

A STUDY ON TRANEXAMIC ACID ROLE FOR SEROMA REDUCTION IN VENTRAL HERNIA REPAIR

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Abstract: *This study aimed to investigate whether tranexamic acid is effective in reducing seroma formation after ventral hernia repair. The study was conducted at multiple centers, including the Department of Surgery at Khyber Teaching Hospital Peshawar and Hayatabad Medical Complex, Peshawar, from January 2023 to June 2023. The study included 70 patients of either gender, aged 18 to 50 years, undergoing ventral hernia repair. After the administration of tranexamic acid, the formation of postoperative seroma was studied. The study found that 35.7% of the patients were male, while 64.3% were female. In 53 (75.71%) patients, seroma formation subsided within six days, while in 17 (24.28%) patients, it took more than six days for seroma formation to subside (P = 0.0001). In conclusion, the study showed that tranexamic acid significantly reduced postoperative seroma formation in patients after ventral hernia repair.*

Keywords: Ventral Hernia Repair, Tranexamic acid, Seroma, Fluid

Introduction

Ventral hernia repair is a standard surgical procedure to address the protrusion of abdominal contents through a weakened or damaged abdominal wall (Xu et al., 2023). One of the postoperative complications associated with this surgery is the formation of seromas, which are pockets of serous fluid that accumulate at the surgical site. Seroma can lead to discomfort, delayed wound healing, increased risk of infection, and prolonged hospital stays. To mitigate these issues, researchers have explored various strategies to reduce seroma formation (Morito et al., 2021; Salari et al., 2021). One such strategy involves tranexamic acid (TXA), a medication known for its ability to control bleeding and inflammation (Tarar et al., 2023).

Tranexamic acid is a synthetic derivative of the amino acid lysine and is widely used in medicine to prevent or treat excessive bleeding. Its mechanism of action involves the inhibition of fibrinolysis, a process that breaks down blood clots (Murao et al., 2020). By blocking the dissolution of blood clots, TXA helps maintain hemostasis, making it an effective tool in reducing bleeding during surgery. This hemostatic property has led researchers to investigate whether TXA can also prevent seroma formation, which often results from the accumulation of blood and other fluids in the surgical area (Ockerman et al., 2021).

Several studies have examined the potential benefits of tranexamic acid in ventral hernia repair. A study investigated the effects of TXA administration in patients undergoing open ventral hernia repair. The study found that patients who received TXA had a significantly lower incidence of seroma formation compared to the control group (Hui et al., 2019). This reduction in seroma formation translated to faster wound healing and shorter hospital stays for the TXA-treated patients. The results demonstrated that TXA

administration significantly decreased the incidence of postoperative seromas. Furthermore, TXA was found to be safe and well-tolerated by the patients, with no significant increase in adverse events (Jafferi, 2021; Nawaz et al., 2021).

The mechanism by which tranexamic acid reduces seroma formation in ventral hernia repair is not fully understood, but several theories have been proposed. Firstly, TXA's ability to control bleeding may indirectly contribute to seroma reduction. Minimizing blood loss during surgery may result in less blood and associated inflammatory mediators accumulating at the surgical site, which could decrease seroma formation (Safran, 2022; Tarar et al., 2023).

Seroma formation is a common complication of ventral hernia repair that can lead to discomfort, delayed wound healing, and other complications. Tranexamic acid, with its hemostatic and potential anti-inflammatory properties, has shown promise in reducing seroma formation in both open and laparoscopic ventral hernia repair procedures. While more research is needed to refine its use, the early evidence suggests that TXA may offer a valuable tool in improving the outcomes of patients undergoing ventral hernia repair. Further investigation and clinical trials are necessary to fully establish tranexamic acid's benefits and safety profile in seroma reduction for this surgical population.

Methodology

The present study was conducted as a cross-sectional study at multiple centers, including the Department of Surgery, Khyber Teaching Hospital Peshawar, and Hayatabad Medical Complex, Peshawar, from January 2023 to June 2023. A total of 70 patients aged between 18 to 50 years of

either gender. All patients admitted from the surgical outpatient center (OPD) and diagnosed with ventral abdominal hernia were included in the study. Exclusion criteria encompassed patients with uncontrolled diabetic mellitus, cirrhosis, bleeding problems, and strangulated hernias.

