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Original Artical

Post-operative Outcome of Hughes Abdominal Repair and Conventional Continuous Closure of Midline Incision in Emergency Laparotomy

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Abstract:

Background: Conventional continuous closure or mass closure for abdominal closure with monofilament non- absorbable Polypropylene is one of the widely used standard techniques. Hughes repair named after Professor Leslie Hughes, is a combination of one horizontal and two vertical mattress sutures in a single suture where load is distributed along the incision length as well as across it. Objective of this study include comparing post-operative wound complications in Hughes abdominal repair and those with that by conventional continuous closure in midline abdominal incision in emergency laparotomy.

Methods: This study was conducted in the Department of Surgery & Casualty, Chattogram Medical College Hospital, Bangladesh between May 2018 and April 2019. Study population included 39 patients in Group A whom Abdomen was closed by Hughes abdominal repair and 39 patients in Group B in whom Abdomen was closed by conventional continuous closure.

Results: Four (10.3%) patients had wound infection in group A and six (15.4%) in group B. Two (5.1%) patients had partial wound dehiscence in group A and six (14.4%) in group B. The difference of wound infection and partial wound dehiscence were found statistically not significant. Two patients had burst abdomen in group A and nine in group B, which was found statistically significant ($p<0.05$). Mortality rate was zero for both groups in the present study. Mean time to stay in hospital was 9.59 ± 4.756 days in Group A and 14.77 ± 9.042 days in Group B respectively. The difference was statistically significant ($p<0.05$) between two groups.

Conclusion: Hughes abdominal repair of vertical midline abdominal incision showed a better result on the patients who underwent in emergency laparotomy and was found to be associated with a low incidence of serious complications.

Key Words: Hughes abdominal repair, Conventional continuous closure, Midline incision, Emergency laparotomy

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Introduction:

Emergency laparotomy through midline incision is a very common procedure in surgical practice. Incidence of post-operative complication varies from center to center. In emergency cases, prevalence of wound disruption is 10-30% according to Indian scenario [1] and 0.4%-3.5% in western world [2]. In a study conducted in Rajshahi Medical College and Hospital, Bangladesh, the development of wound dehiscence was 7.33% [3]. Many factors like Diabetes Mellitus, anemia, malnutrition, obesity, smoking, intra-abdominal malignancy, cough, COPD may contribute in post-operative complications. Along with these factors, closure techniques also play a key role to such post-operative complications [4]. Conventional continuous closure or mass closure for abdominal closure with monofilament non-absorbable Polypropylene is one of the widely used standard techniques [5].

Hughes Repair named as Professor Leslie Hughes, also known as 'far-and-near' or 'Cardiff Repair' [6]. Hughes repair is a combination of one horizontal and two vertical mattress sutures in a single suture where load is distributed along the incision length as well as across it. Objective of this study include finding out post-operative wound complications in Hughes abdominal repair and those with that by conventional continuous closure in midline abdominal incision in emergency laparotomy.

Materials and Methods:

This study was conducted in the Department of Surgery & Casualty, Chattogram Medical College Hospital, Bangladesh between May 2018 and April 2019. Study population included adult patients of both genders scheduled to undergo emergency laparotomy through vertical midline abdominal incision. The study included the following two groups selected by convenient sampling: Group A contained 39 patients in whom Abdomen was closed by Hughes abdominal repair. Group B contained 39 patients in whom Abdomen was closed by conventional continuous closure. The exclusion criteria included patients who did not consent, aged less than 18 years, patients with previous history of laparotomy or incisional hernia.

Hughes abdominal repair for midline abdominal closure for group A:

After definitive procedure a space was created between anterior rectus sheath and subcutaneous tissue on either side during the closure of abdominal wound. The space was created laterally from the cut edge of linea alba for a distance about 2.5 cm. Care was taken not to damage the perforating vessels and not to cut umbilical stalk during this separation.

