

Hughes abdominal wall repair versus conventional mass closure: Our initial results

Original Article

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ABSTRACT

Background: Hughes technique (far-and-near) combines a standard mass closure (two loop 1-PDS sutures) with a series of horizontal and two vertical mattress sutures within a single suture (1-Nylon). So, this will spread the loading over the length of the incision in addition to across it. This technique may be more effective for preventing the development of incisional hernia after a closure of the midline incisions.

This study aimed to compare two techniques of midline abdominal incision closure: Hughes technique versus mass closure as regards: the incidence of wound dehiscence (burst abdomen or incisional hernia).

Patients and Methods: A prospective randomized trial was designed. A total of 575 patients underwent midline laparotomy incisions (for elective or emergency surgery), the midline wounds of 288 patients were closed using the Hughes technique while the wounds of the other 287 patients were closed by the classic mass closure technique.

The incidence of burst abdomen at the end of 30-day postoperative served as the main outcome measure. The incidence of incisional hernia at the end of the first year, as determined by a thorough clinical examination and radiographic evidence obtained by ultrasound, was the secondary outcome.

Results: Compared with traditional abdominal closure, the incidence of incisional hernias was considerably lower in Hughes's abdominal repair.

Conclusion: In both emergency and elective laparotomy instances, Hughes's abdominal wall closure was better than conventional closure in terms of preventing wound dehiscence and subsequent incisional hernias. To adequately analyze these results, this study has to be carried out with a bigger sample size and for a longer duration of follow-up.

Key Words: Cardiff repair, hughes technique, midline incisions, wound dehiscence.

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INTRODUCTION

For decades, although opening and closing the abdominal wall has been an important part of surgical intervention, junior surgeons are usually rewarded for this part of the surgery^[1].

Proper closure of the abdominal wall is an integral step for the patient to avoid the risk of incisional hernia, the commonest major complication of a laparotomy, which may require the need for further surgery^[1].

The main technique of access to the abdomen at open surgery is the midline incision, which is also be used after laparoscopic surgery for specimen extraction^[2]. Incisional hernia is the most common complication following midline abdominal laparotomy. It develops in 10–15% of patients^[3].

The main causes of incisional hernias were multifactorial. Cachexia, anemia^[4], individuals over 45, smoking^[5], obesity, diabetes mellitus^[6], a history of

chronic obstructive pulmonary disease^[7], and medications like corticosteroids were among them^[8]. Modifiable risk variables were shown to have an impact on the incidence of incisional hernias, however, the majority of these factors are outside the surgeons' control. These consist of the suture material and surgical incision closure technique utilized to seal the musculo-fascial layer of the abdominal wall^[5].

The most commonly used method of closure is the classic method of closure which was called the layered fascial closure 'the mass fascial closure'^[9].

To spread the tension strain of the suture both along and across the suture line, the Hughes abdominal repair (also known as the Far-Near-Near-Far, Far-Near-Near-Far, or Cardiff Repair) consists of a sequence of two horizontal and two vertical beds within a single suture (Fig. 1)^[4,9].

It is comprised of: a far bite starting at point '1' 2 cm on the edge of linea alba from outside-in and then taking a

near bite of 0.5 cm at point '2' on the other side inside-out, a near bite on the same side outside-in at point '3' and then a far bite on the other side inside-out at point '4'.

The suture was next converted to a horizontal mattress by taking a far bite 1 cm above or below the previous bite on the other side at point '5' outside-in, a near bite on the same side at point '6' inside-out, a near bite on the other side at point '7' outside-in, and finally a far bite on the same side at point '8' inside-out. The two ends of the suture were tied to approximate the edges of the linea alba^[10].

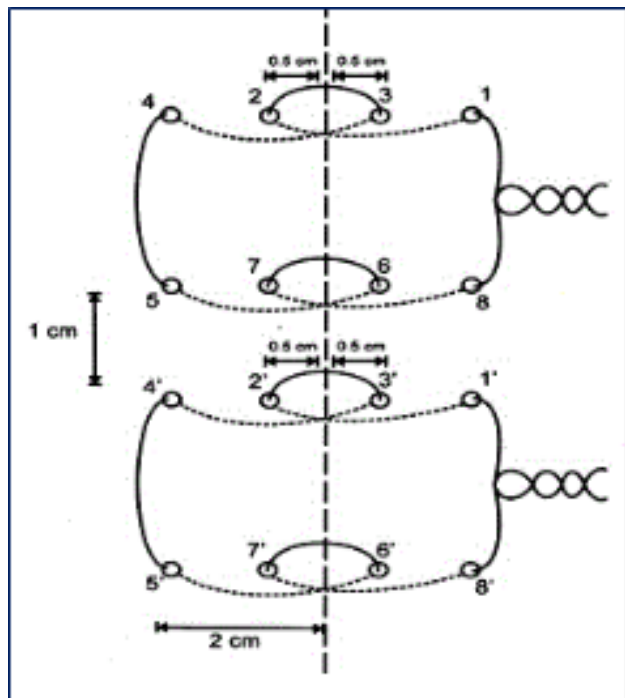


Fig. 1: Hughes midline closure.

