



**Original Article**

## **Interrupted Midline Fascial Closure to Prevent Burst Abdomen in Emergency Laparotomy: Comparison between Continuous and Interrupted closure**

**Baharul Islam<sup>1</sup>, Saiful Islam<sup>2</sup>, Subroto Kumar Roy<sup>3</sup>, Nur Kutubul Alam<sup>4</sup>, Tahmidur Rahman<sup>5</sup>, Md. Habibullah Sarkar<sup>6</sup>**

### **Abstract**

Burst abdomen represents one of the most frustrating and difficult postoperative complication that concerns every abdominal surgeon. It occurs because of various predisposing factors which can be prevented to some extent by having knowledge regarding them. Despite many years of experience, the optimal technique of laparotomy closure remains controversial. The varieties of surgical excess as well as the varieties of abdominal closure techniques are the main difficulties in the proper standardization of this procedure. In this paper a randomized prospective study was designed to compare with a interrupted and continuous technique for closing a midline abdominal fascia in emergency laparotomy. A total of 300 patients of acute abdominal condition who underwent laparotomy were randomized into two groups of 150 patients in each group. Total 22(7.33%) of 300 patients developed burst in the postoperative period. Fourteen (14) (9.33%) in continuous arms and eight (08) (5.33%) patients in interrupted arms developed burst. Burst abdomen occurring mostly 40-60 years age group with a male to female ratio of 1.68: 1. Cough, anemia, malnutrition, DM, intraperitoneal sepsis, wound infection, uremia and abdominal distension were the important predisposing factors for the incidence of burst abdomen. Interrupted suturing was associated with significantly reduced the burst abdomen when comparing with continuous closure.

**Key word: Burst abdomen, wound dehiscence**

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### **Introduction**

Burst abdomen is considered when intestine, momentum or other viscera are seen in the abdominal wound following midline laparotomy due to separation of the abdominal musculo-aponeurotic layer. It is a serious post-operative complication. The incidence of this complication as reported from two hospitals from India, VIZ from Delhi and Surat was 5% and 7%

respectively.<sup>1</sup>The burst abdomen is associated with high morbidity up to 40% and mortality up to 18% in elderly and malnourished patient.<sup>2</sup>

Burst abdomen can occur for a variety of reasons. Factors relating to the incidence of burst abdomen are suture closure, incision, vomiting, distention, obesity, jaundice, malignancy, diabetes mellitus, hypoproteinaemia, anemia, immunocompromised

<sup>1</sup> Associate Professor, Department of Surgery, Rajshahi Medical College, Rajshahi.

<sup>2</sup> Registrar, Department of Surgery, Rajshahi Medical College Hospital, Rajshahi.

<sup>3</sup> Senior Consultant, Surgery, Moulvibazar District Hospital, Moulvibazar.

<sup>4</sup> Associate Professor, Department. of Surgery, Jessore Medical College, Jessore.

<sup>5</sup> Assisltant Registrar, Department of Surgery, Rajshahi Medical College Hospital, Rajshahi.

<sup>6</sup> Associate Professor, Department of Surgery, Rajshahi Medical College, Rajshahi.

patient and wound infection.<sup>3</sup> A surgeon can perform a technically perfect operation in a patient but still have a complication. Similarly, surgical technical errors may account for this operative complication.

There is no ideal wound closure technique that would be appropriate for all situations. Therefore, the correct choice of suturing technique is vital. A marked reduction in the incidence of burst abdomen can be achieved by utilizing employing a correct technique of abdominal closure.<sup>4</sup>The present study assesses the efficacy of the fascial closure of emergency laparotomy incisions with interrupted suture in the prevention of burst abdomen.

#### Materials and methods:

This is a hospital based interventional study. Here, 300 patients who underwent emergency laparotomy in all units of surgery department of Rajshahi Medical College Hospital from January 2015 to December 2016 were studied. Patient were randomized into two groups of 150 patients in

#### Suture technique:

**Interrupted closure:** It was performed using no1 proline suture. A large bite was taken on the cut edge of linea alba from outside in 1.5 to 2 cm from edge and then needle emerged on the other side from inside-outside 1.5 to 2 cm from the edge. The two ends were tied just tight enough to approximate the edges of linea alba taking care not to include bowel or greater omentum between the edges. The next suture will be placed 1.5 to 2 cm from the previous one. Thus in a 14 cm long wound 7 to 9 sutures were applied.

