

Conventional Suture Material and Stapler for Wound Closure: A Comparative Study for Post Surgical Outcome

Abhishek Mishra¹, Binoy Kumar², Pankaj Kumar Mishra^{3*}

¹Ex-Senior Resident, Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India

²Associate Professor, Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India

³Assistant Professor, Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India

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Abstract

Introduction: Tissue repair following skin incisions should be with good strength with least tissue damage and less inflammation with aesthetically acceptable scar. **Aim:** The aim of this study is to compare two skin closure techniques – suture and stapler in open abdominal surgeries. **Materials & Methods:** 160 sequentially admitted patients were divided into 2 groups and one underwent stapler suturing and the other underwent conventional suturing. We measured the length of the incision sutured per minute, pain score, scar type, expenses and wound infections. **Result:** The incidence of Wound infection, pain score, time taken for suturing are lesser in stapler group compared to Conventional group. Cost wise the Conventional type of suturing is cheaper than the Stapler method. **Conclusion:** Wound closure with staples is almost three times faster than time saving.

Keywords: Wound healing, skin stapler, conventional skin suturing

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Introduction

The skin is an organ of astonishing complexity. It is a barrier between the human body and external environment and is protective and self repairing. It is strong, elastic, and water-resistant and acts as a sense organ to a number of stimuli. The skin is also the largest organ of the body and also the protective covering.

When the surgeon suture a clean incision, healing takes place with minimum loss of tissue and without significant bacterial infection with minimal scarring. With passage of time and availability of newer methods of skin closure, it has become an art with stress on better cosmetic results. Any method of skin closure should provide adequate approximation of the tissue to allow wound healing with minimal risk of infection and should produce an acceptable cosmetic result. The method should be simple, quick to use and cost effective. Since long the art of suturing is emerging continuously for the betterment of the patient in terms of cosmetic appearance – minimal scar, decreasing the risk of infection better patient compliance thus overall decreasing the morbidity. The aim of this study is to compare two skin closure techniques – suture and stapler in open abdominal surgeries.

Materials and method

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 January 2020 to January 2021.

A total of 160 cases were included in this study with prior informed consent. The study was carried out over a time period of six months. The present study was observational, and comparative.

*Correspondence

Dr. Pankaj Kumar Mishra

Assistant Professor, Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar India

E-mail: drpankajmishra@gmail.com

The criteria for inclusion were- All patients getting admitted to the Department of general surgery and requiring elective surgery. Surgeries in which Linear abdominal skin incisions are performed. Length of the skin incision > 5 cms. All patients in the age group between 15-60 yrs willing for participation in the study after obtaining informed consent.

The criteria for exclusion were- Psychiatric patients, Immuno compromised states like TB, and Hepatitis B. Patients having uncontrolled Diabetes. Patients who refused to cooperate for the entire study period. Pregnant women

After the surgery, the subcutaneous fat was sutured with 2-0 Vicryl, and

1) Suture Group (A): Skin was approximated with plain interrupted sutures using non-absorbable 2-0 silk at a distance of 1 cm from each other.

2) Stapled Group (B): The staples are used to close the wound and are placed at a distance of 5mm from one another.

Each wound was closed with plain interrupted silk sutures in group 'A' and with staples in group 'B' after achieving haemostasis. All wounds were closed by a single operator to get uniform results. Time taken for skin approximation was measured by an independent observer, wounds after cleaning with povidone-iodine lotion and sterile dry gauze dressing applied and covered with adhesive plaster. The signs of inflammation (redness, oedema), discharge (serous, seropurulent, purulent), dehiscence (partial, complete) was assessed.

Results

This comparative study was done over a period of 6 months at ANMMCH, Gaya. 160 cases were studied and were randomly divided in two groups each of 80 cases:

The results were analyzed from the observations made and are tabulated as follows-

The mean age of the subjects participating in the study was 44.56±14.9, the mean age of the participating subjects in the stapler group was 43.08±17.7 and that in the suture group was 46.04±16.0. Distribution of subjects in different age group is shown in Table 1.

