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Abdominal Wall Closure in Emergency Laparotomy: Management and Outcome in Omdurman Teaching Hospital

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Abstract- *Background :* The incisions those applied in approaching those operations, were vertical anterior abdominal incisions (midline or paramedian), and the way these incisions were closed, it was either mass or layered abdominal wall closure and types of suture materials used in the closure, non-absorbable/absorbable, monofilament (Nylon)/ polyfilament (Vicryl).

Objectives : To study a series of patients those who underwent vertical incisions, either midline or paramedian and how they were closed, mass or layered closure and suture materials used inclosing the abdomen and the outcome.

Keywords: *laparotomy incision closure, suture material, closure technique.*

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Abdominal Wall Closure in Emergency Laparotomy: Management and Outcome in Omdurman Teaching Hospital

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Abstract- ***Background:*** The incisions those applied in approaching those operations , were vertical anterior abdominal incisions (midline or paramedian), and the way these incisions were closed, it was either mass or layered abdominal wall closure and types of suture materials used in the closure, non-absorbable/absorbable, monofilament (Nylon)/ polyfilament (Vicryl). Patients and methods:

Objectives: To study a series of patients those who underwent vertical incisions, either midline or paramedian and how they were closed, mass or layered closure and suture materials used inclosing the abdomen and the outcome.

Patients and methods: This study is an observational prospective analytical hospital based study. Conducted at Omdurman Teaching Hospital, Sudan, over one year duration from 2012 Sep to 2013 Sep. Included were patients who underwent vertical anterior abdominal incisions (midline or paramedian) for emergency laparotomy, Non probability sampling including patients consecutively. Questionnaires were used and the variables were; demographical patient data, indications for laparotomy, suture materials used in these closures, technique of closing the fascial layer and skin and the outcome. Patient consent and ethical clearance were obtained in advance. Data was analyzed using SPSS version 20 and the P value was considered significant if ≤0.05.

Results: 114(91.9%) patients underwent midline incisions and 10(8.1%) patients were paramedian incision. Mass closure were111 (89.5%) and layered were13(10.5%) patients, types of suture materials used in the closure technique were non-absorbable polyamide (Nylon) 103(83.1%). Delayed absorbable polygactin 910 (Vicryl) 21 (19.9%). Sutures size used 2# (106) Nylon 90 (87.4%) Vicryl 16 (76.2%), 1# (17) Nylon 12 (11.7%)-vicryl 5(23.8%) and only one 0# (0.8%). Length of hospital stay 5days and less 55(44.4%) patients, >5-10 days 52(41.9%) patients and >10 days were 16(13.7%) patients. Outcome; 97(78.2%) patients were uneventful, complications 12 (9.7%) patients and 15 (12.1%) deaths. Complications; surgical-site wound infections were 7(5.6%) patients, woud dehiscence 4 (3.2%) patients and incisional hernia only one (0.8%) patient. Most of the closure was conducted by surgical registrars 118(95.2%) patients, surgeons' only two (1.6%) patients and the house officers did 4 (3.2%) patients.

Conclusion: Mass abdominal wall closure technique is the preferable technique by the surgeons than layered closure technique, for it is less time consuming and it has got a disadvantage of forming an incisional hernia, when it got dispted by any assault to area of suture line.

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I. Introduction

Closure of the abdominal wall is a common denominator of all abdominal surgery. The methods of closure are often based on local traditions and preference of the teacher and the surgeon is often reluctant to change these methods later on in his or her career. Abdominal closure is performed in multitude of fashions and an abundance of differently tailored studies on this matter. The goal to wound closure is to restore function of abdominal after a surgical procedure. The optimal method should be so technically simple that its results are as good for the hands of the trainee as they are for the experienced surgeon. It should leave the patient with a reasonably aesthetic scar and most importantly, it should minimize the frequency of wound rupture, incisional hernia (IH) wound infection and sinus formation. Mass closure involves a single layer closure of all musculofascial layers and may or may not include the peritoneum. Numerous clinical trials have compared layered to mass abdominal closure. Some studies have shown an increased incidence of burst abdomen and incisional hernia with layered closure and some studies show no difference in these complications, but no studies demonstrate advantage of layered over mass closure[(1)]. Closure of the midline abdominal incision have varied over time with better understanding of the physiology and engineering of closure of the abdominal wall and improvement in the materials of surgical sutures[(2)].

