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ORIGINAL ARTICLE

Use of Subcutaneous Drain in Gynecological Surgery and its Impact on Wound Healing

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ABSTRACT

Background: Subcutaneous wound drains are useful because they prevent fluid from collecting in the area between the skin and the underlying tissue. Subcutaneous wound drain insertion after caesarean delivery and gynecologic surgery yielded conflicting results. This study aimed to evaluate the effectiveness and impact of a surgical wound drain on wound healing in women who underwent gynecological operations including cancer.**Methods:** This randomized controlled clinical trial was carried out on 174 cases from Department of Obstetrics and Gynecology, at Zagazig University Hospital, divided into two equal groups: In group A: 87 patients had subcutaneous suction drain size (14-16) or tube drain for 2-7 days and the skin was closed by metal clips. In Group B:87 patients without any subcutaneous wound drain, and the subcutaneous fat approximated with interrupted 2-0 or 3-0 Vicryl fast suture and the skin was closed with the metal clips.Assessment of wound healing and outcomes was done for the 2 groups.**Results:** Wound sites that were managed with drain had more significantly clear wound healing than wound sites managed without drain ($p<0.001$), also seroma formation, wound infection, mean wound healing time and duration of hospital stay that were significantly lower in drain group than without drain group ($p=0.036$, 0.022, <0.001, <0.001 respectively). **Conclusions:** Subcutaneous wound drain showed better wound outcomes after gynecologic surgeries; clear healing and less wound disruption, finally resulting in shorter hospitalization ,thus, the application of a subcutaneous negative pressure drain is an effective method of wound management in gynecologic surgery.

Keywords: Subcutaneous Drain; Gynecological Surgery; Wound Healing.

INTRODUCTION

Complications from wound care are a headache for everyone involved, from patients and doctors to healthcare providers and payers. There is no denying that wound complications have a detrimental effect on patients' quality of life; they also prolong hospital stays and place a heavy financial strain on society. A delay in the administration of adjuvant treatment, such as chemotherapy following cytoreductive surgery for ovarian cancer or radiation and/or chemotherapy following radical hysterectomy for cervical cancer, may be attributable to wound problems [1–3].

Pre-operative and intra-operative risk factors have been elucidated, while others have validated a number of therapies that may prevent wound complications during surgery. Intraoperative subcutaneous drainage placement is one of the most studied procedures, along with skin preparation and subcutaneous closure [4].

An advantage of using a subcutaneous wound drain is that it limits the amount of dead tissue beneath the skin by minimizing fluid buildup and facilitating drainage. This has resulted in a number of studies on the subcutaneous wound drain, most of which have focused on individuals who are overweight and have particularly thick subcutaneous tissues [4–8]. Subcutaneous wound drain insertion after caesarean delivery yielded controversial results [6–9]. Prophylactic subcutaneous drains in gynecologic surgery are also controversial and seem to be most helpful for morbidly obese females. [4,10]. Differences in study populations, inclusion/exclusion criteria, illness categories, definitions of wound complications, and standardisation of methodology are the primary causes of these divergent findings. Particularly, the drainage tube's size, length of use, and type varied widely throughout the investigations. In addition, numerous reports failed to detail the drain type.

We hypothesized that subcutaneous drain had roles in decreasing wound complications that occur after gynecological surgery. Therefore, the aim of our study was to evaluate the effectiveness and impact of a surgical wound drain on wound healing in women who underwent gynecological operations including cancer.

METHODS

In this study, 200 patients were assessed for eligibility, 19 patients did not meet the criteria and 7 patients refused to participate in the study. The remaining 174 patients were randomly allocated into two groups (87 patients in each) between February 2022 to February 2023 who were included in this randomized controlled clinical trial at the Department of Obstetrics and Gynecology, at Zagazig University Hospital.

***Inclusioncriteria*:** We includedfemales withgynecologic indications involving malignant disease, like cervical, endometrial as well as ovarian cancer, and also included common benign disease, like and endometriosis and myoma uteri. Also, we included women who had medical and obstetric history uneventful.

***Exclusioncriteria*:** Females who had any of the following were excluded from the study: severe renal or cardiac dysfunction, uncontrolled diabetes mellitus and autoimmune disease, and those who had immune deficiency disease.

After institutional review board approval of IRB (#7097/18-8-2021), written informed consent was obtained from all participants. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

All the participating pregnant women were subjected to the following:

A) Complete history taking (medical and obstetric history) including:

Personal data, and past gynecological Infection: Including any past history of pelvic inflammatory disease and if it was adequately treated or not. Any known contact with sexually transmitted infections. Assessment of the risk of HIV and hepatitis B.Previous surgeries, gynecological operations and cervical operations such as cerclage and cervical biopsy and smear history, date and result of last cervical smear, previous abnormalities, as well as obstetric history including: Parity, number of children, details of pregnancy, method of delivery, birth weights, and complications.

B) *Examinations*:

General, abdominal as well and local examination was performed for the detection of vital signs.

***C) Routine laboratory investigations for the pregnant women*:** Complete blood count **(**CBC), Random Blood Sugar, and Liver, kidney function, Hepatitis markers, HIV markers, electrocardiogram (ECG).

