

# SITRACC - Single Trocar Access: A New Device for a New Surgical Approach

MARCUS VINICIUS DANTAS DE CAMPOS MARTINS<sup>1</sup>; JAMES SKINOVSKY<sup>2</sup>;  
DJALMA ERNESTO COELHO<sup>3</sup>; MARIA FERNANDA TORRES<sup>4</sup>

<sup>1</sup> Estácio de Sá University, Rio de Janeiro, Brazil; Rio de Janeiro Federal University, Brazil; <sup>2</sup> Phd, Positivo University, Jacques Perissat Institute, Curitiba, Brazil ; <sup>3</sup> Estácio de Sá University, Rio de Janeiro, Brazil; <sup>4</sup> Positivo University, Curitiba, Brazil.

## ABSTRACT

Background: The advent of the endoscopic surgery has radically changed the surgical approach among the scientific world. The concept of minimally invasive procedures has spread very fast through the planet, allowing less pain and faster recovery for patients. We have been exploring this new surgical path and developing a new device for a new surgical approach, the single trocar access, a concept that links flexible endoscope, a single surgical access and flexible instruments. We report our technique and initial experience in experimental cholecystectomy in porcine models. Methods: From December 2007 to March 2008, ten Single Trocar Access - Sitracc Cholecystectomies were performed in ten female pigs. The surgeries consisted of the classical steps of a laparoscopic cholecystectomy, using special flexible instruments and a flexible endoscope. In the first three cases, a second 5mm trocar was placed to retract the liver. Since the development of the second generation of instruments, all procedures have been performed through a single trocar. Results: There were no conversions to totally laparoscopic or conventional approach. The operative time ranged from 40 to 150 minutes. The animals were submitted to euthanasia at the end of the procedures, according to experimental surgical rules in Brazil. Conclusions: The cholecystectomy by the Single Trocar Access method is feasible in porcine models. The technique needs improvement and its further use in human beings has to be carefully tested. It will become a new option to the minimally invasive surgical field, as well as a new weapon in a continuous struggle to benefit our patients.

**Key words:** Minimally Invasive Surgery, Single Trocar Access, Cholecystectomy.

**Bras. J. Video-Sur, 2008, v. 1, n. 2: 061-063**

Accepted after revision: April, 24, 2008.

## INTRODUCTION

The endoscopic surgery has been the most important advance with respect to the surgical field in the last decades. The continuous improvement of this technique has allowed complex procedures to be performed in a minimal invasive fashion, adding huge advantages regarding post-operative pain, recovery, metabolic response and cosmetics.

With the development of this concept, the execution of surgical procedures through the human natural orifices is presented as a new approach, which has to be validated in the next years.

Since Kalloo[1] reported his first experience in natural orifice transluminal endoscopic surgeries, using transgastric access in porcine models, many researchers around the world have been working on new technologies for this approach and looking for definitions of feasibility and potential advantages.

The meeting which took place in New York City, in 2005, was an important fact for the development and research of this new technology, gathering members from the *American Society of Gastrointestinal Endoscopy* (ASGE) and from the *Society of American Gastrointestinal and Endoscopic Surgeons* (SAGES). This group, so called NOSCAR (*Natural Orifices Surgery Consortium for Assessment and Research*) produced a document called White Paper, in order to define guidelines for researches, potential benefits and priorities to be used in the practical field[2].

The training and demand of new work stations, which is the goal of this research, as well as the access to the abdominal cavity, the gastric closure, potential infections, new suture devices and spatial orientation are among the main difficulties for the development of this technique.

We first published our experience about this kind of procedure in 2006 in the Brazilian Laparoscopic

Surgery Journal[3] and concluded that some barriers needed to be surmounted for the adequate development of this new technology.

## MATERIALS AND METHODS

As a first step, we have been developing a single trocar access (SITRACC®, Edlo® Company) for abdominal surgery, whose protocol was approved at Positivo University (Curitiba-Brazil).

