Transumbilical Laparoscopic Bilateral Nephrectomy

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ABSTRACT

Introduction: Traditionally, the laparoscopic surgeries use several trocars (three to six) introduced by transperitoneal or retroperitoneal access, depending on the type and the complexity of the procedure. Thus, the optimum triangulation is reached. That triangulation has been considered an essential pre requisite for the complex surgical procedures that need precise dissections and suturing techniques. Lately some authors have attempted to reduce even more the morbidity of the laparoscopy carrying mini-laparoscopy surgeries through natural orifices and transumbilical access. The intention of this article is to describe a case of bilateral nephrectomy for instrumental laparoscopic transumbilical access using of conventional laparoscopic surgery. Case report: 60-year-old female patient, who underwent renal transplant with graft in the right iliac fossa, was directed to our group by the nephrology service due to repetition urinary tract infection and bilateral renal atrophy. An evaluation of the possibility of proceeding bilateral laparoscopic nephrectomy was carried out, and based on this pre-surgery evaluation, the indicated procedure was through transumbilical access. After the confection of the pneumoperitoneum, three trocars had been located within the periumbilical region and the surgery was successfully carried through without the use of any articulated laparoscopic instrument. The operative time was 100 minutes, with an estimated 100 ml blood loss. The patient got discharged from the hospital on the second day of the postoperative period. Conclusion: The accomplishment of bilateral nephrectomy through transumbilical laparoscopic access is feasible and this access can be considered an alternative to the traditional laparoscopy, even when special articulated laparoscopic instruments are not available.

Key words: Transumbilical surgery, Single port, Single incision, Laparoscopy, E NOTES.

INTRODUCTION

In the past few years, the minimum invasive surgery dramatically changed the surgical conception. Some complex procedures performed exclusively through open surgery today are currently approached through laparoscopy in excellence centers. The advantages of the minimum invasive overture include little postoperative pain, lesser in-hospital time, faster recovery and superior esthetic effect. Traditionally, the laparoscopic surgeries use several trocars (three to six) introduced through transperitoneal or retroperitoneal access, depending on the type and the complexity of the procedure. In this, the optimum triangulation, which has been considered an essential pre requisite for the complex surgical procedures that need precise dissections and suturing techniques, is reached. More recently, researches have been directed towards the development of strategies to reduce the morbidity in these surgeries even more, and to improve the esthetic results. This includes the reduction of the size of the portals (mini-laparoscopy), the use of the surgery through natural orifices (NOTES, natural orifice transluminal endoscopic surgery) and of the access transumbilical. In the latter, it is assumed that the umbilicus is an embryonic natural orifice (e) that can be used as a point of access to the abdominal cavity for surgical procedures, since it is considered a scar. Gill et al had proposed the term E NOTES (embryonic natural orifice transumbilical endoscopic surgery) for this via. Other terms which have already been used to describe this technique are TUES (transumbilical endoscopic surgery), NOTES (natural orifices transumbilical surgery), and also single port, single access, single incision or keyhole surgery, all based on the principle of an only abdominal incision inserting articulated laparoscopic instruments.

The possibility of using the transumbilical access to carry through surgical procedures was initially demonstrated in a swine experimental model...
by PARK et al28 and confirmed by various authors in human beings2-4,12-25. Many devices have been developed to allow the introduction of some laparoscopic instruments through a single incision on the skin2 (R port2,12, Uni X Single Port Access Laparoscopic System1, Gelport20 and SITRACC29), but they are still onerous, which might restrict their use in developing countries. RAMAN et al15 were the first ones to report about nephrectomy through a single umbilical incision using 3 conventional trocars located separately as well as special articulated instruments, as an alternative to the use of the single port equipment. Since many services do not make use of articulated instrument, some authors have described the accomplishment of successful transumbilical surgeries using trocars and conventional instruments of laparoscopy14.

In this article, we describe a case of bilateral nephrectomy using the transumbilical access and conventional instruments of laparoscopic surgery.

**CASE REPORT**

60-year-old female patient, who underwent renal transplant with graft in the right iliac fossa, was directed to our group by the service of nephrology due to repetition urinary tract infection and bilateral renal atrophy to have evaluated the possibility of proceeding of bilateral laparoscopic nephrectomy.

After the pre-operative evaluation and confirmation of the indication of the procedure, we considered the accomplishment of bilateral laparoscopic nephrectomy through transumbilical access.

Under general anesthesia, the patient was initially positioned on left lateral decubitus to have the right nephrectomy (Figure 1A). The Veress needle was located through the umbilicus (Figure 1B), allowing the insufflation of carbon dioxide in the abdominal cavity. The intra-abdominal pressure was maintained between 12 and 14mmHg. A 10mm trocar was located in the periumbilical region for a 30-degree optic, followed by the positioning of 2 additional periumbilical trocars (5mm and 10mm ones) (Figure 1C). This way the surgeon worked using two portals with the instruments in parallel (Figure 1D).

The surgery steps had been the same ones carried through in the conventional laparoscopic surgery. Summing up, the ascending colon was mobilized medially after the opening of the right parietocolic leak on Toldt white line using elecrocauterization. The kidney was gradually released from its lateral, superior, inferior and posterior adherences. The renal hilo was accessed and the main renal vases were dissected and isolated. After binding with LT 300 titanium and 10mm Hem o lok clips (Week Closure Systems, Research Triangle Park, NC), the renal vessels were divided (Figures 2A, 2B and 2C). The ureter was dissected, bonded with a LT 300 titanium clip (Figure 2D), and later sectioned.

The patient was placed on right lateral decubitus position and the same procedure previously described was carried through for the left nephrectomy (Figures 3A, 3B, 3C and 3D).

