

A study of Clinical Profile assessment in Patients Undergoing Mass Closure and Layered Closure for Laparotomies

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Abstract

Background: Linen and Cotton were already in use. Silk was the next suture of choice in non-absorbable suture range. It became very popular because of its excellent handling properties. It was extensively used in all surgical procedures including Cardiovascular Surgery. **Aim:** To assess the clinical profile of Patients Undergoing Mass Closure and Layered Closure Techniques in Laparotomies. **Materials and Methods:** History taking was followed as a routine in all cases admitted to the wards. Plain X-ray abdomen, Contrast X-rays like barium meal, Upper GI endoscopy and Abdominal ultrasound and CT scan were done in necessary cases. However in emergency cases, only the investigations necessary for supporting the diagnosis were employed. **Results:** In this study mid line incision was done in 39 patients, 65% of patients. Right Para Median incision in 18 patients 30 %, left Para median in 3 patients, 5%. In this study in mass closure group a mean time taken (min) 15.73 was required for the closure of the incision with standard deviation of 1.82. In the layered closure group mean time taken (min) was 25.03 with a standard deviation of 1.83. **Conclusion:** The age of the patients ranged from 15-65 years. Out of 60 patients 16 were in the age group of <30 years, 13 were 30-39 years, 11 were 40-49 years and 20 were >50 years.

Keywords: Clinical Profile, Mass Closure and Layered Closure Techniques, Laparotomies.

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Introduction

In surgery, the choice of suture materials has been largely empirical. One learns and craft of surgery from one's chief and the tendency is to use the suture materials used by him. Thus the use of suture material has not always been scientific.

The natural non-absorbable sutures had certain disadvantages and with the technological advancements, Polyester and Polyamide were introduced and replaced previous non-absorbable sutures in many surgical procedures. Polyester was made available as braided, coated and non-coated. Recently, polyester is also available as Monofilament in fine sizes. Later on Monofilament Polypropylene was made available after extensive research. It is a very strong material fulfilling many characteristics of an ideal suture material. It is very extensively used today along with Polyester and Polyamide almost replacing the use of Silk, Cotton and Linen.

The era of Synthetic absorbable sutures. In 1970 and 1971, the first suture material from Polyglycolic acid was introduced into clinical practice.

Subsequently, Glycolide and Lactide were combined in suitable proportions to develop a suture known as Polyglactin 910. Later on, this was coated to make it smooth. Further research resulted in development of PDS (Polydioxanone), VICRYL Rapide (Polyglactin 910) and MONOCRYL (Polyglactone 25). PDS was further modified and improved to PDS II.

Subjects and Methods

This prospective study was conducted at Department of Surgery, at Patna Medical College and Hospital, Patna. The study was approved by institutional research and ethical committee. An informed and written consent was taken from all the participating subjects before

the commencement of the study.

The study was conducted over a period from October 2019 to September 2020.

History taking was followed as a routine in all cases admitted to the wards. History was taken regarding diseases like diabetes mellitus, hypertension, jaundice, tuberculosis and other chest infections and also the time of onset of the disease. History of smoking, prolonged use of steroids was also taken into account.

Thorough clinical examination of the patients was made and recorded. Particular attention was given to note the anaemia, nutritional status, jaundice, respiratory tract infections. Apart from the examination of the system involved, routine examination of CVS, RS & CNS were carried out. As a routine the following investigations were done for all cases

Blood: Hb%, TC, DC, ESR, BT, Clotting Time, Blood grouping and Rh typing.

FBS, PPBS (for diabetics)

LFT for protein values and level of bilirubin.

Blood urea, serum creatinine

Urine: for albumin, sugar, microscopy

ECG and chest X-ray PA view

Plain X-ray abdomen in erect posture was used in acute abdominal cases suspected of hollow viscus perforation or intestinal obstruction. Contrast X-rays like barium meal were used whenever necessary.

Upper GI endoscopy was used in suitable cases for diagnosis.

Abdominal ultrasound and CT scan were done in necessary cases.

However in emergency cases, only the investigations necessary for supporting the diagnosis were employed.

