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Original Article

Surgery Section

Effectiveness of Drainless versus Drained Onlay Mesh Hernioplasty in Patients Undergoing Elective Open Ventral Hernia Repair: A Prospective Interventional Study

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ABSTRACT

Introduction: Ventral Hernia Repair (VHR) is one of the most frequently performed surgical procedures worldwide. The two commonly used surgical techniques for ventral hernia are onlay and sublay repairs. The use of drains in hernioplasty is controversial, as some studies suggest an increased incidence of surgical site infections.

Aim: This study aims to compare the postoperative outcomes between patients who had drains placed and those who did not, undergoing elective open VHR.

Materials and Methods: A prospective interventional study was conducted at the Department of General Surgery, Chettinad Hospital and Research Institute, Kelambakkam, Tamil Nadu, India. The study duration was one year, from September 2020 to September 2021. A total of 50 hernia patients participated, with 25 undergoing drainless and 25 undergoing drain onlay mesh hernioplasty. Surgical complications such as surgical site infection, seroma formation, and duration of hospital stay were observed and compared between the two groups. Independent t-tests and Chi-square tests were used to compare continuous and categorical variables, respectively.

Results: Out of 50 patients, 15 (60%) in the drain group were aged between 11 to 60 years, while 11 (44%) in the drainless group were aged between 18 to 40 years. Postoperative seroma was present in 6 (12%) patients, with an equal distribution in both groups (p-value >0.05). Surgical site infection was present in 3 (60%) and 2 (40%) patients in group A and group B, respectively (p-value >0.05). The mean duration of hospital stay was 6.36±1.89 and 4.92±1.91 days in group A and group B, respectively (p-value=0.010).

Conclusion: The presence or absence of a drain did not significantly affect the formation of seroma among the participants. The incidence of infection did not vary significantly with or without the use of a drain.

Keywords: Hernia repair, Hospital stay, Postoperative infection, Seroma

INTRODUCTION

Hernia is an abnormal protrusion of abdominal contents outside the abdominal cavity through an opening. “Ventral” hernias are those in which abdominal contents emerge from the anterior abdominal wall. The defect could be either natural or iatrogenic. Incisional hernias are the only iatrogenic abdominal hernias since they occur through a weak site of abdominal wall closure, immediately after surgery or years after it. This can lead to serious complications, including acute abdominal obstruction and a limited Quality of Life (QoL) [1-5]. There are several risk factors that can increase the likelihood of developing a ventral hernia, including wound infection, the technique used for suturing, the presence of abdominal wall tension, abdominal aortic aneurysms, and connective tissue disorder. Other risk factors include Body Mass Index (BMI), gender, smoking, and co-morbid conditions [6,7].

VHR is one of the most frequently performed surgical procedures across the globe. The two surgical techniques most commonly employed in cases of ventral hernia are onlay and sublay repairs. Mesh is positioned on the fascia or beneath the rectus muscle for onlay and sublay treatments, and in the intraperitoneal layer for inlay procedures. During incisional hernia procedures, mesh is placed to bridge the defect using the inlay technique. The idea of placing a drain after incisional hernia surgery is controversial, with some studies suggesting an increased incidence of surgical site infections. Risks include obstruction, irritation, pain, breakage, and prolonged hospital stay, which increases the risk of skin flap necrosis, wound infection, and structural erosion [1,8]. Thus, the present study aimed to compare the change in postoperative outcomes between the placement of a drain and no placement of a drain among patients undergoing elective open VHR.