Patients were undergone to the surgical procedures, including wound care. Bowel preparation was achieved by 48 hours before surgery just clear fluids. In 1st 24 hours (14 sachets of epimag + 1 liter of clear fluid) drink it over 24 hours. In next 12 hours (14 sachets of epimag + 1 liter of clear fluid) drink it over 12 hours. Then, next 12 hours (No epimag) just clear fluid. Neomycin 500 mg, Flagyl 500 mg& Senalax every 12 hours (start 48 hours before surgery). Pubic hair was removed by shaving. Prophylactic antibiotics (Ceftriaxone 1g& Flagyl 500 mg) intravenous 1 hour before operation.

In group A: 87 patients had subcutaneous suction drain size (14-16) or tube drain for 2-7 days and the skin was closed by metal clips (Figure 1A)

In Group B: 87 patients were without any subcutaneous wound drain, and the subcutaneous fat was approximated with interrupted 2-0 or 3-0 Vicryl fast suture and the skin was closed with the metal clips (Figure 1B).

Postoperative:

The postoperative care was achieved by monitoring vital signs, airway patency, neurologic status, managing pain, assessing and maintaining fluid and electrolyte balance, and providing a thorough report of the patient's status to the receiving nurse on the unit, as well as the patient's family.

After operation we used: We gave Garamycin 80 mg /12 hours for 3 days, flagyl 500 mg / 8 hours for 7 days, and Ceftraixone 1g / 12 hours for 7 days. We monitored the possible side effects of the given drugs as well as any signs of possible complications of the surgery.

Outcome measures: Assessment of wound healing and outcomes were done at the 2 groups.

STATISTICAL ANALYSIS

IBM's statistical analysis software, SPSS, version 19.0, was used to process the data. Qualitative data was represented with numerical and percentage-based language. Quantitative information was summarized by means and standard deviations. Qualitative variables were presented as frequency and percentage (%) and were analyzed utilizing

the Chi-square test or Fisher's exact test when appropriate. A two tailed P value < 0.05 was considered statistically significant. Multivariate logistic regression was used to estimate the relationship between a dependent variable and more independent variables.

RESULTS

There was no statistically significant difference between both groups regarding age, BMI, parity, and history of previous abdominal operations (Table 1).

Regarding the risk factors of wound infection in studied group's current study reported that there was no statistically significant difference between both groups regarding risk factors for wound infection; obesity was present in 67.8% of first group and in72.4% in the second one. Hypertensive patients in our study also had a high risk of infection it was present in 16.1 % of first group and in 25.3% in the second. Malnutrition also is a higher risk factor for increased surgical site infection in our study Malnutrition patients were in 25.3 % of first group and in28.7% in the second. Chest disease also is a higher risk factor for increase surgical site infection in our study were in 5 cases of first group and in 7 cases in the second. Regarding, diabetes mellitus was recorded in 10 cases of group A and in 8 cases of group. The mean fat thickness was 5.4 ± 1.71 cm in group A and 4.98 ± 1.8 cm in group B, there were 37 (42.5%) patients had fat thickness <2 cm and 55 (57.5%) patients had fat thickness ≥ 2cm in group A, whereas 40 (46.0%) patients had fat thickness <2 cm and 47 (54.0%) patients had fat thickness ≥ 2cm in group B (Table 2).

Regarding indication of surgery, our results showed no statistically significant difference between both studied groups (Table 3).

There was no statistically significant difference between both studied groups regarding pre-operative laboratory investigations. (Table 4).

There was no statistically significant difference between both groups of the study regarding surgical data (Table 5).

Wound sites that were managed with drain had more significantly clear wound healing than wound sites managed without drain ($p<0.001$), also seroma formation, wound infection, mean wound healing time and duration of hospital stay that were significantly lower in drain group than without drain group ($p=0.036$, 0.022, <0.001, <0.001 respectively) (Table 6, Supplementary Figure 1).

There were no significant differences in age, BMI, parity, fat thickness, estimated blood loss, complications (clear wound healing, hematoma formation, seroma formation, wound infection and wound dehiscence), wound healing time and duration of hospital stay. But patients with a Pfannenstiel incision had shorter duration of surgery compared to those with Vertical midline incision (128.1 ± 13.92 vs. 134.2 ± 13.95, P=0.0001) (Table 7).

On multivariate logistic regression analysis, BMI, previous surgery, poor hygiene, immune system disorder, diabetes mellitus, obesity, malignancy, using drain and duration of hospital stay were the only predictors for the incidence of wound infection (Table 8).

Table 1: Basiccharacteristics of the two studied groups:

Variable	Group A (n=87)	Group B (n=87)	t-value	p-value
Age (years):				
-Mean±SD	48.0±11.9	44.6±7.7	1.591	0.058
- Range	21.0–76.0	28.0–64.0		
BMI(Kg/m^2):				
-Mean±SD	31.3±5.7	32.4±5.0	-0.896	0.186
- Range	21.1–43.7	19.2–43.7		
Parity:				
-Mean±SD	3.3±1.5	3.0±1.4	0.799	0.213
- Range	0.0–6.0	0.0–6.0		

BMI: Body mass index; X2: chi-square test.