When this surgical procedure is conducted in an emergency setting and depending on the type of surgery (clean and/or contaminated), the incidence of complications may be particularly high, especially when acute dehiscence of the wall occurs. Furthermore, the rate of herniation related to midline laparotomy is still high approximately 16% of cases. Despite efforts to evaluate different suture techniques, suture threads (reabsorbable or non-absorbable) and general factors that may interfere with the repair process, the incidence of complications associated with this approach has been reduced [(3)].

Access to the abdominal cavity must be performed in such a way that surgical treatment

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procedures can be performed safely. For skin incision, scalpel and electrocautery are equivalent. Subcutaneous tissues and fascias must be divided by electrocautery to minimize blood loss. The best way to close abdominal cavity is by an all layer, slowly absorbable, running suture with suture: wound length ratio 4:1. Closing the peritoneal layer is not necessary. Subcutaneous suture and drains do not reduce the risk of wound complications. Staples should be used for skin [4- 9].

A similar technique is used for closure of the paramedian incision (PMI). The anterior and the posterior rectus sheaths are packed up in one bite. A transrectus incision will incorporate the medial sliver of the rectus muscle into the suture loops. Mass closure of the lateral (PMI) is not possible. For this incision, the anterior and posterior rectus sheaths are closed separately [1].

Mass closure techniques (MCT) with the one loop suture technique allow give of suture with coughing, respiration and movement. It basically holds the wound together and allows the properties of wound healing, the strongest of the all wound healing techniques, to take place without necrosis and closure by second intention [2].

The choice of suture material is more complex. They prefer to use absorbable sutures with delayed degradation, such as polydioxanone (PDS). Among nonabsorbable sutures, monofilament suture is recommended. Whether the incision is vertical or transverse, the steps for closure are more or less the same [1, 10-21].

II. Patients and Methods

This is an observational prospective analytical study hospital based study, conducted at Omdurman Teaching Hospital. The study population was composed of male and female patients who underwent vertical abdominal wall closure during the period Nov.2012 Oct.2013. A total number of 124patients were the use of predesigned and pretested structured questionnaire.

Non probability sampling including all patients operated in the emergency theatre during the allocated period of study. Data analysis by using SPSS version 20.The percentage was calculated and chi-square test was used for the analysis. Test of significance was analytically accepted and P value0.000. Ethical clearance and approval for conducting this study was obtained from the ethical committee of Omdurman Teaching Hospital. Informed verbal consent was obtained from the patients participating in this study after full explanation of the study objectives.

III. Results

A total of 124 patients were included in the study of emergency laparotomy. The surgical access in all these laparotomies was through vertical incisions, either midline or paramedian. The mean age range was 37.5 (SD_+19.4) years, ranged from 13to 90 years. Seventy seven (62.1%) were forty or younger and only one patient above 80 years **(Table1)**. Male patients constituted 104(83.9%) and female 20 (16.1%) ratio of male: female was 5.2: 1.

Table 1 : Age of the patients underwent emergency vertical abdominal incision.

Age	Frequency	Percentage
00-20	27	21.8%
21-40	50	40.3%
41-60	29	23.4%
61-80	17	13.7%
81-100	01	0.8%
Total	124	100%

Of the emergency wall closure, 92(74.2%) were acute abdomen, 28 (22.4%) abdominal trauma and 4 (3.2%) other abdominal conditions. Gunshot account 22 (84.6%) of abdominal trauma and stab wounds 6 (21.4%) **(Table2)**.

Table 2 : cause of laparotomy and vertical approach in the study

Causes	Midline	Para median	Total%
Acute abdomen	83	9	92(74.2%)
Stab wound	21	1	22(17.7%)
Gunshot	6	0	6(4.8%)
Others	4	0	4(3.2%)
Total	114	10	124(100.0%)

Midline was 114 (91.9%) and paramedian incision was10 (8.1%) of vertical in the study. Out of114 patients operated through midline incision 83 (72.8%) were cases of acute abdomen, 27 (23.8%) were abdominal trauma and 4 (3.5%) patients other abdominal emergencies. Whereas those of paramedian incision nine were acute abdomen and one patient of stab wound **(Table3)**.