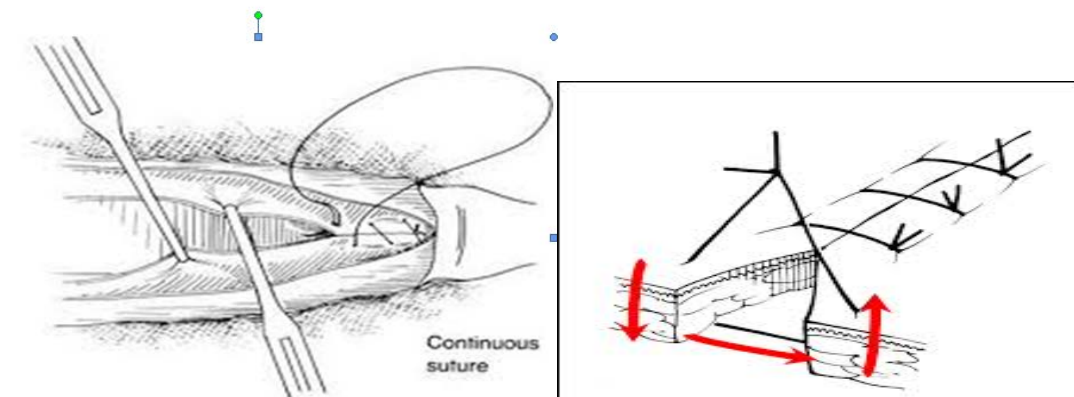


Fig 1; Intrrupted Suture

**Continuous closure:** It was performed using no1 proline , care being taken to palace each bite 1.5 cm from the cut edge of linea alba and successive bites being taken 01 cm from each other . The edges of linea alba

each that is interrupted (case) and continuous (control)

#### Inclusion criteria:

All patients scheduled to underwent midline laparotomy for emergency reasons, admitted in all units of department of surgery of Rajshahi medical college hospital.

#### Exclusion criteria:

1. Patients younger than 20 years of old.
2. Patient who had undergone a previous laparotomy for any condition.
3. Patient who did not given written or verbal consent.

All patients were given explanation of the study and signed a written consent form. All the odd number of patients were taken as case(interrupted group) and even number of patient as control(continuous group).Patients undergoing emergency laparotomy for acute abdomen namely intestinal obstruction, perforation of gas containing hollow viscous, peritonitis and abdominal trauma were included.

were gently approximated without strangulation with an attempt to keep a suture to wound length ratio of 4:1. The closure was performed by a senior resident or consultant.

The patient was followed up from 2<sup>nd</sup> POD to 12<sup>th</sup> POD to determine the risk of dehiscence. All clinical information including history, physical findings, per and post operative findings were recorded a pre-designed data sheets. Data were processed and analyzed using SPSS in version 16.



**Fig 2; Burst Abdomen**

**Results**

A total of 300 patients were studied. Patients were randomized into two groups -  
 Group A (n=150) – Patients in this group underwent Interrupted (case) suturing.  
 Patients in this group underwent Continuous (control) Suturing.

□ Group B (n=150)

**Table1: Age distribution**

Age group	Interrupted suturing (case)		Continuous suturing (control)	
	Number	Percent	Number	Percent
20-29 yrs	20	13.3%	20	13.3%
30-39 yrs	20	13.3%	44	29.3%
40-60 yrs	110	73.3%	86	57.3%
Total	150	100.0%	150	100.0%

$\chi^2=5.969$  df=2 p-value=0.051

In this study most of the patients were aged between 40-60 years in both the groups.

**Table 2: Gender distribution**

Gender	Group A (Interrupted) (n=150)		Group B (Continuous) (n=150)	
	Number	Percent	Number	Percent
Male	88	58.7	100	66.7
Female	62	41.3	50	33.3
Total	150	100.00	150	100.00

$\chi^2=1.026$  df=1      p=0.399

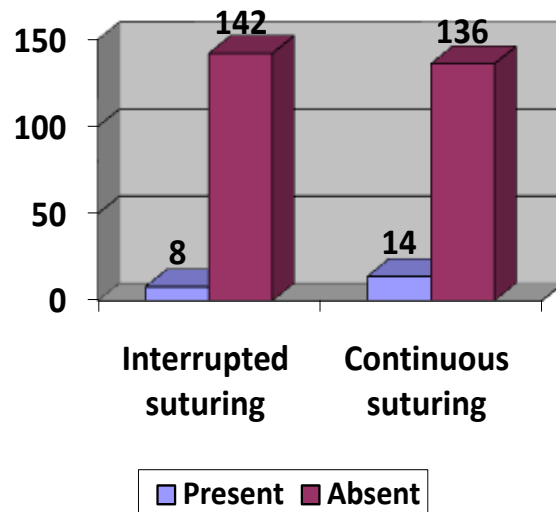
In this study majority of the patients were males in both the groups (58.7% in group A and 66.7% in group B) with male to female ratio 1.68:1.

**Table-3: Relationship between burst abdomen and suturing method.**

Burst Abdomen	Interrupted suturing (case)		Continuous suturing (control)		Total	
	Number	Percent	Number	Percent	Number	Percent
Present	8	5.33	14	9.33	11	7.33
Absent	142	94.7	136	90.7	139	92.7
Total	150	100	150	100	150	100

$\chi^2=0.883$  df=1      p-value=0.533

In this study burst abdomen occurs 5.33% in Interrupted group and 9.33% in continuous group. So, interrupted suturing is better than that of Continuous suturing.