Due to the social burden caused by incisional hernias, we conducted this randomized controlled trial to compare these two distinct abdominal wall closure techniques with the goal of lowering the incidence of incisional hernia following midline laparotomy incisions in our teaching hospital (Qena University Hospital, Qena Faculty of Medicine, South Valley University).

These two methods were: the classic mass closure vs. Hughes technique.

PATIENTS AND METHODS:

This was a prospective randomized trial. We recruited 575 patients who underwent abdominal surgeries through midline incision (incision length ≥ 6 cm).

Inclusion criteria

- (a) Patients aged greater than or equal to 18 years.
- (b) Midline elective/emergency laparotomy incisions of more than 6 cm length.

- (c) Patients giving informed written consent.

Exclusion criteria

- (a) Recurrent abdominal surgery.
- (b) Previous mesh repairs.
- (c) Patient refusal.

Data were collected regarding thorough history, basic clinical examination, and routine laboratory investigations (complete blood count, random blood sugar, coagulation profile, and renal and liver functions). The efficacy in each group was assessed by calculating the *P value*.

They were randomly (by closed envelop method) assigned into two groups:

Group C: included 287 patients (125 patients underwent elective surgeries, 162 patients underwent emergency surgeries). Their midline incisions were closed using the classic mass closure method (mass fascial closure, subcutaneous closure followed by skin closure),

Group H: included 288 patients (120 patients underwent elective surgeries, 168 patients underwent emergency surgeries). Their midline incisions were closed using Hughes techniques (Cardiff repair). The Hughes abdominal closure technique constitutes a series of two horizontal and two vertical mattresses within a single suture (Fig. 2a, b).

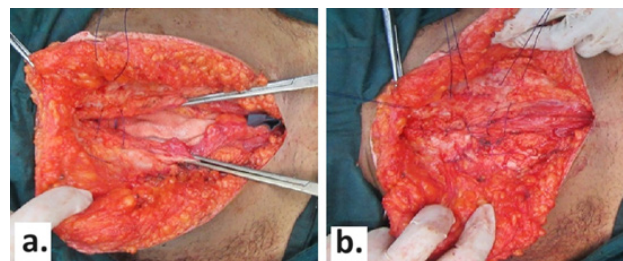


Fig. 2: Hughes sutures (a, first sutures. b, third sutures).

So, there were 245 elective surgeries and 330 emergency surgeries. Elective surgeries included: Splenectomy, Pancreatic Cysto-gastrostomy, Fundoplication, Right hemi-colectomy. Emergency surgeries were for: Perforated appendix, Perforated Peptic Ulcer, Obstructed Left Cancer Colon (Fig. 3).

Classic closure (group C) (287 pts)	Hughes Technique (Group H) (288 pts)
<ul style="list-style-type: none"> • Elective: 125 pts (1 pt died) • Emergency: 162 pts (3 pts died) • Six pts missed follow up 	<ul style="list-style-type: none"> • Elective: 120 pts (2 pts died) • Emergency: 168 pts (4 pts died) • Eight pts missed follow up.

Fig. 3: Patients groups.

The incidence of SSI and abdominal wall dehiscence at 30 days following surgery were the main results. Purulent discharge from the wound, regardless of positive bacteriologic cultures, is considered a surgical site infection. Following the removal of their sutures, all patients were released on the tenth through fifteenth post-operative day. They were then monitored every month for the next year. In both groups, discharge was postponed in cases of ruptured abdomen.

The secondary outcome was the incidence of incisional hernia at the end of the first year which is evaluated by:

(a) Detailed clinical examination: examination of the patient in both standing and supine position, the whole length of the scar is palpated during a cough or the Valsalva maneuver.

(b) Superficial abdominal ultrasound.

These outcomes were analyzed using IBM SPSS software package, version 20.0 (IBM Company, Chicago, Illinois, USA). Qualitative data were represented as number and percentage, whereas quantitative continuous data were represented by mean±SD. *P* less than 0.05 is considered as significant.

RESULTS:

This study recruited 575 patients. The age ranged between 18 and 76 years (mean age was 43.1 years±15.8). Length of the incision is ranged between 8 and 21 cm (mean length 15±2.5 cm).

Group C included 174 (31%) males and 109 (19%) females, while group H included 170 (30%) males and 112 (20%) females (Table 1).

