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HUGHES REPAIR VERSUS VERTICAL MATTRESS SUTURE FOR LAPAROTOMY WOUND CLOSURE- A COMPARATIVE STUDY

General Surgery

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ABSTRACT

Background: Laparotomy is one of the most common surgeries performed by general surgeons in emergency as well as elective settings. The most frequent complications following midline laparotomy includes incisional hernias, which develop in 10-15 % of patients and surgical site infections in 15-25 % of cases. 1 Thus, the placement of incision and suturing of the abdominal layers is the most common procedure done in operative surgery. Acute wound failure occurs in approximately 1% to 3% of patients who undergo an abdominal operation. Dehiscence most often develops 7 to 10 days postoperatively but may occur any time after surgery, from 1 to more than 20 days.2 Hughes repair 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). **Objectives:** Evaluate the efficacy of Hughes technique versus vertical mattress closure in patient undergoing midline laparotomy in terms of

1. Surgical site infection
2. Wound dehiscence
3. Post-operative pain
4. Duration of hospital stay.

Materials& Methods: Prospective, comparative study, A total of 30 patients undergoing abdominal midline laparotomy from March 2020 to August 2020 in Department Of General Surgery at R.L Jalappa Hospital and Research Centre, Tamaka, Kolar were considered for this study. **Conclusion:** We concluded that there is no difference between the two groups but Hughes repair had lesser post-operative pain but was more time consuming and prolonged the duration of the surgery. Whether to recommend this still remains doubtful and requires longer follow up and a larger sample size.

KEYWORDS

Hughes repair, Vertical mattress, laparotomy, surgical site infection, post-operative pain, wound dehiscence.

INTRODUCTION

Laparotomy is one of the most common surgeries performed by general surgeons in emergency as well as elective settings. The most frequent complications following midline laparotomy includes incisional hernias, which develop in 10-15 % of patients and surgical site infections in 15-25 % of cases. [1] Thus, the placement of incision and suturing of the abdominal layers is the most common procedure done in operative surgery.

Acute wound failure occurs in approximately 1% to 3% of patients who undergo an abdominal operation. Dehiscence most often develops 7 to 10 days postoperatively but may occur any time after surgery, from 1 to more than 20 days.[2] Acute wound failure is often related to technical errors in placing sutures too close to the edge, too far apart, or under too much tension.

Abdominal wound dehiscence either partial or complete, a common complication of laparotomy and causes a significant mortality and morbidity, with prolonged hospital stay and repeated surgical interventions.

Different surgical techniques /sutures for closing the laparotomy wounds are being advocated such as interrupted or continuous suturing, mass closure/ layered closure, delayed absorbable/non-absorbable , retention sutures, mesh, biological implant placement, and interrupted X sutures.

Hughes Repair

It is also called as 'far-and-near'repair or 'Cardiff repair [3]'. It was developed by Professor Leslie Hughes [4]. This repair 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). This distributes the load along the width and length of the incision.

Following principles underlie this; Use only sound normal tissues for repair that is ascertained through palpation For easy approximation, use graduated tensionCreate a pulley system through monofilament nylon suture that slips through the tissues [5]Studies show that Hughes repair is more effective than conventional repair [6]. This technique is used for patients who are at a higher risk of developing incisional hernias post laparotomy and total abdominal wound dehiscence [7].

The main objective of the study is to compare the incidence of surgical site infection, wound dehiscence, wound infection, post-operative pain, re-surgery and hospital stay with Hughes Technique vs vertical mattress sutures in laparotomy wounds.

Objectives

Evaluate the efficacy of Hughes technique versus vertical mattress closure in patient undergoing midline laparotomy in terms of