Table 2: Risk factors of wound infection in both group:

Variable	Group A (n=87)	Group B (n=87)	Test	p-value
Previous surgery:				
No	25(28.7%)	28 (32.2%)	X^2 =0.244	0.621
Yes	62(71.3%)	59 (67.8%)		
Poor hygiene:				
No	72 (82.8%)	69 (79.3%)	X^2 =0.149	0.698
Yes	15 (17.2 %)	18 (20.7%)		
Immune system disorder:				
No	84 (96.6%)	86 (98.9%)	X^2 =0.255	0.612
Yes	3 (3.4%)	1 (1.2%)		
Malnutrition:				
No	65 (74.7%)	62 (71.3%)	X^2 =0.116	0.732
Yes	22 (25.3%)	25 (28.7%)		
Hypertension (HTN):				
No	73 (83.9 %)	66 (74.7 %)	X^2 =1.752	0.186
Yes	14 (16.1 %)	21 (25.3 %)		
Diabetes mellitus:				
No	79 (90.8 %)	77 (88.5 %)	X^2 =0.248	0.619
Yes	8 (9.2 %)	10 (11.5 %)		
Chest diseases:				
No	83 (95.4 %)	84 (96.6 %)	X^2 =0.148	0.699
Yes	4 (3.4 %)	3 (3.4 %)		
Heart diseases:				
No	82 (94.3%)	80 (91.9 %)	X^2 =0.358	0.549
Yes	5 (5.7%)	7 (8.1 %)		
Obesity:				
No	28 (32.2%)	24 (27.6%)	X^2 =0.246	0.619
Yes	59 (67.8%)	63 (72.4%)		

Variable	Group A (n=87)	Group B (n=87)	Test	p-value
Smoking history:				
No	83 (95.4 %)	81 (93.1 %)	X^2 =0.424	0.744
yes	4 (3.4 %)	6 (6.9 %)		
Fat thickness				
< 2cm	37 (42.5%)	40 (46.0%)	X^2 =0.093	0.760
≥ 2cm	55 (57.5%)	47 (54.0%)		
Fat thickness				
Mean ± SD	5.4 ± 1.71	4.98 ± 1.8	t = 1.600	0.111
Range	1.6 - 8.5	1.1 - 8		

Table 3: Indications of surgery in the two studied groups:

Variable	Group A (n=87)	Group B (n=87)	X^2-value	p-value
Variable	**Group A (n=87) Mean±SD**	**Group B (n=87) Mean±SD**	**t-value**	**p-valu**
Hemoglobin(mg/dl):	10.46±1.1	10.3± 0.8	1.09	0.274
WBCs(*10^9/L):	8.19±1.7	8.5 ± 1.9	1.13	0.258
Platelets(*10^9/L):	256.64± 20.4	261 ± 18.6	1.47	0.142
AST (U/L):	33.3 ± 6.2	35.2 ± 7.4	1.83	0.06
ALT (U/L):	25.1 ± 4.4	23.9 ± 4.1	1.86	0.06
TotalPlasmaProteins:	6.9 ± 1.6	7.1 ± 1.4	0.87	0.381
SerumAlbumin:	3.4 ± 0.6	3.6 ± 0.7	2.02	0.05
SerumCreatinine:	1.1 ± 0.3	0.9 ± 0.2	0.77	0.438
BloodUrea:	25.4 ± 4.9	24.6 ± 4.2	1.15	0.249
Malignancies				
Ovariancancer:	28 32.2%	31 35.6%	2.054	0.561
Cervicalcancer:	12 13.8%	11 12.6%		

Variable	Group A (n=87)		Group B (n=87)		X^2-value	p-value
Endometrialcancer:	8	9.2%	9	10.4%		
Others:	4	4.6%	1	1.2%		
Benign disease						
UterineMyoma:	19	21.8%	23	26.4%		
Ovariancyst:	10	11.5%	8	9.2%	1.003	0.605
Others:	6	6.9%	4	4.6%		

Table 4: Preoperative laboratory investigations of the two studied groups:

Variable	Group A (n=87) Mean±SD	Group B (n=87) Mean±SD	t-value	p-value
Hemoglobin(mg/dl):	10.46±1.1	10.3± 0.8	1.09	0.274
WBCs(*10^9/L):	8.19±1.7	8.5 ± 1.9	1.13	0.258
Platelets(*10^9/L):	256.64± 20.4	261 ± 18.6	1.47	0.142
AST (U/L):	33.3 ± 6.2	35.2 ± 7.4	1.83	0.06
ALT (U/L):	25.1 ± 4.4	23.9 ± 4.1	1.86	0.06
TotalPlasmaProteins:	6.9 ± 1.6	7.1 ± 1.4	0.87	0.381
SerumAlbumin:	3.4 ± 0.6	3.6 ± 0.7	2.02	0.05
SerumCreatinine:	1.1 ± 0.3	0.9 ± 0.2	0.77	0.438
BloodUrea:	25.4 ± 4.9	24.6 ± 4.2	1.15	0.249

Table 5: Surgical datainthetwostudiedgroups:

