LAPAROSCOPIC TRANSABDOMINAL PRE-PERITONEAL (TAPP) FOR BILATERAL INGUINAL HERNIA

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LAPAROSCOPIC TRANSABDOMINAL PRE-PERITONEAL (TAPP) FOR BILATERAL INGUINAL HERNIA (Abstract): The laparoscopic approach is not still the world wide accepted for the treatment of inguinal hernias. However, in the last years, this approach tends to become the gold standard procedure for the one day surgery of groin hernias. We present the laparoscopic TransAbdominal PrePeritoneal approach (TAPP) in a case of a large bilateral, direct type inguinal hernia. The surgical technique is described and different key points are discussed. Conclusions: TAPP is a feasible method for the treatment of bilateral hernia. The laparoscopic exploration allows the intra operative diagnosis of other associated hernias. The anatomic landmarks are easily recognizable and the learning curve could be shortened. The postoperative recovery is rapid and the patient can quicker return to his normal activity; in this way, the day surgery could be considered.

KEY WORDS: TAPP, INGUINAL HERNIA

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BACKGROUND
The hernia repair is one of the most common surgical procedures; worldwide, at least 2000000 hernia repair procedures are annually performed [1]. Even the laparoscopic approach is widely accepted for many diseases and some laparoscopic surgical procedures become gold standard techniques (e.g. cholecystectomy, surgery of the gastro-esophageal junction and even appendectomy), the laparoscopic approach for the treatment of groin hernias is still controversial [2,3]. Much more the choice of laparoscopic approach (TransAbdominal PrePeritoneal (TAPP) versus the Totally ExtraPeritoneal (TEP)) is also controversial [4]. We present the TAPP approach for a large bilateral hernia.

METHOD
Definitions
In the latest guidelines the laparoscopic hernia repairs techniques are defined as follows [5]:

„TAPP: Transabdominal preperitoneal endoscopic inguinal hernia operation in which the approach to the inguinofemoral region is transabdominal, and the final placing of the prosthesis is extraperitoneal”.

„TEP: Total extraperitoneal endoscopic inguinal hernia operation in which both the approach to the inguinofemoral region as well as the placing of the prosthesis is completely extraperitoneal”.

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The patient
A male patient, age 64, has been addressed to the Clinique Bon Secours Arras, France, for bilateral hernia. The physical exam revealed a body mass index of 23.87 kg/m² and large bilateral direct type hernia. From his medical history we noted hypertension and ischemic heart disease treated by betaxolol chlorhydrate 20 mg/day, valsartan 40 mg/day and acetylsalicylic acid 75 mg/day. The patient was proposed for a day surgery.

The surgical technique
The surgical approach commonly used is transperitoneal approach (TAPP).

Anesthesia and the operative room set-up
The patient was in supine position, in a 10º Trendelenburg tilt with both arms in abduction. General anesthesia has been performed. Single dose of Cefazolin (2 g) was used as antibiotic prophylaxis during the anesthetic induction.

A two monitors high definition laparoscopic equipment has been used and placed to the foot of the table; the monitors were located on the side of hernias. The surgeon operated from the opposite side of the hernia near the patient’s shoulder, and the assistant stands opposite to the surgeon (Fig. 1A).

Trocars and instruments
Three trocars has been used: one of 10 mm (optical) and two of 5 mm (for the instruments).

The laparoscopic instruments used were: monopolar disposable scissor, monopolar hook, two atraumatic fenestrated graspers, needle holder and a 5 mm disposable absorbable screw type stapler device. A 30º laparoscope and a 3 CCD high definition camera have been used.

The standard instrument box for TAPP approach also includes a bipolar grasper, a dissection grasper and a disposable suction-irrigation device, as well as “classical” instruments: graspers (two Kelly and two Halsted), Farabeuf retractors, scissors and Hegar needle-holder.
**Trocars placement**

The 10 mm optical trocar was placed supraumblically and the two 5 mm operating trocars were situated on the mideclavicular line 2 cm under the level of the horizontal line from the umbilicus (Fig. 1B).

Trocars have been placed under establishing the carbon dioxide pneumoperitoneum using the Verres needle. The operating trocars were inserted under laparoscopic view control.

**Fig. 2 Laparoscopic view**

A external inguinal region; B middle inguinal region; C internal inguinal region;
D pain triangle; E vascular triangle
1 internal inguinal ring; 2 direct hernia; 3 urinary bladder; 4 umbilical arteries;
5 urachus; 6 epigastric vessels; 7 ilio-pubic tract; 8 iliac vessels; 9 femoral hernia;
10 ductus deferens

**Exploration and anatomical landmarks**

The aim of the laparoscopic exploration is to identify the anatomical landmarks and the site and type of hernia (Fig. 2). In this way, the Trendelenburg tilt has been increased to 30-45°. The two dangerous „triangle”, vascular triangle and pain triangle has to be well identified (Fig. 2). We revealed two large direct type (Nyhus IIIa) hernias (Fig. 2). On the right side under the ileo-pubic tract, a small depression revealed a femoral (Nyhus IIIc) hernia.
Incision of the peritoneum

We started with the left hernia; in this way the patient was slightly turned on the surgeon’s side (to the right).