MATERIALS AND METHODS

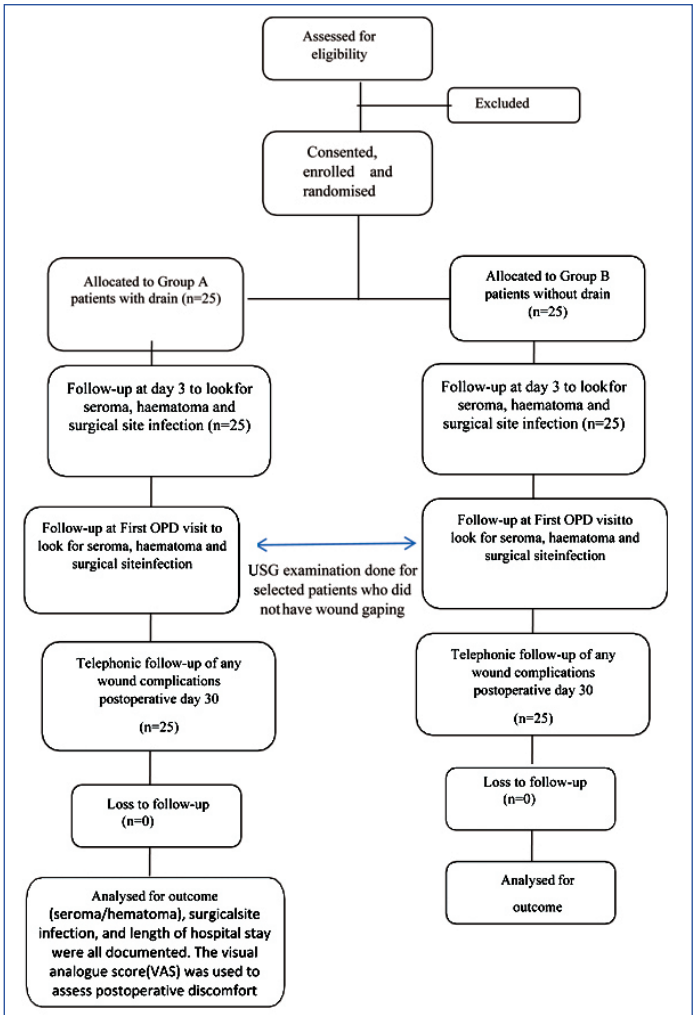
A prospective interventional study was conducted in the Department of General Surgery at Chettinad Hospital and Research Institute, Kelambakkam, Tamil Nadu, India. The study duration was one year, from September 2020 to September 2021. The study was approved by the Institutional Ethics Committee with letter number 121/IHEC/August 2020. Informed consent was obtained from all the patients who underwent the surgery during the study period.

Inclusion criteria: The study included patients between 18 and 80 years of age, of both genders, with umbilical, paraumbilical, or epigastric hernias, initially diagnosed through physical examination and confirmed by Ultrasound (USG).

Exclusion criteria: Patients with emergency situations such as strangulated hernia with signs of obstruction (abdominal distension, vomiting, and absolute constipation), those who lacked follow-up, had skin loss/infections or signs of inflammation at the hernia site, BMI greater than 35 kg/m^2, multiple hernia defects, immune suppression, previous history of abdominal surgery within a year, stage IV malignancy as per the American Society of Clinical Oncology (ASCO) criteria, chronic obstructive pulmonary diseases, alcoholic hepatitis, and American Society of Anaesthesiologists (ASA) III/IV were excluded from the study [9].

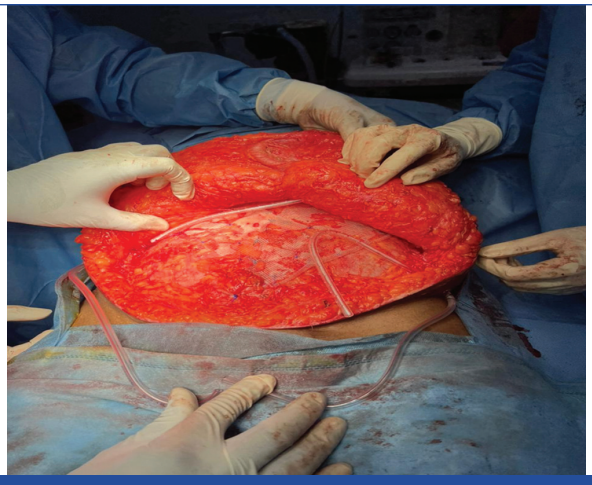
Study Procedure

Eligible patients who gave their consent were divided into two groups (group A and B) using simple random sampling. The Serially Numbered Opaque Sealed Envelope (SNOSE) approach was used to maintain allocation concealment [Table/Fig-1].