The kidneys were placed in a bag and kept with clamps (Figure 4A). Trocars were removed and the 3 periumbilical incisions on the skin were joined. The opening of the abdominal aponeurosis was enlarged and the bag was removed of its cavity (Figure 4B). The closing of the aponeurosis and the skin was carried through with poliglecaprone 910 (Vycril®) and 4/0 mono nylon (Figure 4C), respectively.

The operative time was 100 minutes, with an estimated 100 ml blood loss. The post-operative analgesia was carried through with dipirone (1 gram intra vein each 6 hours) and cetoprofen (100mg intra vein each 12 hours). The patient got discharged from the hospital on the second day of the postoperative period.

The anatomic-pathological report accused renal atrophy and chronic pyelonephritis (Figure 4D).

**DISCUSSION**

One of the basic pre-requisites for the advanced laparoscopic surgery is the correct positioning of the portals in such a way that there is a minimum distance between them, allowing a wide range of movements and also preventing the collision of the instruments. This still enables the triangulation between the instruments and the optics, which is essential in carrying through the surgical dissection and intracorporeal suturing.

The concept of transumbilical surgery includes the positioning of a single trocar with various working channels in the umbilical region or three conventional adjacent periumbilical trocars, so that the optics and the instruments are disposed in parallel within the abdominal cavity. This parallel positioning makes the surgical procedure more difficult since there is internal
Figure 1 - (A) Patient placed on left lateral decubitus position. (B) Creation of pneumoperitoneum with a transumbilical Veress needle. (C) Placement of the transumbilical trocars. (D) External manipulation of the forceps.

Figure 2 - (A) Ligature and sectioning of the right renal artery. (B and C) Ligature of the right renal vein with Hem-o-lok clips. (D) Ligature the right ureter.
Figure 3 - (A) Ligature of the left renal artery with Hem-o-lok clips. (B and C) Ligature of the left renal veins with Hem-o-lok clips. (D) Ligature of the left ureter.

Figure 4 - (A) Placing the kidneys in an extraction bag. (B) Taking kidneys out of the abdominal cavity. (C) Final aspect of the abdomen. (D) Surgical specimens.
and external collision of the instruments during their manipulation. The development of optics and 5mm flexible instruments partially helped overcome this technical difficulty, even thought the instruments are introduced adjacent and parallel to one another through a single portal.

Some urologic procedures through transumbilical access have been described with encouraging results (Table 1). Special trocars with some articulated working channels (R-port\textsuperscript{12}, Uni X Single Port Access Laparoscopic System\textsuperscript{3}, Gelport\textsuperscript{20} and SITRACC\textsuperscript{29}) and laparoscopic instruments have

<table>
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<th>First author</th>
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<td>Nephrectomy, Orquidopexy, Orquidecetomy, Ureterolithotomy</td>
<td>Single transumbilical trocar (R port);</td>
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<tr>
<td>Aron et al\textsuperscript{25}</td>
<td>2008</td>
<td>5</td>
<td>Partial Nephrectomy</td>
<td>R port; 2mm mini-laparoscopy; it was needed 2mm and a 5mm trocar of 5mm</td>
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Table 1 - Transumbilical urologic procedures.
been developed not only to make possible but also to facilitate the laparoscopic surgery using only one incision; however, they are still expensive and impracticable for many surgery groups in developing countries.

The advantages of the transumbilical surgery are: (1) the technique is similar to the traditional laparoscopy2, (2) the orientation is easily controlled by the assistant, thus, the surgeon can get better images, similarly to the conventional laparoscopy26, (3) the technique minimizes the morbidity related to the skin incisions (muscular pain and spasms in the incision, prevents lesions of epigastric vessels), (4) incision can be hidden inside the umbilicus (better esthetic effect)3,23,30, (5) the method allows that the surgeon converts the procedure to a conventional laparoscopic surgery at any time, if necessary, adding one or more conventional laparoscopic trocars1,25, (6) the procedure is simpler and safer than the NOTES techniques26.

The disadvantages are: (1) the parallel positioning and close to the instruments enough tending to result in the collision between the optics and the instruments2,12,30, requiring a significant coordination between surgeon and camera3,30, (2) dissection through a single trocar is more difficult than that in the conventional laparoscopy with various trocars2,30 due to the lack of triangulation of the instruments, and (3) the costs of the single ports and the articulated instruments.

In this article we report a case of bilateral transumbilical laparoscopic nephrectomy using instruments of conventional laparoscopic surgery and 3 adjacent periumbilical incisions punctures. The surgery exposure was adequate and the steps for the conventional laparoscopy could be reproduced within the transumbilical technique. No great difficulty was observed during the procedure. As all the trocars were placed in the periumbilical region, at the end of the surgery incisions were easily joined in order to remove the surgical specimen.

We found the same problems previously mentioned by RAMAN et al15 in relation to the intra and extra abdominal collision of the instruments; however, we could prove that it is feasible to carry through the same procedure without articulated laparoscopic instruments. The coordination between surgeon and assistant is essential to minimize the internal and external collisions of the instrument. The renal vessels ligation were easily performed with 10mm Hem o lok and LT – 300 titanium clips, sparing the use of vascular endo staplers.

We believe that the transumbilical access is a potential alternative for the traditional laparoscopy, with a better esthetic effect since there is only one umbilical incision and a reduction of the complications related to incisions on the skin. The learning curve exists, but it is significantly lower than that in NOTES. We expect prospective and random studies to really evaluate the effectiveness, the indications and the benefits of the transumbilical surgery compared to the traditional laparoscopy.

**REFERENCES**


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