

## ORIGINAL ARTICLE

**Peri-Operative Use of Tranexamic Acid in Reduction of Post Operative Seroma Formation in Patients Undergoing Ventral Hernia Repair**

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**ABSTRACT**

**Objective:** To examine the efficacy of Intraoperative and postoperative IV transamine, in reducing postoperative seroma formation in patients undergoing ventral hernia repair.

**Study Design:** Randomized controlled clinical trial

**Study place:** Karachi

**Methodology:** Eighty patients filled out the in-depth age, gender, and body mass index (BMI) registration forms. All of the patients ranged in age from fifteen to sixty. Patients were randomly assigned to either Group A (receiving 1 g of tranexamic acid Intraoperative and 500mg tranexamic acid 12 hours apart daily for 2 postoperative days) or Group B (not receiving any drug during or after surgery). Drainage volume was collected at postoperative day 1, 2, 3, 4, and 5 was recorded and were compared in both groups.

**Results:** The Mean±S.D of age of the participants in both groups were 41.5± 9.9 and 42.75±9.7 years. Group A had 20% males and 80% female, while group B had 22% males and 78% females. The Mean±S.D of BMI of the participants in both groups were 26.8±3.4 and 25.3± 4.4kg/m<sup>2</sup>. A significant difference in the drainage volume between group A and B was observed at 1<sup>st</sup> (0.025), 2<sup>nd</sup> (0.001), 3<sup>rd</sup> (0.004) and 4<sup>th</sup> (0.003) day were observed.

**Practical implication:** This study will help to determine how tranexamic acid is useful in reducing seroma after hernia repair

**Conclusion:** Seroma development after ventral hernia surgeries may be minimized with the use of tranexamic acid.

**Keywords:** Hernia, tranexamic acid, clinical trial, seroma, effectiveness, hernia repair

**INTRODUCTION**

Worldwide, ventral hernias are common problem for general surgeons. Hernioplasty, which may be performed open or laparoscopically, is now the most prevalent procedure utilized in the literature for ventral hernia repair, while there are others<sup>1</sup>. Prolene mesh is the most popular kind of mesh used in hernioplasty because it reduces the risk of a recurrence<sup>2</sup>. Hernias in the abdominal wall may cause organs like the intestines or omentum to protrude out from the abdomen. This condition is known as an abdominal hernia. These hernias may occur anywhere in the torso, from the thorax to the hips<sup>3</sup>. Operative practice is the typical approach for hernia repair. Patients undergoing significant surgeries, such as abdominal hernia mesh repair, are at a higher risk of developing seromas. Additional risk factors include the patient's age, the number of dissected tissues, the use of anticoagulants, the patient's history of surgery, and the presence of a seroma<sup>4</sup>. After a paraumbilical hernioplasty, fluid collection, a seroma may form as a result of a buildup of serum fluids in the surrounding blood and lymphatic vessels. Cells are frequently seen in the fluid, which is normally transparent. There is speculation that seroma development is linked to an increase in infection and surgical site disturbance. Surgical drain tubes are used after various operations to prevent the development of seroma. They make it possible to regulate the amount of fluid leaking out, and the drainage is emptied once it becomes negligible. When drains aren't utilized and then later removed, seromas might form in the surgical site<sup>5</sup>. Any time fluid collects after surgery, we call it a seroma. Serum is the fluid that forms when blood vessels and lymphatics are injured and begin to leak. Risks of infection and surgical repair failure are often linked to seroma development. Typically, they are removed using suction drains. A buildup in the sealed compartment may be monitored with the help of these drains. When mesh is utilized for abdominal hernia repair, seroma development occurs in 5.6% to 42% of patients in the postoperative period<sup>6</sup>. Surgical sites often develop seromas, which manifest as soft, swollen areas under the skin. The fluid might be colorless or slightly yellow. Infected seromas may cause the discharge to turn from clear to bloody or purulent.

