

Assessment Of Clinical Outcome Of Cyanoacrylate Glue Versus Suture Fixation Of Mesh In Ventral Hernia

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ABSTRACT

Ventral hernia repair (VHR) traditionally involves mesh placement to reinforce the abdominal wall. Current research attempts to evaluate the clinical results of cyanoacrylate glue versus conventional suture fixation for anchoring the mesh in VHR. The research evaluates both techniques regarding operative time span, postoperative pain, duration of hospitalization, complication incidence, as well as recurrence rates. Patients were assigned by randomization into 2 groups: one having cyanoacrylate glue fixation & other receiving suture fixation. Results indicate that cyanoacrylate glue significantly reduces operative time and postoperative pain, with no significant increase in recurrence or complications. The findings suggest that Cyanoacrylate glue is safe & effective alternative to sutures in mesh fixation, improving patient comfort and recovery while maintaining comparable outcomes in terms of hernia recurrence and complications. Additional research recommended to confirm long-term outcomes of CA glue fixation in hernia repair.

Keywords: fixation, complications, Results, cyanoacrylate

INTRODUCTION

Abdominal ventral hernias are characterized as non-inguinal, non-hiatal fascial anomalies in abdominal wall. Repairing such anomalies in abdominal wall is standard procedure performed by general surgeons. They may disrupt an individual's quality of life while, in certain situations, result in hospitalization or even mortality.^[1,2]

Long-term incidence rates of ventral incisional hernia following laparotomy have been found to be within 20-25 percent.^[3]

The aetiologies of a ventral hernia may be categorized as either acquired or congenital. Incisional hernia from previous trauma, surgery, & repetitive stress on inherently weak areas of abdominal wall have been prevalent reasons for acquired ventral hernias. Semilunar line, bilateral inguinal regions, umbilicus, ostomy sites, & oesophageal hiatus exemplify naturally occurring vulnerabilities in abdominal wall.

Hernia repair (HR) for primary as well as incisional hernias is among the most prevalent abdominal surgery performed at substantial price.

In this typical repair technique, the defect is reinforced or bridged by mesh positioned posterior to the fascia, whether in the retrorectus, preperitoneal, or intraperitoneal anatomical regions.^[4,5]

A cyanoacrylate glue mesh fixation has been created as a result of the mesh-related issues generated by sutures, namely prolonged postoperative discomfort.^[6]

Research done by Batinder et al. found the cyanoacrylate glue mesh fixation to be a potential treatment for VHR with classical mesh fixed with suture material.

Despite numerous studies on HR, research on the application of cyanoacrylate glue mesh fixation in patients undergoing VHR is limited, particularly in specified area of study. Consequently, this research aims to evaluate clinical outcomes of suture mesh fixation utilizing cyanoacrylate glue in open primary VHR.

Aim

To assess clinical outcomes of cyanoacrylate glue versus suture fixation of mesh in ventral hernia repair in tertiary care centre.

Objectives

To assess the clinical outcomes of cyanoacrylate glue in mesh fixation for ventral hernia repair concerning operative time, postoperative pain, incidence of seroma, and recurrence rate.

Type of the Study: Observational Cross-sectional study**Study Area:**

Department of **General Surgery**, Department of **Obstetrics & Gynaecology** and Department of **Emergency Medicine** of **Sree Balaji Medical College and Hospital**, Bharath University, Chennai, India.

Study population:

Patients attending the **out-patient** clinic and **in-patients** of the Department of **General Surgery**, Department of **Obstetrics & Gynaecology** and

Department of **Emergency Medicine** of Sree Balaji Medical College & Hospital.

Period of the study: 18 months (January 2023 to June 2024)

Sampling method: Purposive sampling.

Sample size:

Sample size calculation:

Hypothesized % frequency of results in a population (p): 4%

Confidence limits as % of 100 (d): 5%

Design effect: 1

$$n = [DEFF * Np(1-p)] / [(d^2 / Z^2_{1-\alpha/2} * (N-1) + p*(1-p)]$$

Total Sample Size (n): 102 patients

Data Analysis:

Data collected are tabulated and analyzed using IBM SPSS computer software package version 21. To determine statistical significance of investigated parameters on a categorical scale within two or more groups, chi-square test will be employed.