Results

The age of the patients ranged from 15-65 years. Out of 60 patients 16 were in the age group of <30 years, 13 were 30-39 years, 11 were 40-49 years and 20 were >50 years. Mean age in group-1 - 39.6 years and in group-2 - 42.96 years.

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Socio-demographic variables		Group-1 Mass Closure Technique N=30	Group-2 Layered Closure Technique N=30
Age (Mean &SD)		39.6 ± 14.7	42.96 ± 15.02
Age Categories	< 30 yrs	10	6
	30 – 39	4	9
	40 – 49	7	4
	50 & Above	9	11

In this series of 60 patients 42 were male and 18 were female. i.e .70% of the study group comprised of male patients.

Sex	Group-1 Mass Closure Technique N=30	Group-2 Layered Closure Technique N=30	Percentage
Male	17	25	70%
Female	13	5	30%

In the group-1, 20 patients underwent emergency surgery, while 10 underwent elective surgery.

In the group-2, 21 patients underwent emergency surgery while 9 underwent elective surgery.

Overall 68.33% underwent emergency surgery and 31.66% underwent elective surgery.

	Group-1 Mass Closure Technique N=30	Group-2 Layered Closure Technique N=30	Percentage For 60 cases	Statistical Analysis
Emergency	20	21	68.33%	$\chi^2 = 0.07$, NS
Elective	10	9	31.66%	

In this study mid line incision was done in 39 patients, 65% of patients, Right para Median incision in 18 patients 30 %, left para median in 3 patients, 5%.

Type of incision	Group-1 mass closure technique N=30	Group-2 layered closure technique N=30	Percentage	Statistical analysis
Mid Line	20	19	65%	$\chi^2 = 0.58$, NS
Right Para Median	8	10	30%	
Left Para median	2	1	5%	

In this study in mass closure group a mean time taken (min) 15.73 was required for the closure of the incision with standard deviation of 1.82. In the layered closure group mean time taken (min) was 25.03 with a standard deviation of 1.83. The p value is < 0.000, which is statistically significant.

Time Taken in Min	Group-1 Mass Closure Technique N=30	Group-2 Layered Closure Technique N=30	Statistical Analysis
Mean	15.73	25.03	t = 19.75, P<0.000
Std Deviation	1.82	1.83	

Discussion

The existing variations in technique are evidence that no one method is so pre-eminently superior that its advantages will force every surgeon to adopt it at the expense of abandoning a more familiar method. End results must be very similar or less effective techniques would have been abandoned years ago [7]. In all cases of mass closure technique, the suture material used was Prolene No. 1 on round body needle. Suturing was started at the upper end of the incision downwards with continuous sutures. All layers of the abdominal wall except skin and subcutaneous tissue were included in single layer. Large bites were taken about 1 cm from the wound edge with a distance of 1 cm between the sutures.

In all cases of layered closure technique, in midline incisions layer by layer closure of abdominal wall with an anatomical approximation from deep to superficial layers was done. Peritoneum was closed with No. 2-0 Vicryl, continuous sutures. Linea Alba was closed separately with No. 1 Prolene with continuous sutures. In paramedian incisions the peritoneum and posterior layer of rectus sheath was closed with Vicryl No.2.0 by continuous locking sutures. The anterior layer of rectus sheath was closed with No.1 Prolene by continuous locking sutures.

End points were wound infection, burst abdomen (wound dehiscence) in the two groups and also the time taken for closure.

The age of the patients ranged from 15-65 years. Out of 60 patients 16 were in the age group of <30 years, 13 were 30-39 years, 11

were 40-49 years and 20 were >50 years. Mean age in group-1 - 39.6 years and in group-2 - 42.96 years. 42 were male and 18 were female. i.e .70% of the study group comprised of male patients. In the group-1, 20 patients underwent emergency surgery, while 10 underwent elective surgery. In the group-2, 21 patients underwent emergency surgery while 9 underwent elective surgery. Overall 68.33% underwent emergency surgery and 31.66% underwent elective surgery. Smead performed in 1900 what is believed to be the first for near closure of the abdomen, a technique often referred to in the united states as Smead Jones method [8].

