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Histoacryl Glue versus Polypropylene Suture Mesh Fixation in Lichtenstein Inguinal Hernioplasty

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ABSTRACT

Background: Inguinal hernia repair is one of the most common operations in general surgery. The Lichtenstein tension-free operation has become gold standard in open inguinal hernia repair. Despite the low recurrence rates; pain and discomfort remain a problem for a large number of patients. **Aim:** This study was to compare suture fixation vs. histoacryl sealing using a monofilament prolene mesh. **Patient and Methods**: A total of 100 patients randomly underwent primary inguinal hernia Lichtenstein repair fixing the mesh by prolene suture or by histoacryl; in both cases the mesh was fixed to the posterior wall of the inguinal canal and to the inguinal ligament. Follow-up time was 6 months. **Results:** Significantly, less postoperative pain was reported in histoacyl sealant group compared to the suture group Additionally, trends toward a higher postoperative quality of life, a faster surgical procedure, and a shorter hospital stay were seen in the sealant group. **Conclusion:** A widespread technique for the treatment of inguinal hernia is the application of a mesh using Lichtenstein procedure, the prosthesis can be fixed by traditional suture or using a new method of sutureless fixation with adhesive materials that shows an excellent local tolerability and lack of adverse effects and contraindications.

Keywords: Polypropylene mesh, Lichtenstein inguinal hernioplasty, histoacryl, postoperative pain, quality of life.

INTRODUCATION

Inguinal hernia repair is one of the most common surgical operations in general surgery. Inguinal hernia repair surgery is a continuous evolving field due to the elevated incidence of disease in the population and the difference of satisfaction reported from patients after surgery (Lichtenstein *et al*., 1989, Keng and Bucknall 1998, Farion *et al*., 2002, Malangoni *et al*.,2004, Maione *et al*., 2006, Amato *et al*., 2009, Smietannski *et al*., 2012 and Colvin *et al*., 2013). Since, their introduction in clinical use, meshes became to be used in more different applications, up to

repair of post- incisional hernias following renal transplanta-tion: when prostheses are correctly handled, their safety is confirmed even in transplanted patients (Farion *et al*., 2002, Malangoni *et al*., 2004, Maione *et al*., 2006).

Lichtenstein "tension-free" hernioplasty, described for the first time in 1989, became a widely accepted method due to its safety, easiness of learning and low recurrence rate (Timerbulatory *et al*., 2011 and Fortelny *et al*., 2012). Lichtenstein open tension-free mesh augmented repair postoperative pain and chronic postoperative pain syndromes still remain a problem (Just *et al*., 2010, Paajanen and Varjo 2010).

The reports concerning application of glues in inguinal hernia repair are growing in number. In the first preliminary report, Canonico *et al*. (2005) showed the efficacy of mesh fixation with glue, and indicated the viability of a sutureless Lichtenstein procedure. We report our experience of glue mesh fixation compared to tradition fixation in hernia repair surgery (Hartrick *et al*., 2003, Canonico *et al*., 2005, Hidalgo *et al*., 2005, Just *et al*., 2010, Paajanen and Varjo 2010, Ferreira-Valente *et al*., 2011, Hjermstad *et al*. 2011).

PATIENTS AND METHODS

This prospective observational study was carried out between May 2013 and May 2015 in Zagazig university hospitals. 100 consecutive patients underwent surgical operation for primary unilateral inguinal hernia repair. These were randomized either to the group (A group: mesh was secured with histoacryl and group B: mesh was fixed with 3/0 polypropylene suture). The use of sutures or histoacryl was dependent on a blind draw of type of fixation at time of operation.

Inclusion criteria:

1. Patients are above 18 years and below 60 years.
2. Patients fit for surgery with all organs functions within acceptable ranges.
3. All patients who are mentally oriented and consented for joining this research study.

Exclusion criteria:

1. Recurrent and femoral hernia.
2. Metaboic diseases (diabetes and obesity).
3. Patients with oral anticoagulant treatment.