1. Surgical site infection
2. Wound dehiscence
3. Post-operative pain
4. Duration of hospital stay

Materials& Methods

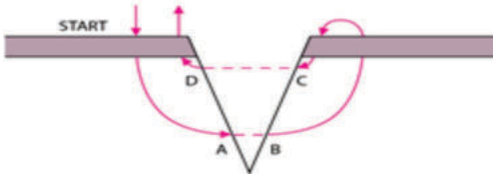
a. Design of study –Prospective, comparative study
b. Total number of study subjects – 30
c. Mode of selection of subjects–
A total of 30 patients undergoing abdominal midline laparotomy from March 2020 to August 2020 in Department Of General Surgery at R.L Jalappa Hospital and Research Centre, Tamaka, Kolar were considered for this study. For all the cases detailed history, complaints, clinical features will be taken and vital signs recorded. These patients will be subjected to investigations – complete blood counts, renal function tests, serum electrolytes, liver function tests, electrocardiogram, X-ray chest and abdomen erect, viral markers and blood grouping & Rh typing. They will be divided into two groups by simple random sampling. Group A- 15 patients in whom laparotomy wound will be closed by vertical mattress closure. Group B includes 15 patients in whom laparotomy wound will be closed by Hughes abdominal closure technique.

Inclusions criteria:
(1) Both sex

(2) Age >15years
(3) Patients who were willing to participate in this study.

Exclusions criteria
(1) Patients who were not willing to participate in the study.
(2) Age >15years

d. Procedure and other material to be used –
Group A: Vertical mattress suture for laparotomy wound closure was done



Group B: The Hughes technique constitutes a series of two horizontal and two vertical mattresses within single suture whereby the tension load of suture is distributed both along and across the suture line. Follow up: Patient will be followed up on POD 3,7,10 and compared based on post-operative pain(assessed by visual analog scale), surgical site infection, presence of wound dehiscence and duration of hospital stay.

Statistical analysis
Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. **Chi-square test or Fischer's exact test** (for 2x2 tables only) was used as test of significance for qualitative data.

Continuous data was represented as mean and standard deviation. **Independent t test** was used as test of significance to identify the mean difference between two quantitative variables

Graphical representation of data: MS Excel and MS word was used to obtain various types of graphs **P value** (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Statistical software:
MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers NY, USA) was used to analyze data

RESULTS
Table 1:- Distribution of subjects according to sex among the groups.

	HUGHES REPAIR		VERTICAL MATTRESS	
	N	%	N	%
Female	6	40.0%	6	40.0%
Male	9	60.0%	9	60.0%

P value 1.00, there was no significant difference found between two groups with respect to sex.

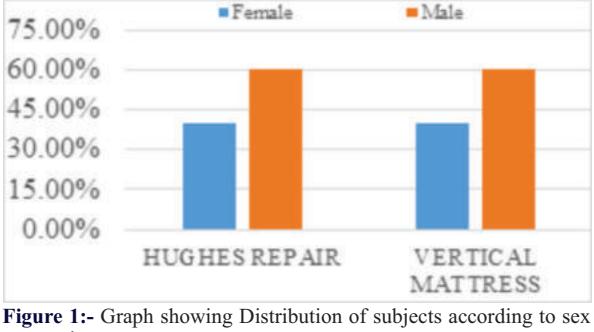


Figure 1:- Graph showing Distribution of subjects according to sex among the groups.

Table 2:- Comparison of mean age between two groups

	Mean	Std. Deviation	P Value
Hughes repair	40.07	8.573	0.312
Vertical mattress	44.27	13.264	

There was no statistically significant difference found between two groups with respect to age.

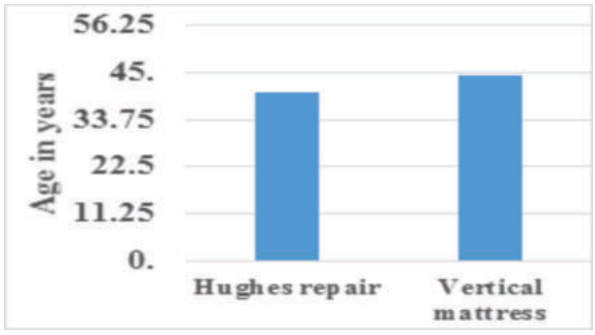


Figure 2:- Graph showing Comparison of mean age between two groups.

Table 3:- Distribution of subjects according to surgical site infections among the groups.