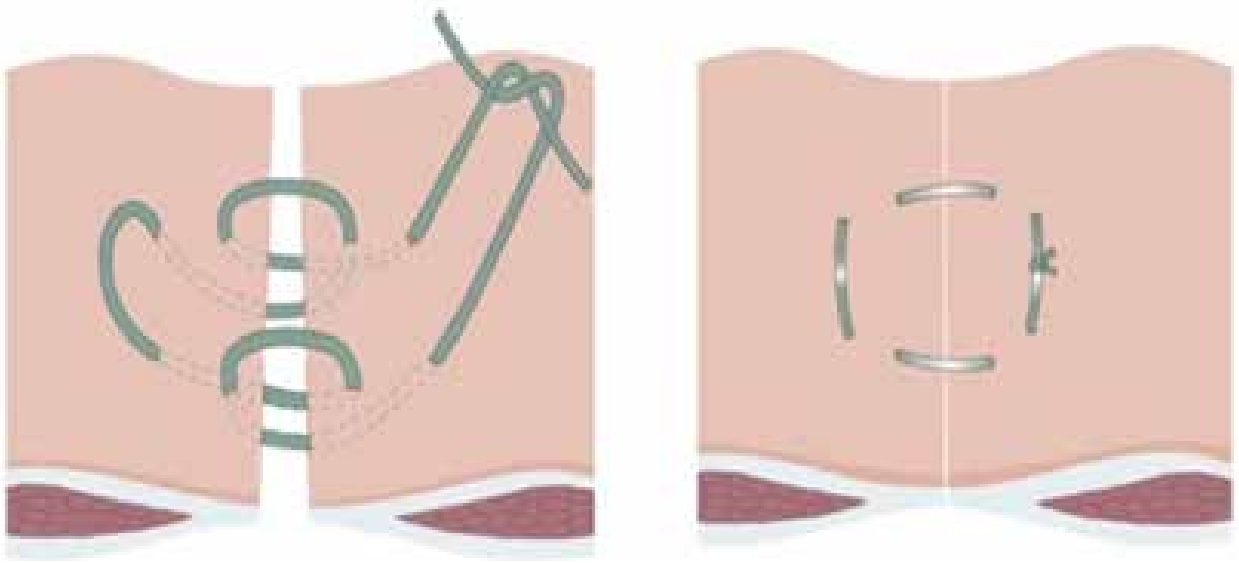

Fig 1: Hughes abdominal repair for midline abdominal closure for group A.

The Hughes technique combines interrupted double mattress sutures of polypropylene that distribute the load vertically along the wound. Care was taken to tie polypropylene suture snuggly rather than tightly to avoid tension and tissue strangulation. At least 5 throws were placed and the sutures were cut close to the knot to minimize the potential risk of suture granuloma. Monofilament polypropylene suture slip easily through tissues so create a pulley system. Thus, two vertical mattress sutures along with one horizontal mattress in a single suture are given (Fig 1). Then Skin was closed with either skin staplers or 2-0 monofilament polypropylene suture.

Conventional continuous closure of midline abdominal incision for Group B:

In conventional closure technique of abdomen, closure was started at one end with no1 polypropylene suture and knot was given. The knot was lying deep to the fascia. Each suture was placed 1 cm from the cut edge and 1 cm advanced from the previous suture. The suture was as tight as to hold the edges in apposition without tension to avoid tissue strangulation. During closure, suture to wound length ratio 4:1 was followed. An Aberdeen knot was given at the end of a continuous suture (Fig 2).

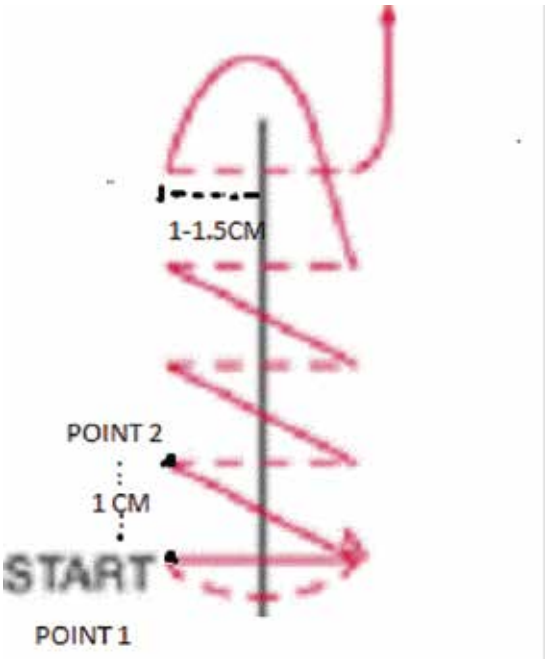

Fig 2: Conventional continuous closure of midline abdominal incision for Group B

All patients were given prophylactic antibiotics during induction of anesthesia. The antibiotic course was extended (cephalosporin and metronidazole) after the surgery. The wound was checked at 4th POD, if wound was soaked it was changed earlier. Patients were discharged at 7th POD if there is no complication and advised for stitch removal at 10th POD. Culture sensitivity was done in those patients' who developed wound infections. Patients with burst abdomen were managed carefully. Emergency tension closure was given by no1 polypropylene suture in that case. Then patient was closely observed during post-operative period and did not discharge until fully cured. During discharge patient was asked for follow up at 14th and 28th POD. If any patient unable or refuses to come for follow up due to long home distance data were collected over phone.