Variable	Group A (n=87)	Group B (n=87)	Test	p-value
	mean ± SD	mean ± SD		
Duration of surgery (min):	133.4 ± 10.9	130.8 ± 12.2	t=1.48	0.14
Estimated blood loss:	525.3±26.9	533.2±27.7	t=1.90	0.58
Type of incision **Midline** **Pfannenstiel**	 41 (47.1%) 46 (52.9%)	 38 (43.7%) 49 (56.3%)	 X^2 =0.208	 0.647

Table 6: Woundoutcomesinthe twostudiedgroups:

Variable	Group A (n=87)		Group B (n=87)		t-value	p-value
	No	%	No	%		
Clear wound healing:						
No	16	18.4%	38	43.7%	12.99	<0.001**
Yes	71	81.6%	49	56.3%		
Hematoma Formation:						
No	84	96.5%	84	96.5%	-	-
Yes	3	3.5%	3	3.5%		
Seroma Formation:						
No	81	93.0%	72	82.8%	4.386	0.036*
Yes	6	7.0%	15	17.2%		
Woundinfection:						
No	83	95.4%	74	89.6%	5.280	0.022*
Yes	4	4.6%	13	14.9%		
Wound dehiscence:						
No	84	96.5%	80	91.9%	1.697	0.192
yes	3	3.5%	7	8.1%		
Wound healing time (days): **-Mean±SD**	13.36±2.9		19.5±3.8		11.98	<0.001*
Duration of hospitalstay: **-Mean ± SD**	6.36±0.81		10.45 ± 2.68		-9.663	<0.001*

Table 7: Comparison of the Pfannenstiel incision and vertical midline incision:

Variable		Pfannenstiel incision (n=95)	Vertical midline incision (n=79)	Test	p-value
Age (years)		49.9 ± 17.36	46.1 ± 16.03	t = 1.517	0.131
BMI(Kg/m^2)		32 .03± 7.18	31.5 ± 7.3	t = 0.459	0.646
Parity		3.18 ± 1.89	2.9 ± 1.84	t = 0.800	0.424
Fat thickness		5.1 ± 2.37	4.6 ± 2.23	t = 1.279	0.203
Duration of surgery (min)		128.1 ± 13.92	134.2 ± 13.95	t = 2.867	**0.005***
Estimated blood loss		528.6 ± 35.21	531.5 ± 34.75	t = 0.541	0.589
	Clear wound healing	67 (70.5%)	53 (67.1%)	X^2 =0.238	0.625
	Hematoma formation	1 (2.1%)	4 (5.1%)	---	0.178
	Seroma formation	9 (9.5%)	12 (15.2%)	X^2 = 1.328	0.249
Outcome	**Woundinfection**	6 (6.3%)	11 (13.9%)	2.832	0.092
	Wound dehiscence	4 (4.2%)	6 (7.6%)	---	0.515
	Wound healing time (days)	13.8 ± 3.78	14.2 ± 4.17	t = 0.697	0.487
	Durationofhospitalstay	9.9 ± 3.31	10.3 ± 3.27	t = 0.844	0.400

Data presented as mean ± SD or frequency (%), BMI: Body mass index, *:statistically significant as P value <0.05.

Table 8: Multivariate logistic regression analysis for prediction of wound infection:

Variable	Coefficient	SE	P	OR	95% CI
Age (years)	-0.017	0.016	0.289	0.984	0.9538 to 1.0142
BMI(Kg/m^2)	0.070	0.033	**0.033***	1.072	1.0058 to 1.1430
Parity	0.002	0.035	0.958	1.002	0.9345 to 1.0740
Previous surgery	0.326	0.131	**0.013***	1.386	1.0719 to 1.7919
Poor hygiene	-2.153	0.799	**0.007***	0.116	0.0243 to 0.5559
Immune system disorder	-3.527	1.055	**0.001***	0.029	0.0037 to 0.2323
Malnutrition	-0.464	0.534	0.385	0.629	0.2206 to 1.7906
Hypertension	0.247	0.521	0.636	1.280	0.4608 to 3.5550

Variable	Coefficient	SE	P	OR	95% CI
Diabetes mellitus	-1.374	0.656	**0.036***	0.253	0.0699 to 0.9152
Chest diseases	0.320	0.526	0.543	1.377	0.4916 to 3.8590
Heart diseases	0.112	0.519	0.830	1.118	0.4046 to 3.0891
Obesity	-1.197	0.556	**0.032***	0.302	0.1016 to 0.8991
Smoking history	0.126	0.528	0.811	1.135	0.4031 to 3.1932
Fat thickness (cm)	0.252	0.131	0.055	1.286	0.9948 to 1.6630
Malignancy	1.349	0.656	**0.040***	3.853	1.0648 to 13.9397
Hb	-0.496	0.256	0.053	0.609	0.3688 to 1.0055
WBCs	-0.079	0.224	0.725	0.924	0.5957 to 1.4338
PLT	0.023	0.013	0.078	1.023	0.9974 to 1.0498
Duration of surgery (min)	-0.001	0.019	0.954	0.999	0.9633 to 1.0359
Estimated blood loss	0.005	0.008	0.499	1.005	0.9903 to 1.0202
Type of incision	-0.462	0.541	0.393	0.630	0.2184 to 1.8177
Drain	-1.967	0.567	**0.001***	0.140	0.0460 to 0.4248
Durationofhospitalstay	0.150	0.070	**0.033***	1.161	1.0120 to 1.3328

SE: standard error, OR: odds ratio, CI: confidence interval, BMI: Body mass index, Hb: hemoglobin, WBCs: white blood cells, PLT: platelets, *:statistically significant as P value <0.05.

