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Comparative Study of Mass Closure and Layered Closure Techniques in Abdominal Incisions

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Abstract:

Background: Closing abdominal wounds after surgery is one of the challenges facing surgeons, and the goal is always to reach the best possible way to close these wounds, especially as they are considered the most prevalent in the field of general surgery.

Objective: To evaluate the operative technique and postoperative complications of abdominal incisions regarding to mass closure and layered closure.

Patients and Methods: From September 2021 to September 2023, this research has been performed in the general surgery department of Damanhour Medical National Institute and Al-Zahraa University Hospital. It involved one hundred cases who suffered midline or paramedian laparotomy. After obtaining informed consent in accordance with the ethical committees of both hospitals, all patients were included in the investigation.

Results: Abdominal burst in our study occurred in 8% in layered closure group and 2% in mass closure group. Incisional hernia was of 6% rate in layered closure and. 0% rate in mass closure these differences are of statistically significant. In current research, the rate of sinus formation was 2% for the mass closure group & 2% for the layered closure.

Conclusion: Performing the best way to close the abdominal wall after surgery represents a prophylaxis from the difficult complications associated with abdominal wounds, and thus we will have avoided the patient a great health and psychological problem, and the surgeons will avoid the consequences of fixing these complications and the society will spare us the costs.

Keywords: Abdominal incisions, layered closure, mass closure

1. Introduction

suturing and Incision of the abdominal layers are the most frequently performed exercises in surgical procedure, as a result of the fact that a significant number of the surgeries conducted

by general surgeons are conducted within the abdomen. The importance of abdominal closure in according to repair technique, incision, & has created a high interest to surgeons, and the use of newer suture material, The ultimate objective of closure of wound is reestablishing the functions of abdominal following the surgical procedure. In accordance with the anatomy of the abdominal wall, laparotomy wounds are typically closed in layers. **(Anjana, 2019).**

Laparotomy wounds are closed using a variety of suture techniques. However, the most effective procedure for abdominal wound closure is frequently altered. Conventional and single layered closure are the most frequently employed abdominal closure techniques. The method of laparotomy incision closure was modified; the traditional method of layer-by-layer closure was given up with a single, mass-formed closure. **(Chaudhary et al., 2012).**

In order to facilitate this lengthening and maintain minimal tension among the tissues and the sutures, it is crucial to maintain an adequate reserve of suture length in the wound. Wound disruption is linked to the utilization of an SL: WL ratio (Suture length: Wound length) of 2:1 or less. The risk of a burst wound increases as the ratio decreases. An SL: WL ratio of 4:1 or greater and the use of non-absorbable continuous sutures at 1cm intervals (Jenkins rule) can prevent wound disruption caused by the cutting out of sutures. **(Bhavikatti and Gupta, 2019).**

The optimal abdominal closure should be easy, cost-effective& fast, and it should prevent both late & early complications. Traditionally, layer-by-layer closure of abdominal incisions is performed. The transversalis fascia and the peritoneum are closed in a single layer. However, studies in the lab and in clinical settings have shown that the healing of an abdominal incision is unaffected by the closure of the peritoneal layer. **(Deshmukh and Maske, 2018).**

Traditionally, the abdominal incisions are meticulously closed layer by layer. The transversalis fascia closes the peritoneum in a layer. Nevertheless, clinical & laboratory observations have demonstrated that the closure of the peritoneal layer does not affect abdominal wounds healing. Therefore, its omission will not have any adverse consequences on the healing process of the wound. The raw peritoneal defects heal immediately. **(Anjana, 2019).**

The wound disruption rates were unaffected in both groups, regardless of whether the peritoneum has been closed with the number one chromic catgut or not. Nevertheless, the aesthetic appeal of the abdominal incision is significantly enhanced by the layer-by-layer closure. Therefore, the peritoneum might be closed with synthetic absorbable material if it is technically easy to accommodate. Lord Moynihan once said, "each needless stitch is a bad operation." By avoiding peritoneal closure unnecessary step, time and cost can be saved. **(Bhavikatti and Gupta, 2019).**