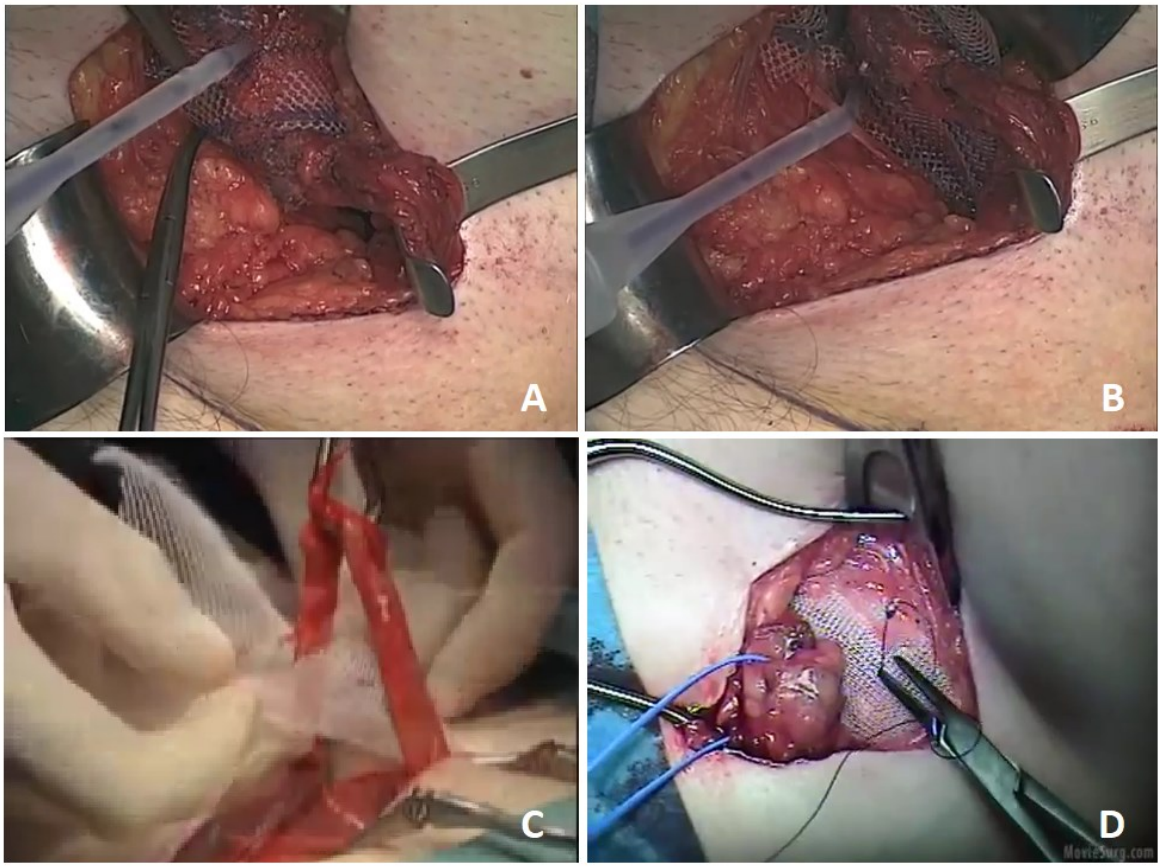

Figure 1A & B: Glue fixation. C & D: Suture mesh fixation

Preoperative care:
Complete preoperative laboratory investigations were ordered. Patients were not allowed to undergo the operation unless their investigations were within acceptable range.

Technique:
All surgical procedures were performed under spinal anaesthesia. Into the A group hernia repair was perfor-med as described by Lichtenstein. The mesh was fixed to the posterior wall of the inguinal canal and to the inguinal ligament by applying the histoacryl over the mesh surface, respectively the edges of external aponeurosis were approximated and the histoacryl was applied to allow the complete closure.

Into the B group, the mesh was fixed to the posterior wall of the inguinal canal and to the inguinal ligament by a running 3/0 polypropylene and interrupted 3/0 to the inguinal ligament and to the internal oblique and transverse muscles, respectively. After repositi-oning the Scarpa's fascia, the skin was closed with a subcuticular absorbable suture 3/0 Vicryl (Figure 1).

All the patients were discharged the same day of the surgical procedure and were reviewed at 7 days, 1, 3 and 6 months after surgery. For all the patients the following parameters were recorded: the operative time, the intra-operative and post-operative complica-tions, the first and seventh postoperative day's pain, the persistent pain and the recurrences.

Statistical analysis:
Data were analyzed using Excel and SPSS (Statistical Package forSocial Science, Bristol University, UK) version 16 under Microsoft Windows. The description of data was in the form of mean ± SD for quantitative data and frequency and proportion for qualitative data. The analysis of data was carried out to test the statistically significant difference between groups. The Student t-test was used to compare quantitative data (mean ± SD) between two groups. P values less than 0.05 were considered significant. OD was considered if Wexner score was more than 5. Significant improve-ment in OD or FI was considered as a reduction in Wexner or Pescatori score of at least 25%.

RESULTS

The A group included 55 patients and the B group included 45. Indirect hernia were recognized in 40 and 30, direct in 15 and 15 patients of the A group and B, respectively. The mean ± SD of age was 55.10 ± 5.35 years into the A group, and 52.94 ± 4.89 years into the B group. The skin-to-skin operative time was 51.6 ± 6.27 minutes and 48.89 ± 5.71 minutes into the B group and A, respectively. All patients were discharged 5-6 hours after surgery and none of them required readmission to hospital.

Seven days after the surgical procedure 3 patients from the A group and 7 patients from the B group developed a small seroma that was eventually evacua-ted by percutaneous puncture. 1 patient into the A group and 3 patients into the B group developed wound infection, whereas none of patients of the A group and 3 of the patients of the B group developed mesh rejection at 6 months from surgery. At 6 months, no recurrence or late complications, such as scar immobility, fibrosis, neuralgia or scrotal hyperes-thesia, were observed (Table 1).