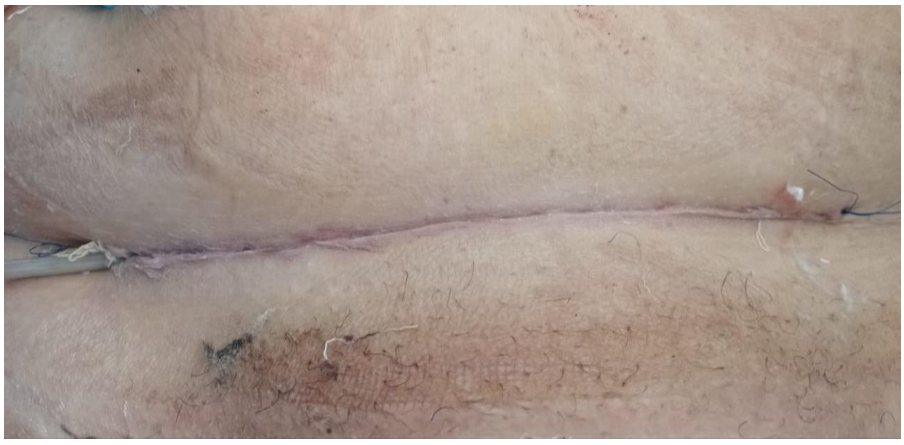

Figure 1: Placement of subcutaneous suction drain.

