



TO COMPARE THE EFFICACY AND OUTCOMES OF SIMPLE INTERRUPTED VERSUS CONTINUOUS SUTURE WITH ABERDEEN KNOT TECHNIQUE FOR ABDOMINAL FASCIAL WALL CLOSURE

Ashok Swaminathan Govindarajan^{1*}, Kumaraguru.V² and Subramanian.C.S³

¹Department of Plastic Surgery, Rajah Muthiah Medical College & Hospital, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu, India-608 002

^{2,3}Department of Surgery, Rajah Muthiah Medical College & Hospital, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu, India-608 002

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ABSTRACT

Open surgical access to the abdomen is required for all major abdominal procedures. One of the most popular incisions for opening the abdomen is midline laparotomy till today. Here we describe the principles and techniques of fascial closure of midline laparotomy. To study the results of two techniques, simple interrupted closure and continuous with intermittent Aberdeen knot technique for midline laparotomy wound closure. This study included 80 patients of midline laparotomy wound closure. They were randomly divided into two groups. In one group (group A) of 40 cases, midline fascial wound closure was done with continuous sutures with intermittent Aberdeen knot technique using Prolene No. 1 suture material. In the other group (group B) of 40 cases, closure was done with the technique of simple interrupted sutures with Prolene No.1 suture material. Comparison of both the techniques regarding preoperative status the type of closures, time taken for fascia closure, length of prolene suture material used and postoperative complication such as incisional hernia, wound dehiscence, suture sinus formation, stitch granuloma, patient satisfaction index and chronic wound pain was assessed according to clinical examination and recorded in the pro forma prepared. Both the techniques, simple interrupted suture closure and continuous with intermittent Aberdeen knot closure for midline laparotomy fascial wounds, show a similar rate of postoperative complication such as incisional hernia, wound dehiscence, and suture sinus formation. But the continuous suturing with intermittent Aberdeen knot technique is a better option to prevent complications such as stitch granuloma, chronic wound pain, and wound infection, which are higher in the simple interrupted fascial wound closure technique.

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INTRODUCTION

All abdominal procedures are done by either by open or laparoscopically. All major abdominal surgeries are approached by midline laparotomy. Midline laparotomy is the most common technique of abdominal incisions in both emergency and elective settings because it is simple, provides adequate exposure to all four quadrants, affords quick exposure with minimal blood loss. Secure wound closure is an essential requirement for an uncomplicated and expedient recovery after laparotomy. One of the most common and major complication associated with the closure of midline laparotomy are wound dehiscence and incisional hernia which are a major cause of postoperative morbidity. Various

techniques and sutures are described for this midline laparotomy. When tissue has been disrupted severely after surgery that it cannot heal naturally (without complications or possible disfiguration), it must be held in opposition until the healing process provides the wound with sufficient strength to withstand stress without mechanical support [1].

The wound failure (dehiscence and ventral hernia) and other postoperative wound complications may result from an improper choice of suture material and improper technique. The incidence of incisional hernia varies from 9 to 19 % [2]. There is no standard method or ideal suture material prescribed for this procedures. The standard technique should have minimum complications and should be acceptable to the patient and with minimal post operative pain. The ideal

technique and suture material for wound closure is yet to be decided. Closure technique involves a choice of continuous versus interrupted suture, the size of fascia bites, distance between consecutive sutures (stitch interval), the length and size of the suture used [3, 4]. Here, we have tried to highlight our result of two different techniques of abdominal fascial closure—simple interrupted suture and continuous with intermittent Aberdeen knot [5]—by using nonabsorbable polypropylene suture material in midline laparotomies.

MATERIALS AND METHODS

This is a comparative randomized study carried out in Rajah Muthiah Medical College, Annamalai University. The duration of study will be two years (July 2014 to September 2016). All patients planned for elective midline laparotomies were studied. patients will be randomized by means of lots system and data collection is ready after obtaining written consent from the patient and completely examined as per study proforma

Inclusion Criteria

- All adult patients
- Only midline laparotomy incision used
- The study included are elective laparotomies.
- Only continuous with interrupted Aberdeen knot and interrupted knots were used.

Exclusion Criteria

- We excluded patients undergoing surgery where in the abdomen is opened by transverse or other non-vertical incisions
- Patients with pre – or post operative diagnosis of malignant involvement of peritoneum
- Patients with whom there was preexisting cause of raised intra abdominal pressure and Ascites
- loss of follow up.