		Hughes repair		Vertical mattress		P value
		N	%	N	%	
Day 3	Absent	14	93.3%	13	86.7%	1.00
	Present	1	6.7%	2	13.3%	
Day 7	Absent	14	93.3%	12	80.0%	0.596
	Present	1	6.7%	3	20.0%	
Day 10	Absent	15	100.0	15	100.0%	--
	Present	0	0%	0	0%	

There was no significant difference found between two groups with respect to surgical site infections on day 3 and day7. There were no surgical site infections on day 10 in both the groups.

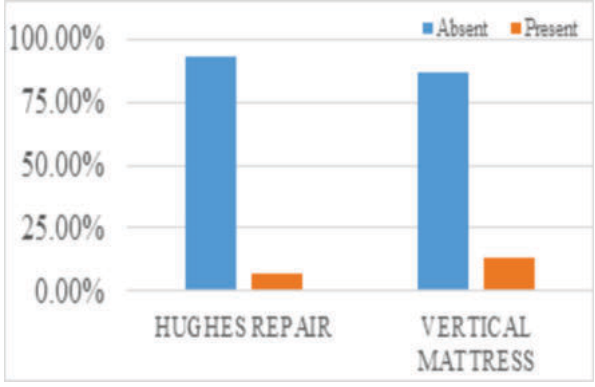


Figure 3a:- Graph showing Distribution of subjects according to surgical site infections among the groups. Day 3

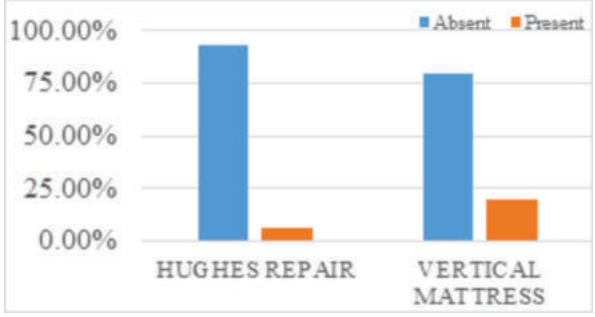


Figure 3a:- Graph showing Distribution of subjects according to surgical site infections among the groups. Day 7

Table 4:- Distribution of subjects according to wound dehiscence among the groups.

		Hughes repair		Vertical mattress		P value
		N	%	N	%	
Day 3	Absent	15	100.0%	15	100.0%	--
	Present	0	0%	0	0%	
Day 7	Absent	15	100.0%	14	93.3%	1.00
	Present	0	0%	1	6.7%	
Day 10	Absent	15	100.0%	14	93.3%	1.00
	Present	0	0%	1	6.7%	

There was no significant difference found between two groups with respect to surgical site infections on day 7 and day10. There was no wound dehiscence on day 3 in both the groups.

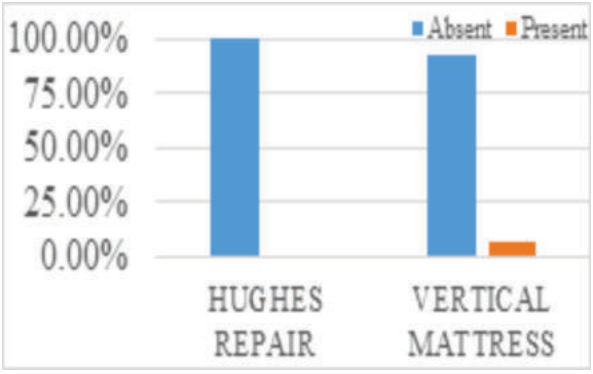


Figure 4a:- Graph showing Distribution of subjects according to surgical site infections among the groups. Day 7

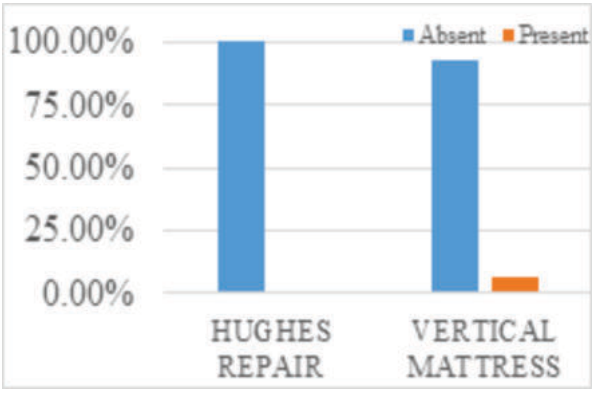


Figure 4b:- Graph showing Distribution of subjects according to surgical site infections among the groups. Day 10

Table 5:- Comparison of mean pain score between two groups on day 3 There was a statistically significant difference found between two groups with respect to pain on day 3 and day 7.