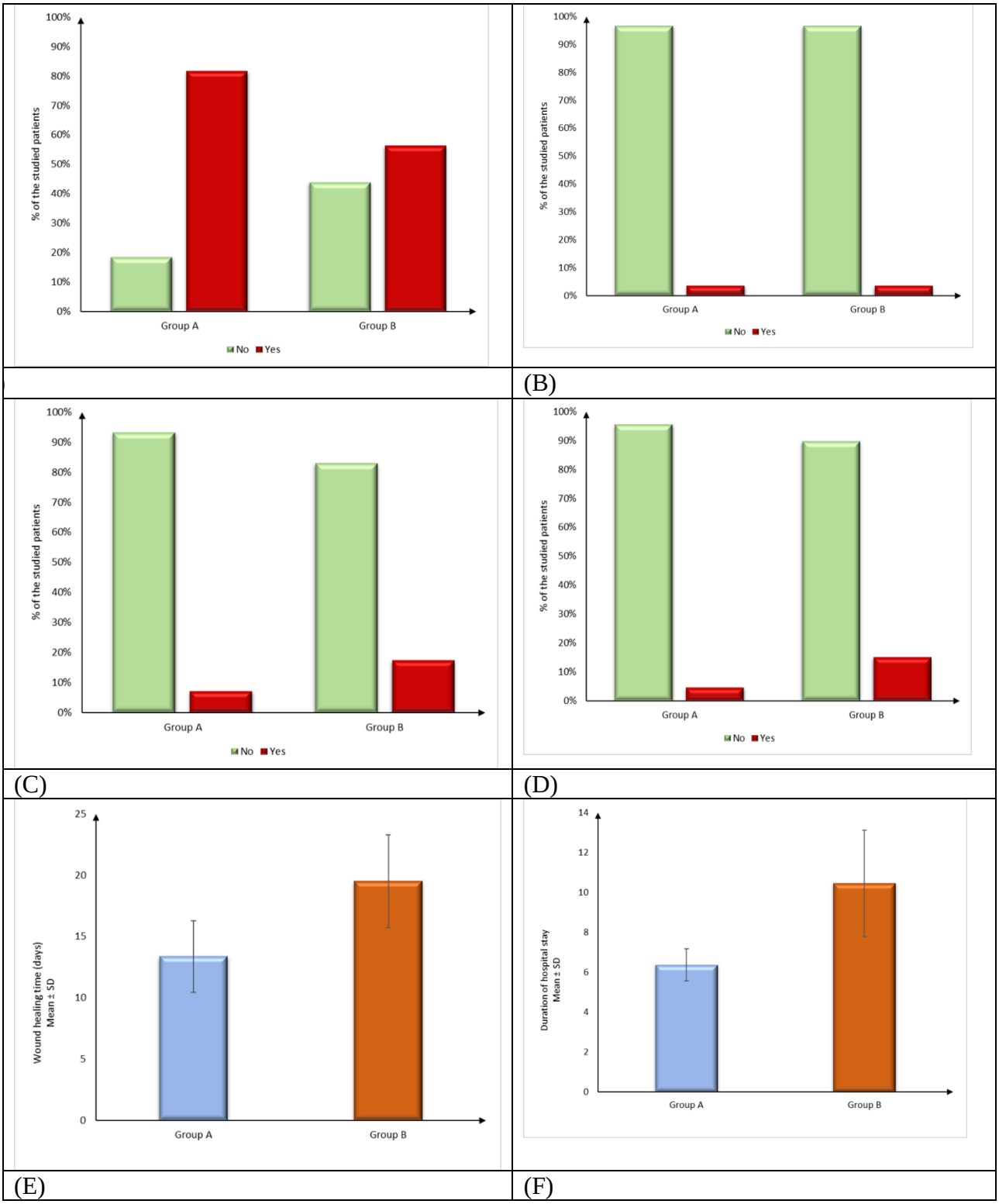

Figure 2: (A): Comparison between both groups regarding incidence of clear wound healing, (B): Comparison between both groups regarding incidence of hematoma formation, (C): Comparison between both groups regarding incidence of seroma formation, (D): Comparison between both groups regarding incidence of wound infection, (E): Wound healing time of the studied groups, (F): Comparison between both groups regarding hospital length of stay

DISCUSSION

Increased rates of readmission and postoperative death as well as delays in chemotherapeutic treatment following abdominal surgery have been linked to wound

problems in gynaecological cancer [10].

Many methods for lowering the risk of wound complications have been studied as a result. The risk of postoperative wound problems can be reduced by shortening the duration of the operation, using perioperative prophylactic antibiotics, irrigating the operational site, ensuring good hemostasis, avoiding dead space, and practicing thorough surgical technique [11].

The theory behind these methods is that they can lessen the amount of dead space in the subcutaneous tissue, hence reducing the number of germs in the area. It is possible for serous fluid or blood to develop in this area, leading to infection and eventually wound disruption [9].

About two decades ago, subcutaneous wound drains were created for the purpose of removing transudate from wounds. These drains stop transudate from surgical wounds from collecting in the subcutaneous tissue, reducing the risk for dead space there. The use of subcutaneous wound drains has shown great promise in a number of surgical specialties. However, wound drains' usefulness in gynecological surgery is still up for debate [5].

The results of the current study were: Combinations of morbid conditions like diabetes mellitus, hypertension, and obesity are the important risk factors for surgical site infection. Regarding the Risk factors of wound infection in studied groups current study reported that there was no statistically significant difference between both groups regarding risk factors for wound infection I, obesity was present in 67.8% of first group and in72.4% in the second one. Hypertensive patients in our study also had a high risk of infection it was present in 16.1 % of first group and in25.3% in the second .Malnutrition also is a higher risk factor for increase surgical site infection In our study Malnutrition patients were in 25.3 % of first group and in28.7% in the second . chest disease also is a higher risk factor for increase surgical site infection In our study were in 5 cases of first group and in 7 cases in the second.Regarding, diabetes mellitus was recorded in 10 cases of group A and in 8 case of group.

Also,Zhang et al. [12] stated that diabetes mellitus is significantly associated with increased risk of SSIs. Martin et al. [13] agreed that diabetes should be considered a separate risk factor for SSIs across a wide range of surgical procedures. AlMohawis et al. [14] demonstrated that DM is a significant predictor of SSIs following a variety of surgical procedures. The overall prevalence of SSI among diabetes patients shown by their meta-analysis was 26.3%.

Similar finding was reported by Kikkeri, et al. [15] documented the same result. They discovered that 65 percent of diabetics, 57 percent of hypertensives, and 65 percent of anemics had infections. Our results were comparable to those of these other studies in that patients with co-morbidities were at an increased risk of infection after surgery because their immune systems were compromised.

Smoking in our study noted that it was an important risk factor of surgical site infection as there were 4 patients of first group and in 6 cases in the second.

About smoking our study was comparable with Beldi, et al. [16] who claimed that smoking slowed wound healing and increased the risk of infection at surgical sites. this was thought to be due to the narrowing of peripheral blood vessels caused by smoking. Smoking cessation for at least four weeks

before to surgery lowered the risk of SSI in one trial[16].

Winfield et al. [17] researched the prevalence of septic, nonseptic, and contaminated wounds in morbidly obese patients. Clean and clean-contaminated cases, but not contaminated or dirty/infected cases, were reported to have significantly higher SSI rates among obese and morbidly obese individuals. Obesity and morbid obesity were found to be independently linked with the overall progression of SSI in both the clean and clean-contaminated cases (obesity OR = 1.757, morbid obesity OR = 2.544, P 0.001), as determined by logistic regression.

As regard to post- operative complication infection was significant higher in group A, while hematoma, dehiscence and seroma were higher in group B**.** There was no significant difference between studied groups regarding operative time while there was significant difference between them as regard duration of postoperative hospital stay that was more in drain group.However, studies evaluating the effectiveness of drain implantation in preventing wound complications have yielded contradictory results, thus the practice is not without [8].

Similarly, Panici et al. [18] proved that the use of a subcutaneous wound drain reduced the rate of wound complications from 6% to 3% (p = 0.003).

On the other handopposite to our result Gallup et al. [4] analysed the effectiveness of a subcutaneous wound drain in morbidly obese women undergoing gynecologic procedures in a prospective randomised study. The rate of wound complications was not significantly different between the wound drain group and controls (20% vs. 31%; p = 0.09).