The following are patient risk factors for incisional hernia and dehiscence: malignancy, obesity, diabetes mellitus, old age, malnutrition, steroid therapy, smoking. and. The synthesis of collagen is reduced as a result of these factors, which results in delayed wound healing. **(Bhavikatti and Gupta, 2019).**

closure of Abdominal fascia has persisted as a procedure that commonly reflects personal preference. and experience of the surgeon, despite improvements in surgical techniques and materials. **(Deshmukh and Maske, 2018).**

Some researchers have demonstrated an elevated prevalence of incisional hernias and burst abdomen in conjunction with layered closures, while others have not observed any significant distinctions in these complications. The recent research aimed to assess the benefits of mass (single

layered) closure comparing to layered closure in terms of time of healing, postoperative morbidity & duration of surgery, including burst abdomen, incisional hernia and. wound infection (*Chaudhary et al., 2012*).

AIM OF THE WORK

The objective of the investigation is to evaluate the operative technique and postoperative complications of abdominal incisions regarding to mass closure and layered closure.

PATIENTS AND METHODS

From September 2021 to September 2023, this investigation was performed in the General Surgery Department of Damanshour Medical National Institute and Al-Zahraa University Hospital. It involved 100 cases who received paramedian laparotomy or midline. After obtaining informed consent in accordance with the ethical committees of both hospitals, all cases became involved in the investigation.

Inclusion criteria: patients with midline or paramedian laparotomy. Having no other serious illness including hemorrhagic disorders, uncompensated heart or lung disease. case agreement to undergo the surgery with either mass or layered methods of closure.

Exclusion criteria: Cases that are less than twenty years old and exceed 65 years old. All patients with liver and kidney diseases. Grossly obese patients (patients having BMI>35). Patients with previous midline laparotomy scars. Pregnant women. Patient refusal to the type of closure.

Before the procedure, each case was presented to: History taking; Inform of age, sex, occupation, worker...etc. Clinical examination; General and local. Laboratory examinations involving: Prothrombin time. Liver & renal function tests, Complete blood count, Radiological investigations, Random blood glucose level, for confirmation of the diagnosis including: Abdominal x-ray. Ultrasonography. CT.

The patient's general condition was corrected in emergency situations by administering fluids to manage electrolyte imbalances and dehydration. Prior to surgery, patients with diabetes and hypertension were properly controlled.

Operative procedure:

The 100 cases were randomly distributed to 2 equal groups (A and B). according to the surgical technique used for closure of the incision.

- **Group (A):** fifty cases mass closure has been used.
- **Group (B):** fifty cases layered closure has been used.

Anesthesia:

General, spinal or epidural anesthesia were used. At the time of anesthesia induction, administration of a single dose of broad-spectrum antibiotic.

Position of the patient:

The supine position was established for each patient.

Sterilization:

operative field has been sterilized by 10 % povidone iodine solution and draped in the usual manner.

Surgical techniques:

In group A:

Fascial closure with a single suture for mass closure. The anterior rectus sheath, parietal peritoneum and posterior rectus sheath, were all approximated as a single layer using PDS or vicryl in a continuous running suture.

This method minimizes tissue strangulation by ensuring that tension is evenly distributed throughout the entire length of the suture. The objective is to approximate the edges of the tissue in order to facilitate the formation of scars. The closure eventually fails due to tissue necrosis and excessive tension.

The assistant applies 2 Kocher clamps to the fascial layers midway by the incision, & then they are retracted. The surgeon frequently benefits from improved visualization by having the assistant cross the Kochers.

This type of Suture material was selected and standardized in both groups to exclude other variables except the technique of closure.

Midline incision: To achieve linea alba, closure and cut edges of the peritoneum, have been sutured together. Continuous sutures have been employed with Vicryl No. 1 to take bites approximately 1 cm interval & one centimeter from the cut edges. starting from each angle of the incision towards the middle of the incision where the two sutures were ligated.