Dambrin reported the decreased incidence of wound evisceration with a mass layered technique in 1937 [9].

In 1941, Jones and associates reported only 1 burst abdomen in 81 operation after steel wire closure with interrupted mass 'far and near' sutures incorporating all layers of abdominal wall apart from the skin. A study carried out at Cleveland clinic by Hoerr et al identified in 1951 that there was little to choose between the abdominal incision closed with mass closure technique and that closed in layers so far as the immediate post operative complications and the post operative pain were concerned through mass closures were simpler to execute and required only ¾ th as much time as a layered closure [10].

A single layer wire closure of abdominal incisions was used by Spencer and Sharp in a group of 293 patients. The authors concluded (in 1963) that single layer closure was a reliable and effective method for incisions in which deficient wound healing was expected.

Experimental studies by Higgins et al (1969) showed that abdominal incisions closed by mass suture technique had greater strength than those closed with conventional layer method[11].

In an experimental analysis by Dudley in 1970, it was concluded that mass closure was more resistant to disruption in the early period and did not seem to be a disadvantage when healing was nearly complete[12].

Kirk, in 1972, presented a comparative study of vertical laparotomy wound closure, using chromic catgut by conventional layer technique in 540 cases (method 1) and closure in single layer with monofilament nylon (method 2) in 327 cases. The difference in the rate of burst abdomen observed in his series after method 1 (3.88%) and method 2 (.31%) was highly significant as it was more than three times the standard error of the difference between the two rates (1 : 10)[13].

Goligher et al in 1975 conducted a controlled clinical trial of three methods of closing laparotomy wounds and concluded that "mass suture with wire was probably the most secure method of abdominal wound closure"[14].

Nayman, in 1976, conducted a prospective study consisting of 616 cases to evaluate the technique of mass single layer closure of abdominal wounds. Complete wound breakdown occurred in two patients (.3%) and partial wound breakdown occurred in two patients (.3%), a total incidence of (.6%)[15]. Irvin et al conducted a prospective clinical study on abdominal wound healing involving 200 patients. The patients were randomly allocated to a layered closure or mass closure. They concluded in 1977 that the incidence of incisional hernia and wound dehiscence were similar after the two methods of abdominal wound closure[16].

Pollock et al conducted a prospective randomized trial involving 305 patients and concluded in 1979 that laparotomy closure by a single continuous layer of sutures was satisfactory[17].

Wallace et al in 1980 concluded that mass closure of midline abdominal wounds using Snead Jones technique was superior to layered closure in prevention of wound disruption[18]. Narsimharao et al in 1983 recommended single layer abdominal wound closure technique as a routine, particularly in poor risk patients and contaminated wounds[19].

Shepherd JH et al after a prospective study involving 200 patients concluded in 1983 that continuous 1-layer abdominal closure method was simple, time saving, and successful and that it carried a low complication rate for patients at high risk for postoperative evisceration[20].

A randomized controlled clinical trial conducted by Ausobsky et al in 1985 concluded that layered closure of a paramedian incision resulted in a lower incidence of incisional hernia than mass closure of a midline incision[21].

S.B. Sharma et al conducted a comparative study of two different techniques of abdominal wound closure. One was single layer closure and the other was the conventional layered closure technique. They concluded in 1986 that single layer closure technique was superior because it was easy, saved time and was associated with lesser postoperative complications as compared to conventional layered closure technique[22].

Taube M et al after a prospective study, concluded in 1987 that the rate of wound in jaundiced patients could be reduced much using the mass closure technique[23].

Nasher studied 112 patients and reported in 1988 that single layer closure of laparotomy wounds was more effective than classical layered closure[24].

Conclusion

The age of the patients ranged from 15-65 years. Out of 60 patients 16 were in the age group of <30 years, 13 were 30-39 years, 11 were 40-49 years and 20 were >50 years. Mean age in group-1 - 39.6 years and in group-2 - 42.96 years. 42 were male and 18 were female. i.e. 70% of the study group comprised of male patients. In the group-1, 20 patients underwent emergency surgery, while 10 underwent elective surgery.

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