Inclusion criteria:

- Patient 18 year of age or older.
- Patients exhibited a non-incisional epigastric hernia, paraumbilical hernia, or umbilical hernia.
- Patients with hernial defects measuring less than 5 cm are included in this study.

Exclusion criteria:

- Patients exhibit divarication of the recti muscles
- Patients with complex hernias: irreducible, blocked, or strangulated hernias.
- Individuals with incisional hernia.

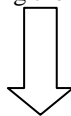
Operational definition:

Group A – Candidates for cyanoacrylate glue mesh fixation for ventral hernia

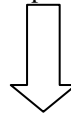
Group B – Candidates for polypropylene mesh secured with sutures for ventral hernia

Data collection process

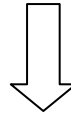
Patients presenting with ventral hernia and following the inclusion criteria and obtaining Informed consent



On basis of systematic random sampling study, participants divided into 2 groups



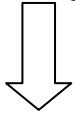
Group A patients undergoing cyanoacrylate glue mesh fixation



Group B patients undergoing conventional surgery



Demographic variables will be collected through Proforma.



History and physical examination done.



Assessment of clinical outcome in patients with cyanoacrylate glue mesh fixation (Group A)



Assessment of clinical outcome in polypropylene mesh secured with sutures for ventral hernia (Group B)



Comparison of clinical outcome in both the groups



Data are tabulated in MS-Excel



Data analysis in SPSS version 21

Patients following inclusion criteria & providing consent will be first divided into control and study group based on systematic random sampling (odds in group A and evens into group B) and subjected to clinical examination, demographic variable and other details are collected. Assessment of outcome will be monitored in group A comprising cyanoacrylate glue mesh fixation, whereas, for group B which underwent proline mesh fixed with sutures, clinical outcome would be assessed simultaneously, based on postoperative recovery, postoperative pain and decrease in hospital stay. The data will be collected, consolidated and conclusion drawn after statistical analysis.

Ethical issues

Institutional ethics review committee permission is required before the study can go forward. If a patient is interested in participating in the study, they were given written informed permission after being informed about the study's purpose and protocol in a language they could understand.

Statistical analysis

Data coded & entered into computer utilizing Microsoft Excel. The analysis will be conducted utilizing SPSS. Results will be displayed through descriptive statistics, & suitable significance test will be conducted at 99% confidence interval & 5% significance level. A statistically substantial P-value < 0.05.

Observations

Group A – cyanoacrylate glue mesh fixation

Group B - Mesh secured with sutures

Table 1: Age Distribution of Study Groups

Group	Number	S.D	Mean	t	P-value
Group-A	51	14.72	26.0	2.201	0.27
Group-B	51	14.72	26.0		

Two groups are comparable in age & sex.

Table 2: Comparison of procedure duration among study participants

Group	Number	S.D	Mean(min)	t	P value
Group-A	51	14.72	26.0	2.201	0.27
Group-B	51	14.72	26.0		

Two groups have comparable procedure durations.