The first step consists to perform a large peritoneal incision from the iliac spine until the right umbilical artery, opening the preperitoneal space. The peritoneal incision starts 2 cm above the iliac spine and has been made by using the monopolar hook (Fig. 3).

![Fig. 3 The incision of the peritoneum](image)

1 anterior iliac spine; 2 ilio-pubic tract; 3 line of the peritoneal incision; 4 triangle of pain; 5 vascular triangle; 6 internal inguinal ring; 7 epigastric vessels

![Fig. 4 Preperitoneal medial dissection – left side](image)

1 the hernia’s sac; 2 pubis; 3 Gimbernat ligament; 4 urinary bladder; 5 Cooper ligament; 6 femoral vein; 7 parietal defect (middle inguinal region)

![Fig. 5 Preperitoneal medial and lateral dissection – left side](image)

1 Cooper ligament; 2 pubis; 3 inguinal ligament; 4 urinary bladder; 5 femoral vein; 6 femoral artery; 7 parietal defect (middle inguinal region); 8 ductus deferens; 9 spermatic vessels; 10 internal inguinal ring; 11 pain triangle;
Preperitoneal dissection

The aim of this step is to ensure the best positioning of the mesh. In this way several anatomic landmarks have to be identifying, as well as a complete dissection of the hernia’s sac.

The anatomic landmarks are: epigastric vessels, urinary bladder, pubis and Cooper’s ligament, Gimbernat’s ligament and medial part of ilio-pubic tract, external iliac vessels, corona mortis vein, ductus deferens and spermatic vessels, internal inguinal ring (Fig. 4-7).

The preperitoneal dissection began at the lateral part of the internal inguinal ring and continued medially and caudally at the level of Retzius until the pubis is well exposed (Fig. 4, 6).

Then, the hernia sac dissection was performed using traction contra-traction maneuvers and fine coagulation (Fig. 6). To avoid the injuries of the ductus deferens and spermatic vessels the sac dissection always starts anteriorly.

The preperitoneal dissection ends when the anatomic landmarks previous described are well exposed and the two dangerous triangles (vascular and pain triangle) can be identified (Fig. 5, 7).
Mesh placement

We usually use a large (120x150 mm) polypropylene mesh (F polypropylene + porcine collagen + polyethylene terephthalate). The mesh is inserted from the optical trocar. Then, it was placed in the appropriate position and fixed by absorbable tacking staples. The first staple is at the level of iliac spine (2 cm above it); then, the mesh is fixed on the upper and internal edge, as well as at the level of pubis and pectineal ligament (Fig. 8). The mesh hasn’t to be stapled at the level of dangerous triangles and epigastric vessels.

The peritoneal closure

The peritoneum is closed by a running suture using a 2-0 monofilament non absorbable suture and an extracorporeal knot was performed (Fig. 9).

Contra laterally hernia

The right hernia was treated in the same manner; however there are some particularities:
- the medial and caudal preperitoneal dissection continued until the exposure of the internal edge of the contra lateral mesh (Fig. 6);
- in the presented case, during the right side preperitoneal dissection, debutant femoral and obturatory hernias were revealed (Fig. 7).

The overall postoperative time was 120 minutes.
**Postoperative period**

The immediate postoperative course was uneventful and the patient was discharged in the same day. One month later, the routine control consultation revealed no pain or other complications.

**DISCUSSIONS**

There are a lot of discussions about the best treatment for the inguinal hernia. However some clear facts were revealed by the latest trials and guidelines.

*Mesh or non mesh repairs?*

In adult patients the mesh repair is mandatory (level 1A\(^b\)) for open and laparoscopic approach [5,6]. For the non mesh repair the Shouldice technique is considered the best choice (grade A recommendation\(^c\)) and could be used only for the cases with high risk of mesh infection [5]. The best open mesh repair technique is Lichtenstein (level of evidence 1A); the other mesh repairs techniques (e.g. Trabucco, Kugel patch) could be also used but, even the short term results are comparable with Lichtenstein technique, there are no sufficient studies to demonstrate the long term efficacy [5].

*Open or laparoscopic approach?*

Different studies, as well as the recent guidelines revealed that the laparoscopic techniques are similar in the term of the recurrence rate with the Lichtenstein procedure [2,3,5,7]. All the studies noted less pain and numbness following laparoscopic repair and a faster return to usual activities [2,3,5,7]. However, a recent trial revealed no difference between TAPP and Shouldice technique after 5 years from the procedure from point of view of pain [8]. The best immediate postoperative comfort recommend laparoscopic technique for a day surgery [2,3,5,7]. In the reported case we also noticed a minimum immediate and late postoperative pain. Another important feature is the learning curve which is longer for the laparoscopic techniques (50-100 procedures) (level of evidence 2C\(^d\)) [5]. The risk of serious complications is higher during the learning curve period, especially during the first 30-50 procedures; in this way an adequate patient selection and appropriate training minimize the complications risks [5]. The laparoscopic techniques also allow a better exploration of the inguinal region and can diagnose associated hernias, as in presented case. For this reason the laparoscopic approach is recommended especially for women to reduce the femoral recurrence or overlooked femoral hernias during the first operation (level of evidence 2C, grade D recommendation\(^e\)) [5].

