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Different Methods to Decrease Seroma Formation Post Hernioplasty of Ventral Hernias

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ABSTRACT

Background: Wounds can become infected associated with serous collection in the wound dead space in a condition known as seroma. After abdominal wall hernias correction, a variety of treatments have been tried to decrease seroma formation. **Objective**: To assess the rule of different modalities used in prevention of seroma formation post abdominal wall hernias repair.

Patients and Methods: At Zagazig University Faculty of Medicine's General Surgery Department we carried out a clinical trial investigation. Transverse incisions and suction drains have been inserted in all patients undergoing hernioplasty and onlay mesh repair. The patients were divided into 4 groups: Group A: Classic hernioplasty for ventral hernia. Group B: Applying of histoacryl intraoperative after onlay mesh fixation. Group C: Applying of fibrin glue intraoperative after onlay mesh fixation. Group D: block closure of dead space after onlay mesh fixation. The patients were followed up in inpatients wards for 24 hours then discharged to continue their care and follow up in outpatient clinic at 1, 2, and 4 weeks.

Results: When it came to the reduction of seroma production or other postoperative outcomes, there was no statistically significant difference between the groups. **Conclusion**: Fluid buildup can be avoided with the use of sclerotherapy, a minimally-invasive procedure that eliminates empty space. Chemical agents, tetracyclines, and talc were used satisfactorily with minimal complication rates.

Keywords: Hernioplasty, Seroma Formation, Ventral Hernias.

INTRODUCTION:

Wounds can become infected with a condition known as seroma. An investigation into the source of this sludge is still ongoing. The inflammatory foreign body reaction with monocytes and macrophages at the connective tissue-implant contact can lead to seroma development. To control the wound healing, immune response, and scar formation at the site, these cells secrete cytokines. The presence of seroma in a patient might lead to higher rates of pain, infection at the surgical site, need for additional procedures, and an extended hospital stay [(1)].

Dead space closure may lower the chance of seroma formation during open surgical procedures because seroma is a common consequence, particularly when big skin flaps are created during surgery. Seromas are more likely to occur when mesh is used for repair, although little is known about how they form. Tissue reactions to alloplastic mesh prostheses are many, including the release of cytokines following surgery [(2)].

It is likely that the true frequency of seroma following hernia repair is underreported, as clinical signs may not always be visible and intervention might not be required. Discomfort, persistent pain, or an infection may necessitate percutaneous aspiration, drainage, or reoperation in other circumstances [(3)].

In contrast to minor seromas, large symptomatic or chronic seromas may necessitate several aspirations, which may raise the risk of secondary infection, but this is rare. One study found that 20% of open ventral hernia surgeries necessitated intervention due to seromas [(4)]. These hernias are frequently repaired by utilizing subcutaneous drains. Despite the fact that drains have been found to minimize the frequency of postoperative seroma, infection risk may be increased if foreign material is present [(5)].

Techniques aimed at reducing seroma production following herniation correction have been tested. Serous drainage volume following surgery can be reduced by using harmonic scalpel tissue dissection rather than electrocautery [(6)].

Other methods to reduce seroma risk in abdominal wall hernia repair include the use of tetracycline, talc, histoacryl, and fibrin glue, however the results have been inconsistent. No single treatment has been found to totally eliminate the risk of postoperative seromas despite past efforts. There has been a recent increase in interest in the use of fibrin sealant to reduce postoperative seroma development, however the supporting data are few [(7)].

We aimed at this study to assess the rule of different modalities used in prevention of seroma formation post abdominal wall hernias repair.

PATIENTS AND METHODS

At Zagazig University Faculty of Medicine's General Surgery Department we carried out a clinical trial investigation. Transverse incisions and suction drains were inserted in all patients undergoing hernioplasty and onlay mesh repair. We divided patients into 4 groups: Group A: Classic hernioplasty for ventral hernia. Group B: Applying of histoacryl intraoperative after onlay mesh fixation. Group C: Applying of fibrin glue intraoperative

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after onlay mesh fixation. Group D: block closure of dead space after onlay mesh fixation.

