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Transmesenteric approach for left transperitoneal renal surgery: technique and experience

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Complete List of Authors:	<p>Zacchero, Monica; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>Volpe, Alessandro; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>Billia, Michele; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>Tarabuzzi, Roberto; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>Varvello, Francesco; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>De Angelis, Paolo; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>De Lorenzis, Elisa; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>Mittino, Irene; Maggiore della Carità Hospital, University of Eastern Piedmont, Urology</p> <p>Terrone, Carlo; Maggiore della Carità Hospital, University of Eastern Piedmont, Department of Urology</p>
Keyword:	Urology, General Laparoscopy
Abstract:	<p>Introduction. In the last few years laparoscopic surgery has become the gold standard for the treatment of several urological diseases such as renal cancer and uretero-pelvic junction obstruction (UPJO). A transmesenteric approach for left laparoscopic pyeloplasty has been recently described in order to avoid bowel manipulation and the potentially related complications. Aim of the present study is to describe the surgical technique and the advantages of the transmesenteric approach for laparoscopic pyeloplasty, pyelolithotomy and simple nephrectomy in our experience.</p> <p>Materials and methods. From December 2007 to May 2010, 12 laparoscopic procedures for left renal diseases were performed using a transmesenteric approach. The indications were left UPJO in 9 cases, left pelvic-ureteral stones in 2 cases and left end-stage kidney disease in one case.</p> <p>Results. No conversions or intra-operative complications were observed. No</p>

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	<p>blood transfusions were required. Resumption of oral intake and canalization occurred in all cases within 48 hours of the procedure. All patients had an uneventful postoperative course. Conclusions. The laparoscopic transmesenteric approach represents an interesting and advantageous technical improvement of minimally invasive surgery for the treatment of left renal diseases.</p>

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4 **Transmesenteric approach for left transperitoneal renal surgery:**
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11 Monica Zacchero, Alessandro Volpe, Michele Billia, Roberto Tarabuzzi,
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13 Francesco Varvello, Paolo De Angelis, Elisa De Lorenzis, Irene Mittino,
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17 Carlo Terrone
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21 Division of Urology, Maggiore della Carità Hospital
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24 University of Eastern Piedmont, Novara, Italy
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32 **Key words:** laparoscopy; transmesenteric; pyeloplasty; renal surgery.
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36 **Running title:** the role of transmesenteric approach to the left kidney
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40 *Correspondence to:*

41 Carlo Terrone, M.D.

42 Division of Urology, Maggiore della Carità Hospital

43 University of Eastern Piedmont

44 Corso Mazzini, 18

45 28100, Novara, Italy

46 Tel: +39-0321- 3733313

47 Fax: +39-0321-3733763

48 E-mail: carlo.terrone@med.unipmn.it
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ABSTRACT

Introduction. In the last few years laparoscopic surgery has become the gold standard for the treatment of several urological diseases such as renal cancer and uretero-pelvic junction obstruction (UPJO). A transmesenteric approach for left laparoscopic pyeloplasty has been recently described in order to avoid bowel manipulation and the potentially related complications. Aim of the present study is to describe the surgical technique and the advantages of the transmesenteric approach for laparoscopic pyeloplasty, pyelolithotomy and simple nephrectomy in our experience.

Materials and methods. From December 2007 to May 2010, 12 laparoscopic procedures for left renal diseases were performed using a transmesenteric approach. The indications were left UPJO in 9 cases, left pelvic-ureteral stones in 2 cases and left end-stage kidney disease in one case.

Results. No conversions or intra-operative complications were observed. No blood transfusions were required. Resumption of oral intake and canalization occurred in all cases within 48 hours of the procedure. All patients had an uneventful postoperative course.

Conclusions. The laparoscopic transmesenteric approach represents an interesting and advantageous technical improvement of minimally invasive surgery for the treatment of left renal diseases.

INTRODUCTION

In the last few years laparoscopic surgery has become the gold standard for the treatment of several urological diseases, such as renal cancer when complete removal of the kidney is required and uretero-pelvic junction obstruction (UPJO) [1].

The laparoscopic approach to the kidney can be both retroperitoneal or transperitoneal [2,3]. When a transperitoneal approach is preferred, the classical technique implies the mobilization of the ascending or descending colon. In order to avoid this surgical step and the potential risks of bowel injuries and postoperative prolonged ileum a transmesenteric approach has been recently described for left laparoscopic pyeloplasty [4-6].

Aim of this study is to describe surgical technique and advantages of the transmesenteric approach to the left kidney for laparoscopic pyeloplasty (LPP), laparoscopic pyelolithotomy (LPL) and laparoscopic simple nephrectomy (LSN) in our experience.

