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Comparative Study Between Subcuticular Suture and Skin Staples for Skin Closure in Elective Surgery in A Tertiary Care Hospital in Bangladesh

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ABSTRACT

Background: With the development of accelerated rehabilitation and the pressure placed on surgeons to reduce length of hospital stay, the method of skin closure has become increasingly important. The ideal surgical wound would be as strong as normal tissue; the moment it is closed. It is widely accepted that both sutures and staples can achieve the basic goals of wound closure. Both methods endeavor to re-approximate the skin by creating a watertight, tension-free, non-inverted opposition of the edges that promotes rapid healing and a cosmetically acceptable scar. **Objective:** The aim of the study was to see the comparison between subcuticular suture and skin staples for skin closure in elective surgery. **Methods:** This prospective type of comparative study was carried out at the department of Surgery, Mugda Medical College and Hospital, Bangladesh, from July 2019 to June 2020. A total of 380 patients were included in this study, divided in two groups based on the technique of wound closure: (i) subcuticular suture and (ii) skin staples group. Data was collected by face-to-face interview using a prepared structured questionnaires & checklist and analyzed on SPSS 22. **Results:** Operation time in group I was less than operation time for the same aged group II at 73.55<80.26, which makes suture more efficient. Even the standard deviation error is more prominent in the staple group at 15.53 minutes compared to the suture group at 13.65 minutes. The P value is significant at 5% significant level for the Suture

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group in case of operation time. Comparisons of independent post-operative parameters between two groups of study population. It was observed that majority patients in the poor alignment variable belonged to 'No' parameter. The poor alignment of scar variable is significant at 1% significant level. The suture group had lower people belonging in the poor alignment of scar than that of the staple group at 20% $<$ 41.58. It can be observed that group II has almost double the samples that have poor alignment of scar than that of the group I. Other post-operative observations, such as the presence of hypertrophic scar and keloid are not significant. **Conclusion:** The study suggests that subcuticular suture is comparatively better than skin staples according to BNS score and prospective observation.

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INTRODUCTION

Open surgical technique in elective surgery involves some modality of skin closure. The correct choice of suture technique and suture material is vital but will never compensate for inadequate operative technique. For a good healing there must be a good blood supply and no tension on the skin closure. [1] The selection of the proper incision, suture material and closure technique are very important to assist the patient's own repair mechanism and restore normal anatomic relationship after surgery. Attention to these details also prevents such complications as dehiscence and infection, assuring a good cosmetic result. [2]

Skin closure techniques have evolved from the earliest development of suturing materials to synthetic absorbable sutures, staples, tapes, adhesive compounds. [3] Wound closure materials are divided into three major categories: Suture materials, staples, and tissue glue. Suturing has been the most widely used method for skin closure because of the high reliability of suture materials. However, in the modern era alternative techniques of staples and fibrin glue are increasingly used. [4]

Sutures can be continuous or interrupted and the material used can be natural or synthetic, absorbable or non-absorbable, single filament or braided,

depending on the length and anatomic location of the wound; Staples are an alternative option to sutures and are mainly made of stainless steel, although staples using absorbable materials are now available. The potential advantage of subcuticular suturing in skin closure is related to their better composition, low level of tissue reactivity, easy to apply, less post-operative pain and easy removal. [5, 6]

However, it is thought that the use of staples reduces the local inflammatory response, time to wound closure and residual cross marks. Stapling is the fastest method of skin closure. The wound edges must be accurately aligned before wound closure to permit simultaneous implantation of the staple points. [7]

The growing need for accelerated rehabilitation and pressure on surgeons to reduce hospital stays has made skin closure more important. Skin closure is the final step of the surgical procedure. Closing the skin to create aesthetically pleasing scars has always been a challenge. An ideal surgical wound is as strong as normal tissue. [8] The optimal method of skin closure should be simple, safe, rapid, inexpensive, painless and aesthetically appealing scar. Cosmesis is an essential and important aspect in this day of modern surgical practice. It is generally accepted that both sutures and staples can achieve the basic

purpose of wound closure. Both methods re-approach the skin by creating a watertight, tension-free, non-reversing marginal attachment, promoting rapid healing and cosmetically acceptable scarring. [9] Multiple studies have produced conflicting results regarding the efficacy, economics, rate of complications and cosmetic outcomes achieved when comparing these two closure methods for a variety of applications. [10, 11]