Table 1: Demographic characteristics of patients and complications

	Group A	Group B	P
Total number of patients	55	45	-
Age (mean ± SD)	25.1 ±5.35	22.94±4.89	ns
Patients with indirect hernia	40	30	-
Patients with direct hernia	15	15	-
Number of patients with seroma at 7 days following surgery	3	7	-
Number of patients with mesh infection at 6 months	1	3	-
Patients with mesh rejection at 6 months	0	3	-

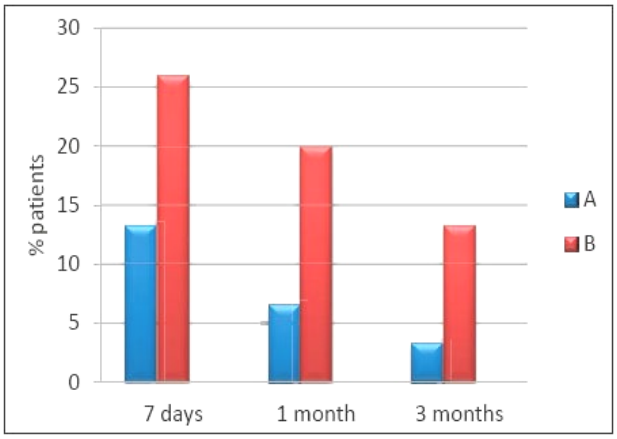

Figure 2: Comparative diagram of pain in studied groups.

The statistical analysis showed no significance in term of age or operative time for both the groups. Pain assessment during follow-up resulted lower for the A group at 7 days ($p< 0.05$) and at 3 months compared to the B group ($p < 0.05$) showing instead none differences at 6 months ($p>0.05$) (Figure 2).

DISCUSSION

The introduction of Histoacryl in the late 1960s was a revolution for tissue glue. The tissue adhesive made it possible to close small wounds without suturing. The wide use of tissue glue reflects the continuing popularity and high level of acceptance of Histoacryl as an alternative to sutures (Quinn *et al*., 1993).

The prospective, observational, randomized study we present compared the glue mesh fixation versus conventional sutures for inguinal hernia repair according to Lichtenstein. The postoperative pain occurrence during the first months following open inguinal hernia surgery shows a high prevalence, causing in some cases, severe limitation to daily activities and/or keep patients away from their work (Farion *et al*., 2002, Malangoni *et al*., 2004, Maione *et al*., 2006, Amato *et al*., 2009, Smietannski *et al*., 2012 and Colvin *et al*., 2013).

The method of mesh fixation is currently considered (when surgical technique is well performed) a crucial factor from which it depends the chronic pain syndrome (Gagliese *et al*., 2005).

At initial follow-up assessments, the patients in the glue study group reported a lower pain score assessments basing in term of less pain, numbness, and discomfort compared to the patients into the sutures group for the whole period of observation. At 6 months we observed no recurrence or late complications, such as scar immobility, fibrosis, neuralgia or scrotal hyperesthesia for both the groups. Interesting and consistent to other authors' findings in the first month - the period time in which patients experienced the bigger discomforts and reduction of quality of life - we found an advantage in using the histoacryl compared to the traditional mesh fixation.

Several studies have already demonstrated the effect of histoacryl for hernia repair surgery. The use of biological glues is safe and they are currently applied in different medical applications (Williamson & Hoggart 2005, Companelli *et al*., 2008, Albala & Lawson 2010 Nowobilski *et al*., 2010 and Spotnitz 2010). The histoacryl is an effective adhesive, it possesses an excellent local tolerability and lack of adverse effects and contraindications (Spotnitz 2010).

During follow-up period, no complications or early recurrences were observed. Furthermore, the Authors underlined better results in the group with glue application, in terms of pain and local numbness. The reason for the lower postoperative pain may be the scarce irritating potential of the adhesive material and a lower tissue tension or nerve compression, as it may be caused by fixing sutures.

They observed that the duration and the cost of the surgical procedure were similar in suture and adhesive group. They emphasized the strong tendency to earlier return to daily activities of patients in adhesive group.

Our data confirm that histoacryl is suitable for use in open tension- free inguinal hernia repairs. However, after 7 days follow-up we observed 10 seromas (5 into the A group and 5 into the B group) but probably these were related to a local inflammation. No complications regarding the spermatic cord were observed because, as the genito-femoral nerve, it was lifted in order to avoid any direct contact until the glue was dried. The mean operative time instead not showed significant difference compared to the classic Lichtenstein technique.

CONCLUSION

Using Histoacryl glue in mesh fixation could substitute the suture fixation in consideration of the reduction of postoperative pain and the efficacy in mesh fixation. The slight increase in costs is balanced by an overall improvement of the quality of life and an early return to daily activity and work, thus reducing the days of sickness from work. In conclusion, this study demonstrates that sealant mesh fixation is well tolerated and effective in reducing postoperative pain and improving postoperative quality of life.

Conflicts of interest: The authors stated that no conflicts of interest.

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