Fig. (1): Midline incision mass closure.

Paramedian incision: The fascia, transversalis, peritoneum, medial fibers of rectus abdominis muscle, anterior layer of rectus sheath and posterior layer of rectus sheath were all sutured together as a single layer. The bites were taken at a distance of approximately 1cm interval and 1cm from the cut edges Continuous sutures with Vicryl No. 1

Fig (2): Mass closure of right paramedian incision

In group B:

The sequential closure of each fascial layer is referred to as layered closure. as one separate layer. The p^{ty} benefit of this technique is the presence of multiple suture strands, which ensure that the incision remains intact in the event of a suture break.

Midline incision: The peritoneum has been closed with Vicryl No.2.0 by continuous sutures, & the linea alba was similarly closed with Vicryl No.1.

Paramedian incision: The Vicryl No.2.0 was used to close the posterior and peritoneum layer of the rectus sheath using continuous sutures. Continuous sutures were employed to close the anterior layer of the rectus sheath with No. 1 Vicryl.



Figure (3): Posterior rectus sheath closure (layered closure).



Figure (4): Rectus muscle closure (layered closure).



Figure (5): Anterior rectus sheath closure (layered closure).

Subcutaneous closure

The abdominal wall's subcutaneous tissue is susceptible to infection due to its inadequate vascular supply. The objective of subcutaneous closure is to eliminate any potential spaces, thereby decreasing the potential for seroma accumulation. Absorbable suture may be employed to achieve subcutaneous closure in either a continuous or interrupted manner.

Skin closure

Staples and sutures are the 2 primary skin closure procedures. Suture closure is typically conducted by employing a 3-0 or 4-0 absorbable suture in a running subcuticular fashion, or a prolene running or an interrupted transdermal suture.

The wounds were cleaned and dressed subsequent to the surgeries. In each instance, the duration of time required to close the abdomen was documented. A separate stab incision was made to insert drains whenever they were required.

The subsequent operational data was documented: Type of operation. Either elective or urgent. Type of incision. Type and size of suture material used in closure. Time required for the wound closure.

Postoperative management

All cases will receive 3rd generation cephalosporin antibiotics parenterally for a period of three days, followed by oral administration for five to seven days. If necessary, antibiotics have been maintained for an additional 10 days. Additionally, analgesics will be administered to control pain following surgery. Drains will be eliminated on the 2nd or 3rd day following operation, and wound examinations will be conducted on a regular basis. The suture was removed among the 7th and 10th day following operation. Patients were examined postoperatively for infection of the chest, abdominal distension, and vomiting. wound infection. or Signs and symptoms of a burst abdomen have been observed

After discharge, for a period of one month, all cases were required to attend monitoring every week, and subsequently, every month for six months. in order to assess the surgery's success & identify any delayed postoperative complications, such as formation of sinus. and hernia.

The following parameters were used to evaluate the two distinct wound closure techniques: Postoperative pain and analgesic requirement. Time required for the wound closure. Time of stitch removal. Wound complications: Wound infection, hematoma, burst abdomen, seroma, sinus formation and incisional hernia.

Statistical analysis

SPSS (statistical package for social science) version twenty has been utilized to analyze and tabulate the data that was collected on an IBM compatible computer.

Two types of statistics were conducted: For example, descriptive statistics include the mean, standard deviation, and percentage (%).

Analytic statistics: **Student t-test** for quantitative variables that are normally distributed. **Mann Whitney test** for quantitative variables with an abnormally distributed distribution. **Fischer exact test** for qualitative (categorical) variables. The significance of the results obtained in all of these tests was assessed at the 5% level ($P \leq 0.05$).

RESULTS

Table (1): Distribution of the examined cases regarding characteristic data.

