



Original Research Article

Evaluation of various closure techniques after laparotomy

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Abstract

Introduction: Every operation requires one of closure techniques to close the wound for subsequent successful healing, proper closing of wound influence the success of surgery. Many complications such as infection, wound dehiscence and burst abdomen occur in wound closure. Laparotomy is a surgical procedure involving a large incision through the abdominal wall to gain access in to the abdominal cavity and subsequent closure of abdominal wall after dealing the pathology. Proper closure of wound influences the success of surgery by healing.

Study Design: A prospective type of study.

Material and Method: Study was carried out in 360 patients, who were admitted for acute abdominal conditions in surgical wards and underwent emergency laparotomy for various indications. All the laparotomies were done by midline longitudinal incision under General Anesthesia and after dealing with the pathology, closure of the wound were done in two layers - peritoneum and linea alba in one layer and skin subcutaneous tissue in other layer and drains were placed. Peritoneum and linea Alba were closed by two technique-continuous and interrupted suturing. Two types of sutures were used vicryl and prolene, and results were analyzed.

Results and Conclusion: Complication rate was more in continuous vicryl (25.71 %) than in interrupted prolene technique (25 %). In interrupted vicryl technique complication rate was 23.07%. Infection rate was less in interrupted prolene group 16.66% as compared to that in continuous group.

Keywords: Laprotomy, Wound Closure, Vicryl, Prolene.

Introduction

Laparotomy is a surgical procedure involving a large incision through the abdominal wall to gain access in to the abdominal cavity and subsequent closure of abdominal wall after dealing the

pathology. Proper closure of wound influences the success of surgery by healing¹⁻².

The wound healing process is influenced by many systemic and local host factors. Wound healing is a complex set of biochemical events that take

place in a closely orchestrated cascade to repair the wound. Wound healing is classically divided into haemostasis, inflammation, proliferation and remodeling phases, although there is considerable overlapping among individual phases¹⁻².

Median laparotomy is the most common technique of abdominal incision because it is simple, provides adequate exposure to all four quadrants, is rapid to open and usually bloodsparing³. There are two types of wound healing, by primary intention and secondary intention. In healing by primary intension wound edges are brought together so that they are re-approximated and in secondary intension wound are allowed to granulate. Nutritional status of the patient is very important. Protein deficiency and particularly ascorbic acid deficiency inhibits collagen synthesis and impairs healing. Glucocorticoids therapy by its anti-inflammatory aspects, retards healing. Patient's age is also a systemic factor that plays a role⁴. Local infections are important causes of complication and delays healing process.

MATERIALS AND METHODS

The study was carried out in 360 patients, admitted for acute abdominal conditions in surgical wards of Sanjay Gandhi Memorial Hospital, associated with S.S. Medical College, Rewa (M.P.) and underwent emergency laparotomy for various indications. Patients of abdominal pathology were diagnosed on the clinical grounds, investigated and admitted in surgical wards for laparotomies were selected for the study. Detailed clinical histories along with necessary hematological investigations for surgical procedure were carried out. The patients were then informed of the surgery and method of closure of the surgical wound, its advantage and complication. Those who fulfilled and consented for the laparotomy were enrolled for the study. In our study both male and female patients of all age group such as children, adults and elders were included. Patients of laparotomy who died within 3 days of operation were excluded from study.

All the laparotomies were done by midline longitudinal incision under General Anaesthesia and after dealing with the pathology, closure of the wound were done in two layers - peritoneum and linea alba in one layer and skin subcutaneous tissue in other layer and drains were placed. Peritoneum and linea alba were closed by two technique-continuous and interrupted suturing. Two types of sutures were used vicryl and prolene, and results were analyzed.

After skin closure dressing was done with Povidine-iodine ointment in all patients. Iv antibiotic covering aerobic and anaerobic pathogen were given in post operative days with antacid and analgesic.