Patients who were prescribed anticoagulants were instructed to discontinue the medication five days before undergoing surgery. A comprehensive clinical history was obtained, and a thorough examination was conducted. Laboratory investigations about anesthesia and surgery were conducted. An abdominal and pelvic ultrasound was performed to assess the dimensions of the lesion and its contents. The assessment of anesthesia suitability and the acquisition of informed consent were conducted. All patients had the conventional surgical procedure of onlay mesh repair. A vacuum drain was inserted to monitor the volume of seroma. In the postoperative period, intravenous tranexamic acid was administered as a single dose of 1 gram immediately after the closure of the skin. Subsequently, 500 milligrams were administered orally every 12 hours until the fifth day after the surgery. The daily drainage output was recorded.

The drain was removed either on the fifth day after the operation or when the amount of drainage from the wound was less than 30ml within 24 hours.

Numerical and categorical data were presented using descriptive statistics. The results were stratified based on age and gender. The statistical significance of the data was assessed using a post-stratification T-test. A significance level of less than 0.05 was considered statistically significant.

Results

We enrolled 70 patients presenting for ventral hernia repair. The mean age of the patients recorded was 33.26±9.34 years. The mean seroma formation was 91.04±31.59 ml. Gender-wise distribution revealed that 64.3% were female while 35.7% were male. Comorbidity such as hypertension was seen in 28.6% of patients. Around 45.7% of patients in our study were illiterate, while the literacy rate was 54.3%. In our study, a high % of patients were from middle-class backgrounds, 51.4%. There were 30% of patients from poor backgrounds, and from upper-class backgrounds, there were 18.6% of patients. Postoperatively, seroma formation subsided in 53 (75.71%) patients within six days, while in 17 (24.28%) patients, seroma formation subsided in more than six days. The difference was significant (P = 0.0001). We could not find a significant association between gender and postoperative seroma formation.

Figure 1 Gender-wise distribution of patients

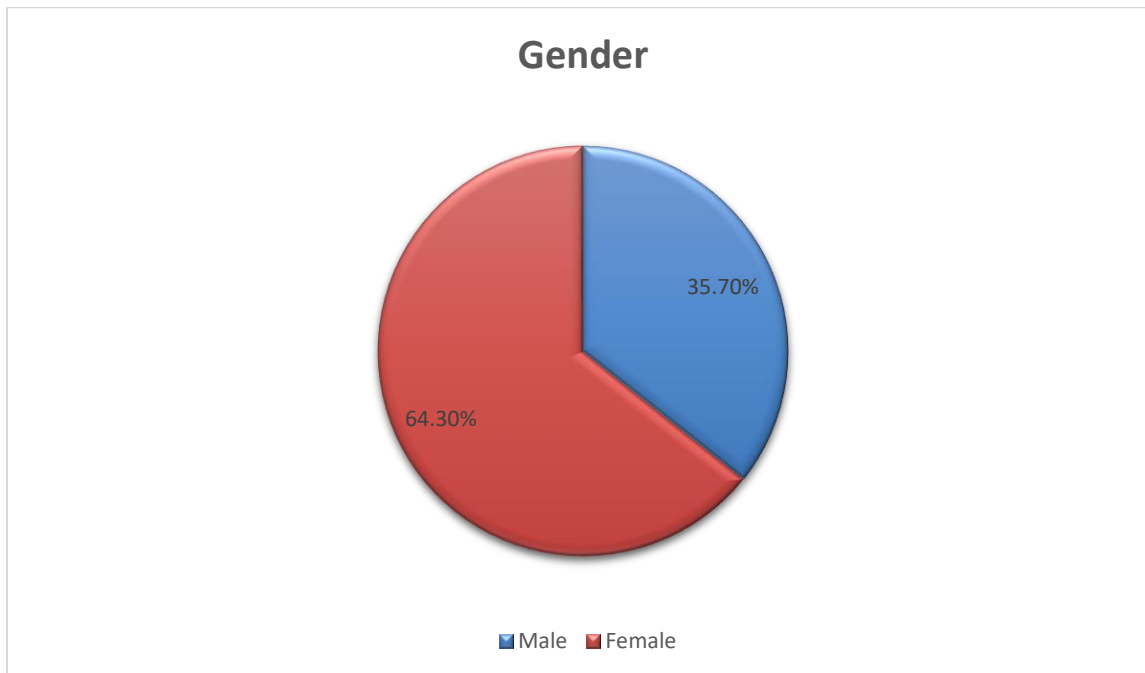


Table 1 Seroma reduction with respect to postoperative days

Days	N	Mean	Std. Deviation	P-value
<= 6 days	53	79.4340	23.84687	0.0001
> 6 days	17	127.2353	24.88858	