When the collection is small, conservative therapy is usually sufficient, but when it's bigger, needle aspiration or, in rare cases, open drainage may be necessary<sup>7</sup>. Fluid accumulation occurs when mesh is used to repair a hernia. However, the risk of seroma development and related consequences increases with the size of the region repaired by mesh. By using tranexamic acid, seroma development may be avoided<sup>8,9</sup>. Synthetically derived from the amino acid lysine, tranexamic acid has an anti-fibrinolytic effect that may be used to treat and prevent excessive bleeding throughout the initial and secondary phases of wound healing<sup>10</sup>. However well bleeding control measures are implemented, surgical bleeding may still occur if fibrinolysis is greater than coagulation. Fibrinolysis may be prevented by administering tranexamic acid. The conversion of plasminogen to plasmin is inhibited. As much as 34% less postoperative bleeding may be expected while using it. In most research, TXA has been recommended either as an injectable or orally administered drug to lessen the risk of problems after inguinal hernia surgery. We decided to conduct a randomized controlled experiment to learn more about the effects of topical TXA administration on hernia problems because of the contradictory findings of studies and the severe constraints of clinical trials. The purpose of the present study was to examine the efficacy of Intraoperative and postoperative IV transamine, in reducing postoperative seroma formation in patients undergoing ventral hernia repair.

**METHODOLOGY**

This randomized controlled clinical trial was conducted at Surgery Department of Jinnah Medical College Hospital, Korangi Karachi from 15 June 2022 to 20 September 2022. A total of 80 patients were recruited randomly of both genders, between age 15-60 years, scheduled have a ventral hernia surgery. The patients' full demographic information, including age, sex, and body mass index (BMI), was collected after obtaining written permission from each individual. Patients with history of taking anticoagulants, obstructed and strangulated hernia patients, uncontrolled diabetes, any personal or family history of thrombotic disease, patients having vascular disease, patients having BMI more than 35 were excluded

from the present study. Groups A and B (the intervention group and the control group, respectively) were randomly assigned using a lottery system. 1g of Intravenous tranexamine was administered intra-operatively, and intravenous tranexamic acid 500mg given 12 hours apart till 48 hours post operative period. When repairing a hernia, a drain was placed in the cavity to remove any seroma that may occur after surgery. In order to compare intervention and control groups, drain fluid was measured on days 1, 2, 3, 4, and 5 after surgery. The data was analyzed using SPSS version 26. Descriptive statistics were computed to illustrate the demographic characteristics of sample, frequencies, percentages and means were calculated for variables like age, gender, BMI, ASA class, Comorbid conditions. Amount of Seroma measured in milliliters of Intervention group and control groups were compared as means and standard deviation was calculated of both groups. Independent sample T-test was applied as test of significance for quantitative variables and Chi-square test was used for Proportion to compare results of both groups, value  $\leq 0.05$  was considered as significant.

**RESULTS**

A total of eighty participants were included in the present study and were divided into two groups Group A-intervention (n=40) and Group B-control (n=40) (Table 1). The Mean±S.D of age of the participants in both groups were 41.5± 9.9 and 42.75±9.7 years. No significant variation (P=0.558) in the mean age difference was observed in two groups. Group A had 20% males and 80% female, while group B had 22% males and 78% females. The Mean±S.D of BMI of the participants in both groups were 26.8±3.4 and 25.3± 4.4kg/m<sup>2</sup>. No significant variation (P=0.65) in the mean BMI difference was observed in two groups. The Mean±S.D of hospital stay of the participants in both groups were 3.25±0.74 and 4.47±1.2 days. Significant variation (P=0.000) in the mean hospital stay difference was observed in two groups. The Mean±S.D of defect size of the participants in both groups were 2.875±0.72 and 2.87±0.85 cm. No variation (P=1.0) in the mean defect size difference was observed in two groups. Overall significant less drainage was observed in group A at day 2, 3, and 4 in comparison to the control group (Table 2).