Ethical considerations:

As long as all participants signed informed consent forms and submitted them to Zagazig University's Research Ethics Committee, the study was allowed (ZU-IRB#6231). We followed the World Medical Association's ethical code for human experimentation, the Helsinki Declaration.

Inclusion criteria: Adult patients from both genders with uncomplicated paraumbilical hernia, and uncomplicated incisional hernia.

Exclusion criteria: Complex hernias, hernias associated with medical conditions that influence the coagulation profile, diabetic patients, and patient refusal were all ruled out of this clinical research.

This is what all of the participants in this research had to go through:

History taking and clinical examination.

Operative design:

Clinical examination: Prior to surgery, all patients were evaluated clinically and laboratory for their vital signs, concomitant medical conditions, and any anticoagulation such as (low-dose aspirin, anti-platelets, and warfarin) or corticosteroids.

Laboratory investigations: Blood sugar, INR, CBC, liver function and serum creatinine.

Ultrasound imaging of the abdomen and pelvis: determining the size of the abdominal wall defect and showing the contents of the hernia is quite helpful using this tool.

All patients have undergone hernioplasty and onlay mesh repair via a transverse incision, and a suction drain was implanted in all of them.

Operative procedure:

Steps of performance and technique:

For hernia repair in this study, we used the same type and size of polypropylene mesh and the same surgeon would perform hernioplasty in the hospital through the following steps:

Transverse supra-umbilical incision. Dissection around hernia sac. Opening of sac, identification of its contents and reduction of those contents back to abdominal cavity. Excision of sac and repair of defect with prolene 1. Application of onlay mesh and fixation using prolene 1. Insertion of suction drain. In group A: closure of wound as classical method. In group B and C: Injection of topical fibrin glue or histoacryl respectively before closure of wound. In group D: closure of dead space first in layers before skin closure.

Postoperative follow up:

The patients were followed up in inpatients wards for 24 hours then discharged to continue their care and follow up in outpatient clinic at 1, 2, and 4 weeks.

Parameters of evaluation and follow up:

Wound infection or breakdown.

Seroma formation.

Amount of drain.

(A)

(B)

Figure (1): (A) Application of mesh and fixation using prolene 1, (B) Insertion of suction drain

Statistical analysis

In order to analyze the data acquired, it was loaded into a computer and run via the Statistical Package for the Social Sciences, version 25. (SPSS). Tables were used to present the findings. The Shapiro–Wilk test was used to examine the distribution properties of variables as well as the homogeneity of variance. The quantitative data were reported in the form of the mean and standard deviation. The frequency and proportions of qualitative data were used to present the information. For quantitative independent data, the student's t test (T) and the Mann-Whitney test (MW) were employed to examine the data as needed between 2 groups. One-way ANOVA was used to compare means of more than 2 groups. To examine qualitatively independent data, researchers employed the Pearson Chi-square test or the Fisher's exact test. P value equals or less than 0.05 was considered significant.

RESULTS

As regard age, BMI and sex distribution there was no significant difference among groups. The majority of cases were females **(Table 1).**

Table (1): Comparison of age, BMI and sex among studied groups

			Group A	Group B	Group C	Group D	F/X^2	P
Age/ years Mean+SD			**54.83±6.96**	**51.5±4.76**	**52.5±4.81**	**53.83±4.66**	**0.445**	**0.723**
BMI Mean+SD			**29.98±2.45**	**29.38±1.93**	**28.98±2.49**	**29.1±1.91**	**0.243**	**0.865**
Sex	**Male**	**N**	2	1	2	2		
		%	33.3%	16.7%	33.3%	33.3%		
	Female	**N**	4	5	4	4	0.605	0.89
		%	66.7%	83.3%	66.7%	66.7%		
Total		**N**	6	6	6	6		
		%	100.0%	100.0%	100.0%	100.0%		

There was no significant difference among studied groups as regard hernia characters **(Table 2).**

