladder (infundibulum) in a Transumbilical Cholecystectomy.

Right Flank (FD) (2mm)

Clamp for traction of the infundibulum

Pinça (5mm) → 5mm clamp

Ótica (10mm) → 10mm optic

RESULTS

The present study involved 26 cases using a transumbilical approach: sixteen cholecystectomies, seven liver biopsies, two inguinal herniorrhaphies and one appendectomy. In 16 patients the transumbilical port was the only access. In nine, two point of access were used. All of the procedures were performed by one surgeon. Patients were informed regarding the surgical technique employed.

In only one patient, who was morbidly obese (BMI = 44.01), was conversion to conventional videolaparoscopy necessary; four access points were used. No major complication was observed.

In two patients who underwent cholecystectomy, the availability of a 5mm optic, concomitantly with a 10mm optic, facilitated the performance of the surgery at the moment of the placement of the clip in the cystic duct and artery. Thus, the clip applier was used in the 10mm trocar and in the 5mm trocar, lateral to the clip applier, a 5mm optic was used. In one patient a 2 mm trocar was necessary.

All patients were discharged the day after undergoing the surgical procedure.

Since discharge all patients are being followed as outpatients. To date no complications have been observed. In all patients' wound closure proceeded appropriately with the formation of good looking intraumbilical scars, without signs of infection. All

patients responded to a questionnaire that the cosmetic result was satisfactory.

DISCUSSION

In the past the maxim “great incisions, great surgeries” prevailed in medical practice. Today, we will seek techniques that are increasingly less invasive. It is against this backdrop that Natural Orifice Transluminal Endoscopic Surgery (NOTES) is gaining popularity. NOTES procedures provide a degree of satisfaction about the cosmetic result that exceeds even conventional laparoscopic techniques, until now considered the gold standard for some surgical procedures, such as cholecystectomy. Besides the favorable aesthetic result, it is believed that NOTES procedures cause less injury, with less metabolic response to the surgical stress, and fewer postoperative complications.^{10,11}

In 2004, the American surgeon KALLOO^{11,12} published the first report related to the topic, using transgastric access in pigs to remove the gall bladder. In 2007, ZORRÓN and cols⁶ performed surgery through a transvaginal approach, utilizing the umbilical scar for access to the peritoneal cavity solely for induction of the pneumoperitoneum. Currently, most procedures employing Natural Orifice Transluminal Endoscopic Surgery (NOTES) use the transluminal approach in association with at least one transparietal access, a process known as the hybrid technique.^{6,7,13}

Transumbilical surgery (TUES) has been considered a transition between conventional videolaparoscopy and surgery through natural orifices, since there still are barriers to overcome such as the lack of appropriate instruments, difficulties of access, and the potential for infection.^{1,7,12,14,15} The first transumbilical surgery was reported by ZHU and cols, in 2007, using the umbilicus as the sole surgical access.^{8,12} TUES can be performed using instruments for mini-laparoscopy or those used in conventional videolaparoscopy, without posing risks or additional costs.^{1,4,5} The incision is made in the umbilicus, decreasing the number of access ports when compared with conventional videolaparoscopy, resulting in a scar that is barely visible or virtually imperceptible (figures 4 and 5). The aesthetic advantages, in addition to less post-operative pain, earlier discharge from the hospital, and a more rapid return to work activities are the observed benefits.^{1,4}



Figure 4 - Excellent aesthetic result 3 months after a transumbilical videolaparoscopic procedure.



Figure 5 - Excellent aesthetic result 6 months after a transumbilical videolaparoscopy procedure.

Several studies describe the use of a single trocar – also known as Single Trocar Access - SITRACC – a special flexible instrument, which permits the surgeon greater freedom of movement.^{12,16} In the present study, the fact that we did not have articulated instruments did not prove to be a limiting

factor for performing procedures using the transumbilical approach. All were performed with instruments used in conventional videolaparoscopy or in minilaparoscopy without posing risks or additional costs.

With TUES, conversion to conventional videolaparoscopy is possible whenever necessary.^{1,4,15} In our study, of the 26 patients, only one with morbid obesity (BMI=44.01) where there was bleeding of the cystic artery – which proved to be difficult to control – required conversion to conventional videolaparoscopy (four access ports). Despite the difficulties experienced, the bleeding was controlled. This case notwithstanding, an elevated BMI probably will not represent a limiting factor for

using the technique, as recent publications describe natural orifice surgery being performed in obese patients.^{17,18}

Although transumbilical videolaparoscopy is a promising surgical option that is still developing, new studies are likely to establish the reproducibility and safety of the technique. The use of instruments employed in conventional videolaparoscopy permits patients immediate access to this new technique. This procedure offers patients a better cosmetic result, with fewer and smaller scars, or even scars that are imperceptible. The improvement of surgical instruments is of great importance, and will accelerate the routine use of this approach by most surgery services.

RESUMO

Objetivo: Descrever, preliminarmente, os resultados com a cirurgia videolaparoscópica via transumbilical utilizando equipamentos de videolaparoscopia convencional. **Pacientes e Métodos:** Vinte e seis pacientes submetidos à colecistectomia, herniorrafia inguinal, herniorrafia umbilical, biópsia hepática e apendicectomia utilizando a via transumbilical como principal e/ou único acesso. O índice de massa corporal (IMC) médio foi de 27,9 e a idade média foi de 42,3. Foram utilizados um trocarte de 10 mm (ótica de 30°), um trocarte de 3mm e outro de 5mm, introduzidos via transumbilical. Nas colecistectomias, quando necessário, um trocarte de 2mm foi introduzido em flanco direito. **Resultados:** Em dezessete pacientes utilizou-se a via transumbilical como acesso único. Em nove, foram utilizados dois sítios. Um caso foi convertido para videolaparoscopia convencional em paciente com IMC de 44,0. Nenhuma complicação maior foi observada. Todos os pacientes tiveram excelente evolução pós-operatória e efeito estético. **Discussão:** Os procedimentos por TUES (Transumbilical Endoscopic Surgery) têm sido realizados na tentativa de promover satisfação estética, menor dor pós-operatória e recuperação mais rápida. **Conclusões:** A videolaparoscopia por via transumbilical é opção cirúrgica promissora que ainda está em desenvolvimento, no entanto, novos estudos poderão ratificar a reprodutibilidade e segurança da técnica. Tal procedimento possibilitou aos pacientes um melhor resultado cosmético, com cicatrizes em menor número, de menor tamanho ou mesmo não visíveis.

Palavras-chave: Cirurgia laparoscópica; NOTES. TUES. Cicatriz umbilical.

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