Age (years)	Group A (n= 80)		Group B (n=80)		Total	
	Number	%	Number	%	Number	%
15-20	14	18	12	15	26	15
21-30	10	13	11	14	21	12
31-40	25	31	16	20	41	23
41-50	21	26	25	31	46	26
51-60	10	13	16	20	26	15
Total	80	100	80	100	160	100

The distribution of subjects amongst the gender showed, the number of males were 112 and the number of females were 68. (Fig 1)

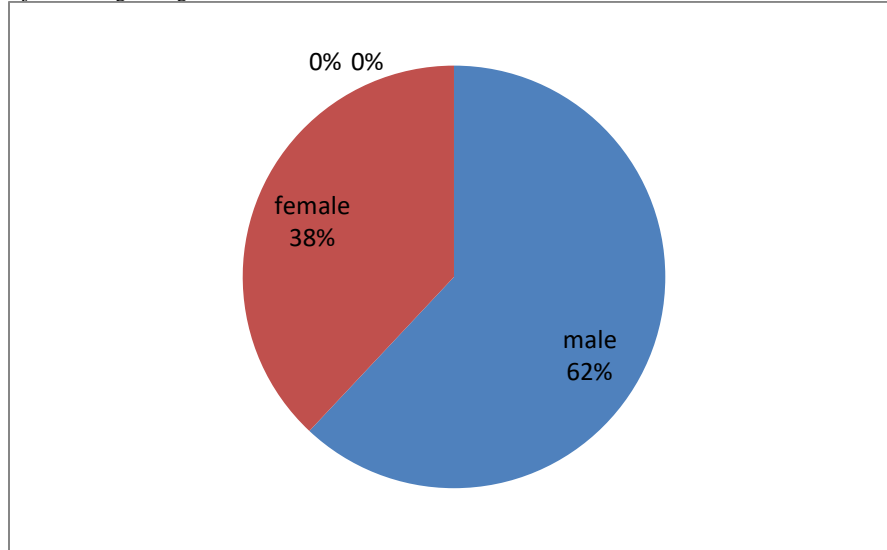


Fig 1: Distribution of subjects amongst gender

The study result showed that, the average wound length in the suture group was 7.32 cm and that in the staple group was 7.5 cm. The time taken to close the surgical wound was statistically different in the two group with the suturing using traditional suture material took significantly more time compared to the staples. The traditional suturing technique also required more number of sutures compared to the staples for the same length of wound. In contrast the cost of the stapler was double the cost of the suture material. (Table: 2)

	Sutures	Staples
Average wound length (in cm)	7.32	7.5
Time taken / wound (in mins)	9.8	7.3
Time taken / cm wound (in sec)	45	15
Number of staples / sutures /wound	9.4	8.1
Time taken / suture or staple	12.54	8.74
Average cost / wound	80	160

The nature of response after wound closure showed inconclusive result in terms of choice of material as the incidence of erythema was more in the suture while tumor was more in the stapler group. Both the materials showed almost similar response to the wound infection. (table :3)

	Sutures (%)	Staples (%)
Signs of inflammation		
Redness	20	10
Swelling	10	20
Discharge		
Serous	10	10
Seropurulent	00	00
Purulent	00	00
Dehiscence		
Partial	00	00
Complete	00	00

Discussion

Wound closure is as important as any other action performed by the surgeon. And apart from the need for producing a healthy and strong scar, it is the surgeon’s responsibility to ensure its aesthetically

pleasing physical appearance. Skin staples are an alternative to regular sutures in offering this advantage.

Sutures are used to facilitate the process of wound healing by:

- 1) Closing dead space within wound

2) Supporting wounds until their tensile strength is increased
3) Approximating skin edges.

Sutures initiate a foreign body response (i.e. tissue reaction). The initial tissue reaction is attributed to the injury inflicted by the passage of suture and needle and reaction to the suture material itself. The reaction of living tissue to injury or foreign bodies is called inflammation. The inflammatory response usually peaks between 2 to 7 days after implantation. The longer a suture mass stays in the human body, the more likely it is to produce undesirable tissue reactions. For the surgeon, a scar may be the only trademark of the surgical procedure performed, as FitzGibbon has stated, "By your scars you will be judged." (Fitz Gibbon, 1968). In our present study, Regarding post operative surgical site infection on 3rd day infection is three times more in suture than in stapler which was justified by the study of Stillman and colleagues[1]. On the 7th post operative day infection is two times more in suture than in stapler which is correlated with the study of Iavazzo and Gkegkes ID[2]. Regarding post operative pain over surgical site, wound pain is more in suture group patients, than in stapler group patients, which is correlated with the study of Ritchie AJ[4] and with the study of D. Gatt, C. R. Quick[5]. Regarding post operative wound discharge and dehiscence, wound dehiscence was not found in any case of the two group. The incidence of discharge was similar in both group, this is in contrast to the study of Stillman and colleagues[6] and with the study of Vouloumangu EK[7].

Conclusion

In this study time taken to close a wound with staples was almost three times faster than with sutures, signs of inflammation were more or less equal and wound dehiscence was zero in both the groups. Average cost per wound closure was very high with staples v/s sutures.

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