Table (2): Comparing of hernia characters among studied groups

			Group A	Group B	Group C	Group D	F/X^2	P
Duration/ Months Mean±SD			45.66±8.8	46.16±9.8	42.83±6.46	46.33±7.91	0.231	0.874
Size defect/ cm Mean±SD			113.83±10.4	115.16±11.25	109.83±10.6	114.0±8.51	0.307	0.820
Type of Hernia	**Incisional**	**N**	3	4	3	4		
		%	50.0%	66.7%	50.0%	66.7%		
	Para umbilical	**N**	3	2	3	2	0.68	0.87
		%	50.0%	33.3%	50.0%	33.3%		
Total		**N**	6	6	6	6		
		%	100.0%	100.0%	100.0%	100.0%		

No significant difference was found as regard hospital stay but drain duration was significantly longer in group A **(Table 3).**

Table (3): Comparison of hospital stay and duration of drain among studied groups

	Group A	Group B	Group C	Group D	F	P
Hospital stay Mean+SD	2.83±0.99	2.52±0.82	2.66±0.81	2.5±0.83	0.159	0.922
Duration drain Mean±SD	8.5±2.07	5.83±1.47	5.16±1.16	5.84±1.36	5.149	0.008

No significant difference was found as regard complication **(Table 4).**

Table (4): Complication distribution among studied groups

			Groups				X^2	P
			Group A	Group B	Group C	Group D		
Seroma	**-VE**	**N**	3	4	5	4		
		%	50.0%	66.7%	83.3%	66.7%		
	+VE	**N**	3	2	1	2	1.51	0.68
		%	50.0%	33.3%	16.7%	33.3%		
Infection	**-VE**	**N**	2	4	5	5		
		%	33.3%	66.7%	83.3%	83.3%		
	+VE	**N**	4	2	1	1	4.5	0.21
		%	66.7%	33.3%	16.7%	16.7%		
Hematoma	**-VE**	**N**	4	6	5	6		
		%	66.7%	100.0%	83.3%	100.0%		
	+VE	**N**	2	0	1	0	4.19	0.24
		%	33.3%	0.0%	16.7%	0.0%		
Induration	**-VE**	**N**	5	6	6	6		
		%	83.3%	100.0%	100.0%	100.0%		
	+VE	**N**	1	0	0	0	3.13	0.37
		%	16.7%	0.0%	0.0%	0.0%		
Overall Complication	**-VE**	**N**	1	4	4	4		
		%	16.7%	66.7%	66.7%	66.7%		
	+VE	**N**	5	2	2	2	4.53	0.21
		%	83.3%	33.3%	33.3%	33.3%		
Total		**N**	6	6	6	6		
		%	100.0%	100.0%	100.0%	100.0%		

Cases had seroma were significantly higher as regard WBCs, Albumin and drain duration **(Table 5).**

Table (5): Seroma predictors' data

			NO	Seroma	t/X^2	P
Age (years) Mean+SD			52.75±5.63	54.0±4.34	0.549	0.589
BMI (kg/m^2) Mean+SD			29.56±2.3	28.95±1.71	0.671	0.509
Duration Mean+SD			43.18±7.12	49.37±8.21	1.908	0.070
HB (g/dL) Mean+SD			11.25±1.05	11.85±0.88	1.366	0.186
WBCs (mcL) Mean+SD			5.96±1.75	9.92±1.74	5.225	<0.01
PLT (mcL) Mean+SD			247.81±40.18	233.25±30.76	1.831	0.068
Albumin (g/L) Mean+SD			4.08±0.31	3.77±0.21	2.557	0.018
INR Mean+SD			1.03±0.06	1.01±0.05	1.942	0.059
Size defect Mean+SD			111.37±10.54	116.87±7.39	1.316	0.202
Hospital stay Mean+SD			2.37±0.71	3.12±1.12	1.992	0.059
Duration of drain Mean+SD			5.5±1.15	8.37±1.76	4.813	<0.01
Sex	**Male**	**N**	5	2		
		%	31.2%	25.0%		
	Female	**N**	11	6	0.101	0.75
		%	68.8%	75.0%		
Co morbidity	**-VE**	**N**	7	3		
		%	43.8%	37.5%		
	Cardiac	**N**	2	1		
		%	12.5%	12.5%		
	HTN	**N**	5	4	1.55	0.67
		%	31.2%	50.0%		
	Renal	**N**	2	0		
		%	12.5%	0.0%		
Previous operation	**No**	**N**	7	2		
		%	43.8%	25.0%		
	Yes	**N**	9	6	0.80	0.37
		%	56.2%	75.0%		
Type Hernia	**Incisional**	**N**	8	6		
		%	50.0%	75.0%		
	Para umbilical	**N**	8	2	1.37	0.24
		%	50.0%	25.0%		
Drain type	**Open**	**N**	3	1		
		%	18.8%	12.5%		
	Closed	**N**	13	7	0.15	0.69
		%	81.2%	87.5%		
Groups	**Group A**	**N**	3	3		
		%	18.8%	37.5%		
	Group B	**N**	4	2	1.5	0.68
		%	25.0%	25.0%		
	Group C	**N**	5	1		
		%	31.2%	12.5%		
	Group D	**N**	4	2		
		%	25.0%	25.0%		
Total		**N**	16	8		
		%	100.0%	100.0%		

