EVALUATION OF OUTCOME OF SYSTEMIC TRANEXAMIC ACID INJECTION IN DRAIN OUTPUT IN VENTRAL HERNIA REPAIR

Muhammad Rahab Saeed[1], Danish Abdus Samad[1], Muhammad Saad Usmani[2], Muhammad Khurram Zia[1] &[2], Alvia Saad[1]

[1]Department of General Surgery, Hamdard University Hospital, Karachi, Pakistan, [2]Department of Anatomy, Liaquat College of Medicine & Dentistry, Karachi, Pakistan

Correspondence:
Alvia Saad,
Department of General Surgery, Hamdard University, Hospital, Karachi, Pakistan

Email: alvi-asaad@gmail.com

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ABSTRACT

The primary objective of the study was to determine the mean drain output after systemic tranexamic acid injection in patients undergoing ventral wall hernia repair. This was a descriptive cross-sectional study conducted in the Department of General Surgery, Hamdard University Hospital Karachi, Pakistan for a period of six months from Oct 2020 to April 2021. The patients undergoing ventral hernia repair were included. Injection tranexamic acid 1gm intravenous twice a day for 1st post-operative day and then capsule Tranexamic acid 500mg per oral three times a day for two consecutive days was given and drain output was measured for 3 days. A total of 63 patients with ventral hernia were included, mean age of patients was 41.476 (±SD= 8.693). There were 41 male patients (65.1%) and 22(34.9%) females. The mean drain output on first day, second and third day was 115.047+14.678 ml/day, 91.919+9.947 ml/day, 66.914+7.070 ml/day and 273.254+29.165 ml/day respectively. The results showed overall reduction in post-operative drain output after oral and intravenous tranexamic acid for 72 hours. However further large scale randomized controlled trials are recommended for confirmation of these findings.

Key Words: Tranexamic Acid Injection, Drain output, Ventral wall hernia repair

INTRODUCTION

Ventral hernias contribute to about 10% and are the commonest with challenging risk of recurrence. They are defined as non-hiatal non inguinal fascial defects in abdominal wall. They can develop anywhere in the abdominal wall (1). Mostly incisional hernia develop at the post-surgical incisions. These ventral hernias have been categorized into congenital an acquired depending on the cause with latter being more common. The common acquired causes of ventral hernias are postsurgical at the site of incision, repetitive stress at weakened abdominal wall, trauma or causes with raised intra-abdominal pressures like coughing, child birth, chronic constipation (3). After surgery abdominal wall restores only 80% tensile strength and operating at incisional site restores around 64% of tensile strength in a healthy individual (2-5). Clinically the presentation of ventral hernia varies among individuals some may remain asymptomatic for many weeks to months while some patients present with strangulation or in-carceration with the need to be operated in emergency (6, 7). Elective repairs have good outcomes as compared to emergency repairs. Mortality after strangulated hernial repairs have been reported in 5% of cases (6-8).

Studies have shown reduction in complications in ventral hernia with use of tranexamic acid. Recently (in 2023) a cross-sectional study by Tarar et al has shown reduced risk of seroma formation in patients with ventral hernia, where in 81% of the patients seroma formation was improved within 5 days (9). Also, reduced number of complications have been reported with topical use of tranexamic acid in different surgeries (10). Khan et al has also reported reduction in seroma formation in 82.7% of patients with reduced drain output (11). Tranexamic acid has anti-fibrinolytic action and limits conversion of plasminogen to plasmin and therefore reducing hemostatic fibrin from getting dissolved and stabilize fibrin, therefore reduces seroma formation. It is also observed that in wound healing phase excessive bleeding is also reduced. However, there are still limited use of tranexamic acid in clinical practice, therefore, this study was designed to evaluate the effects of tranexamic

acid in our population with drain output monitoring regularly as required at our Hamdard University Hospital which is a tertiary care hospital, in order to represent local statistics related to ventral hernia.