Table 2 Association of postoperative seroma formation with gender

Gender	N	Mean	Std. Deviation	P-value
Male	25	93.5600	30.41529	0.62
Female	45	89.6444	32.48927	

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Discussion

An abdominal hernia can be described as the protrusion of some or all of the contents of the abdominal cavity through a weaker area of the abdominal wall. This condition primarily involves the escape of intestines or omentum through flaws in the abdominal wall, thereby forming hernias. These herniations can occur in many intra-abdominal regions, from the thorax to the pelvis. Hernia repair is a widely recognized and crucial surgical procedure in medicine. Individuals who are subjected to complex surgical interventions, such as the treatment of abdominal hernias using mesh, exhibit an increased vulnerability to the occurrence of seroma. In addition to these characteristics, other risk factors contribute to developing seroma formation. These include older age, the degree of tissue dissection, the use of anticoagulant medications, and a previous history of surgical interventions associated with an increased likelihood of seroma formation (Akarsu et al., 2021).

A seroma refers to the collection of fluid that occurs following a surgical procedure. The fluid, known as serum, is produced due to leakage via weakened blood arteries and lymphatic channels. The occurrence of seroma is closely connected to the concomitant risks of infection and the failure of the surgical repair. Suction drains are often used to evacuate fluids and simultaneously allow for ongoing monitoring of fluid build-up in a restricted anatomical area. Postoperative seroma formation varies between 5.6% and 42% when mesh is utilized for abdominal hernia repair (Cho et al., 2019).

From a clinical perspective, a seroma presents as a specific area of swelling located beneath the skin surface close to the surgical site. The fluid commonly has a transparent or slightly yellowish look. Nevertheless, in instances of seroma infection, the exudate may change color, exhibiting a sanguineous or purulent nature (Kashif et al., 2020). Conservative therapeutic techniques often improve smaller seroma collections, although larger ones typically require needle aspiration or, in rare cases, open drainage procedures. Significantly, the use of mesh in hernia repair amplifies the inclination for fluid build-up, whereby the size of the repaired area exhibits a positive association with the likelihood of seroma formation and its associated problems. Using tranexamic acid has shown significant effectiveness in preventing seroma development (Henriksen et al., 2020). Tranexamic acid is a synthetic compound derived from the amino acid lysine. It functions by inhibiting fibrinolysis, preventing and reducing excessive bleeding during the first or subsequent stages of wound healing. In cases when fibrinolysis exceeds coagulation, surgical bleeding may occur even when appropriate hemostatic methods are employed. Tranexamic acid functions by inhibiting the enzymatic conversion of plasminogen to plasmin, reducing postoperative bleeding by an estimated 34% (Petro et al., 2019).

Hernias can form at several anatomical places in the body, with the abdominal wall being a prominent location for their development. Ventral abdominal hernias, defined as defects in the abdominal wall fascia not located in the inguinal or hiatal regions, are a significant subset of hernia cases. The surgical treatment known as hernia repair holds significant prominence within the global medical community, as it encompasses a notable fraction of 10% to 15% of all

surgical operations conducted globally (Madsen et al., 2020). The incidence of hernia formation after a laparotomy procedure is approximately 10%, whereas muscle-splitting incisions are associated with a 5% risk, and laparoscopic repair is linked to a risk of less than 1% (Akhtar et al., 2019). The presence of seroma significantly increases the probability of wound infection. The substance in question functions as an optimal environment for the growth and reproduction of bacteria, which consequently increases the likelihood of patients developing severe consequences, including wound dehiscence and septicemia (Ahmed, 2020; Maskal et al., 2023). The results of our study support the widely accepted notion that seroma is a common complication that might occur after hernia repair. In line with previous research examining risk factors associated with seroma formation, our study results likewise confirm the absence of any significant impact exerted by variables such as gender on the occurrence of seroma formation.

We observed that after administering tranexamic acid both IV and orally, in most patients, seroma significantly resolved within six days postoperatively ($P = 0.0001$). Similar results have been shown by various studies that reported that most patients' seroma was resolved within five days after administration of tranexamic acid.

Conclusion

Our study concludes that tranexamic acid significantly resolves postoperative seroma formation in patients after repair of ventral hernia. We suggest further studies should be conducted in multiple centers in Pakistan to understand tranexamic acid's effect on postoperative seroma formation completely.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

Approved by the department concerned.

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

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