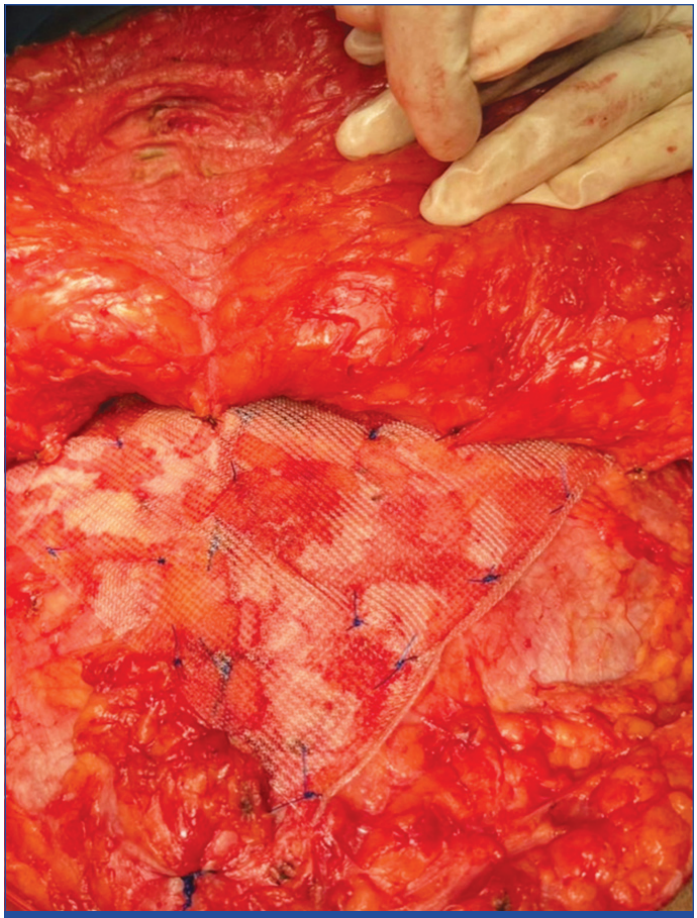


[Table/Fig-1]: Study procedure flowchart.

Demographic and medical details were documented. Preoperative assessments were conducted to evaluate the risks associated with surgery. This included a full blood count, liver function test, kidney function test, as well as radiographic tests such as abdominal ultrasound, chest X-ray, and Electrocardiogram (ECG). Demographic information, clinical presentation, duration, co-morbidities, defect dimensions, associated symptoms, intraoperative and postoperative complications, operating time, seroma formation, wound infection, and hospital stays were recorded. For patients who experienced chronic musculoskeletal pain, a Visual Analogue Scale (VAS) score of 3.4 or lower indicated mild pain, 3.5 to 7.4 indicated moderate pain, and 7.5 or higher indicated severe pain. Group A received an onlay mesh drain with continuous closed suction implanted [Table/Fig-2], while group B had no drain and an abdominal belt fitted shortly after surgery [Table/Fig-3].



[Table/Fig-2]: Group A (with drain).



[Table/Fig-3]: Group B (without drain).

STATISTICAL ANALYSIS

The data were analysed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables such as age, duration of surgery, anthropometric measurements (height, weight, BMI), length and width of the defect, and number of days stayed in the hospital were expressed as mean and Standard Deviation (SD). Categorical variables including age category, gender, occupation, presence of co-morbidities, addiction history (smoking, alcohol consumption), ASA PS, distribution of diagnosis, type of surgery performed, VAS score, wound gaping, signs of postoperative seroma, surgical site infection, and risk factors for seroma and infection were expressed as frequency and proportion [10]. Independent sample t-test was used to compare two means. Chi-square test and Fisher's exact test were employed to compare the distribution of qualitative variables between the groups. All test results were considered statistically significant if the p-value was <0.05.