Table 1: Clinical and demographic parameters of the study groups

| Parameters               | Group A (n=40) | Group B (n=40) | P Value |
|--------------------------|----------------|----------------|---------|
| Age                      |                |                |         |
| Mean ± S. D              | 41.5± 9.9      | 42.75±9.7      | 0.558   |
| BMI                      |                |                |         |
| Mean ± S. D              | 26.8±3.4       | 25.3± 4.4      | 0.65    |
| Gender                   |                |                |         |
| Male                     | 8(20%)         | 9 (22%)        |         |
| Female                   | 32 (80%)       | 31 (78%)       | 0.324   |
| ASA Class                |                |                |         |
| I                        | 16 (40%)       | 26 (65%)       |         |
| II                       | 24 (60%)       | 14 (35%)       | 0.001   |
| Comorbid                 |                |                |         |
| DM                       | 1              | 2              |         |
| HTN                      | 13             | 3              |         |
| Obesity                  | 0              | 3              |         |
| HTN+Obesity              | 4              | 0              |         |
| HTN+DM                   | 2              | 6              |         |
| Nkcm                     | 1              | 0              |         |
| DM+HTN+Obesity           | 1              | 1              | 0.001   |
| Hernia Type              |                |                |         |
| Epigastric               | 3              | 3              |         |
| Incisional               | 7              | 9              |         |
| Paraumbilical            | 28             | 22             |         |
| Recurrrent Paraumbilical | 1              | 2              |         |
| Umbilical Port site      | 1              | 4              | 0.168   |
| Mesh Use                 |                |                |         |
| Yes                      | 28 (70%)       | 25 (63)        |         |
| No                       | 12 (30%)       | 15 (37%)       | 0.83    |
| Hernia Contents          |                |                |         |
| Omentum                  | 26             | 28             | 0.83    |

|                   |            |           |       |
|-------------------|------------|-----------|-------|
| Small Bowel       | 12         | 11        |       |
| preperitoneal fat | 2          | 1         |       |
| Hospital stays    |            |           |       |
| Mean ± S. D       | 3.25±0.74  | 4.47±1.2  | 0.000 |
| Defect size       |            |           |       |
| Mean ± S. D       | 2.875±0.72 | 2.87±0.85 | 1.0   |

Table 2: Drainage volume recorded in study groups

| Drainage volume (mL) | Group A (n=40) | Group B (n=40) | P Value |
|----------------------|----------------|----------------|---------|
| Day 1                | 22.375±11.9    | 31.25±21.2     | 0.025   |
| Day 2                | 10±5.4         | 17.87±15.8     | 0.001   |
| Day 3                | 3.4±1.33       | 7±6.5          | 0.004   |
| Day 4                | 0.38±1.3       | 2.75±4.5       | 0.003   |
| Day 5                | 0              | 0.75±1.8       | 0.12    |

**DISCUSSION**

A hernia can develop in a variety of places. Typically, hole in the abdominal wall is the most noticeable. Non-inguinal and non-hiatal defects in the abdominal wall fascia are the simplest way to describe a hernia in the abdominal ventral wall. On a global scale, hernia repairs make up between 10% and 15% of all operations <sup>11</sup>. With a laparotomy, the risk of hernia is at 10%, with a muscle-splitting incision at 5%, and with a laparoscopic repair at less than 1%. However, seromas are more common after major hernia repairs that cause extensive tissue disruption. While the precise cause of seromas is debated, it is generally agreed that they develop due to the accumulation of liquefied fat, lymphatic fluid, inflammatory exudates, and serum, under a skin flap<sup>11</sup>. Many factors, including the depth of the incision and whether or not electrocautery or a knife was used to lift the skin flap, affect the size and duration of the resulting seroma. Infection of seromas is common if they are left untreated <sup>12</sup>. Our results demonstrated the potential efficacy of topical TXA in preventing postoperative hemorrhage after inguinal hernia repair. The greatest concern for individuals on antiplatelet medicines is the potential for bleeding. Surgeons sometimes struggle with the decision of whether or not to continue antiplatelet medication in the perioperative phase. Aspirin and clopidogrel should typically be stopped seven days (median time) before to surgery to decrease the risk of bleeding, however doing so may be linked to a number of complications in high-risk cardiovascular patients (including thrombosis or ischemic events)<sup>15</sup>. In the present study, on the first postoperative day, the average drain output for Group A was 11.625±4 ml, while for Group B, it was 31.25±21.2 ml. Five days after surgery, there was a statistically significant difference between groups A and B, with group B having a higher drain output. These findings mirrored those of numerous prior studies demonstrating that tranexamic acid effectively reduced drain volume and prevented seroma formation. According to research by Zubair et al., who looked into the effectiveness of tranexamic acid in preventing seroma formation, only 15.1% of patients who took the drug developed seroma, while 64.7% of those who didn't <sup>13</sup>. Ahmed et al. reported that 81% of seroma patients obtained community subsidization of tranexamic acid within 5 days, whereas 19% of patients needed longer than 5 days <sup>14</sup>. Weeding out serous edema, postoperative seroma, and soakage, this anti-fibrinolytic medication, tranexamic acid, has been shown to produce fluids. The healing process after a wound is reportedly aided by it. In a randomized, controlled trial, researchers discovered that the total amount of drainage from a patient's body after surgery was the median duration of hospital stays for patients taking 1 gram of tranexamic acid per day has decreased significantly <sup>15</sup>.