Age	Group A (n = fifty)		Group B (n = fifty)		Total (n = hundred)	
	No.	%	No.	%	No.	%
20 - < 30	5	10	2	4	7	7
30 - < 40	9	18	11	22	20	20
40 - < 50	24	48	22	44	46	46
50 - < 60	10	24	14	24	24	24
≥ 60	2	4	1	2	3	3
Min. - Max.	27 - 61		24 - 64		24 - 64	
Mean ± SD.	44.45 ± 8.82		45.25 ± 9.29		44.85 ± 9.03	
Median	45.5		46		46	
Sex	Group A (n = fifty)		Group B (n = fifty)		Total (n = hundred)	
	No.	%	No.	%	No.	%
Male	34	68	30	60	64	64
Female	16	32	20	40	36	36

As indicated in table (1), the ages of one hundred cases varied among 21 & 64 years with a median age of 46. The mean age of the patients was 44.85. 64 cases were men while 36 were women. The men to women ratio was 1.7: 1. The greatest prevalence (46 %) was between cases with an age varied among forty & fifty years, although the fewest prevalence (3 %) has been in cases aged sixty years or greater.

Table (2): Distribution of the examined patients regarding the original incision.

Type of incision	Group A (n = fifty)		Group B (n = fifty)		Total (n = hundred)	
	No.	%	No.	%	No.	%
Midline	38	76	37	74	75	75
Paramedian	12	24	13	26	25	25

As shown in table (2), in 75 patients (75 %) a midline incision was performed, in the other 25 patients (25 %) the surgery was done via paramedian incisions.

Table (3): Distribution of the examined patients regarding Cause of surgery.

Cause of surgery	No.	%
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Emergency (72)	• Exploratory laparotomy for trauma	34	47.2
	• Perforated peptic ulcer	27	37.5
	• Adhesive intestinal obstruction	6	8.3
	• Obstructed colonic cancer	4	5.5
	• Sigmoid volvulus	1	1.4
Elective (28)	• Right hemicolectomy	8	28.5
	• Splenectomy	8	28.5
	• Cholecystectomy	7	25
	• Left hemicolectomy	4	14.3
	• Heller cardiomyotomy for achalasia	1	3.6

Out of 100 cases, in 72 patients, emergency laparotomy was performed. In the remaining 28 patients the operation was done electively as shown in table 3.

Table (4): Distribution of the examined cases regarding time of operation.

Time of closure	Group A (n = 50)	Group B (n = 50)	Test of significance	P value
Min. - Max.	15- 27	24 - 36	Student t-test	<0.05*
Mean ± SD.	21.6 ± 4.42	30.2 ± 5.80		
Median	22	31		

p: p value to compare among the examined groups

*: Statistically significant at $p \leq 0.05$

As indicated in table (4), the mean surgical duration in group A was 21.6 mins varied among 15 & 27 mins although in group B it varied among 24 & 36 mins with a mean value of 30.2. There has been a statistically significant distinction among the two groups according to the operative time ($P \leq 0.05$).

Table (5): Distribution of the studied cases regarding time to remove the stitches.

Time to remove the stitches	Group A (n = 50)	Group B (n = 50)	Test of significance	P value
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Min. - Max.	10- 16	12 - 19	Mann Whitney test	>0.05
Mean $\pm$ SD.	12.4 $\pm$ 3.32	14.17 $\pm$ 5.19		
Median	10	13		

Table (5) demonstrated that the mean time to remove the stitches in group A was 12.4 days ranging from 10 to 16 days while in group B, it ranged from 12 to 19 days with a mean value of 14.17. There was statistically insignificant distinction among the two groups according time to remove the stitches.

Table (6): Distribution of the examined cases regarding time of analgesic need.

Duration of analgesic need	Group A (n = 50)	Group B (n = 50)	Test of significance	P value
Min. - Max.	5- 7	6 - 8	Mann Whitney test	>0.05
Mean $\pm$ SD.	5.4 $\pm$ 1.5	6.7 $\pm$ 1.7		
Median	5	6		

The mean time of analgesic need in group A was 5.4 days, with a range of 5 to 7, as indicated in Table (6). In group B, the mean value was 6.7 days, with a range of 6 to 8.

