Lightweight Partially Absorbable Monofilament Mesh (Polypropylene/Poliglecaprone 25) for TAPP Inguinal Hernia Repair

Initial Experience

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Objective: An ideal mesh should produce slight foreign-body reactions and be compatible with the human organisms. Studies focusing on these aspects indicate that the use of mesh with less nonabsorbable material may reduce postoperative complications, insofar the web structure and its rigidity play an important role in compatibility. We evaluated retrospectively the patients of the past 1 year, who underwent laparoscopic transabdominal preperitoneal (TAPP) hernioplasty (without the use any trocar and/or instrument of 10 mm in diameter) focusing attention on the feasibility of the technique and on the incidence of complications, especially those possibly related to the new type of mesh implanted.

Methods: Between June 2004 and September 2005, 76 patients have been operated on by using TAPP hernioplasty (bilateral or unilateral) without any 10 mm instrument/optic/trocar, and by applying a lightweight composite mesh fixed by ''glues'' (fibrin sealant and *N*-butyl 2-cyanoacrylate).

Results: The mean overall operative time was 55.57 (± 15.2) minutes. All the procedures have been performed on a day surgery basis. We have registered any kind of major or minor morbidity (early or late), relapse, prosthesis rejection, and/or infection. We have registered no severe pain at 10 days; whereas a mild pain is still reported in 10.5% of our cases at a 3-month follow-up. The mean follow-up is 12.4 (± 5.1; range 4 to 19) months.

Conclusions: On the basis of this our initial experience, TAPP hernioplasty with a lightweight composite mesh is feasible, effective, and easy to perform by experienced hands, with good results. The well-known characteristics of a mini-invasive and gentle approach, together with the type of mesh implanted and its fixation of related glues, might explain the encouraging results of our experience.

Key Words: inguinal hernia, TAPP repair, lightweight mesh, biocompatibility, chronic pain, sealant

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With improved techniques in hernia surgery, the emphasis for research has rightly shifted from recurrence to the effects on quality of life.[1–6] Chronic groin pain after inguinal hernia repair is well recognized and known to be of multiple potential etiology (nerve/tissue injury, biomaterial used; patient's insurance status and so on).[7–14] Clinical studies show that the results of endoscopic hernia repair might also depend on the type of mesh implanted too.[15–22] The ideal meshes should produce slight foreign body reaction and be compatible with the human organism (to reduce paresthesia, hematoma, seroma, and infection).[15] Studies focusing on these aspects indicate that the use of mesh with less nonresorbable material may reduce postoperative complications, insofar as the web structure and its rigidity play an important role in compatibility.[15–17,19–23] Recent experiences with a new type of low-weight mesh with an anterior approach have yielded favorable results.[16,19–22] In this report, we evaluated retrospectively the early 1-year experience, with a lightweight partially absorbable monofilament mesh (polypropylene/poliglecaprone 25), of surgeons at 2 Community hospitals in Italy for transabdominal preperitoneal (TAPP) laparoscopic inguinal repair, focusing the attention on the feasibility of the technique (defined as the ratio between successful to total attempts—primary end points) and on the incidence of complications, especially those possibly related to the new type of mesh implanted (minor complications were defined as those that did not influence the length of the postoperative hospital stay, whereas major complications were defined as those leading to mortality, those requiring conversion to ''classic'' laparoscopy/open surgery or reintervention, and those leading to prolongation of the

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hospital stay). Secondary end points were the evaluation of chronic groin pain (defined as one of any degree, which significantly interferes with normal daily activities) after hernia repair with the TAPP technique and the implantation of an light weight mesh (which was measured on a visual analog scale ranging from 0, no pain to 10, unbearable pain), physical activity, and return to work. According to the Medline survey, this is the first-time result of laparoscopic day-surgery hernia repair with a lightweight partially absorbable monofilament mesh (polypropylene/poliglecaprone 25) (Ultrapro*-Ethicon Products).

MATERIALS AND METHODS

Between June 2004 and September 2005, a total of 76 patients at ''Civil Hospital'' in Vittorio Veneto (TV) and at the ''E. Bassini'' Hospital in Cinisello Balsamo (MI), underwent laparoscopic inguinal hernia repair with a lightweight partially absorbable monofilament mesh (polypropylene/poliglecaprone 25). The preoperative workup (chest x-rays, electrokardiogram, and routine blood tests) was the same as with any laparoscopic procedure and all the patients had elective surgery. There were 68 men and 8 women, with a median age of 45 years (range 14 to 83 y). Globally 56 patients had bilateral hernias (10 of them showing unilateral recurrent disease); 20 patients had unilateral hernia (14 patients having a recurrent disease).

A total of 132 patients with hernia have been considered for evaluation. Moreover, in 6 patients, suffering from concomitant associated pathologies, the following procedures were performed in the same setting: 4 cholecystectomies and 2 abdominal postincisional ventral hernia repairs.

All the patients have been visited and interviewed, on a scheduled basis, at 10 postoperative days, 2 months, and 12 months after the procedures (for the purpose of this report, all the patients have been visited and interviewed again, without any regard to the scheduled follow-up period, just before writing down the findings).