**CONCLUSION**

Patients undergoing ventral hernia repair with a mesh technique may see less seroma development if they take tranexamic acid following surgery. It also shortens the amount of time needed to remove drains after surgery. Overall costs and patient morbidity

may be reduced using Tranexamic acid in split dosages, and patients can go back to their normal lives sooner.

## REFERENCES

1. Carbonell AM, Warren JA, Prabhu AS, Ballecer CD, Janczyk RJ, Herrera J, et al. Reducing length of stay using a robotic-assisted approach for retromuscular ventral hernia repair. *Annals of surgery*. 2018;267(2):210-7.
2. Cobb WS, Kercher KW, Heniford BT. The argument for lightweight polypropylene mesh in hernia repair. *Surgical innovation*. 2005;12(1):63-9.
3. Ammar A, Ismail T. Abdominal wall hernias in upper Egypt: A different spectrum. *East and Central African Journal of Surgery*. 2008;13(2):109-14.
4. Cho JE, Helm MC, Helm JH, Mier N, Kastenmeier AS, Gould JC, et al. Retro-rectus placement of bio-absorbable mesh improves patient outcomes. *Surgical Endoscopy*. 2019;33(8):2629-34.
5. Othman I, Metwally Y, Bakr I, Amer Y, Gaber M, Elgohary S. Comparative study between laparoscopic and open repair of paraumbilical hernia. *J Egypt Soc Parasitol*. 2012;42(1):175-82.
6. Janis JE, Khansa L, Khansa I. Strategies for postoperative seroma prevention: a systematic review. *Plastic and reconstructive surgery*. 2016;138(1):240-52.
7. Purushotham G, Revanth K, Aishwarya M. Surgical management of umbilical and paraumbilical hernias. *International Surgery Journal*. 2017;4(8):2507-11.
8. Petro CC, Haskins IN, Perez AJ, Tastaldi L, Strong AT, Ilie RN, et al. Hernia repair in patients with chronic liver disease-A 15-year single-center experience. *The American Journal of Surgery*. 2019;217(1):59-65.
9. Schlosser KA, Arnold MR, Otero J, Prasad T, Lincourt A, Colavita PD, et al. Deciding on optimal approach for ventral hernia repair: laparoscopic or open. *Journal of the American College of Surgeons*. 2019;228(1):54-65.
10. Ker K, Edwards P, Perel P, Shakur H, Roberts I. Effect of tranexamic acid on surgical bleeding: systematic review and cumulative meta-analysis. *Bmj*. 2012;344.
11. Schools I, Van Dijkman B, Butzelaar R, Van Geldere D, Simons M. Inguinal hernia repair in Amsterdam region. *Hernia*. 2001;5(1):37-40.
12. Seretis K, Goulis D, Demiri EC, Lykoudis EG. Prevention of seroma formation following abdominoplasty: a systematic review and meta-analysis. *Aesthetic surgery journal*. 2017;37(3):316-23.
13. Zubair R, Mirza MR, Habib L, Iftikhar J, Zehra B. Role of tranexamic acid in prevention of seroma formation after ventral hernioplasty. *Pak J Surg*. 2020;36(2):126-9.
14. Ahmed H. Seroma reduction and role of tranexamic acid in ventral hernia repair. *Journal of Surgery Pakistan*. 2020;25(2):89-92.
15. Eldesouky MS, Ashour HSA, Shahin MA. Effect of topical application of tranexamic acid on reduction of wound drainage and seroma formation after mastectomy. *The Egyptian Journal of Surgery*. 2019;38(4):772-5.
16. Hamedani SM, Akbari A, Sayaydi S, Zakariaei Z, Moosazadeh M, Boskabadi J, Naserifar M, Soliemanabad SK. The topical application of tranexamic acid to control bleeding in inguinal hernia surgery candidate patients: A randomized controlled trial. *Annals of Medicine and Surgery*. 2021 Sep 1;69:102683.