MATERIALS AND METHODS

From December 2007 to May 2010 12 laparoscopic procedures for left renal diseases were performed at our centre using a transmesenteric approach. The indications were left UPJO in 9 cases, left pelvic-ureteral stones in 2 cases and left end-stage kidney disease in one case.

Preoperative characteristics of the patients (6 males and 6 females) are shown in Table 1. Two patients were obese (BMI>30). ASA score was 2 for all patients.

After induction of general anaesthesia, a 16 Fr Foley urethral catheter is applied and the patient is placed in a lateral 60° decubitus. In 11 cases, open laparoscopy was performed using a Hasson trocar placed at the level of the umbilicus or on the pararectal line. The choice was based on patient's body habitus. Pneumoperitoneum was induced using a Veress needle only in one case.

In 11 cases 4 trocars were used (one 5 mm below the xifoid process, one 12 mm along the hemiclavear line and one 5 mm in the iliac fossa along the anterior axillary line). In one case the procedure was performed using only 3 trocars (Hasson trocar and two 5 mm trocars).

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3 The first step of the transmesenteric technique was the exposure of the mesentero-colic space, that
4 can be located between the descending colon and the inferior mesenteric vein and the gonadal vein
5 (Fig. 1). The small bowel was then gently pushed medially. Renal pelvis and UPJ can be generally
6 easily identified underneath the peritoneum. A 3-4 cm longitudinal incision was performed through
7 the mesentery of the descending colon in order to create a window through which the renal vessels
8 and pelvis can be bluntly isolated (Fig 2a-2b).

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Laparoscopic dismembered pyeloplasty was performed according to Anderson-Hynes technique in
all cases of UPJO (fig. 3a-3b). When a pyelolithotomy was performed, renal pelvis was incised with
cold scissors. Stones in the renal pelvis were retrieved with a laparoscopic grasper. A flexible
cystoscope was then inserted through a 12 mm trocar to explore the renal calyces. Caliceal stones
were extracted using a basket. All stones were placed in a laparoscopic bag that was extracted
through one of the trocars at the end of the procedure.

In all cases of LPP and LPL a double J ureteral stent was introduced in an antegrade fashion through
a 5 mm trocar with the assistance of a ureteral open-end catheter before completing the pelvic suture.
The correct position of the distal end of the stent was checked with flexible cystoscopy.

LSN was performed following the classical laparoscopic steps. In this case a stitch was placed to
anchor the lateral edge of the peritoneal window to the abdominal wall in order to obtain better
exposure.

At the end of the procedure the mesenteric window was always closed using single reabsorbable
stitches. Finally, a drainage was left into the peritoneal cavity.

RESULTS

No conversion or intra-operative complication occurred. Blood transfusions were not needed.

Intraoperative and perioperative features of the 12 procedures are shown in Table 2.

Resumption of oral intake and canalization occurred within 48 hours of the procedure in all cases.

No significant post-operative complication was recorded. Blood work before discharge showed a mean hemoglobin of 12,5 g/dL and mean white blood count of $8,25 \times 10^3 / \mu\text{L}$. Creatinine was in normal range for all patients.

The ureteral stent was always removed 20 days after the surgical procedure.

Two months after surgery all patients were investigated with clinical examination, urinalysis, urine culture and sensitivity. All patients were asymptomatic. Abdominal ultrasound and renal scintigraphy were performed for patients who underwent LPP. In all cases the abdominal ultrasound showed reduction of hydronephrosis and renal scintigraphy demonstrated an improved urinary excretion pattern. Patients with urinary stones were all stone free at the KUB performed after LPL.

DISCUSSION

The first laparoscopic nephrectomy was performed by Clayman et al in 1991 [7] and the first laparoscopic pyeloplasty by Schuessler et al in 1993 [1]. These techniques were quickly adopted in urological practice in centres with laparoscopic expertise. Several studies have confirmed the efficacy, safety and excellent results of these procedures, that allows a shorter hospital stay and a earlier return to normal activities compared to open surgery. Therefore, LPP and LSN are today the gold standard for treatment of UPJO and kidney removal for benign disease. Minimally invasive procedures (ESWL, endoscopic treatment) are today preferred for the treatment of renal stones. However, LPL is sometimes needed for complex renal stones [8].