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Table 3 : type of closure in patients underwent emergency vertical abdominal incision

Closure type	Midline Incision	Paramedian incision	Total
Mass	111(97.4%)	00 (0.00%)	111(89.5%)
Layered	03 (2.6%)	10 (100%)	013(10.5%)
Total	114 (100%)	10 (100%)	124(100%)

P value 0.000

Mass closure technique was used in 111(89.5%) while layered closure in 13 (10.5%). The later technique was used in all cases of paramedian incision and only three cases of midline incision. 97.4% of midline was closed in mass closure, which was found to be statistically significant P value 0.000(Table3). The continuous mode of closure was adopted in all cases (100%). This was used in mass closure of midline and layered closure of paramedian incisions. Interrupted fasial closure was not practiced in this study.

Vicryl was applied in 21 (16.9%). The most commonly used size of suture material was size 2# in106 (85.5%), size 1# 17 (13.7%) and 0# is only one suture. Of Nylon type of suture size 2# was commonly used 90 (87.4%) of Vicryl variety, size2# was 16 (76.2%) of patients (Table 4). In all ten patients of paramedian incisions and three midline incision, layered closure was applied. Vicryl was used in closing both fascial layers. The first layer was of peritoneum and posterior rectus sheath and second layer of the anterior rectus sheath) P value 0.000.

Table 4 : Type of suture material and its size used in closing the fascial layer

Suture type	Suture 2#	Suture1#	Suture0#	Total%
Nylon	90 (87.4%)	12 (11.7%)	01 (0.9%)	103(100%)
Vicryl	16 (76.2)	05 (23.8%)	00 (0.00%)	21(100%)
Total	106(185.5%)	17 (13.7%)	01 (0.8%)	124(100%

Closure of the abdominal incisions took between 5-10minutes 76 (61.3%) of patients, however, those who took >10mkinutes 48 (38.7%) of patients. Regarding type of incision incisions, out of 114 midline incisions 68 (59.6%) < 10 minutes. In the paramedian incision the great majority 10 (80%) took less than10 minutes though this was statistically not significant P value 0.205.

In all cases, conventional interrupted skin closure was practice. Suture size 0# was used in 66 (53.2%), 2/0 # in 48 (38.7%) and size 1# or2 # were used in 5 (4%) each. Regarding type, the majority 120 (96.8%) Nylon was used and 4 (3.2%) other types were employed (Silk in one and Vicryl in three patients. Most of abdominal wall closure 118 (95.2%) wre by done by the registrars; remaining six patients (4.8%) were completed by either surgeons' two patients or house officers' four patients.

Length of hospital stay varies 55 (44.4%) were discharge in less than five days, 52 (41.0%) discharged between5-10 days and 16 (13.7%) discharged in more than 10 days. Ninety seven of patients (78.2%) discharged home without any complications. The morbidity 12 (9.7%) and mortality was seen in 15 (12.1%). The morbidity and mortality were seen in 10.9% and14.1% respectively in patients with acute abdomen, where as in 3.7% and7.4% of patients with abdominal trauma.

Wound infection 7 (5.6%), burst abdomen 4 (3.2%) and (IH) 1(0.8%) were complications encountered. All seven cases of wound infection and single case that developed (IH) in the study had mass closure of their anterior abdominal wall. Out of four patients who developed burst abdomen, three followed mass closure. Out of 15 mortality 14 (93.3%) followed mass closure whereas one patient (6.7%) from layered closure.

IV. Discussion

Midline incision is still the most frequently used to access the abdominal cavity in emergency surgery. In our study midline incisions are the most which constitutes about 97.4% and this comply the previous international studies [5, 6, 7].

Mass closure where all layers of the abdominal wall were closed as one structure (except skin), 89.5% whereas layered closure was less utilized 10.5% [5].

Most suture materials used Nylon 103 (83%) and Vicryl 21(17%). The most commonly used size of suture materials was 2# and1# Nylon and Vicryl 2#.

Surgical-site infection remains the important early postoperative complications as within the first 30 days postoperatively 5.6%, burst abdomen 3.2% and incisional hernia 11.2% [18].