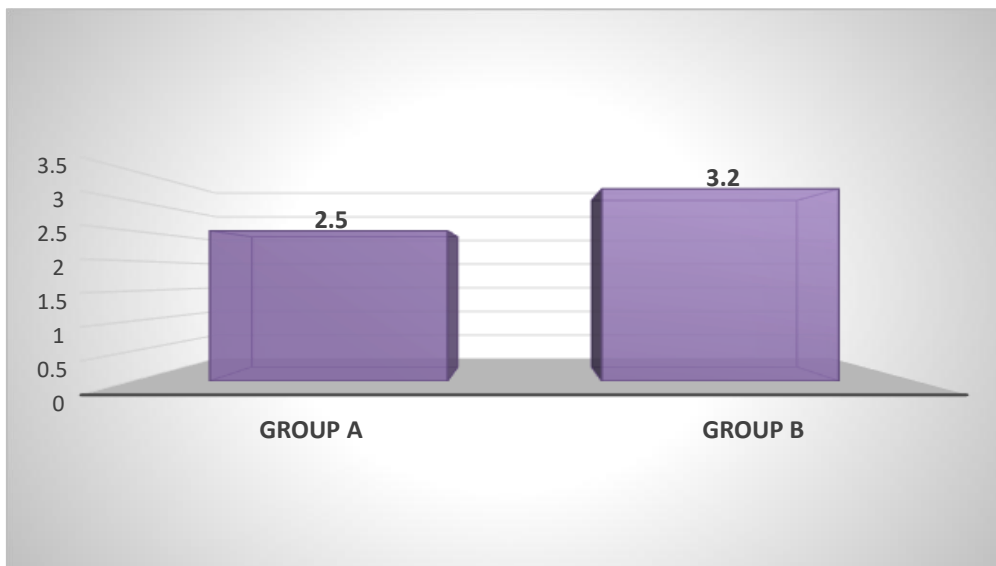


Figure 1: Mean duration of hospital stay in days among study participants

Table 3: Postoperative complications among study participants

Group	Present	Not present	Total	df	P value
Group A	7	44	51	1	0.03
Group B	14	37	51		
Total	21	81	102		

Table 4: Postoperative wound infection among study participants

Group	Present	Not present	Total	df	P value
Group A	0	51	51	1	0.04
Group B	1	50	51		
Total	1	101	102		

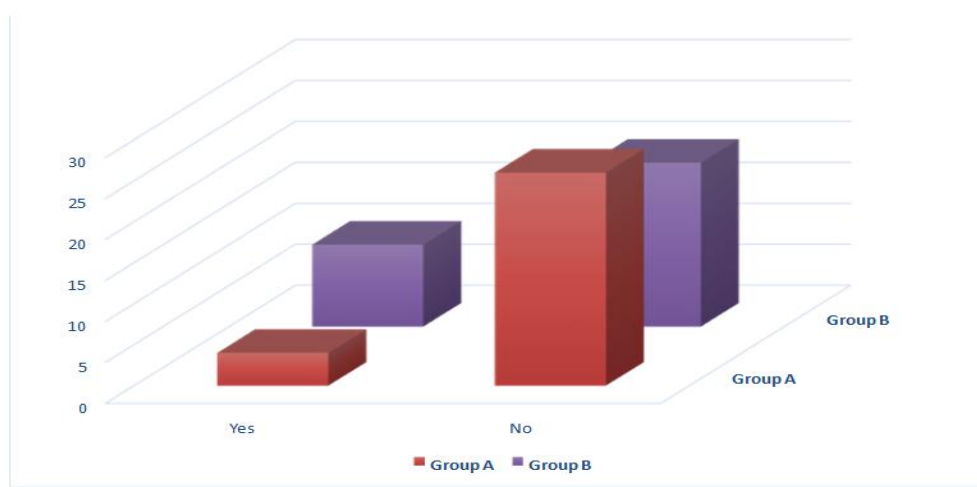


Figure 2: Seroma collection among study participants

There is significance in statistical terms of association in either of groups with regards to hospital stay duration, postoperative complication, postoperative wound infection & seroma collection (**P<0.05**)

RESULT

- Postoperative wound infection is higher in Group B comparison with Group A. Statistically substantial association between both groups concerning postoperative wound infection ($P<0.05$)
- There is insignificant short-term recurrence in Group A & B.
Long-term recurrence among either of groups has to be analyzed as it is out of scope in the current study.

DISCUSSION

VHR is prevalent conducted protocol in routine clinical practice. The repair of primary open ventral hernia involves suturing the aponeurosis on either side of hernia defect then securing a mesh. Current research sought to document preliminary clinical experience of cyanoacrylate glue for fixing.

Traditionally, monofilament polypropylene mesh is the most frequently utilized biomaterial; nevertheless, published findings on alternative primary mesh materials have also shown safe and effective outcomes. Certain studies indicate that high-density, microporous polypropylene meshes may provoke inflammatory responses, potentially leading to detrimental mesh shrinking, especially during scar tissue formation [7]

The use of mesh in hernia repairs has recently become the norm, and the recurrence rate of hernias has decreased significantly as a result of this trend. Postoperative morbidity, particularly persistent pain & surgical site infection (SSI), is now commonly linked to other outcome metrics, and uses of mesh significantly decreased recurrence rates to less than 5% in inguinal hernia repair. [8]

Current research is randomized controlled trial involving 60 study participants, with 30 in respective groups. Duration of hospital stay, postoperative complications and seroma collection is more in suture fixed mesh group compared to cyanoacrylate glue fixation group. There is statistically significant association between both groups with regards to hospital stay duration ($P<0.05$).