Post operatively wounds were examined and evaluated on the third, fifth and seventh day for pain/tenderness, itching/irritation, swelling, collection of serum, blood and pus, wound gapping burst abdomen and scar mark and if patient has any complication, were recorded and treated accordingly. Skin sutures were removed on tenth post-operative day and patients were discharged and followed up in SOPD.

Results

It is evident from the Table-1 that in majority of the patients 323 (89.72%) continuous sutures were applied and in rest of the patients 37 (10.27%) interrupted sutures were applied. Majority of cases of peptic perforation 130 (40.37%) Typhoid perforation 88 (27.33%) and intestinal obstruction 64 (19.88 %) continuous sutures were used while in 24 cases of perforation interrupted stitches were used.

Table – 1: Distribution of cases according to closure technique

S. N.	Diagnosis		Total no. of cases	%	Continuous		Interrupted	
					No.	%	No.	%
1	Perforation Peritonitis 248	Typhoid	99	27.5	88	27.33	11	28.95
		Gastric	94	26.11	84	26.09	10	26.32
		Duodenal	49	13.61	46	14.29	03	7.89
		Appendicular	06	1.667	06	1.86	00	00
			248	68.89	224	69.56	24	63.15
2	Intestinal Obstruction 75	Small Bowel	51	14.16	46	13.97	06	15.78
		Large Bowel	24	6.67	19	5.90	05	13.15
			75	20.83	64	19.88	11	28.95
3	Traumatic perforation peritonitis 25	Jejunal	17	4.722	17	5.28	0	00
		Ileal	06	1.667	6	1.86	0	00
		Duodenal	01	0.278	01	00	00	2.63
		Ascending colon	01	0.278	01	0.31	00	00
	Other 07	Hemoperitoneum	06	1.667	06	1.86	0	00
		Pancreatic necrosis	01	0.278	01	0.31	00	00
			32	8.89	32	9.62	00	2.63
5	Kock`s abdomen		03	0.833	02	0.62	01	2.63
6	Pancreatitis		02	0.556	01	0.31	01	2.63
Total			360	100	323	89.72	37	10.27

It is evident from Table 1 that vicryl was used in 328 cases (91.11), and prolene was used in 32 cases (8.89%)

Table 2: Distribution of cases according to suture material used

S. No.	Diagnosis		Total no. of cases	%	Vicryl		Prolene	
					No.	%	No.	%
1	Perforation Peritonitis peritonitis 248	Typhoid	99	27.5	88	24.44	11	3.05
		Gastric	94	26.11	87	24.17	07	1.94
		Duodenal	49	13.61	49	13.61	00	00
		Appendicular	06	1.667	06	1.667	00	00
			248	68.88	230	63.89	18	5.00
2	Intestinal Obstruction 75	Small Bowel	51	14.16	46	12.78	05	1.38
		Large Bowel	24	6.66	18	5.00	06	1.66
			75	20.83	64	17.78	11	3.05
3	Traumatic perforation Peritonitis 25	Jejunal	17	4.722	17	4.72	0	00
		Ileal	06	1.667	6	1.66	0	00
		Duodenal	01	0.278	01	0.27	00	00
		Ascending colon	01	0.278	01	0.27	00	00
	Other 07	Hemoperitoneum	06	1.667	06	1.66	0	00
		Pancreatic necrosis	01	0.278	00	00	01	0.27
			32	8.89	31	8.61	1	0.27
4	Kock`s abdomen		03	0.833	02	0.55	01	0.27
5	Pancreatitis		02	0.556	01	0.27	01	0.27
Total			360	100	328	91.11	32	8.89

Table 3: Distribution of complication according to closure technique and suture material used (n 95)

Closure technique.	Suture used	No. of Cases	Complication	Percentage
Continuous 323	Vicryl	315	83	26.34
	Prolene	08	03	37.50
Interrupted 37	Vicryl	13	03	23.07
	Prolene	24	06	25.00

It is evident from the above table that complication rate was more in continuous vicryl technique(25 %).In interrupted vicryl technique complication rate was 23.07%. (25.71 %) than in interrupted prolene

Table 4: Incidence of Wound infection according to closure technique and suture material used (n 70)

Closure technique.	Suture used	No. of Cases	Wound infection	Percentage
Continuous 323	Vicryl	315	61	19.36
	Prolene	08	02	25.00
Interrupted 37	Vicryl	13	03	23.07
	Prolene	24	04	16.66

It is evident from the above table that infection rate was less in interrupted prolene group 16.66% as compared to that in continuous group.

