Single incision versus conventional laparoscopic trans-abdominal pre-peritoneal inguinal hernia repair: prospective study

Thesis
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By

Ahmed Medhat Ahmed Mokhtar
M.B.B.CH., MS
AIN SHAMS UNIVERSITY, CAIRO

Supervised by

Prof. Mohamed Emad Saleh
PROFESSOR OF GENERAL SURGERY
AIN SHAMS UNIVERSITY

Prof. Ashraf M. Fawzy Mahmoud
PROFESSOR OF GENERAL SURGERY
AIN SHAMS UNIVERSITY

Dr. Mohamed Mahfouz M. Omar
LECTURER OF GENERAL SURGERY
AIN SHAMS UNIVERSITY

Ain Shams University
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Introduction

Inguinal hernias are commonly met surgical conditions; large numbers of them are repaired every year in all world countries. This was not possible until anaesthesia became available in the 19th century, when true anatomical procedures could be performed (**Wall et al., 2008).**

Inguinal hernia repair is one of the most common surgical procedures worldwide, at least 2000000 hernia repair procedures are annually performed **(Leroy, 2001).**

For about 100 years the Bassini operation, with its many eponymous variants in Europe, Britain and North America, were the mainstay of hernia repair. The results slowly improved with the development of better materials, but the recurrence rate has remained at about 15% (35% for recurrent hernia). In 1987, Lichtenstein introduced the tension-free mesh repair, with a much reduced recurrence rate of 0.2% **(Lichtenstein et al., 1993)**.

The first attempts at laparoscopic repair by Ger, involved repairing the internal inguinal ring with clips and later with a special suturing device. This was not an anatomical repair and did not do anything about any generalized inguinal weakness **(Ger, 1991)**.

Since the early 1990s, the laparoscopic approach to inguinal hernia repair using three ports has gained increased popularity worldwide(**Agrawal et al., 2010).**

Laparoscopic surgery has been a well-established alternative to open counterpart **(Tai et al., 2010).**

Laparoscopic hernia repair is not more expensive than open repair in terms of direct hospital costs or where a difference exists, this is relatively small. Societal costs due quicker recovery and return to daily activities and work, show clear advantages for the laparoscopic repair and although not currently evaluated in detail, the reduction in chronic groin pain after laparoscopic repair is likely to lead to savings in both direct hospital costs and societal costs **(Snehal et al., 2008).**

In the early 1990's Phillips and McKernan described the totally extraperitoneal (TEP) technique of endoscopic hernioplasty where the peritoneal cavity is not breached and the entire dissection is performed bluntly in the extraperitoneal space with a balloon device or the tip of the laparoscope itself **(Snehal et al., 2008).**

TEP is different in that the peritoneal cavity is not entered and mesh is used to seal the hernia from outside the peritoneum. This approach is considered to be more difficult than TAPP, not feasible in patients with previous abdominal operations, and not applicable for incarcerated hernia but may lessen the risks of

damage to the internal organs and of adhesion formation which has been linked to TAPP **(McCormack et al., 2005).**

Around the same time Arregui and Doin described the transabdominal pre-peritoneal repair (TAPP), where the abdominal cavity is first entered, peritoneum over the posterior wall of the inguinal canal is incised to enter into the avascular preperitoneal plane which is adequately dissected to place a large mesh over the hernial orifices. After fixation of the mesh, the peritoneum is carefully sutured or stapled **(Snehal et al., 2008).**

However some surgeons prefer TAPP because the initial laparoscopy (before dissection) immediately shows the full anatomy and pathology on both sides, It is feasible for incarcerated or strangulated hernias, identifying missed additional direct, femoral hernia or other rare inguinal herniae as paravesical hernia (**Wall et al., 2008).**

Both laparoscopic techniques are similar in term of duration of operation, length of hospital stay, time to return to usual activities and recurrence **(Simons et al., 2009).**

The choice of laparoscopic approach (Trans Abdominal Pre-Peritoneal (TAPP) versus the Totally Extra Peritoneal (TEP)) is still controversial for using the laparoscopic technique **(McCormack et al., 2005).**