The study protocol was reviewed and approved by the Ethical Review Committee of Chattogram Medical College and hospital. Informed written consent was obtained from each patient or patient's attendant after detail briefing about the study.

Results

Table I shows the distribution of the patients according to age. The mean age was 32.23±13.62 years in Group A and 33.77±16.365 years in Group B. The age difference was statistically not significant.

Table I: Distribution of the patients according to age (n=78)

Age in years	Group A Hughes abdominal repair		Group B Conventional continuous closure		P Value
	Number	%	Number	%	
≤20	10	25.6	9	23.1	
21-30	15	38.5	13	33.3	
31-40	3	7.7	6	15.4	0.653[ns]
41-50	7	17.9	6	15.4	
51-60	3	7.7	2	5.1	
>60	1	2.6	3	7.7	
Mean ± SD	32.23±13.62		33.77±16.365		
Range	18-65		18-80		

ns =not significant/ P value of age difference reached from unpaired t-test

Table II shows the distribution of the patients according to per operative diagnosis, it was observed that 12 (30.8%) patients suffered from peptic ulcer perforation in Group A and 14 (35.9%) patients in Group B. The second significant diagnosis was appendicular perforation, the patient number of which was 6 (15.4%) in group A and 4 (10.3%) in group B.

Table II: Distribution of the patients according to per operative diagnosis (n=78)

Per operative diagnosis	Group A		Group B		
	n	%	n	%	
Traumatic jejunal perforation	3	7.7	3	7.7	
Traumatic Ileal perforation	1	2.6	2	5.1	
Traumatic liver injury	2	5.1	0	0	
Traumatic spleen injury	2	5.1	1	2.6	
Peptic ulcer perforation	12	30.8	14	35.9	
Appendicular perforation	6	15.4	4	10.3	0.726[ns]
Acute intestinal obstruction due to sigmoid colon growth	2	5.1	1	2.6	
Typhoid ileal perforation	3	7.7	5	12.8	
Acute intestinal obstruction due to cecal growth	2	5.1	0	0	
Ileal perforation	1	2.6	3	7.7	
Others	5	12.8	6	15.4	

Table III shows the distribution of the patients according to post-operative events. It was observed that 31 (79.5%) patients discharged with normal wound healing in group A and 20 (51.3%) in group B. Four (10.3%) patients had wound infection in group A and six (15.4%) in group B. Two (5.1%) patients had partial wound dehiscence in group A and six (14.4%) in group B. Two (5.1%) patients had complete wound dehiscence in group A and nine (23.1%) in group B. The mortality rate was zero for both groups. The differences of patient discharged with normal wound healing and complete wound dehiscence were statistically significant ($p<0.05$) between two groups whereas wound infection and partial wound dehiscence were statistically not significant ($p>0.05$).

Table III: Distribution of the patients according to post-operative events (n=78)

Postoperative Events	Status	Group A		Group B		P Value
Normal wound healing during discharge	Yes	31	79.5	20	51.3	0.009^{s}
	No	8	20.5	19	48.7	
Wound infection	Yes	4	10.3	6	15.4	0.498^{ns}
	No	35	89.7	33	84.6	
Partial wound dehiscence	Yes	2	5.1	6	15.4	0.135^{ns}
	No	37	94.9	33	84.6	
Complete wound dehiscence	Yes	2	5.1	9	23.1	0.023^{s}
	No	37	94.9	30	76.9	

Figure 1 showing more than three fourth 82.5% patients were male in Group A and 79.5% in Group B. Male was predominant in two groups. The difference was statistically not significant ($p>0.05$) between two groups.