Total number of 80 patients were selected and randomly divided into two groups: group A (continuous suturing with intermittent aberdeen): 40 cases and group B(simple interrupted): 40 cases. In group A wounds were closed with Prolene No 1 suture,with continous suture with intermittent Aberdeen knot at every fourth bite of stitch. In group B simple interrupted sutures are made with Prolene No 1. In both groups datas were collected and recorded in proforma and postoperative complications if any are noted. Patients were followed up at regular intervals upto 2, 4 weeks and from 6 months to 2 years after surgery.

RESULT

The study was done between July2014 to September 2016 all midline laparotomies were enrolled. The patients were randomly divided into two groups: group A (continuous suturing with intermittent aberdeen): 40 cases and group B(simple interrupted): 40 cases. In group A wounds were closed with Prolene No 1 suture, with continous suture with intermittent Aberdeen knot at every fourth bite of stitch. In group B simple interrupted sutures are made with Prolene No 1. Table 1 shows distribution of age of patients in our study group varied from 12 years to 70 years. In group A the mean age is 50.87+/-12.55 years and in group B mean age 51.8+/-8.36 years. The most common age group was between 50 and 60 years in our study. Disruption of abdominal wounds is more common in age above 60 years. Further more older patients

fall into the groups with constitutional disease, frequently neoplastic¹¹.

There were 25 males and 15 females In Continuous Sutures With Intermittent Aberdeen Knot Technique (Group A) as compared to 16 males and 24 females In Simple interrupted (Group B). The sex incidence shows predominance for males the ratio being about 4:1. The male predominance is attributed to abdominal breathing, greater physical activity and less elasticity of abdominal wall¹⁰.



Fig.:1 Group-A Continous Sutures With Intermittent Aberdeen Knot

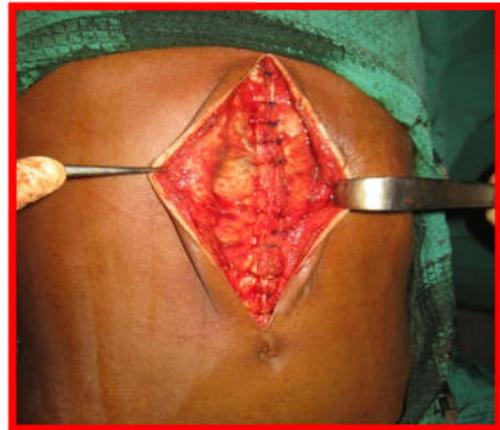


FIG. 2:Group-B Simple Interrupted Sutures

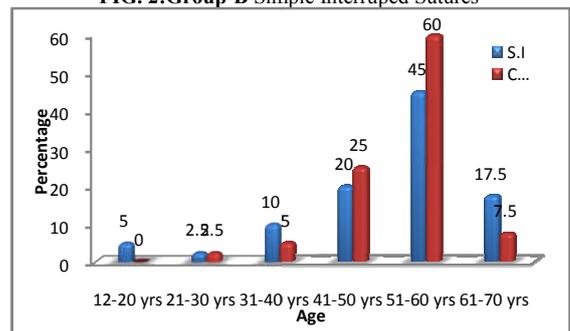


Table: I. Age Distribution

The distribution of occupation in our study was more of labours and least of students, teacher, sales man & painters.

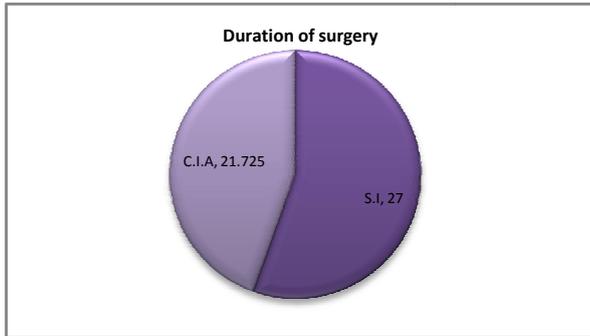
In our study mean Body mass index In Continuous Sutures With Intermittent Aberdeen Knot Technique (Group A) was 27.565 and in Simple interrupted (Group B) was 27.485.

In our study duration of time taken for abdominal fascial wall closure in Continuous Sutures With Intermittent Aberdeen Knot Technique (Group A) is 21.725 min and in Simple interrupted (Group B) it is 27min, indicating simple

interrupted is time consuming compared to continuous suture with intermittent Aberdeen knot technique because in continuous suturing no need to tie multiple knots.

Table -2. Duration of Surgery

Type of closure	N	Mean	Std. Deviation	t-value	P value
S.I	40	27.0000	2.45994	9.490	<0.001
C.I.A	40	21.7250	2.51138		



In our study mean incisional length In Continuous Sutures With Intermittent Aberdeen Knot Technique (Group A) is 15.2 cms and in Simple interrupted (Group B) it is 16 cms.