Hellums et al. [9]Women undergoing gynaecological surgery may theoretically benefit from subcutaneous drainage, according to the results of a meta-analysis that examined the clinical uncertainty surrounding this practice. Subcutaneous drains are intended to get rid of any remaining fluid and blood in a wound so that it doesn't become a breeding ground for bacteria. There is little evidence in the literature to support the theoretical benefits of subcutaneous drainage.

Higson and Kettlewell. [19]Divided 250 abdominal surgical incisions into two groups: those that had a Penrose drain placed and those that did not. There were 300 total incisions, and these were categorised as follows: clean (100), potentially contaminated (100), and contaminated (50 Wounds). Separately, we split each set of people in half (drain or no drain). In the third group, patients were given an intraparietal powder form of ampicillin. Conclusion: Open parietal drains are detrimental when used on clean wounds and of dubious utility on potentially contaminated wounds; nonetheless, they are an appropriate alternative to topical antibiotic powder for the treatment of highly polluted wounds. In a nonrandomized trial, Morrow et al. [20]revealed that subcutaneous suction drains (20 women) were associated with a significantly lower rate of wound infection than control group patients (19 women).

In contrast**,** Kozol et al. [21]compared 98 individuals who underwent either closed suction drainage of the subcutaneous space or stay suture closure of this gap and discovered no difference in wound infection, skin separation, or hematoma.

Allaire et al. [8] performed their study on 76 women who were about to have caesarean sections were randomly assigned to receive one of two treatments. Patients were

randomly assigned to one of three groups: group 1, which underwent subcutaneous tissue suture closure; group 2, which underwent implantation of a subcutaneous closed suction drain; and group 3, which underwent neither subcutaneous tissue suture closure nor drainage. The researchers drew the conclusion that closed suction drainage of the subcutaneous region may lessen the risk of complications following surgical wounds.

Al-Inany, et al. [22] divided the 118 overweight expectant mothers who were having caesareans into two groups at random. Group one had a subcutaneous drainage system that was completely closed, whereas Group two did not. Both groups were frequently administered prophylactic antibiotics. Subcutaneous drains were not significantly more effective than prophylactic antibiotics in preventing wound breakdown, the researchers observed.

Prophylactic subcutaneous drainage after caesarean delivery was studied in a meta-analysis published in the Cochrane library in 2015, and the results showed no advantage for the women who underwent the procedure. Wound infection, wound complications, febrile morbidity, endometritis, blood loss, surgical time, and postpartum hospital stay were all accounted for in the Cochrane meta-analysis [23].

For the objective of determining the efficacy of subcutaneous wound drainage in surgery,kosins et al. [24] conducted the largest systematic review and meta-analysis to date, analysing 52 papers including a total of 6,930 procedures. The drain group had 3495 procedures, while the no-drain group saw 3435. There was only a statistically significant benefit to prophylactic subcutaneous drainage for:

(1) Reduction of blood loss (2) the avoidance of seromas. However, the surgeon has discretion over whether or not to insert a drain after surgery, and this decision may be influenced by factors other than the nature of the treatment and the patient's body mass index [24].

From our study results, the closed suction system using subcutaneous negative pressure drain without subcutaneous suture has several benefits. First, oozing and/or discharge from the surgical wound definitely decreased. Second, fewer surgical procedures, skipping the subcutaneous suture and having no remaining suture material in the subcutaneous tissue, was definitely related to better surgical outcomes in terms of wound healing. Third, less operation time was an additional virtue. Lastly, there was no issue related to controlling of suture tension, which might be a difficult issue for beginners.

The Strong points of this study was:all known risk factors and characteristics of the patients were not statistically different between the two groups. **Also,** all surgical procedures, included placement of subcutaneous drain, were consistently performed by the same surgeon and in the same fashion. Perioperative management related to wound outcome, such as skin preparation, bowel preparation, use of antibiotics, wound dressing, and stitch removal, was not different between the two surgeons.

Limitations:

The current study was done in one center on a relatively small sample size; also the study duration was relatively short.

CONCLUSIONS

The net result of our study and majority of other similar and recent study is the subcutaneous wound drain showed better

wound outcomes after gynecologic surgeries; clear healing and less wound disruption, finally resulting in shorter hospitalization , Thus, the application of a subcutaneous negative pressure drain is an effective method of wound management in gynecologic surgery.

