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Original Article

Role of Tranexamic Acid in Seroma Reduction in Ventral Hernia Repair: A Cross-Sectional Study.

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Abstract

Objective: This study aimed to determine the role of tranexamic acid in reducing seroma formation after ventral hernia repair.

Methodology: This cross-sectional study was conducted at the Surgery Department, Multan Medical and Dental College, Multan, from January 2026 to June 2026. Individuals of both genders and different age groups who visited the OPD and were diagnosed with ventral abdominal hernia were enrolled. We performed an ultrasound of the abdomen and pelvis to evaluate the extent and contents of the defect. All patients had routine surgical onlay mesh repair. We placed a vacuum drain to monitor seroma volume. We administered intravenous tranexamic acid (1 g stat) at skin closure, followed by oral 500 mg every 12 hours until the fifth day after surgery. We analyzed data using SPSS version 22.

Results: A total of 110 individuals were included in this study, of whom 75 (75.90%) were female, and 35 (35.90%) were male. The age ranged from 22 to 62 years. To investigate the impact of age and gender on seroma production, patients were stratified accordingly. No significant differences were observed by sex (P=0.628) or age (P=0.180). After surgery, 80 (73.63%) participants developed a seroma that resolved within 5 days (mean fluid volume: 75.00 ± 36.93 mL). However, in 30 (27.2%) individuals, it decreased in more than 5 days (mean volume: 131.00 ± 5697 mL).

Conclusion: Our study concluded that Tranexamic acid greatly reduces the development of seromas following surgery for ventral hernia repair.

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Introduction

An abdominal hernia is the protrusion of part or all of the internal lining of the abdominal cavity resulting from weakness in the abdominal wall. A ventral hernia is a non-inguinal, non-hepatic defect in the abdominal wall fascia [1]. They may occur anywhere in the abdominal wall. Ventral hernias are the most common type and have a high recurrence risk [2]. The majority of incisional hernias occur at the incisions made after surgery. Depending on the etiology, these ventral hernias are classified as either acquired or congenital, with the latter more prevalent. Frequent acquired factors that lead to ventral hernias include trauma, repeated stress at the site of incision, coughing, childbirth, and persistent constipation, which elevate intra-abdominal pressures [3]. After surgery, only 80% of the abdominal wall's tensile strength is restored, and in a healthy person, the incisional site returns to about 64% of its tensile strength [4]. Clinical manifestations of ventral hernias vary from person to person; some may show no symptoms for weeks or months, while others may present with strangulation or incarceration and require emergency surgery. Compared with emergency repairs, elective repairs yield better results. Five percent of cases have been documented to result in death following strangulated hernial procedures [5]. Hernia repair is the most frequent operation performed worldwide (10–14%) [6]. After hernia repair, seroma development is common. A seroma is a buildup of fluid after surgery. The cause of seroma formation is still debated. It is supposed to be the accumulation of serum, liquid fat, inflammatory exudates, and lymphatic fluid under a skin flap [6]. Tranexamic acid has been demonstrated to minimize surgical problems in ventral hernia patients, including seroma development, serous discharge, and wound leakage. One study reported that tranexamic acid 1 g twice daily decreased seroma development in patients after 5 days post-surgery [7]. Another study found that 82.7% of individuals had less seroma development and lower drain output [8]. Tranexamic acid acts as an anti-fibrinolytic, limiting the transformation of plasminogen to plasmin. This prevents hemostatic fibrin from being destroyed and stabilizes fibrin, which inhibits seroma development. Additionally, it reduces excessive bleeding during the wound-healing period. However, tranexamic acid is not widely used in clinical practice [8]. Therefore, this study aimed to determine the role of tranexamic acid in reducing seroma formation after ventral hernia repair: a single-center cross-sectional study.

Materials and Method

This cross-sectional study was conducted at the Surgery Department, Multan Medical and Dental College, Multan, from January 2026 to June 2026, following approval from the hospital's ethics committee. Individuals of both genders and different age groups who visited the OPD and were diagnosed with ventral abdominal hernia were enrolled. Individuals who had cirrhosis, bleeding disorders, uncontrolled diabetes mellitus, and those with strangulated hernias were excluded. Individuals on anticoagulant therapy were instructed to discontinue it five days before surgery. We obtained a thorough clinical history and examination. We performed laboratory assessments for anesthesia and surgery-related conditions. An abdominal and pelvic ultrasound was performed to evaluate the extent and contents of the defect. We obtained anesthesia fitness and informed consent. All patients had routine surgical mesh repair only. We placed a vacuum drain to monitor seroma volume. We administered intravenous tranexamic acid (1 g stat) at skin closure, followed by oral 500 mg every 12 hours until the fifth day after surgery. We withdrew drainage on the fifth day after surgery or when wound drainage was below 30ml in 24 hours, and recorded it daily. We analyzed data using SPSS version 22. We used descriptive statistics to present numerical and categorical data. We used the chi-square test to assess statistical significance. We considered a P-value of less than 0.05 statistically significant.