**Graph-1: Burst Abdomen with suture method**

In this study burst abdomen occurs 5.33% in Interrupted group and 9.33% in continuous group. So, interrupted suturing is better than that of Continuous suturing.

**Table-4: Age group with burst abdomen**

			Burst Abdomen		Total
			Present	Absent	
Age group	20-29 yrs	Count	2	38	40
		% within Age group	5.0%	95.0%	100.0%
	30-39 yrs	Count	6	58	64
		% within Age group	9.4%	90.6%	100.0%
	40-60 yrs	Count	14	182	196
		% within Age group	7.1%	92.9%	100.0%
Total		Count	22	278	300
		% within Age group	7.3%	92.7%	100.0%

In this study most of the patients were aged between 40-60 years in both the groups.

**Table-5: Gender with burst abdomen**

			Status		Total
			Interrupted suturing (case)	Continuous suturing (control)	
Gender	Male	Count	88	100	188
		% within Gender	46.8%	53.2%	100.0%
		% within Status	58.7%	66.7%	62.7%
	Female	Count	62	50	112
		% within Gender	55.4%	44.6%	100.0%
		% within Status	41.3%	33.3%	37.3%
Total		Count	150	150	300
		% within Gender	50.0%	50.0%	100.0%
		% within Status	100.0%	100.0%	100.0%

In this study majority of the patients were males in both the groups (58.7% in group A and 66.7% in group B) with male to female ratio 1.68:1.

**Table -6: Predisposing Factors for burst abdomen.**

Factors	Burst Abdomen				Total		P-value
	Present		Absent		Number	Percent	
	Number	Percent	Number	Percent			
Cough	12	54.5	56	20.1	68	22.7	0.017
Anaemia	18	81.8	50	18.0	68	22.7	0.001
DM	12	54.5	46	16.5	56	19.3	0.007
Uremia	18	81.8	48	17.3	66	22.0	0.001
Intraperitoneal sepsis	16	72.7	44	15.8	60	20.0	0.001
Post-operative abdominal distension	16	72.7	38	13.7	54	18.0	0.001

In this study, variables are highly significant with the development of burst abdomen as p-value=0.017 and p-value=0.001.

**Table -7: Burst abdomen and malnutrition**

BMI	Burst Abdomen				Total		P-value
	Present		Absent		Number	Percent	
	Number	Percent	Number	Percent			
<18 (Malnutrition)	18	81.8	52	18.7	70	23.3	0.001
>18 (Average)	4	18.2	226	81.3	230	76.7	
Total	22	100	278	100	300	100	

$\chi^2=22.697$  df=1 p-value= 0.001

**In the above table, shows 70 (23.3%) patients were malnourished and in 18 cases (81.8%) burst abdomen occurred.**

### Discussion:

Burst abdomen remains a major cause of morbidity and mortality following laparotomy especially in the emergency setting. Trials from western countries have shown no significant difference in the risk of burst in the interrupted versus continuous methods of suturing<sup>5</sup>. In a study, from Department of Surgery, University of

Alabama Hospitals, Birmingham, Alabama<sup>6</sup> the 2.0% (5/244) dehiscence rate for the continuous method is similar to other reports of continuous closure in which the incidence of disruption ranged from 0 to 2.8%.<sup>7,8</sup> The 0.9% (2/229) of dehiscence for the interrupted method is also comparable with other series of interrupted closure in which the incidence ranged from 0 to 4.0%<sup>9,10</sup>.

But in our trial, a statistically significant difference in the risk of burst was obtained between the continuous and interrupted arms.

In this study, 14 (9.33%) in the continuous and 8 (5.33%) in the interrupted arm develop burst value=0.533. Most of the patients were aged between 40-60 years and male to female ratio 1.68:1. In a continuous suturing cutting out of even a single bite of tissue leads to opening of the entire wound. This is the probable explanation for a high prevalence of burst in our emergency group.

Srivasta A reported 8 burst in the continuous arm of suturing whereas only 01 dehiscence took place (dehiscence risk 2.17 %) with interrupted technique indicating a much lower risk of burst with interrupted method of closure<sup>[11]</sup>. Other Authors also reported protection from burst by interrupted technique.<sup>[4]</sup> The continuous suture is associated with a hacksaw effect due to varying tension on different parts of suture due to abdominal wall movements. This results in cutting out of the suture. In case of interrupted suture there is no hack-saw effect hence cut out force is minimal. Our data in emergency group supports this theoretical explanation.

From this study, it is shown that Interrupted suturing was associated with significant reduction in risk of burst when compared with continuous in case of midline fascial closure.

### Conclusion

Intraperitoneal sepsis, cough, uremia, wound infection, anemia, DM and malnutrition are significant predictors of burst. In presence of these symptoms, the risk of abdominal wound dehiscence can be reduced significantly by using interrupted sutures. Interrupted suture technique should be used in all emergency laparotomy cases

and in elective laparotomy cases presenting with one or more risk factors for burst.

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