V. Conclusion

Mass closure technique is most preferred by the surgeons than the layered closure for it is less time consuming, it has got disadvantage of forming incisional hernia when it gets disrupted by any assault to the area of suture line.

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References Références Referencias

1. Michael J Zinner, Stanley W. Ashley Maingot's Abdominal Operations. 11th edition. 2007 by McGraw-Hill Education.
2. Chawia S A. Comparison between mass closure and layered closure of midline abdominal incision. Med J DY Patil Univ. 2012 Jun; 5: 26-7.
3. Bellon-Caneiro JM. Abdominal wall closure in laparotomy. Cir Esp. 2005 Mar; 77(3):114-23.
4. Bolli M, Schilling M. Incision and closure of the abdominal wall. Chirurg. 2006 May; 77 (5): 408-
5. Ceydeli A, Rucinski J, Wise L. Finding the best abdominal closure: An evidence-base review of the literature. Curr Surg 2005; (62):220-225.
6. Millbourn D, Cengiz Y, Israelsson L A. Effect of stitches length on wound complications after closure of midline incisions: A randomized controlled trials. Arch Surg. 2009 Nov; 144 (11): 1056-9.
7. Carlson MA. New developments in abdominal wall closure. Chirurg.2000 Jul; 71(7): 743-53.
8. Rahbari NN, Knebel P, Diener MK. Current practice of abdominal wall closure in elective surgery13.Is there any consensus? BMC Surg. 2009 May; 9:8.
9. Singh G, Ahluwalia R. A comparison between mass closure and layered Closure of midline abdominal incisions. Med J DY Patil Univ 2012 Jun; 5:26-7.
10. Bellon JM, Lopez-Hervas P, Rodriguez M. Midline abdominal wall closure: A new prophylactic mesh concept. J Am Coll Surg. 2006 Oct. 203 (4): 490-7.
11. Gaikwad V, Kapoor R, Thambudorai R. An ideal suture for midline abdominal closure. Indian J Surg 2009 March-April; 71: 1 28-132.
12. Nicole C F, Richard A. The search for an ideal method of abdominal fascial closure. Ann Surg. 2000 March; 231(3): 436-442.
13. Altaf A T, Mohammad S A, Abdul Rasheed S. Closure of elective abdominal Incisions with monofilament, non-absorbable suture material versus poly-filament absorbable suture material. J Ayub Med Coll Abbottabad 2011; 23 (2).
14. Justinger C, Slotta JE, Schiling MK. Incisional hernia after abdominal wall closure with slowly absorbable versus fast absorbable antibacterial coated sutures. Surgery 2012; 151 (3):398-403.
15. Albertsmeier M, Seiler CM, Fischer L: Evaluation of the safety and efficacy of MonoMax® suture material for abdominal closure after Primary midline laparotomy a controlled prospective multicentre trial: ISSAAC [NCT005725079]. Langenbecks Arch Surg 2012 March; 397 (3):363-371.
16. Leaper DJ, Allan A, Kennedy RH. Abdominal wound closure: A controlled Trial of polyamide (Nylon) and polydioxanone suture (PDS). Ann R Coll Surg Engl. 1985 Sept; 67 (5): 273-275.
17. Scheidel P, Hohl M K. Modern synthetic suture materials and abdominal wound closure techniques in gynecological surgery. Baillieres Clin Obstet Gynecol. 1987Jun; 1(2):223-46.
18. Schahtrupp A, Fackledey V, Klinge U. Temporary closure of the abdominal wall (laparotomy) hernia. 2002 Dec; 6(4):155-62.Epub 2002 Sep 20.
19. Alcides J B, Nelton T K, Joao A S Jr. Needle for abdominal wall closure; Society of American Gastro-intestinal and endoscopic Surgeons (SAGES) 2012 Annual Meeting.
20. Joris J H, Harold E L, Willem R. A multicentre randomized controlled trial evaluating the effect of small stitches on incidence incisional hernia in midline incisions. BMC Surg 2011 Aug; 11:20.
21. Bloemen A, van Dooren P, Huizinga BF. Randomized clinical trial comparing polypropylene or polydioxanone for midline abdominal wall closure. Br J Surg.2011 May; 98(5):633-403.

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