Table . 3 Length Of Suture Material Used

	N	Mean	Std. Deviation	t- value	P value
S.I	40	83.2000	1.95067	47.049	<0.001
C.I.A	40	60.2750	2.38572		

In our study mean length of suture material used InContinuous Sutures With Intermittent Aberdeen Knot Technique (Group A) is 60.275cmsand in Simple interrupted (Group B) it is 83.2 cms.with significant P value <0.001.



Patient satisfaction index :Patients were very satisfied in Continuous Sutures With Intermittent Aberdeen Knot Technique (Group A) in 15 % (6) and in Simple interrupted (Group B) it was 15%(6). Results were satisfied inGroup A&Group B with 75%&62.5% respectively. 22.5% (9) were not satisfied in group B and 10%(4) in group A.

Table.4: Type of Surgery

Type of Surgery	Type of closure				Total	
	S.I		C.I.A		N	%
GBD	2	5.0	1	2.5	3	3.8
GBD+IH	1	2.5	2	5.0	3	3.8
IBS	0	.0	1	2.5	1	1.2
LA	1	2.5	2	5.0	3	3.8
PM	11	27.5	5	12.5	16	20.0
PSC	0	.0	5	12.5	5	6.2
RM	1	2.5	1	2.5	2	2.5
SAIO	7	17.5	5	12.5	12	15.0
Spleen	0	.0	1	2.5	1	1.2
TOM	10	25.0	4	10.0	14	17.5
TVGJ	7	17.5	13	32.5	20	25.0
Total	40	100.0	40	100.0	80	100.0

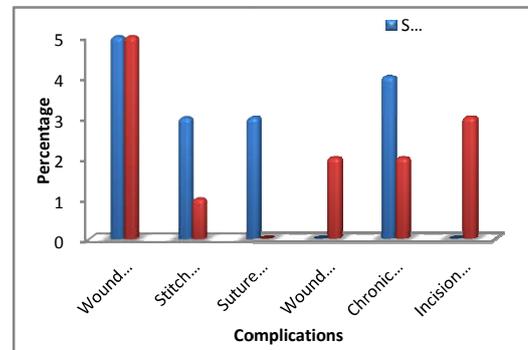
Chi-Square Tests

	χ^2 value	df	Sig.
Pearson Chi-Square	14.955	10	0.134

In our study number of Truncal Vagotomy+Gastrojejunostomy (TVGJ) was 20 cases most of the them with Group A - Continuous with intermittent Aberdeen knot where as in pelvic mass cases simple interrupted suturing used.

Table.5: Complications

Complications	Type of closure		n	χ^2 value	P value
	S.I	C.I.A			
Wound infection	5	5	10	0.000	1.000
Stitch Granuloma	3	1	4	1.053	0.305
Suture Sinus	3	0	3	3.117	0.077
Wound dehiscence/ burst Abdomen	0	2	2	2.051	0.152
Chronic wound pain	4	2	6	0.721	0.396
Incisional hernia	0	3	3	3.117	0.077



- Wound infection was observed in 5 cases of group A and 5 cases in group B, with insignificant P value 1.000.
- Stitch granuloma was observed in 3 cases of GROUP A and one case in group B and the P value found to be insignificant 0.305.

- Suture sinus in Group A, 3 cases were observed compared to group B where no case suture sinus observed and the P value found to be insignificant 0.077.
- Wound dehiscence/burst abdomen :In GROUP A 2 cases were observed compared to Group B where no cases observed and P value 0.152, found to be insignificant
- Chronic Wound pain:In Group A ,2 cases were observed and 4 cases were observed in Group B with insignificant P value 0.721.
- Incisional Hernia: in Group A 3 cases were observed and no cases observed in Group B with insignificant P value 0.077.

DISCUSSION

The best method of abdominal closure is one that maintains tensile strength throughout the healing process with good tissue approximation, does not promote wound infection or inflammation, is well tolerated by patients and is technically simple and expedient. The specific technique used in closure of the abdominal fascia for the individual is frequently based on nonscientific factors. Because of difficulties arising from differently tailored study designs, the surgical literature has not clearly demonstrated an optimal technique to close abdominal fascia, especially in elective settings. This prospective, randomized trial was undertaken to study and compare the ideal technique and suture for closure of abdominal fascia. The study included 80 patients undergoing exploratory laparotomy through a midline incision in elective set-up in department of surgery.