METHODS

This was a cross-sectional descriptive study, conducted in the Department of General Surgery, Hamdard University Hospital Karachi, Pakistan. The study duration was six months from 28th Oct 2020 to 28th April 2021. A total of 63 patients were included in this study. The sampling technique was non-probability consecutive sampling. The study included all patients presenting with ventral hernia and undergoing repair, with age range between 18 to 70 years, both genders. All the patients underwent open mesh repair and the redivac drain was placed. The study excluded patients not given informed consent, patients with history of carcinoma, patients with intestinal obstruction (i.e. assessed by history, clinically and X-ray abdomen suggestive of intestinal obstruction). Systemic tranexamic acid is defined as starting injection tranexamic acid 1gm intravenous twice a day for 1st post-operative day and then capsule Tranexamic acid 500mg per oral three times for 2 days and drain output was measured. The Redivac drain was placed over the mesh. Output in drain was measured daily with labels, if there is more than 25ml per day of output was considered positive, however, less than 25ml per day of output was labelled negative. After the ethical approval study was conducted.

Patients meeting the inclusion criteria admitted in general surgery department with ventral hernia diagnosis undergoing open mesh repair in whom redivac drain was placed over the mesh were enrolled in the study. Prior to inclusion patients were explained about benefits of the study and written informed consent was taken. Brief history regarding duration of sign and symptoms was taken & clinical examination was done. In all these patients injection tranexamic acid 1gm intravenously given twice a day for 1st post-operative day and then capsule Tranexamic acid 500mg per oral three times a day for 2 days was given and drain output was measured on daily basis for 3 days, drain output was labeled as positive if it was more than 25ml/day, while was labeled as negative if it was less than 25ml/day. The drain was removed when the output was negative (i.e. less than 25ml/day).

Statistical analysis

Data was entered and analyzed by using Statistical Package for Social Sciences (SPSS) version 22.0. The variables like age, height, weight, BMI, duration of sign and symptom of ventral hernia and drain output mean and standard deviation were calculated. Frequency and percentages were calculated for gender, comorbid conditions (DM/hypertension), type of ventral hernia, drain removed on day, drain output (positive/negative). Effect modifiers was controlled through stratification of age, gender, BMI, duration of sign and symptoms of ventral hernia, comorbidities, type of ventral hernia.

RESULTS

A total of 63 patients with ventral hernia repair undergoing open mesh repair were selected to conduct this study. Mean age was 41.476+8.693 years. In Table 1 the descriptive statistics for age are shown. The mean height was 1.548+0.213 m & weight was 53.859+11.910 kg. In our study 41 patients (65.1%) were males & 22 patients (34.9%) were females. Mean BMI was 21.216+3.250 kg/m2. Diabetes mellitus was seen in 13 (20.6%) patients, Hypertension was noted in 16 (25.4%) patients, the type of ventral hernia was paraumbilical hernia in 25(39.7%) & incisional hernia in 38(60.3%) patients. The mean drain output on day 1 was 115.047+14.678 ml/day. The mean drain output on day 2 was 91.919+9.947 ml/day. The mean drain output on day 3 was 66.914+7.070 ml/day. The mean total drain output was 273.254+29.165 ml/day. The descriptive statistics of drain output on day 1, drain output on day 2, drain output on day 3, total drain output are presented in Table-2.

Table 1. Demographic characteristics of patients undergoing ventral hernia repair

Descriptive	Frequency
Age in years (Mean ±SD)	41.476 ±8.693
Diabetes mellitus	13 (20.6%)
Hypertension	16 (25.4%)
Type of ventral hernia Para-umblical hernia Incisional hernia	 39.7% 60.3%

Table 2. Summary of the drain output per day after ventral hernia repair

Day	Drain output (ml/d)
Day 1	115.047 (±14.678)
Day 2	91.619 (±9.947)
Day 3	66.904 (±7.070)
Total	273.254 (±29.165)

The frequencies age groups, gender, BMI, duration of ventral hernia, diabetes mellitus, hypertension and type of ventral hernia according to mean drain output on day 1, mean drain output on day 2, mean drain output on day 3 and mean total drain output. In our study there was no significant difference of mean drain output on day 1, mean drain output on day 2, mean drain output on day 3 and mean total drain output was noted in age, gender, BMI, diabetes mellitus, hypertension and type of ventral hernia.