There was no statistically significant distinction among the two groups according their use of analgesics. ($p < 0.05$).

Table (7): Distribution of the examined cases regarding complications.

Postoperative complications	Group A (n = 50)		Group B (n = 50)		Test of significance	P value
	No.	%	No.	%		

Wound infection	4	8	9	18	Fisher Exact test	<0.05*
Hematoma	0	0	0	0		>0.05
Seroma formation	1	2	2	4		>0.05
Burst abdomen	1	2	4	8		<0.05*
Incisional hernia	0	0	3	6		<0.05*
Sinus formation	1	2	1	2		>0.05

In table (7), both groups have been compared according to the problems following surgery.

Infection of the wound happened in 4 cases in group A (8%) and in 9 cases in group B (18%). They demonstrated good response to conservative therapy with broad-spectrum antibiotics and common dressings.

Hematoma was not recorded in any patient of both groups.

Seroma formation was recorded in 1 case (2%) of group A although it happened in two cases in group B (4%). The seroma was managed by drainage through removal of one or two stitches and repeated squeezing and dressing of the wound.

Burst abdomen happened in one case in group A (2%) & in four cases of group B. In those patients, the cause was either, ileus, abdominal distension, repeated vomiting or, episodes of vigorous cough. This led to wound dehiscence & followed by burst. patients were transferred urgently to the theater room and managed by closure of the wound with retention sutures with little tension. In 3 patients, fascial closure could be done and in the other 2, skin only could be closed. Then the patients of incisional hernia will be prepared for hernia repair later on.

During the 6 months follow up period, incisional hernia happened in 3 cases in group B (6%) & not happened in any case in group A (0%).

Chronic stitch sinus happened in one patient in each group. they were managed by removing the offending suture material and exploring the sinus.

There was a statistically significant distinction among both groups according to incisional hernia, burst abdomen and wound infection ($p < 0.05$) but there was no significant distinction according to, stitch sinus formation, hematoma and seroma.

DISCUSSION

The most frequently performed exercises in operative surgery are suturing and incision of the abdominal layers., as a result of the fact that a significant number of the surgeries achieved by general surgeons are carried out within the abdomen. The technique of repair, using newer suture material & incision, are all crucial components of abdominal closure, which create a great interest of surgeons. (*Bender, 2016*).

Recent research indicates that the surgeon has the ability to manipulate technical factors, which are essential. Various suture techniques are employed to close wounds of laparotomy, & each has

its own strong proponents. However, the optimal approach to abdominal wound closure is commonly altered. single and Conventional layered closure are the most frequently employed abdominal closure techniques. (*Basta et al., 2019*).

The traditional method of layer-by-layer closure has been abandoned, & all layers have been closed by mass. In his text of laparotomy incisions closure, Harold Ellis states, "My ideal method of laparotomy incision closure is mass closure with nylon." Until recently, the layered closure of the abdominal wall has been regarded as superior, with high emphasis on the peritoneal layer closure. (*Holihan et al., 2016*).

It is now completely recognized, both from laboratory & clinical animal researches, that the incision healing occurs through the formation of a dense fibrous scar which unites the opposing faces of the laparotomy wound in a mass. The function of sutures is to align the wound edges & provide a splint although the dense fibrous scar matures & deposits. Distension may result in a 30% increase in the length of a wound. In order to facilitate this lengthening and confirm a minimal significant increase in tension among the tissues and the sutures, it is essential to have a sufficient reserve of suture length in the wound. The risk of a burst wound is increased by an SL: WL ratio (Suture length: Wound length) of 2:1 or fewer, which is associated with wound disruption. The disruption of the wound due to the cutting out of sutures might be prevented by utilizing non-absorbable continuous sutures at one-centimeter intervals and an SL: WL ratio of 4:1 or more (Jenkins rule). (*Bender, 2016*).

