

# Chemical Fixation of Mesh in Repair of Inguinal Hernia: Long Term Follow Up

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## ABSTRACT

**Background:** Repair of inguinal hernia is the most widely disseminated operation in general surgery, because of high incidence of occurrence, and high incidence of complications. Lichtenstein Tension free in repair of Open Inguinal Hernia remains the golden technique for repair as it has the least number of complications and least incidence of recurrence. But fixation of mesh is still challenge in early and late post-operative period, namely as regard pain which remain long lasting for a very long period. One of factors of occurrence of pain possibly due to entrapment of nerve or nerve compression by sutures during fixation of upper border of the mesh. Also, it may be due to periosteal reaction to sutures fixed to the periosteum. Other explanations, due to excessive tension on muscles, causing its ischemia. Hence many surgeons resort to alternative for mesh fixators, so one of these alternatives was fixation by Cyanoacrylate.

**Aim:** Aiming to study the effectiveness of Cyanoacrylate as fixator of mesh in repair of inguinal hernia, as regard post-operative pain, hospital stay, time of mesh fixation, post-operative pain, hospital stay, and recurrence of hernia. In long term follow up.

**Conclusion:** The application of cyanoacrylate as fixator in Lichtenstein inguinal hernia repair looks like a golden method for mesh fixation as it is safe, simple, less operative time, less hospital stay with less complications as regard marked reduction in postoperative pain in both short and long post-operative follow up.

## Introduction

Inguinal hernia repair is one of the most common general surgical operations performed worldwide. More than a million inguinal hernia repairs are performed annually in the United States and Europe alone [1]. The Lichtenstein technique is the method of open repair most widely disseminated for treatment of inguinal hernia, with which the incidence of recurrence has been remarkably reduced, as we know this fact has been the most important quality index in inguinal hernia repair [2].

## Objectives

More detailed information on cyanoacrylate in mesh fixation on lichtenstein tension free in repair of open inguinal hernia regard as postoperative pain, infection, recurrence, & cost benefit. Long term Follow up.

## Patients and Methods

The first study was conducted in Department of Surgery, AL-Hussein university Hospital, Al-Azhar University (Cairo) in the period from November 2017 to July 2018.3 followed by another study for long term follow up one year.

The Study at first was conducted on 10 patients, and was short term follow up but later on, the study increased to be long term follow up in period from November 2017 to November 2020. An informed consent was taken from all patients with a follow up period up to 3 year. The study was approved by the appropriate ethical authority of the hospital. Inclusion criteria: Patients are between 22 years and below 60 years, patients fit for surgery.

**Exclusion Criteria:** Bilateral and/or recurrent hernia, femoral hernia, emergency presentation, unfit for surgery or suffering from associated acute or chronic illness.

## Technique

Lichtenstein Tension free in repair of Open Inguinal Hernia but with Cyanoacrylate glue which was applied using specially syringe to cover the whole surface of the mesh using minimal amount of the glue (0.5-2ml); glue could be applied as drops at interrupted points over conjoint tendon, inguinal ligament and pubic tubercle. Lateral to the spermatic cord, the upper part of the mesh was flipped over the lower one and they were joined with one polypropylene stitch. The mesh was compressed against the inguinal floor for about 2 min.

## Statistical analysis

The results were statistically analyzed. Data were fed to the computer and analyzed using IBM SPSS software package version 20.0.(Armonk, NY: IBM Corp). Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution, quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 5% level. The used tests were Chi-square test: For categorical variables, to compare between different groups. Monte Carlo correction: Correction for chi-square when more than 20% of the cells have expected count less than 5. F-test (ANOVA): For normally distributed quantitative variables, to compare between more than two groups, and Post Hoc test (Turkey) for pairwise comparisons. Kruskal Wallis test: For abnormally distributed quantitative variables, to compare between more than two studied groups.