Consistent with our findings, Tarchi and colleagues discovered that average age 62 years, and that males more impacted (94.3%) than females (5.7%). Our results align to Wang & Zhang's research, which indicated that age of affected patients had been 48.7 ± 16.8 years. However, they disagreed with our data, finding that 73% of their patients were male and 27% were female. [9]

Tarchi et al. reported in their research that no intraoperative complications occurred. Hematoma, seroma (5.7%), superficial wound infection (1%), scrotal swelling (1%), & urinary retention (0.5%), as in both groups, exhibited early postoperative complications. Although the sutured group in our research experienced higher incidence of complications than sutureless group, there weren't apparent distinction in two groups' degrees of complications. Hematomas occurred at a considerably higher rate in suture fixation group in comparison with sutureless group, according to Lin and colleagues' study. Recurrence rates, chronic pain, wound infections, and mesh infections are insignificantly different among two groups. We found that average operating time for suture fixation was much greater than that of adhesive fixation, which was the main drawback of this method.

In terms of operation time, hematoma, and recovery time after surgery, Sun et al. additionally discovered that self-grip meshes performed more efficiently than sutured meshes. According to our data, there were negligible differences between the two groups in terms of mesh/deep infection, superficial wound infection, seroma, persistent numbness, along with postoperative hospital stay.

The research groups failed to vary significantly in terms of wound seromas, superficial infections, analgesic requirements, or postoperative pain response, which is consistent with our results.

Consistent with our findings, Tarchi and colleagues discovered that mild postoperative pain may need NSAIDs (non-steroidal anti-inflammatory drugs) for relief in the early postoperative period, but chronic postoperative pain improved without NSAIDs in long-term follow-up period.

CONCLUSION

This research recommends continued sutureless techniques application in the management of ventral hernias during hernioplasty.

Training our junior staff on the method of hernioplasty to get optimal results and minimize problems.

Further investigations must be undertaken to demonstrate the efficacy and superiority of cyanoacrylate glue fixing compared to mesh in hernioplasty.

REFERENCES

1. Schlosser KA, Arnold MR, Otero J, Prasad T, Lincourt A, Colavita PD, Kercher KW, Heniford BT, Augenstein VA. Deciding on Optimal Approach for Ventral Hernia Repair: Laparoscopic or Open. *J Am Coll Surg*. 2019 Jan;228(1):54-65.
2. Townsend RC, Beauchamp BD, Mattox MEK. Clinical surgery of hernia. *Sabiston Textbook of Surgery*, 19th Edition, Volume II, Elsevier. 2016:1128

3. Singhal V, Szeto P, VanderMeer TJ, Cagir B. Ventral hernia repair: outcomes change with long-term follow-up. *JSLs*. 2012;16(3):373-9.
4. Cobb WS, Kercher KW, Heniford BT. Laparoscopic repair of incisional hernias. *Surg Clin North Am*. 2005;85(1):91-103.
5. Vorst AL, Kaoutzanis C, Carbonell AM, Franz MG. Evolution and advances in laparoscopic ventral and incisional hernia repair. *World J Gastrointest Surg*. 2015;7(11):293-305.
6. Abd El Maksoud WM, Abbas KS, Mohii AD. Comparison between Lichtenstein procedure using polypropylene mesh and cyanoacrylate glue fixed mesh for management of primary inguinal hernia in adult male patients in terms of chronic postoperative pain: a prospective randomized controlled trial. *Egypt J Surg*. 2019;38(3):597.
7. Sun P, Cheng X, Deng S et al. (2017): Mesh fixation with glue versus suture for chronic pain and recurrence in Lichtenstein inguinal hernioplasty. *Cochr. Database Sys. Rev.*, 2: 10-114.
8. Tarchi P, Cosola D, Germani P et al. (2014): Self-adhesive mesh for Lichtenstein inguinal hernia repair. Experience of a single center. *Minerva Chirurgica.*, 69(3): 167-76.