Results

We included 110 individuals: 75 (75.90%) female and 35 (35.90%) male. The age ranged from 22 to 62 years. The most prevalent age group in the study population was 43-62 years, followed by 22-42 years. To investigate the impact of age and gender on seroma production, patients were stratified accordingly. No significant differences were observed by sex (P=0.628) or age (P=0.180). After surgery, 80 (73.63%) participants developed seroma, which resolved within 5 days (mean fluid volume: 75.00 ± 36.93 ml). However, in 30 (27.2%) individuals, it decreased

after more than 5 days (mean volume: 131.00 ± 5697 ml), as shown in Table **2.**

Table 1. Formation of seroma associated with sex and age

Variable	Frequency/percentage	Mean ± SD	P-Value
Age in years			
22-42	45(45.9%)	81.06 ± 41.77	0.180
43-62	65(65.9%)	109.98+ 60.97	
Sex			
Female	75(75.90%)	106.00+60.94	0.638
Male	35(35.90%)	97.00+ 35.35	

Values are presented as frequency (percentage) and mean ± standard deviation (SD). The p-values indicate the statistical association of seroma formation with age and sex.

Table 2. Reduction in seroma following surgical therapy

Post-operative days	Frequency/percentage	Mean ± SD
More than 5 days	30(27.2%)	131.00±5697 ml
Less than 5 days	80(73.63%)	75.00 ±36.93ml

Values are presented as frequency (percentage) and mean ± standard deviation (SD), indicating the reduction in seroma volume following surgical treatment at different postoperative time intervals.

Discussion

One of the most prevalent disorders is abdominal wall hernias, which are caused mostly by elevated intra-abdominal pressure [9]. Tranexamic acid, developed in 1962, is an essential drug used to treat significant traumatic injuries, excessive bleeding, postpartum hemorrhage, operations, nasal bleeding, tooth removal, and heavy menstrual bleeding. Tranexamic acid is a readily accessible, cost-effective medication that does not require dosage adjustments and is safe for hepatic impairment [10]. Therefore, this study aimed to determine the role of tranexamic acid in reducing seroma formation after ventral hernia repair in a single-center cross-sectional study. The study included 110 individuals: 75 females (75.90%) and 35 males (35.90%). The age ranged from 22 to 62 years. The most prevalent age group in the study population was 43-62 years, followed by 22-42 years. Ahmed's study reported similar demographic features, with females predominating and most participants aged 20 to 40 years [11]. However, the demographic features in Saeed et al. were different, with males predominant [12]. To investigate the impact of age and gender on seroma production, we stratified patients accordingly. In our study, we found no significant differences by sex (P=0.628) or age (P=0.180). These findings are similar to those reported by Ahmed [13]. In our study, after surgery, 80 (73.63%) participants developed a seroma that resolved within 5 days (mean fluid volume: 75.00 ± 36.93 ml). However, in 30 (27.2%) individuals, it decreased after more than 5 days (mean volume: 131.00 ± 5697 ml). Our findings are similar to a previous study, which reported a seroma reduction rate of 74.3% [14]. Ahmed e observed that using tranexamic acid 1 g twice daily decreased seroma development and drain output in 81% of patients within 5 days following surgery, with a short hospital stay [15]. Khan et al. found that 67.3% of ventral hernia patients were female, and 82.7% developed seromas that resolved within a week. 41 patients had drain output <150ml, 55 had 150-300ml, and 14 had >300ml drain output [16]. In a cross-sectional study by Lashari et al., patients who received tranexamic acid had a lower risk of complications, a shorter hospital stay, and earlier drain removal. Tranexamic acid has a well-established purpose in orthopedic surgery. Some research proposes using tranexamic acid topically in orthopedics. Tranexamic acid has a well-established role in treating mastectomy patients [17-20]. Albatonanny discovered that individuals with ventral hernia who used tranexamic acid only once had a lower risk [21,22]. In our study, using Tranexamic acid decreased seroma development and postoperative drain output in patients undergoing ventral hernia surgery. Our study was limited by its single-center design and small sample size. More research with larger sample sizes and randomized controlled trial designs is needed.

Conclusion

Our study concluded that Tranexamic acid greatly reduces the development of seromas following surgery for ventral hernia repair.

Ethical Approval

The Hospital Research and Ethics Committee (IREB) approved this study under reference number **Ref. No. 5278/2023** before the study commenced.

Informed Consent

We obtained written informed consent from all participants before enrolment. We informed participants and their parents or legal guardians about the study objectives, procedures, and the voluntary nature of participation. Participation was entirely voluntary.

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This study received no external funding and used available institutional resources.

Conflict of Interest

The authors declare no competing interests or conflicts of interest related to this study.

Authors' Contributions

Muhammad Waqas Arshad, Khadim Hussain: Contributed to conceptualization, study design, data collection, interpretation of findings, manuscript drafting, critical revision, and final approval. He also accepts accountability for all aspects of the work.

Anam Fayyaz, Muhammad Sabir: Contributed to study design, data collection, data curation, literature review, data interpretation, manuscript revision, and final approval. They also accept accountability for all aspects of the work.

Muhammad Imran Khan, Ghulam Murtaza: Contributed to conceptualization, study supervision, clinical assessment, interpretation of findings, and critical revision of the manuscript for important intellectual content. She also approved the final version and accepts accountability for all aspects of the work.

All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work in accordance with the ICMJE authorship criteria.

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