## Results

This study was a prospective, randomized. It was held in Department of Surgery, AL-Hussein university hospital, Al-Azhar University (Cairo) on 10 cases who were attendant to outpatient surgery clinic for elective repair of uncomplicated inguinal hernia. Using Prolene® mesh. Patients underwent inguinal hernioplasty with mesh fixation using (Cyanoacrylate) glue, their age ranged from 25-60 years with a mean of  $40.30 \pm 13.04$  and a median of 39.50. 70% had a right-side hernia while 30% had a left side one. 80% had an indirect inguinal hernia while 20% had a direct inguinal hernia. 10% had a history of other side hernia repair with Prolene® mesh. the time ranged from 2.0 – 6.0 minutes with a mean of  $4.0 \pm 1.33$  and a median of 4.0. The technical difficulties, was encountered in only 10%, was obese and had disturbed anatomy. The overall operative time for this patient was 80 minutes while time needed for mesh fixation was 4 minutes. The surgeon recorded being unsatisfied in 10% earlier in the study when he was still not so familiar with the glue used for fixation which adheres tightly and rapidly to the underlying tissues making any trial for re-positioning was quite difficult.

In this case we used two ampoules of glue for fixation. The Cremasteric muscle was cut in 30% for better positioning of the mesh. The two nerves (Ilio-inguinal and genital branch of Genito-femoral nerve) were identified and preserved in 80% while accidental cutting of the Ilioinguinal nerve occurred in two patients 10%. while clear identification of the two nerves failed in only 10%. The post wall was weak and required a repair in 30%. As regard to pain, evaluation of the post-operative pain was done using the VAS the pain score in the first post-operative day ranged from 2.0 – 4.0 with a mean of  $2.60 \pm 0.70$  and a median of 2.50. The pain score in two weeks post-operative ranged from 1.0 – 3.0 with a mean of  $2.30 \pm 0.82$  and a median of 2.50. The pain score in one-month post-operative ranged from 0.0 – 4.0 with a mean of  $1.90 \pm 0.99$  and a median of 2.0. The pain score in two months post-operative day ranged from 0.0 – 0.0 with a mean of 0.0 – 0.0 and a median of 0.0. After long term follow up, the results do not change as pain score ranged from 0.0 – 0.0 with a mean of 0.0 – 0.0 and a median of 0.0. every year for 3 years and no recurrence occur. No additive analgesia needed in early post-operative period. 100% showed a gradual improvement of pain and became a pain free by the 2nd month post-operative. As regards to the hospital stay, ranged from 6.0 – 12.0 hour with a mean of  $9.30 \pm 2.45$  and a median of 10.0.

## Discussion

There has been increasing evidence in the literature over the last decade regarding the growing incidence of chronic groin pain. The exact cause for the pain is still unclear and various etiologies have been suggested, including the type of mesh, suture materials and tissue handling techniques [4]. The successful use of cyanoacrylate in the different surgical disciplines was the motive to perform such a prospective, randomized controlled study to compare the efficacy of mesh fixation by cyanoacrylate, sutureless and polypropylene suture for one day surgery of open inguinal hernia repair and all patients were re-examined using a standardized questionnaire at 1 week, 30 days, 3 months and 6 months after surgery. Regarding the type of mesh fixation, recent literatures review to establish an evidence base for cyanoacrylate glue in mesh fixation and based on this evidence several studies have eliminated the use of sutures in mesh fixation to reduce chronic groin pain, this aims to avoid direct nerve irritation or nerve entrapment. On the other hand, mesh fixation with glue (tissue adhesive) seems an optimal choice to reduce postoperative pain. Accordingly, preliminary results published with different glues all showed promising results with reduced postoperative pain [5]. There are two studies reported their preliminary results of cyanoacrylate glue versus the use of sutureless method for mesh fixation in Lichtenstein repair; After 3 months, no recurrence was observed. Minor pain was observed after 3 weeks in 33% patients in the sutureless group and in 18% patients in the cyanoacrylate glue group, 3 months postoperatively 16% patients in the sutureless group and 5% patient in the cyanoacrylate glue group recorded minor pain. Local numbness

was documented in 60% vs. 44% patients 3 weeks postoperatively and in 40% vs. 25% patients 3 months postoperatively in the sutureless group and cyanoacrylate group, respectively [6-8]. Shorter surgery time may be beneficial in terms of overall cost and reduced infection rate. In our series, there were no reported cases with mesh infection [3].

## Conclusion

Finally, the application of cyanoacrylate as fixator in Lichtenstein inguinal hernia repair looks like a golden method for mesh fixation as it is safe, simple, less operative time, less hospital stays with less complications as regard marked reduction in postoperative pain in both short and long post-operative follow up. and can be used easily by any surgeon regardless the level of skills with no increase in the early or late recurrence rate. Of course, it will be of great value if larger, randomized, and controlled trial done to confirm the results of cyanoacrylate as fixator.

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