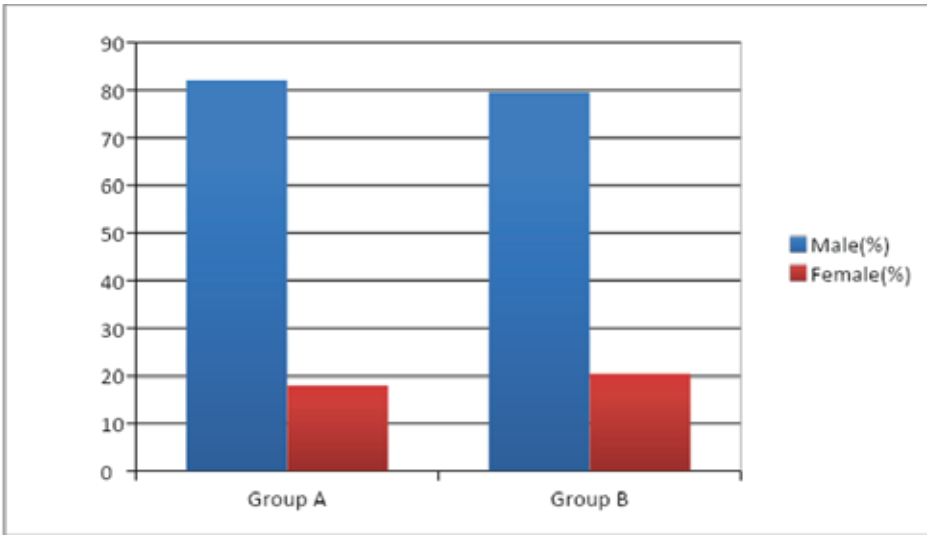

Figure 1: Bar diagram showing sex distribution (n=78)

Table IV shows the distribution of the patients according to duration of hospital stay, the mean time to stay in hospital was 9.59±4.756 day in Group A and 14.77±9.042 day in Group B. The difference was statistically significant (p<0.05) between two groups.

Table IV: Distribution of the patients according to duration of hospital stay (n=78)

Duration of hospital stay	Group A (n=39) Mean±SD	Group B(n=39) Mean±SD	P Value
Days	9.59±4.756	14.77±9.042	0.002[s]
Range	7-24	7-35	

Discussion

In the present study, it was observed that more than three fourth (79.5%) patients had discharged with normal wound healing in group A and 20 (51.3%) in group B. The difference of patient discharged with normal wound healing were statistically significant (p<0.05) between the two groups. In the study of Rajasekaran C et al. [7] all except 10 cases out of 50 were healed in group A and all except 13 cases out of 50 were healed in group B. The author concluded the healing as a little significant variable which matches with the current study.

Four (10.3%) patients had wound infection in group A and six (15.4%) in group B. Two (5.1%) patients had partial wound dehiscence in group A and six (14.4%) in group B. The difference of wound infection and partial wound dehiscence were found statistically not significant (p>0.05) between two groups. Deshmukh SN et al. [8] and Dhamnaskar SS et al. [9] mentioned wound infection is not significant between groups which are consistent with current study. But study of sringeri R et al. [1] proved that wound infection significantly high in mass closure (32.4%) over far-near-near-far technique (12.3%).

In current study 2 (5.1%) patients had burst abdomen in group A and 9 (23.1%) in group B. The difference of burst abdomen was found statistically significant (p<0.05) between two groups. Burst abdomen was found as a significant variable with respect to suture technique in the study of Agrawal CS et al. [10], Sringeri R et al. [1], Dhamnaskar SS et al. [9], Ahi KS et al. [11] which is consistent with current study. Mortality rate was zero for both groups in this study.

Regarding the duration of hospital stay in this present study it was observed that, the mean time to stay in hospital was 9.59 ± 4.756 days in Group A and 14.77 ± 9.042 days in Group B respectively. The difference was statistically significant (p<0.05) between two groups. In the study of Godara R et al. [12] mean duration of hospital stay was 3.7 days whereas it was 6.8 days for control groups. In the study of Sringeri R et al. [1] it was 15 days for group A (conventional closure) and 20 days for group B (far-near-near-far closure). Both of them concluded the variable as significant which is consistent with the current study. In this study short time follow up was given within 28 days time period. Patient was asked for follow up at 14th and 28th POD. If any patient unable or refuses to come for follow up due to long home distance data were collected over phone. At that time data were recorded according to presence of post-operative wound complications - wound infections, abdominal wound dehiscence. Incisional hernia could not be included due to short time follow up.

Limitations of the study includes **v**ariation in sample selection were absent as observations were recorded from only one hospital. Long term follow up could not carry out so risk of incisional hernia could not be calculated. Different surgeons performed surgeries at different period of time.

Conclusion:

It can be concluded that Hughes abdominal repair of vertical midline abdominal incision showed a better result on the patients who underwent emergency laparotomy. The technique is found to be associated with a low incidence of serious complications like wound infection and abdominal wound dehiscence. So, it can reduce duration of

hospital stay. Long term follow up should be done to evaluate risk of incisional hernia.

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