Time Taken for Closure of anterior abdominal fascia

Richards et al⁴⁸ did not record the exact closing time in 571 patients consistently, but the closing time for continuous method was 20-25 minutes while it was 40-45 minutes. In 1983 Stone et al⁴⁸ reviewed 2006 emergency laparotomy retrospectively and suggested that anesthesia and operating time could be reduced by using a continuous closure, although the exact closing time was not calculated. Overall, anesthesia and operating time were prolonged by 11 and 10 minutes respectively by use of an interrupted suture. The difference was statistically significant ($p=0.02$). In a prospective, randomized comparison by McNeil⁵² et al continuous closure was accomplished in significantly less time (21 ± 8 minutes) than interrupted closure (43 ± 19) minutes but this also included the time taken for closure.

In our study duration of time taken for abdominal fascial wall closure In Continuous Sutures With Intermittent Aberdeen Knot Technique (Group A) is 21.725 min and in Simple interrupted (Group B) it is 27min, indicating simple interrupted is time consuming compared to continuous suture with intermittent Aberdeen knot technique because in continuous suturing no need to tie multiple knots
Wound infection

The part played by wound sepsis is important, as this is the major avoidable cause of wound failure. Inadequate treatment or immuno-compromised state may lead to serious systemic complications like septicemia, shock and multi organ failure.

Incisional hernia

It develops from the scar of a surgical incision, when a patient is examined by making him lie flat on the bed and is asked to lift his legs or to cough, any bulges in the scar is considered as Incisional hernia. Incisional hernias are mainly due to faulty incision and faulty technique of closure, other important determinants are sex (males more predisposed) and age (elderly more predisposed) of the patients, chest infection and wound infection. As age advances, breakdown of collagen fibres takes place weakening the old-healed scars, predisposing for hernia, thus indicating the need to use non-absorbable suture material to support it, using chromic catgut in conventional layered closure proved to be a draw back in causing incisional hernia and thus proving the advantages of using polypropylene in preventing incisional hernia by holding more tissue with little tension for a long period of time after the wound heals.

Various study groups confirm that incidence of incisional hernia is reduced by continuous suturing with polypropylene as compared to simple interrupted with chromic catgut and polypropylene. Golligher (1976) had no incidence of incisional hernia with continuous suturing as compared to 3.73% with Simple interrupted.

Leaper (1977) had 2.48% incisional hernia with continuous suturing gas compared to 4.2% in Simple interrupted.

Singh A (1981) had no cases of incisional hernia with continuous suturing as compared to 6.6% with Simple interrupted.

Shukla (1981) had no cases of incisional hernia with continuous suturing as compared to 3% with Simple interrupted.

In our study, the incidence of incisional hernia is higher in group A compared to group B this is because continuous suturing with intermittent Aberdeen has less knot securing property compared to simple interrupted.

Suture Sinus Formation

It is defined as a chronic granulating infection or micro abscess that results in a persistent fistulous tract. The incidence of suture sinus formation is predisposed by the use of multi filament suture material. Due to lodgment of infective foci in the crevices of suture material. The incidence of suture sinus formation is various study groups are as follows:

In a comparative study conducted by Goligher (1976) had 0.92% suture sinus formation with continuous suturing as compared to 6.54% with Simple interrupted.

Bucknall (1982) had 2.6% suture sinus formation with continuous suturing as compared to 2.6% with Simple interrupted.

Chowdhry (1994) had 2.5% suture sinus formation with continuous suturing as compared to 25% with Simple interrupted.

The incidence of suture sinus formation is lesser in singled layered closure as compared to conventional layered closure by various authors.

In our study the incidence of suture sinus formation in continuous suturing was nil as compared to 3 cases seen in Simple interrupted.

In our study we have used only mono filament sutures in both the study groups so the incidence of suture sinus formation is statistically insignificant.



Fig. 3: Wound Infection



Fig. 4: Incisional Hernia with Prolene Sinus

CONCLUSION

Continuous suturing with intermittent Aberdeen is comparable to Simple interrupted suturing in terms of occurrence of wound infection, wound dehiscence, stitch granuloma, suture sinus, chronic wound pain and incisional hernia.

1. Continuous suturing with intermittent Aberdeen is better than Simple interrupted closure as it is less time consuming
2. Patients experienced less wound pain and discomfort when rectus was primarily closed with Continuous suturing with intermittent Aberdeen than with interrupted and hence higher satisfaction index in continuous suturing with Intermittent Aberdeen Knot Technique

3. Length of suture material, prolene 1 used in simple interrupted is higher than the Continuous suturing with intermittent Aberdeen
4. Post operative complications is statistically insignificant when comparing Continuous suturing with intermittent Aberdeen and Simple interrupted closure.

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