Table – 5: Incidence of complications recorded in four common indications of laparotomy closed by various closure technique and suture material used

Closure technique.	Suture used	Typhoid Perforation		Gastric Perforation		Intestinal obstruction		Duodenal Perforation	
		No	Com. (%)	No	Com. (%)	No	Com. (%)	No	Com. (%)
Continuous	Vicryl	84	22	82	20	63	17	46	10
	Prolene	04	02	02	00	01	01	00	00
Interrupted	Vicryl	04	02	05	01	01	00	03	00
	Prolene	07	03	05	01	10	02	00	00
Total		99	29 (29.29)	94	22 (23.4)	75	20 (26.67)	49	10 (20.4)

As it is evident from the above table that the complication rate is higher in cases of typhoid perforation (29.29%) followed by intestinal obstruction (26.67%), gastric (23.40%) and duodenal perforation (20.40). It is further observed that high incidence of mortality recorded in cases of intestinal obstruction 7(9.33%), followed by peptic perforation 6 (6.385), in typhoid perforation 4 (4.04%) and 2 in duodenal perforation (4.08%).

Discussion

The incidence of wound infections following abdominal surgery has been studied by different authors who reported a variable incidence of wound infection. It ranges from 5.30 % to 28.60 % in different studies².

In the present series incidence of postoperative wound related complication is 19.16%. The discrepancy in incidence of wound infection can be explained on the basis of the lack of uniform criteria for diagnosis of wound sepsis and variable distribution of different types of operative wounds viz clean, contaminated and highly contaminated, in different series.

In spite of improved pre-operative and post-operative care, the use of antibiotics and newer

types of suture materials and periodic publications on this subject, the incidence of this complication has remained static^{1,3,4,5,6,7}. Incidence of burst abdomen following abdominal surgery has been variably reported by various authors from 0 to 24.9 % in various studies using various suture materials as shown in table⁷.

Author	Year	Incidence of burst abdomen
Murray and Blaisdell	1978	>1
Cameron et al	1980	0.60
Bloemen et al	2011	20.2 (Prolene) 24.9 (PDS)
Sharad Pandey et al	2013	6 (Prolene) 17 (Vicryl)
Present series	2013	3.33 (Prolene 6.25, Vicryl 3.04%)

In present series incidence of burst abdomen is 3.33 %.

Poor nutritional status, underlying pathology and lack of adequate pre-operative preparation together with higher proportion of poor risk cases undergoing emergency operations account for high incidence of disruptions following emergency operations.

The effect of wound healing by interrupted or continuous stitches and different type of suture material was affected by underlying pathology

and procedure done. Overall outcome of different procedures was directly influenced by factors of wound healing.

Conclusion

Observations were systematically recorded and critically analyzed in the background of review of literature and following conclusions drawn:-

- 1) Vicryl was used in 328 cases (91.11 %), and prolene was used in 32 cases (8.89%).
- 2) Complication rate was maximum in Typhoid perforation (30.53%) followed by gastric perforation (23.16 %). In intestinal obstruction complication rate was 21.05%. There was one complication in 6 cases of appendicular perforation.
- 3) Overall incidence of post operative wound complications, which occurred in 26.11% of cases. Infection was the commonest 19.16% followed by wound gapping (3.61%) and burst abdomen (3.33%).
- 4) Complication rate was more in continuous vicryl (25.71 %) than in interrupted prolene technique (25 %). In interrupted vicryl technique complication rate was 23.07%.
- 5) Infection rate was less in interrupted prolene group 16.66% as compared to that in continuous group.
- 6) The incidence of burst abdomen was high in cases of continuous stitches with prolene as compared to interrupted stitches with prolene.

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