TECHNICAL ASPECTS

All the interventions were performed by the preperitoneal transabdominal approach by 2 experienced surgical teams. The surgical technique was similar in all the principal phases, to the technique already described and was according to the standard transabdominal preperitoneal laparoscopic procedure. We did not use the 10-mm trocars, but only 5-mm trocars in 36 cases, (47%) of patients with a 5 mm optic. In the remaining 40 (52.6%) patients, we used one 5-mm trocar and plus two 3-mm trocars and with a 3 mm optic). In this series, we used a 10×15 cm monocryl-prolene-composite mesh (Ultrapro* mesh-Ethicon Products) for sufficient medial and lateral overlap to avoid recurrence; this was fixed using a fibrin sealant (Tissucol, Baxter AG, Vienna, Austria) in 40 patients (52.6% of the cases) and an *N*-butyl 2-cyanoacrylate glue (Glubran 2, GEM, Viareggio, Italy) in the remaining. Both the sealants, once the mesh was correctly placed over the inguinal area, were spread over its lower border from the Cooper's ligament to the psoas muscle.

RESULTS

The overall mean operative time was 55.57 ($\pm$ 15.2) minutes. All the procedures were carried out on a day surgery basis. There were no conversions to open repair or deaths in our series. We have registered any kind of major or minor morbidity (early or late), relapse, and any sign of mesh-related complications (prosthesis rejection and/or infection and so on). The mean follow-up was 12.4 months ($\pm$ 5.1) and the range was 4 to 19 months.

All the patients were seen at the scheduled follow-up. None of them reported severe pain at 10 days; whereas 10.5% (8 patients) still reported mild pain at the 3-month follow-up. There were no reports of night pain at 30 days. About 90% of the patients had a return to physical-work capacity within 7 days, the remaining within a maximum of 14 days. We had no reports of feelings of stiffness or foreign bodies at follow-up. All patients reported complete satisfaction at the 3-month follow-up.

DISCUSSION

The optimal approach and technique for performing inguinal-hernia repair are still debated. Laparoscopic TAPP approach is documented as an excellent choice in numerous studies, especially when the surgeon is experienced.[24–28]

Physical characteristics, such as weight, size of surface, pores, and structure of mesh, together with its chemical properties, seem also to have a greater influence on the postoperative complications (shrinkage, migration, infection, nerve damage, and so on) and to improve quality of life of the patients.[15,17,18,22] It is reported in the literature that lightweight meshes are less antigen and are therefore more comfortable for patients and also that if the groin pain is chronic, it is considered to be of multiple potential etiology (with an increasing speculation about its causes!). The implantation of a heavy mesh, may, therefore lead to more pain and restriction in daily activities.[16,19–21,23] On the surgeon's side, a mesh should be smooth, stiff, and wide enough to cover all possible defects, easy to handle and, should have, especially for its possible use in laparoscopy a certain degree of transparency (to allow a clear visualization of the anatomy) and thickness, enough to let it pass through a 5 mm trocar when rolled up (the ''idea'' of performing a laparoscopic approach in the treatment of hernia disease, without using any 10 mm trocars, comes from the unnecessary removal of any specimen, which would need a bigger trocar and incision as in the case of cholecystectomy).[29]

The mesh that we have used in this early experience showed all these properties, and this experience supports the hypothesis that reducing the amount of mesh left in situ after laparoscopic inguinal-hernia repair ameliorates

the well-known results of the minimally invasive approach concerning the long-term pain.[16,19–21] The situation shows the relative success with a lightweight and smooth mesh of polypropylene and the role of polyglecaprone 25 in optimizing the healing and in the inclusion of the mesh into the tissue.[16] Another point of interest is its pores: apart from their importance for a better biocompatibility of the mesh, wider pores (about 3 mm in diameter) allow us to use sealants (both fibrin and or cyanoacrylate) by just spreading them over the mesh (owing to the capability of the sealant both to pass through the pores and to reach the tissue beneath), without any need to move the mesh once it is correctly positioned.

About this last point (mesh fixation), stapling of the mesh is one of the most evocated mechanisms, in the multiple potential etiologies of the symptoms, as a cause of chronic pain after hernia surgery. Fibrin and cyanoacrylate glue seem to have achieved both efficiency and security of mesh fixation, and are obviously potentially less harmful than stapling the mesh.[30–33]

CONCLUSIONS

On the basis of our initial experience, TAPP hernioplasty with instruments/trocars and optics ≤ 5 mm in diameter and with a lightweight composite mesh (Ultrapro* mesh-Ethicon Products) is feasible, effective, and easy to perform by experienced hands with results comparable to those of classic laparoscopy. Most of the advantages of laparoscopy rely on the minimal access and, as a consequence, the benefits of this technique will become greater as the access becomes smaller. Sparing patients a wider skin incision in the trocars site (10 mm, for example) might reduce postoperative pain, increase prompt recovery of gastrointestinal functions, shorten hospitalization, help contain health-care costs, and increase cosmetic benefits. In our view, these characteristics, together with the ''glues'' fixation and the type of mesh implanted—lightweight partially absorbable monofilament mesh (polypropylene/poliglecaprone 25) (Ultrapro* mesh-Ethicon Products), which uses considerably less material, and which seems to offer improved biocompatibility coupled with good handling and fixing properties—might explain the encouraging results of our experience.

Of course, longer follow-up periods and, especially, prospective randomized and controlled trials are needed to eventually confirm these good results.

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