Single port access (SPA) surgery is a rapidly evolving field. SPA offers cosmetic advantage compared with standard multiple access laparoscopic procedure **(Buscher et al., 2008).**

Performing laparoscopic operations through one single skin incision has recently emerged as a possible alternative to conventional laparoscopy in a variety of surgical cases (**Piskun and Rajpal , 1999).**

The SILS hernia repair using an access port device is feasible and may offer patients a novel method to have their inguinal hernias repaired (**Jacob et al., 2009).**

The main point for reducing the number of incisions is not only the cosmetic advantage but also lowered incision risks, as wound infection, morbidity of bleeding, incisional hernia, and organ damage **(Tacchino et al., 2009)**.

Whether or not there are any benefits of SILS for TAPP inguinal hernia repair over the conventional TAPP laparoscopic approach certainly remains debatable (**Jacob et al., 2009).**

So far, no published data of ongoing studies comparing SILS TAPP inguinal hernia repair with the conventional laparoscopic TAPP inguinal hernia repair.

Aim of the Work

This prospective randomized trial aims at conducting a comparing single incision versus conventional laparoscopic trans-abdominal pre-peritoneal inguinal hernia repair.

Surgical Anatomy

"No disease of the human body, belonging to the province of the surgeon, requires in its treatment, a better combination of accurate, anatomical knowledge with surgical skill than Hernia in all its varieties**":** Sir Astley Paston Cooper, 1804 ***(Read, 2002).***

❖ Tissue layers of the groin:

The lower abdominal wall is composed of several layers, each placed on top of the other from the peritoneum outward to the skin, similar to the layers of an onion ***(Flament et al., 2001).***

📖**The layers of the lower abdominal wall include the following** :

1. The Skin.
2. Superficial fascia (Camper's &Scarpa's).
3. Innominate fascia (Gallaudet). This may not always recognized as a distinct entity.
4. External oblique aponeurosis including the inguinal, lacunar and reflected inguinal ligament.
5. Internal oblique muscle.

6. Transversus abdominis muscle and aponeurosis modified to conjoint tendon (Falx Inguinale).
7. Transversalis fascia associated with the pectineal ligament (Cooper), iliopubic tract, transversalis fascia sling and the deep inguinal ring.
8. Preperitoneal connective tissue and fat.
9. Peritoneum ***(Skandalakis et al., 2004)***

Abdominal Skin

- **Langer lines**

As elsewhere on the human body, the abdominal skin is transgressed by Langer lines, also called cleavage lines. This is a term used to define the direction within the skin along which the skin has the least flexibility and corresponds to the alignment of the collagen fibers within the dermis. Across the superior half of the anterior abdominal skin, these lines are oriented in a transverse direction. Toward the inferior half of the abdominal skin, these lines begin to assume a slightly more oblique course in an inferior medial direction toward the groin, paralleling the inguinal crease.

- **Innervation**

The abdominal skin is innervated in a segmental pattern by the anterior rami of the T7-L1 thoracoabdominal nerves. T7-T9 thoracoabdominal nerves innervate the skin above the umbilicus; T10 thoracoabdominal nerves innervates the skin around the umbilicus; and T11 thoracoabdominal nerves plus cutaneous branches of the subcostal (T12), iliohypogastric, and ilioinguinal (L1) nerves supply the skin inferior to the umbilicus**(Moore et al., 2011).**

- **Superficial Fascia**

The superficial fascia of the abdominal wall is the next layer encountered just deep to the skin. It consists of connective tissue that contains a variable amount of fat. This layer can vary in thickness from less than 1 cm to greater than 15 cm, depending on a person's body habitus ***(Spitz and Arregui, 2001).***

- **Camper and Scarpa fasciae**

Superior to the umbilicus, the superficial fascia consists of a single layer. Inferior to the umbilicus, it splits into 2 layers. The more superficial and fatty layer is the Camper fascia. The deeper, more fibrous layer is the Scarpa fascia. The Scarpa fascia contains very little fat and is continuous with both the superficial fascia of