RESULTS

In group A (drain group), nearly 15 patients (60%) belonged to the age group ranging from 11 to 60 years, while in group B (drainless group), the majority of patients, 11 (44%), belonged to the age group ranging from 18 to 40 years. Both groups showed a female predominance, with 68% in group A and 80% in group B [Table/Fig-4]. Diabetes, hypertension, and asthma were common co-morbidities observed in both groups. All 25 patients in group A had a previous history of surgery [Table/Fig-5]. Around 10 patients (40%) in group A and 12 patients (48%) in group B underwent paraumblical and umbilical hernioplasty [Table/Fig-6]. The mean duration of hospital stay was 6.36±1.89 days in group A and 4.92±1.91 days in group B (p-value=0.010). In group A, 56% of participants stayed in the hospital for more than five days, while in group B, it was 28% [Table/Fig-7].

Among the patients with seroma, 2 (33.3%) had a history of smoking, and among those with surgical site infection, 3 (60%) in group A and 2 (40%) in group B had a history of smoking, which was significant with a p-value of 0.009.

Characteristics	Group A (n=25) n (%)	Group B (n=25) n (%)	p-value
Age (in years)			
18 to 40	9 (36)	11 (44)	0.328
41 to 60	15 (60)	8 (32)	
61 to 80	1 (4)	6 (24)	
Gender			
Male	8 (32)	5 (20)	0.333
Female	17 (68)	20 (80)	
Occupation			
Labourer	10 (40)	4 (16)	0.199
Farmer	1 (4)	3 (12)	
Homemaker	5 (20)	7 (28)	
Electrician	3 (12)	1 (4)	
Housemaid	3 (12)	4 (16)	
Carpenter	1 (4)	3 (12)	
Accountant	2 (8)	0	
Teacher	0	2 (8)	
Driver	0	1 (4)	

[Table/Fig-4]: Sociodemographic details of the study participants.
Chi-square test

Characteristics	Group A (n=25) n (%)	Group B (n=25) n (%)	p-value
Co-morbidities*			
Diabetes mellitus	6 (24)	3 (12)	0.069
Systemic hypertension	6 (24)	6 (24)	0.269
Hypothyroidism	2 (8)	1 (4)	0.225
Asthma	3 (12)	1 (4)	1.000
Coronary artery disease	1 (4)	1 (4)	0.440
Benign prostatic hyperplasia	1 (4)	1 (4)	1.000
Tuberculosis	1 (4)	1 (4)	1.000
No morbidities	5 (20)	11 (44)	1.000
Physical status			
ASA PS I	5 (20)	11 (44)	0.069
ASA PS II	20 (80)	14 (56)	
Previous surgery**			
Yes	25 (100)	16 (64)	0.002*
No	0	9 (36)	
Smoking			
Yes	2 (8)	2 (8)	1.000
No	23 (92)	23 (92)	
Alcohol consumption			
Yes	1 (4)	2 (8)	0.552
No	24 (96)	23 (92)	

[Table/Fig-5]: Medical and behavioural details of the study participants.
*Multiple response questions, p-value based on Chi-square (χ^2) test; **p-value based on Fisher's-exact test

Characteristics	Group A (n=25) n (%)	Group B (n=25) n (%)	p-value
Surgery type			
Paraumbilical hernioplasty	10 (40)	7 (28)	0.102#
Umbilical hernioplasty	4 (16)	12 (48)	
Incisional hernioplasty	10 (40)	5 (20)	
Ventral hernioplasty	1 (4)	1 (4)	
Mean duration of surgery (in minutes)	102.0±23.09	92.0±27.42	0.170*
Visual Analogue Scale (VAS)			
Mild pain (<3.4)	15 (60)	13 (52)	0.569#
Moderate pain (3.5-7.4)	10 (40)	12 (48)	
Wound gaping			
Yes	3 (12)	4 (16)	0.684#
No	22 (88)	21 (84)	
Size of the defect (in cm)			
Length	15.80±2.93	16.12±2.26	0.187*
Width	6.00±2.71	5.04±2.35	

[Table/Fig-6]: Surgical details of the study participants.
*Independent t-test, #Chi-square test was used