This new device consists of a trocar with multiple channels, adding concepts of flexible endoscopy and laparoscopy. This trocar could be used through the umbilicus or the vagina (Figure 1). A flexible optical system and flexible instruments, specially developed for this purpose, are inserted through four individual channels.

Articulated graspers, scissors, hooks and clip appliers have been developed (Figure 2). These new instruments are very similar to the conventional laparoscopic instruments, except for the new articulated mechanism. This articulation allows the



*Figure 1 - Trocar with multiple channels.*



*Figure 2 – New flexible instruments.*

surgeon to work with several different movements in a single axis.

From December 2007 to March 2008, ten SITRACC® Cholecystectomies were performed in ten female pigs, average weight 30 Kg. For pre-operative sedation, the animals received ketamine, xylazine and acepromazine. Right before the beginning of the procedure, the pigs underwent general anesthesia induced by thiopental (10 mg/Kg) and maintained with halothane.

In the first three cases, a second 5mm trocar was placed to retract the liver. Since the development of the second generation of instruments, all procedures have been performed through a single trocar.

The surgeries consisted of the classical steps of a laparoscopic cholecystectomy.

## RESULTS

There were no conversions to totally laparoscopic or conventional approach. The operative time ranged from 40 to 150 minutes and the procedure was completed in all cases.

The euthanasia was performed using a fast shot of tiopental, 20 mg/Kg.

## DISCUSSION

Several natural human body orifices allow access to the abdominal cavity, such as the mouth, anus and, in women, the vagina. None of these orifices has direct access to the peritoneal cavity, but to an organ inside it.

In 2007, Zhu published his first experience using the umbilicus to access the peritoneal cavity. This new access technique was described as transumbilical endoscopic surgery (TUES)<sup>4</sup>.

The flexible endoscopy has reached a huge development in the last years and nowadays therapeutic procedures may be a possibility for a high or even low path. A lot of instruments have been developed and are inserted through the endoscope work channels. These devices have limited movement to perform more advanced surgeries due to their small diameter and great length.

We propose the use of this new device, which consists of a trocar with multiple channels, adding concepts of flexible endoscopy and videolaparoscopy and using it through the umbilicus or vagina. A flexible optical system and flexible instruments, specially developed for this platform, are inserted through four

individual channels, allowing the execution of abdominal surgeries.

In the first protocol, ten pigs have been submitted to single trocar access cholecystectomies, without major complications.

In this manuscript we show the new device, the instruments and earlier stages of this surgical procedure and its first experimental surgeries of a new minimally invasive approach.

## CONCLUSIONS

The SITRACC® – Single Trocar Access Cholecystectomy is feasible in pigs. The possibility to become in the future an alternative to minimally invasive approach in human beings depends on the development of this new technique and its new instruments.

## REFERENCES

1. Kallo NA, Sibgh VK, Jagannath SB, Niiyama H, Vaugh CA, Magee CA, Kantsevov SV (2004) Flexible transgastric peritoneoscopy: a novel approach to diagnostic and therapeutic interventions. *Gastrointest Endosc* 60: 114-7.
2. ASGE/SAGES Working Group on Natural Orifice Translumenal Endoscopic Surgery White Paper (2006). *Gastrointest Endosc* 63:199-203.
3. Martins MVDC, Coelho DE, Coelho JF, Rios M (2006) Initial experience with natural orifices transluminal endoscopic surgery. *Rev Bras Videocir* 4(2): 75-77.
4. Zhu, JF(2007) Scarless endoscopic surgery: NOTES or TUES. *Surg Endosc* 21:1898-1899.

### Correspondence Address:

MARCUS VINICIUS DANTAS DE CAMPOS MARTINS  
Av. das Américas, 1981 - Casa 64 - Barra da Tijuca  
Rio de Janeiro, RJ - Brazil  
CEP: 22631-000  
Tel.: 2484-3850 - Cel.: 9989-1036