These procedures can be performed either with a retroperitoneal or a transperitoneal approach. As several other authors, we generally prefer a transperitoneal access because it allows better vision to identify anomalous vessels or manage renal abnormalities and a wider working space that allows

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3 easier suturing of the renal pelvis and easier tying of intracorporeal knots. On the right side,
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5 mobilization of the ascending colon is not always necessary to expose the renal pelvis, while this is
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7 generally always required on the left side. To avoid this surgical step a transmesenteric access to the
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9 left kidney was proposed. Cisek et al first described this approach in pediatric practice [9] and
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11 recently few series of transmesenteric left LPP have been reported with good results [4-6]. In the last
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13 few years we also applied the transmesenteric approach in our practice for treatment of UPJO and
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15 recently extended the indications to selected cases of complex stones and end-stage kidney disease.
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17 Using this technique, the mobilisation of the splenic flexure of the colon and the section of the
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19 splenicocolic ligament are avoided with less risk of bowel and splenic injuries. Furthermore, minimal
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21 bowel manipulation is needed, potentially leading to faster recovery of bowel peristalsis [4].
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25 Our results confirm the potential advantages of the approach. In fact, no complications related to
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27 injuries of abdominal organs were observed and blood transfusions were never required. All patients
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29 showed a fast canalization and resumption of oral intake. The operative times was comparable with
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31 those of traditional laparoscopic procedures in our experience. However, a proper comparison of the
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33 length of the procedure with the two approaches is not possible because the surgeries were
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35 performed by different operators in different periods of their learning curve. In all cases with UPJO
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37 post-operative results showed an improved urinary excretion pattern.
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41 In case of renal stones, the laparoscopic approach allows the use of endoscopic instruments (such as
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43 flexible cystoscopes) to remove fragments located in calyces that would be hard to reach with
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45 laparoscopic instruments. In our experience this combination of minimally invasive treatments
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47 always allowed a complete extraction of complex stones.
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50 Finally, to our knowledge no cases of LSN with transmesenteric approach have been previously
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52 described. Our patient had an uneventful postoperative course with no intraoperative or
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54 postoperative complications.
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57 In conclusion, the transmesenteric approach for the treatment of left kidney diseases appears to be
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59 safe, to favour an early discharge and recovery of patients and to obtain results comparable with the
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3 traditional technique that implies the mobilization of the descending colon. This approach represents
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5 an interesting and advantageous technical improvement of minimally invasive surgery for renal
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16 **DISCLOSURE STATEMENT**

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18 All authors have no conflict of interest or financial ties to disclose.
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Table 1. Preoperative characteristics of patients

	Mean ± DS	Range
Age (years)	41,6 ± 16,9	16-74
BMI	24,1 ± 3,2	19-31
Hemoglobin (g/dL)	14,4 ± 1,9	12,4-16,9
White blood count/ μ L	6900 ± 1,4	4100-9800
Serum creatinine (mg/dL)	1 ± 0,3	0,6-1,3

Table 2. Intra and perioperative features

	Mean ± DS	Range
Operative time (minutes)	239 ± 85,3	60-310
Estimated blood loss (ml)	60 ± 28,1	20-100
Catheterization time (days)	3,5 ± 1,5	3-5
Hospital stay (days)	5,7 ± 0,9	5-8

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FIGURE LEGENDS

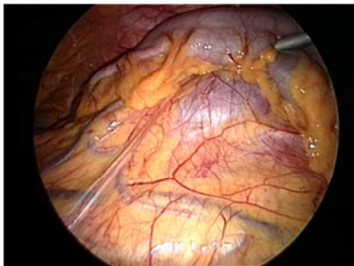
Fig. 1. Exposure of the mesentero-colic space

Fig. 2a-2b. Identification of enlarged renal pelvis below the peritoneum (left). Incision of the mesenter in order to create a window (right).

Fig. 3a-3b. Laparoscopic dismembered pyeloplasty according to the Anderson-Hynes technique (left). Running suture at the end of the procedure (right).

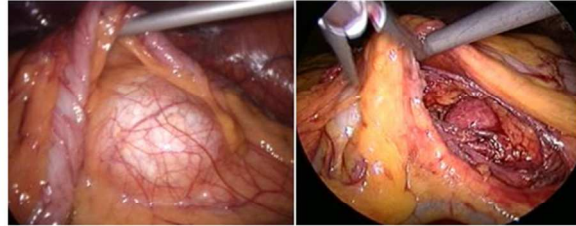
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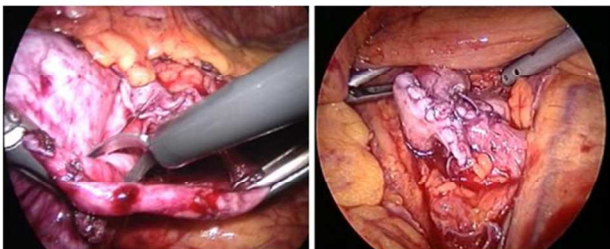
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