*What type of laparoscopic approach TAPP or TEP?*

Both laparoscopic techniques are similar in term of duration of operation, haematoma, length of stay, time to return to usual activities and recurrence [4,5]. However, TAPP appear to be associated with higher rates of port-site hernias and visceral injuries while TEP appear to be associated with more conversions [4,5].

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\(^b\) Systematic review of randomized controlled trials (RCTs) with consistent results from individual (homogenous) studies.

\(^c\) Supported by systematic review and/or at least two RCTs of good quality (Level of evidence 1A, 1B).

\(^d\) Outcome studies, descriptive studies.

\(^e\) Expert opinion, consensus committee.
Vascular injuries and deep/mesh infections were rare and there was no obvious difference between the two laparoscopic techniques [4]. For the bilateral hernia, TAPP also appear to be more feasible and reduces the time taken to return to normal activities compared with open-mesh repair [9]. Much more, TAPP is feasible for incarcerated or strangulated hernias [10]. Even the both laparoscopic techniques requires a learning curve, this seemed to be shorter for TAPP [5,11,12]. The reported case was operated by a surgeon during the learning curve (the 12th case / the 15th hernia repair). We noticed that the first 10 procedures were operated under the direct coordination of an expert (about 150 TAPP procedures annually). In this way we consider 10 TAPP procedures as a sufficient learning curve for trainees already experienced in basic laparoscopic procedures (cholecystectomies, appendectomies). This shortest learning curve was also noted in other studies [13].

What kind of mesh?

The guidelines strongly recommend the use of a synthetic non-absorbable flat meshes (or composite meshes with a non-absorbable component) [5]. There are a lot of type prosthetic materials which differing from point of view of textile features: polymer, filament, construction, pore size, elasticity, tensile strength, surface etc. In our opinion the material we are using (a porous polypropylene mesh covered with porcine collagen) cause less inflammatory reaction and, as consequence, less postoperative pain.

For the unilateral hernia, during the TAPP procedure, the uses of large meshes (100x150 mm) are recommended to reduce the recurrence rate [1,5,14,15]. For the bilateral hernia it could be used a single large meshes (like in Stoppa procedure [16]) or two meshes [1,5]. The actual tendency is to use two separate meshes technique covering the bilateral defects which is technically easier and associated with good short and long term results [17]. We are usually using no keyhole large meshes (120x150 mm) which allow a wide covering of the parietal defect.

Stapled or non stapled mesh?

There are a few studies about this debate; a reduced immediate postoperative pain was found after the non fixation mesh techniques with similar long term results from point of view of chronic pain and recurrence rate [18,19]. An alternative is the use of fibrin glue fixing the mesh [20]. We are using absorbable tackers to fix the mesh in the appropriate position, covering all the parietal defects. This appears to be reasonable especially for the large or multiple hernias, like in reported case.

Antibiotic prophylaxis

The use of antibiotic prophylaxis for the hernia repair procedure is still a subject of debate due to the heterogeneity of the different trials. The latest guidelines consider the antibiotics as unnecessary to reduce the wound infection rate in open mesh repair (level of evidence 1B) or for laparoscopic procedures (level of evidence 2B) [5]. Much more, the French Society of Anesthesiology also recommends no antibiotic prophylaxis for the uncomplicated hernia repair [21].

However, European guidelines noticed the use of antibiotic prophylaxis „in the presence of risk factors for wound infection based on patient (recurrence, advanced age, immunosuppressive conditions) or surgical (expected long operating times, use of drains) factors” (grade C recommendation). In this way (the expected long operating time > 90 minutes or expected duration of the procedure > 2 hours) we consider the use of antibiotic prophylaxis. In the reported case, the procedure took 130 minutes, without drainage or any other risk factors.

footnotes:

f randomised controlled trials (RCTs) of good quality.
g RCT of poorer quality or cohort or case–control studies.
h Supported by case series, cohort studies of low quality ± ‘outcomes’ research. Level of evidence 2C,3.
time), a single dose Cefazolin (2 g) prophylaxis has been performed in the reported case.

*Day surgery*

In concordance with the actual guidelines [5] and medical assurance requirements [22], the hernia repair procedures are considered feasible to be performed as a day surgery (level of evidence 2B, 3'). In different countries the day surgery for hernia repair procedures varies to 35-75% [5]. The laparoscopic procedures appear to be more feasible to be performed in day surgery due to a lack of postoperative pain [5]. Even the day surgery for bilateral hernia is still a subject of debate [5] the TAPP approach could be also feasible, like in presented case.

**CONCLUSIONS**

TAPP is a feasible method for the treating of bilateral hernia. Much more the laparoscopic exploration allows the intra operative diagnosis of other associated hernias. The anatomic landmarks are easily recognizable and the learning curve could be shortened. The postoperative recovery is rapid and the patient can quicker return to his normal activity; in this way, the day surgery could be considered.

**REFERENCES**


1 Cohort or case–control studies of low quality.