Table 1: Comparison between C group versus H group

	C group (283 patients)		H group (282 patients)		P value
	174 (31%) males and 109 (19%) females		170 (30%) males and 112 (20%) females		
	Elective surgeries (122 patients)	Emergency surgeries (161 patients)	Elective surgeries (119 patients)	Emergency surgeries (163 patients)	
Closure time	13.9±3.3 min		17.1±4.3 min		S
Died Pts	1 pt	3 pts	2 pts	4 pts	
Superficial SSI ('n' %)	'5/121' (4.1)	'12/158' (7.6)	'7/117' (6)	'16/159' (10.1)	NS
Burst abdomen and Deep SSI ('n' %)	'5/121' (4.1)	'8/158' (5)	'0/117' (0)	'2/159' (1)	S
Pts missed follow-up	'13/279' (5.7)		'2/276' (0.7)		
Inc. hernia ('n' %)	3 pts	3 pts	3 pts	5 pts	
	'2/118' (1.7)	'7/155' (4.5)	'1/114' (0.9)	'2/157' (1.3)	S
	'9/273' (3.3)		'3/268' (1.1)		

Incision closure time

For the H group; closure time was significantly longer than the C group (17.1±4.3 min vs. 13.9±3.3 min), and this is logical because the addition of (two horizontal and two vertical mattresses within a single suture) to the mass closure took a few min.

In group C: one patient of the elective group and three emergency patients died during the first postoperative week (C group 121 elective pts and 158 emergency pts).

In group H: two elective and four emergency patients died (H group; 117 elective pts and 159 emergency pts).

(Causes of death were heart failure, myocardial infarction, or massive pulmonary embolism).

Superficial SSI (after subtracting the died patients)

In the C group, the incidence of SSI was ('6.1%' 17 patients out of 279 patients) which was insignificantly lower than SSI among the H group ('8.3%' 23 patients out

of 276 patients). This required repeated daily dressing plus a combination of Antibiotics.

Burst abdomen

This included cases of deep SSI and cases complicated by a burst abdomen. There was a significant difference between patients in the C group in comparison to patients in the H group ('5.9%' 13 patients out of 297 vs. '0.7%' two patients out of 276).

C group: Six patients missed the follow-up period while in the H group, eight patients missed the follow-up period.

Incisional hernia (after subtracting the patients missed the follow-up period)

In C group, nine patients '3.3%' out of 273 showed incisional hernia in comparison to three patients '1.1%' out of 268 in the H group. (*P*<0.05). These cases were detected either by clinical examination or by superficial US.

DISCUSSION

We conducted this study to evaluate Hughes technique (Far-Near-Near-Far, Far-Near-Near-Far, or Cardiff Repair) versus the Classic mass closure method for closure of abdominal midline exploratory incisions. The main items of comparison were the efficacy of the Hughes closure method to minimize the incidence of burst abdomen and the incidence of Incisional hernia within 1 year follow-up.

Our results showed a significantly longer closure time in Hughes closure than in classic mass closure (13.9±3.3 min vs. 17.1±4.3 min). This was similar to the results of Zeitoun et. al.^[5]. Their suture time was 15.16±4.32 min versus 12.95±3.36 min, respectively.

We showed no significant difference between the two groups as regard SSI which is similar to results of Zaitoun et. al.^[5], and Rajasekaran et. al.^[9].

However, we found a statistically significant difference in the incidence of wound dehiscence which was more with mass closure (5.7% vs. 0.7%). Rajasekaran et. al. concluded the same result, they showed an incisional hernia incidence of 14% versus 8%^[9].

According to our findings, the Hughes repair for closing midline exploratory incisions reduced the risk of postoperative wound complications such as incisional hernias and burst abdomens more successfully. However, this method required a somewhat longer period for wound closure.

Godara and colleagues study showed that for the treatment of incisional hernias, Hughes' abdominal repair was better than mesh hernioplasty^[11].

The Professor Hughes BR technique of abdominal wall closure bears his name. At first, he demonstrated that this method worked better for curing incisional hernias than mesh repair^[12].

CONCLUSION

In conclusion, even in situations where there was a higher risk of incisional hernia because of abdominal sepsis, the Hughes technique may be utilized as the recommended technique of abdominal wall closure in all midline laparotomy wounds.

Limitations

A larger sample size of patients and a longer follow-up period may be required to obtain more impressive results. General risk factors that may affect healing as: obesity, smoking, chronic chest diseases, and diabetes

mellitus may be taken into consideration in future research. Hughes may be tried for repair of incisional hernias or para-umbilical hernias. Also, Hughes repair may be compared with Classic mass closure in certain selected operations e.g. in colonic surgeries, upper gastrointestinal tract surgeries.

CONFLICT OF INTEREST

There are no conflicts of interest.

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