Table 3. Drain output in patients undergoing ventral hernia repair

Variables	Mean drain output on day 1	Mean drain output on day 2 (ml/day)	Mean drain output on day 3 (ml/day)	Mean total drain output (ml/day)
Age in years				
25-43	112.473±15.60	89.000 ±10.33	66.105 ±7.34	267.31 ±31.01
44-60	118.960±12.43	95.000 ±7.97	68.120 ±6.48	282.28 ±23.94
Gender				
Male	116.146 ±14.57	92.00 ±10.049	67.29 ±7.103	274.95 ±28.89
Female	113.000 ±14.98	92.00 ±10.049	66.18 ±7.115	270.09 ±30.07
BMI Kg/m2				
17-25	115.17 ±14.471	92.00 ±9.842	67.41 ±7.026	274.23 ±28.728
26-35	114.00 ±17.473	88.57 ±11.058	62.85 ±6.517	265.42 ±33.400
Diabetes Mellitus	114.61±18.40	91.23 ±13.479	64.15±10.24	270.00±40.78
Hypertension	116.75 ±15.22	90.87 ±9.769	66.25±7.224	273.87 ±29.61
Types of Ventral hernia				
• **Paraumbilical hernia**	115.60 ±15.567	92.64 ±10.403	67.88 ±6.489	275.72 ±30.66
• **Incisional hernia**	114.68 ±14.266	90.94 ±9.717	66.26 ±7.442	271.63± 28.436

DISCUSSION

One of the most common problems are the Abdominal wall hernias with predominant cause being the increased intra-abdominal pressure (7-10). In 1962, tranexamic acid was discovered, essential medicines used to treat major traumatic injuries, excessive bleeding injuries, post-partum bleeding, surgeries, bleeding from nose, removal of tooth, and heavy menstrual bleeding (8-11). Tranexamic acid is an easily available drug and its cost-effective with no dose adjustment required and safe in hepatic impairment (11-15). Our study therefore designed to explore use of tranexamic acid in drain output.

Studies have shown postoperative reduction in complications when tranexamic acid was used in patients of ventral hernia with reduced seroma formation, serous discharge and postoperative wound leakage as reported previously (16-20). A Study by Ahmed et al has found 81% patients with seroma formation but reduced in 5 days postoperatively and reduced drain output with use of tranexamic acid 1gm twice daily with short hospital stay (20). Another study by Khan et al has found that mostly females were presented with ventral hernia i.e. 67.3%, whereas 82.7% have seroma formation, reduced within 1 week, 41 patients had drain output <150ml, while 55 patients had 150-300ml and 14 patients had >300ml drain output (21). Tarar et al has also found reduced risk of seroma formation in 81% of patients with tranexamic acid given postoperatively. Seromas are commonly seen in patients with hernia repair but their cause is largely not defined. Seroma has increased risk of developing infection if not treated and therefore most studies have shown that tranexamic acid effectively reduces seroma formation. Another cross-sectional study by Lashari et al has found statistically significant correlation among patients treated with tranexamic acid and those in which it was not given with reduced risk of complications and shortened hospital stay with early removal of drain output. Established role of tranexamic acid has been seen in orthopedic surgeries as well. Some studies have suggested topical use of tranexamic acid in orthopedics. Even in patients with mastectomy tranexamic acid has well established role (23, 24). Albatonanny has also found reduced risk among patients with single use of tranexamic acid in patients with ventral hernia (12). Use of Tranexamic acid in our study reduced postoperative drain output in patients with ventral hernia repair. The limitation of our study was single center study, smaller sample size. Further studies with larger sample size and randomized controlled trial design are required.

CONCLUSION

The use of tranexamic acid in patients postoperatively for 72 hours reduced risk of drain output and also seroma formation in patients operated for ventral hernia.

Conflict of interest:
Authors declare no conflict of interest
Funding source:
The study did not receive any external funding
Ethical Approval:
The study was approved by local research ethics committee.

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