There is no consensus about the ideal method of closure of abdominal incisions.

The most effective technique of wound closure must be technically simple.

Free from complications such as incisional hernia & burst abdomen, ...etc.

Patient-friendly.

Leave a scar that is aesthetically pleasing (*Basta et al., 2019*).

The objective of this investigation was to evaluate the operational technique and complications following surgery of abdominal incisions with respect to mass and layered closure.

The average age of the cases in our investigation was 44.85 years. Males comprised 64% of the cases, while females comprised 36%.

The type of incision was 75% midline and 25% paramedian.

The majority of cases (72%) were emergency laparotomies and the remaining (28%) were elective cases.

In terms of the operative time, we discovered that the mean surgical duration in group A has been 21.6 mins., whereas it was 30.2 mins in group B. The variance has been statistically significant.

Therefore, the mass closure technique can significantly accelerate the closure of the incision. This, in turn, would decrease the exposure to anesthesia & ultimately affect the morbidity following surgery. In high-risk surgical cases and emergency contaminated operations, rapid closure may be especially crucial. (*Bender, 2016*).

The results of Bhavikatti and Gupta's comparative research of layered and mass closure techniques in paramedian & midline laparotomies are consistent with this. They reported that the incision was closed on average in the mass closure group in 15.73 mins, while the incision has been closed on average in the layered closure group in 25.03 minutes. This was determined to be statistically significant ($p < .05$, Significance). (*Bhavikatti & Gupta, 2019*).

The average wound closure time in the mass closure group has been 16.2 mins, while in the layered closure group it was 26 minutes, according to a comparable study conducted by Deshmukh and Maske (2018). These results are in accordance with the results of this recent investigation. (*Deshmukh and Maske, 2018*)

According to the mean time of stitches removal, it was 14.17 in layered closure and 12.4 days in mass closure and this distinction is of no statistical significance.

Bhavikatti and Gupta reported similar results regarding the time of stitches removal (*Bhavikatti & Gupta, 2019*).

In our research the mean time of analgesic need postoperatively has been 5.4 days in mass closure group and 6.7 days in layered closure group which is of no statistical significance. j

Deshmukh and Maske, also found that no difference between the two groups in relation to the analgesic need (*Deshmukh and Maske, 2018*).

Wound infection is the most prevalent and problematic condition that affects wound healing. During the initial six hours, bacteria that are swabbed on the surface of a wound that is primarily closed are completely unresisting. The wound becomes increasingly difficult to infect after this period, and by the fifth day, it is as resistant to infection as the adjacent skin. Therefore, it is recommended to use an occlusive dressing only throughout the initial days, if a clear source of contamination was found in the surrounding area, such as a colostomy. The 1st source of wound infection is endogenous, originating from the case's own bacteria at the operational period. The operation's nature is a critical factor, & the lowest frequency is observed following clean procedures. (*Basta et al., 2019*).

- **Additional factors that increase the risk of wound infection involved: •**
- Local trauma resulting from improper hemostasis, extensive electrocoagulation, or excessive retraction
- The presence of foreign material: the probability of a contaminated wound becoming infected is doubled by the presence of a single piece of sterile silk suture material.
- Reduced perfusion (*Basta et al., 2019*).

The overall infection rate in this research is 13%. The rate of infection in the mass closure group has been 8%, while the layered closure group had a rate of 18%. This was determined to be statistically significant. The mass closure group exhibited a significantly lower rate of wound infection than the layered closure group.

In research by Chhabra et al. wound infection was 37.5% in the layered group & 20% in the mass closure group. wound infection is significantly fewer in in the mass closure group than the layered

closure group, possibly due to excessive tissue traumatization and entrapment of tissue blood supply during the layered closure technique (*Chhabra et al., 2020*)

In another study by Nasir et al. in 2022, it has been found that wound infection has been 3% in mass closure and 10% in layered closure. This difference is statistically insignificant (*Nasir et al., 2022*).