		Mean	SD	P value
Day 3	Hughes repair	4.87	1.125	0.014
	Vertical mattress	5.93	1.100	
Day 7	Hughes repair	2.60	1.549	0.008
	Vertical mattress	3.93	0.961	
Day 10	Hughes repair	0.13	0.352	0.125
	Vertical mattress	0.53	0.915	

There was no statistically significant difference found between two groups with respect to pain on day 10

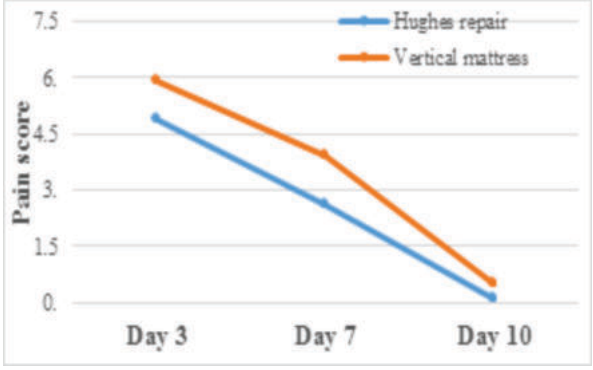


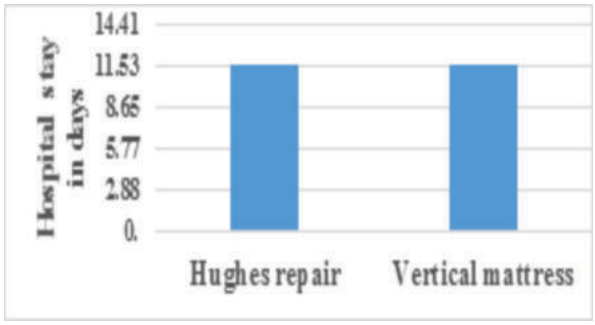
Figure 5a:- Graph showing Comparison of mean pain score between two groups on day 3

Table 6:- Comparison of mean hospital stay between two groups

	Mean	Std. Deviation	P Value
Hughes repair	11.47	0.516	0.726
Vertical mattress	11.53	0.516	

There was no statistically significant difference found between two groups with respect to hospital stay.

Figure 6:- Graph showing Comparison of mean hospital stay between two groups.



DISCUSSION

A number of studies have been done to ascertain the best method of closing the abdominal wall; however, it is still inconclusive. There are studies that suggest that non absorbable sutures reduce the risk of recurrence and incisional hernia incidence[8,9]. On the other hand, there are studies that show that absorbable sutures are of lower risk[10]. These differences can be attributed to the methodological variations in various trials, patient selection, type of surgeries, expertise of the surgical team, etc. Lower sample sizes were also a major reason for incomplete reporting.

The objective of the study is to compare the incidence of surgical site infection, wound dehiscence, wound infection, post-operative pain, re-surgery and hospital stay with Hughes Technique vs vertical mattress sutures in laparotomy wounds.

The 30 cases of laparotomy were chosen non-randomly and allocated for Hughes Abdominal Repair. The 30 cases of emergency laparotomy were chosen non-randomly and allocated for conventional repair. All patients were discharged after suture removal followed by 15th post-operative day and monthly follow up to 1 year.

The mean age of all the participants in the Hughes repair group was 40.07 years with a standard deviation of 8.573 years, while the mean age of all the participants in the Vertical mattress group was 44.27 years with a standard deviation of 13.264 years. There was no statistically significant difference between the two groups.

Among all the cases, majority of them were males (n=18, 60%). Rest of them were females (n=12, 40%). In the Hughes repair, 9 of them are males and 6 are females. In the conventional repair, 9 of them are males and 6 are females.