Clinical signs	Group A (n=25) n (%)	Group B (n=25) n (%)	p-value Chi-square (χ^2) test
Redness			
Yes	2 (8)	3 (12)	0.637
No	23 (88)	22 (88)	
Tenderness			
Yes	2 (8)	3 (12)	0.637
No	23 (88)	22 (88)	
Purulent discharge			
Yes	0	1 (4)	0.312
No	25 (100)	24 (96)	
Clinical swelling at day three			
Yes	3 (12)	3 (12)	1.000
No	22 (88)	22 (88)	
Clinical swelling at first OPD visit			
Yes	0	1 (4)	0.312
No	25 (100)	24 (96)	
Clinical swelling at POD 30			
Yes	0	0	NA
No	25 (100)	25 (100)	
Duration of hospital stay			
<5 days	11 (44)	18 (72)	0.010*
>5 days	14 (56)	7 (28)	
Seroma formation			
Yes	3 (12)	3 (12)	1.000
No	22 (88)	22 (88)	
SSI			
Yes	2 (8)	4 (16)	0.513
No	23 (92)	21 (84)	

[Table/Fig-7]: Study outcomes among the participants.
Chi-square test was used; OPD: Outpatient department; POD: Postoperative day; SSI: Surgical site infection

DISCUSSION

Among all surgical procedures, open onlay mesh repair is one of the simplest and safest techniques learned by surgeons [11]. However, it is known to have complications such as seroma formation and wound infection, which can prolong the duration of hospital stay [12]. The occurrence of postoperative seroma was similar in both groups, suggesting that the placement of a drain did not have a significant effect in preventing seroma formation. This finding is supported by a study conducted by Soon PSH et al., where they also reported similar results [13]. Luo Y et al., reported that keeping a drain and the occurrence of seroma were independent events [14]. These complications occur due to injury to the blood and lymphatic systems during subcutaneous tissue dissection, which is part of the onlay technique's preparation of a bed for the mesh, leading to seroma formation [15]. He C et al., found that primary closure is the most promising strategy for preventing seroma formation, and

other strategies include cauterisation of the hernia sac and injection of fibrin sealant. However, no evidence was found for the use of a drain to prevent seroma [16].

The distribution of surgical site infection was also similar between the groups, with similar signs such as redness, tenderness, and purulent discharge. However, these findings contradict a study conducted by Mujagic E et al., where they reported that the placement of drains increased the chance of surgical site infection [17]. The present study found that smoking was the only modifiable risk factor associated with the occurrence of complications such as seroma and surgical site infection among the participants. Similar findings were reported by Wilson RB and Farooque Y, who identified obesity, tobacco use, and diabetes mellitus as major modifiable patient co-morbidities associated with postoperative surgical site infection in hernia surgery [18].

Shekhar H et al., found that 2% of onlay mesh-repaired cases experienced recurrence and 4% experienced local wound infection after one month of follow-up [19]. Onlay mesh repair was also associated with an infection rate ranging from 5% to 75% (mean value 33.5%), as reported by Timmermans L et al., [20]. Regarding the duration of hospital stay, the present study found that the placement of drains significantly increased the duration of hospital stay compared to non-placement of drains. Similar results were obtained by Luo Y et al., who reported a positive association between the presence of a drain and increased duration of hospital stay [14]. This could be due to the additional procedures associated with drain placement. Prolonged hospital stay not only places a burden on manpower and increases healthcare costs but may also impair the ability of the patient to return to routine activities. Therefore, keeping a drain prolonged the duration of hospital stay and was not found to be useful in preventing seroma or surgical site infection.

Limitation(s)

The results of the present study may not be generalisable due to its single-centre nature and the short duration of follow-up.

CONCLUSION(S)

The development of seromas was not influenced by whether or not a drain was present, and infection rates were similar regardless of drain usage. Hospital stays were significantly shorter when drains were not used. It is possible to reduce postoperative pain, psychological stress, and promote postoperative recovery without the use of drains by employing techniques such as quilting sutures and abdominal binder belts.

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