Similarly in a study performed by Sreeharsha wound infection was found to be 6% in the mass closure group and 8% in the layered closure group (*Sreeharsha, 2013*).

No cases of wound hematoma were detected in our study in the two groups in our study.

This is similar to the outcomes obtained by Deshmukh and Maske in their research on 60 patients with midline laparotomies (*Deshmukh and Maske, 2018*).

In contrary Chauhan, et al, in 2022 reported 5% hematoma in layered closure group and 10% in mass closure group which is statistically insignificant (*Chauhan et al., 2022*).

As regard seroma formation we found that in 1 patient (2%) of mass closure group while it happened in two cases in layered closure group (4%). Deshmukh and Maske have found similar results as they reported seroma

0% in mass closure and 3% in layered closure, which is not statistically significant. broken down abdominal incisions, Separation of burst abdomen, abdominal wounds, dehiscence of abdominal wounds, and postoperative eventration are all terms that have been used to describe abdominal wound disruption.

(*Kumar et al., 2018*).

It is a tragic and grave complication that may occur following any abdominal surgery, regardless of gender, at any age. When it happens, it presents numerous serious issues in the managing of the case. Although the average operational mortality in a collective review is 18.1 percent (average 9.4% to 43.8%), The mortality rate associated with this complication varies considerably. (*Kumar et al., 2018*).

Factors involved in wound disruption include:

A) Preoperative case predisposition:

- Metabolic: Diabetes, uremia, steroid therapy.
- Nutritional: Hypoproteinemia, anemia, advanced age
- . Malignancy.
- Chemotherapy.
- Prior irradiation.
- Pulmonary disease.
- Obesity.

B) Intraoperative technique:

- Pressure necrosis, Closure technique-suture cutting through fascia
- Suture- Tensile strength, Knot strength
- Incision choice

C) Postoperative increased tension on suture line:

- Increased intra-abdominal pressure: vomiting, bowel obstruction, ascites, ileus
- Pulmonary disease (*Nasir et al., 2022*).

The burst abdomen is the early complication in the duration following surgery, with the majority of cases occurring among the sixth- and ninth-days following surgery. In basically, wound disruption occurs when the knot slips, the sutures penetrate, or the suture breaks. the tissue. Suture breakage is infrequently an issue. It may happen due to its inadequacy in resisting the tension or its rapid degradation in the tissues. Knot slippage is a rare occurrence, but it can be prevented by selecting the appropriate suture material. (*De Beaux, 2017*).

Abdominal burst in our study occurred in 8% in layered closure group and 2% in mass closure group. Incisional hernia has been of 6% rate in layered closure and 0% rate in mass closure. these differences are of statistically significant.

Nasir et al.,2022, have found that Abdominal burst has been (10%) in layered closure group and (5%) in mass closure group. Incisional hernia (10%) in layered closure group and 0 % in mass closure group (*Nasir et al., 2022*).

In comparison to Chhabra et al. study, the incidence of abdominal rupture was 5% in the mass closure group and 10% in the layered group but, the rate of incisional hernia was equal in both groups (*Chhabra et al., 2020*)

The rate of sinus formation was 2% for the layered closure group and 2% for the mass closure group in the current research.

Compared with research conducted by Kumar et al. sinus formation was 3.33% in layered closure group and 0% in mass closure group without statistical significance (*Kumar et al., 2018*).

These results are different from another study in which rate of sinus formation has been significantly fewer in mass closure group then layered closure group (*Deshmukh and Maske, 2018*).

CONCLUSION

Surgical performance can be enhanced to decrease the prevalence of these complications. The success of the surgery is significantly influenced by the extent to which a more favorable cosmetic appearance and the wound heals with minimal complications.

Based on the findings of this investigation, it is evident that the mass closure technique is more cost-effective, requires less time, and has fewer complications than the layered technique.

This study suggests conducting more studies on the technique of mass or mass closure of the abdominal layers so that it includes a larger number of cases with longer follow-up periods.

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