On Day 3, one patient from Hughes repair group presented with surgical site infection (6.7%) and two patients from vertical mattress developed surgical site infections (13.3%). On Day 7, one patient from Hughes repair group continued to have surgical site infection (6.7%) and two patients from vertical mattress continued to have surgical site infections and one patient developed surgical site infection on POD 7 (20%).On Day 10, no patients had surgical site infections. There was no statistically significant difference in surgical site infections between the two groups.

One patient from the vertical mattress group who developed surgical site infections developed wound dehiscence. This patient had undergone laparotomy for fecal peritonitis.

On Day 3, the mean pain scores from Hughes repair group was 4.87 (SD 1.125) and from vertical mattress group it was 5.93 (SD 1.100) with a P value of 0.014 which was statistically significant. On Day 7, the mean pain scores from Hughes repair group was 2.60 (SD 1.549) and from vertical mattress group it was 3.93 (SD 0.961) with a P value of 0.008 which was statistically significant. On Day 10, the mean pain scores from Hughes repair group was 0.13 (SD 0.352) and from vertical mattress group it was 0.53 (SD 0.915) with a P value of 0.125. There was no statistically significant difference in surgical site infections between the two groups.

The mean duration of hospital stay in Hughes repair is 11.47 days

(S.D=0.516 days). The median duration is 11 days. The range is between 11 and 12 days. The mean duration of hospital stay in conventional repair is 11.53 days (S.D=0.516 days). The median duration is 10 days. The range is between 11 and 12 days. Student t-test shows that the two groups do not differ significantly in the duration of hospital stay ($p > 0.05$).

Analysis shows that; in the Hughes repair group 14 of them (93.3%) did not have any complications. One patient had surgical site infection. Analysis shows that; in the conventional repair group 12 of them (80%) did not have any complications. Out of the remaining three patients, three of them (20%) had surgical site infection and progressed to have wound dehiscence.

CONCLUSION

We concluded that there is no difference between the two groups but Hughes repair had lesser post-operative pain but was more time consuming and prolonged the duration of the surgery. Whether to recommend this still remains doubtful and requires longer follow up and a larger sample size.

Limitations

Following are the limitations of the study:

- The study is a single centric study
- Smaller sample size affects the generalizability of the findings
- Short term follow up

REFERENCES

1. Heger P, Pianka F, Diener MK, Mihaljevic AL. Current standards of abdominal wall closure techniques: conventional suture techniques. The surgeon. J Surg Med. 2016;87(9):737-43.
2. Ma¨kela¨ JT, Kiviniemi H, Juvonen T et al. Factors influencing wound dehiscence after midline laparotomy. Am J Surg1995;170:387–390.
3. Shukla VK, Gupta A, Singh H, et al. Cardiff repair of incisional hernia: a university hospital experience. Eur J Surg. 1998;164(4):271–4.
4. Hughes BR, Webster D. Leslie Ernest Hughes – Obituary. BMJ. 2011;343.
5. Mudge M, Harding KG, Hughes LE. Incisional hernia. Br J Surg. 1986;73(1):82.
6. Godara R, Garg P, Shankar G. Comparative evaluation of Cardiff repair and mesh plasty in incisional hernias. Internet J Surg [Internet]. 2007;9:about 8 p.
7. Malik R, Scott NA. Double near and far prolene suture closure: a technique for abdominal wall closure after laparostomy. Br J Surg. 2001;88(1):146–7.
8. Hodgson NC, Malthaner RA, Ostbye T. The search for an ideal method of abdominal fascial closure: a meta-analysis. Ann Surg. 2000;231(3):436–42.
9. Weiland DE, Bay RC, Del Sordi S. Choosing the best abdominal closure by meta-analysis. Am J Surg. 1998;176(6):666–70.
10. Diener MK, Voss S, Jensen K, et al. Elective midline laparotomy closure: the INLINE systematic review and meta-analysis. Ann Surg. 2010;251(5):843–56. es of concrete. So, we can say that up to 15% foundry sand utilized for economical and sustainable development of concrete. Uses of crumb rubber in concrete can reduce the harmfulness to the environment and produce a 'greener' concrete for construction. An innovative supplementary Construction Material is formed through this study.