REFERENCES

1. Kim I, Lim C, Song J, Seo S, Kang S, Park Y. Application of a subcutaneous negative pressure drain without subcutaneous suture: impact on wound healing in gynecologic surgery. EJOG, 2014, 173, 94-100.
2. Wechter ME, Pearlman MD, Hartmann KE. Reclosure of the disrupted laparotomy wound: a systematic review. *Obstet Gynecol*. 2005; 106(2):376-83.
3. Yoo HJ, Lim MC, Seo SS, Kang S, Yoo CW, Kim JY,et al. Pelvic exenteration for recurrent cervical cancer: ten-year experience at National Cancer Center in Korea. *J Gynecol Oncol*. 2012; 23(4):242-50.
4. Ketch L Winston R. Management of Neurosurgical Wounds. In Plastic Neurosurgery: Opening and Closing Neurosurgical Doors in Adults and Children, 2023, (pp. 145-171). Cham: Springer International Publishing.
5. Cardosi RJ, Drake J, Holmes S, Tebes SJ, Hoffman MS, Fiorica JV, et al. Subcutaneous management of vertical incisions with 3 or more centimeters of subcutaneous fat. *Am J Obstet Gynecol*. 2006; 195(2):607-16.
6. Ramsey PS, White AM, Guinn DA, Lu GC, Ramin SM, Davies JK, et al. Subcutaneous tissue reapproximation, alone or in combination with drain, in obese women undergoing cesarean delivery. *Obstet Gynecol*. 2005; 105(5 Pt 1):967-73.
7. Magann EF, Chauhan SP, Rodts-Palenik S, Bufkin L, Martin JN Jr, Morrison JC. Subcutaneous stitch closure versus subcutaneous drain to prevent wound disruption after cesarean delivery: a randomized clinical trial. *Am J Obstet Gynecol*. 2002; 186(6): 19-1123.
8. Ladlow, J. Surgical drains in wound management and reconstructive surgery. In BSAVA Manual of Canine and Feline Wound Management and Reconstruction 2009, 54-68. BSAVA Library.
9. Hellums EK, Lin MG, Ramsey PS. Prophylactic subcutaneous drainage for prevention of wound complications after cesarean delivery--a metaanalysis. *Am J Obstet Gynecol*. 2007; 197(3):229-35.
10. O'Donnell RL, Angelopoulos G, Beirne JP, Biliatis I, Bolton H, Bradbury M, et al. Impact of surgical site infection (SSI) following gynaecological cancer surgery in the UK: a trainee-led multicentre audit and service evaluation. *BMJ Open*. 2019; 9(1):e024853.
11. Nygaard IE, Squatrito RC. Abdominal incisions from creation to closure. *Obstet Gynecol Surv*. 1996; 51(7):429-36.
12. Zhang Y, Zheng QJ, Wang S, Zeng SX, Zhang YP, Bai XJ, et al. Diabetes mellitus is associated with increased risk of surgical site infections: A meta-analysis of prospective cohort studies. *Am J Infect Control*. 2015;43(8):810-5.
13. Martin ET, Kaye KS, Knott C, Nguyen H, Santarossa M, Evans R,et al. Diabetes and Risk of Surgical Site Infection: A Systematic Review and Meta-analysis. *Infect Control Hosp Epidemiol*. 2016; 37(1):88-99.
14. AlMohawis LT, Alfraikh SH, Alfalahi I,

Alqarni AH, Alshehri AA, Altamimi IM, et al.Risk of Surgical Site Infection (SSI) in Diabetes Mellitus Patients: Systematic Review and Meta-Analysis. Ann. med. health sci. res, 2021.

15. Kikkeri N, Setty H, Nagaraja MS, Nagappa DH, Giriyaiah CS, and Gowda NR. A study on surgical site infections and associated factors in a government tertiary care teaching hospital in Mysore, Karnataka.Int J Med Public Health. 2014; 4(2):171.
16. BeldiG, Bisch Knaden, Banzv, Muhlemann K, and Canadian D. Impact of intraoperative behavior or surgical site infection. Am. J. Surg. 2009; 198,2157-62.
17. Winfield RD, Reese S, Bochicchio K, Mazuski JE, Bochicchio GV. Obesity and the Risk for Surgical Site Infection in Abdominal Surgery. *Am Surg*. 2016;82(4) :331-6.
18. Panici PB, Zullo MA, Casalino B, Angioli R, Muzii L. Subcutaneous drainage versus no drainage after minilaparotomy in gynecologic benign conditions: a randomized study. *Am J Obstet Gynecol*. 2003; 188(1):71-5.
19. Higson RH, Kettlewell MG. Parietal wound drainage in abdominal surgery. *Br J Surg*. 1978; 65(5):326-9.
20. Morrow CP, Hernandez WL, Townsend DE, Disaia PJ. Pelvic celiotomy in the obese patient. *Am J Obstet Gynecol*. 1977; 127(4):335-9.
21. Kozol RA, Fromm D, Ackerman NB, Chung R. Wound closure in obese patients. *Surg Gynecol Obstet*. 1986; 162(5):442-4.
22. Al-Inany H, Youssef G, Abd ElMaguid A, Abdel Hamid M, Naguib A. Value of subcutaneous drainage system in obese females undergoing cesarean section using pfannenstiel incision. *GynecolObstet Invest*. 2002; 53(2):75-8.
23. Gates S. and Anderson R. Wound drainage for caesarean section. Cochrane Database Syst Rev; 2013; 1:CD004549.
24. Kosins AM. Scholz T, Cetinkaya M, Evans GRD. Evidence-based value of subcutaneous surgical wound drainage: the largest systematic review and meta-analysis. *Plast Reconstr Surg*. 2013; 132(2):443-50.

Figure legend:

Figure (1): Figure 1: Placement of subcutaneous suction drain.

Supplementary Figure 1: (A): Comparison between both groups regarding incidence of clear wound healing, (B): Comparison between both groups regarding incidence of hematoma formation, (C): Comparison between both groups regarding incidence of seroma formation, (D): Comparison between both groups regarding incidence of wound infection, (E): Wound healing time of the studied groups, (F): Comparison between both groups regarding hospital length of stay

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