DISCUSSION

When it comes to general surgery, hernia repairs are among the most popular procedures. It's continually changing the way abdominal wall reconstruction is done, bioprosthetics and innovative items have been introduced to the operating room in an effort to reduce surgical morbidity. These advancements and minimally invasive dissection methods still cause complications in 24% to 34% of patients following surgery [(8)].

Following both laparoscopic and open hernia surgeries, seroma development is a common consequence. Hernia repair seromas may be underreported since clinical symptoms may not always be obvious and the need for surgery may not always be required. Due to chronic discomfort, pain or an accompanied infection, in some circumstances, drainage, percutaneous aspiration, or reoperation may be required [(9)].

In this study, the majority of cases were females where there were 4 or 5 female cases in each group and all were almost at the same age and there was no significant difference regarding BMI and sex distribution among the 4 groups. This is in line with the findings of the **Azoury *et al.*** [(8)] investigation, which covered 250 patients. All patients had their ventral hernias repaired openly using a hybrid-vacuum assisted closure (HVAC) device. The patients' median age was 56.6 years (P = 0.97) on average. Women comprised a majority of the patients. In a study conducted in China in 2011 by **Yan-ping *et al.*** [(10)] they discovered that age was a major risk factor for postoperative seroma development and other local wound complications in Chinese breast cancer patients (p-value 0.004).

In our study, regarding size of hernia defect, there was no significant difference among studied groups. **Azoury *et al.*** [(8)] also found no difference between the groups as regard the average hernia defect size and other major medical conditions.

In our study, concerning drain duration, it was significantly longer in group A: where classic hernioplasty was done but regarding hospital stay, there was no significant difference. That's consistent with study done by **Azoury *et al.*** [(8)]. TISSEEL fibrin sealant for the prevention of postoperative seroma was explored in this research project. No substantial change in hospital stay time was detected, according to researchers.

As regard postoperative complications, no significant difference was found as regard complication but group C (Applying of fibrin glue intraoperative after onlay mesh fixation) was the lowest in distribution of seroma and the highest was group A where seroma formation was 50 % of cases and infection was 66.7% of cases and also group C and D groups were lower regarding infection.

According to **Azoury *et al.*** [(8)] there were no perioperative deaths during the research period. It was found that 18.1 percent of the TISSEEL group had surgical site occurrences (SSO), compared to 13 percent in the non-TISSEEL group (P = 0.27). Both groups had the same number of surgical site infections (P = 0.84) and there was no significant difference in incidence. A severe surgical site infection, defined as a deep or organ-space infection, was not found in either group of patients. No substantial differences were found in other SSOs (such as wound dehiscence or enterocutaneous fistula) across groups.

In this study; as regard the predictors of seroma formation; cases had seroma were significantly higher regarding WBCs, albumin and drain duration.

CONCLUSION

Seromas continue to be a common concern for surgeons, despite better recognition and management of risk factors. As a non-invasive procedure, sclerotherapy can be used to remove dead space and avoid fluid collection. Chemical agents such as talc, tetracyclines, and others have been used successfully with few side effects. As a result, it is impossible to assess the reproducibility or generalizability of the provided results due to their small size, heterogeneity, and retrospective nature. It is necessary to conduct large-scale, randomized, comparative studies to analyse the effectiveness of these chemical agents in the treatment of seromas.

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