Surgical Site Infections (SSIs) are infections of the tissues, organs or spaces exposed by surgeons during performance of an invasive procedure. SSIs are classified into incisional and organ/space infections which are further subdivided into superficial and deep infection categories. [12] SSIs are serious operative complications that occur in approximately 2% of surgical procedures and account for some 20% of health care associated infections. [13]

The type of suture material for skin closure is also reported to influence postoperative wound complications. The surgical scar remains the only visible evidence of the surgeon's skill and not infrequently all of his efforts are judged on its final appearance. [14] The aim of the study is to compare the outcome between subcuticular suture and skin staples in elective surgery.

METHODOLOGY

RESULTS

This is a prospective type of comparative study. This study was carried out on 380 patients, irrespective of sex, aged (20-70 years), who went through elective surgery and needed skin closure due to surgery incision(s) during the study period in the Department of surgery, Mugda Medical College Hospital, Dhaka, Bangladesh, in the period from July 2019 to June 2020. The inclusion criteria were, all elective surgery patients fulfilling selection criteria. The patients were pre-briefed in detail regarding everything about the study; such as: objective, rationality, potential benefit of the study and a written consent was taken from individual. Formal ethical approval was taken from Ethical Review Committee of Mugda Medical College Hospital. After collection, the data were checked and cleaned, followed by editing, compiling, coding and categorizing according to the objectives and variable to detect errors and to maintain consistency, relevancy and quality control. The choice of treatment was made by the patient after a full discussion with the multidisciplinary team consisting of Transfusionists. The data for this study about had been accumulated from patients' medical information. Statistical evaluation of the results used to be got via the use of a window-based computer software program devised with Statistical Packages for Social Sciences (SPSS-24).

Table 1: Distribution of the study population according to age (n=50)

	Group-I (n=190)		Group-II (n=190)		P value
	n	%	n	%	
Age (in years)					^a 0.097 ^{ns}
20-36	53	28	68	36	
37-53	61	32	53	28	
54-70	76	40	69	36	
Mean ±SD	35.28±2.74		31.35±3.07		
Range (min-max)	20-70		21-70		

ns=not significant, ^ap value reached from Unpaired t-test, ^bp value reached from Chi-square test

The total study population was 380patients aged 20-70 years,53(28.0%) were 20-36 years, 61(32.0%) were 37-53 years and76(40.0%) were 54-70 years in Group-I, and 68(36.0%) were 20-36 years, 53(28.0%) were 37-53 years and 69(36.0%) were 54-70 years in Group-II. Table 1 demonstrated the

distribution of studied population according to age. The total study population was 380patients aged 20-70 years, (44.0%) males and (56%) females. Figure I demonstrated the demographic characteristics of studied population according to sex.

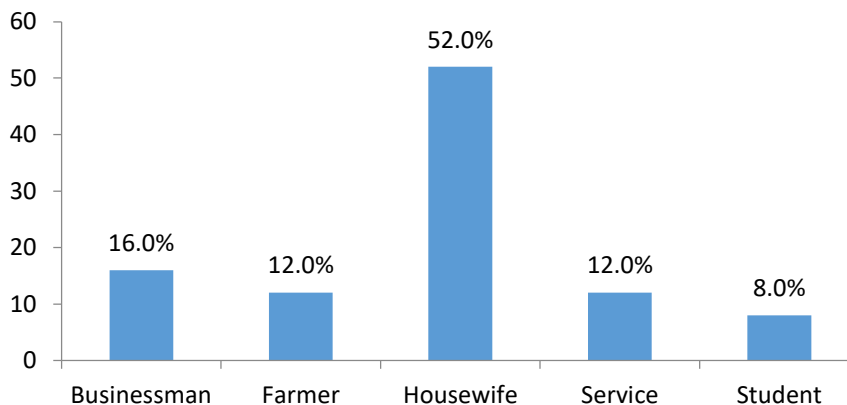


Figure II: Demographic characteristics of occupation (n=380)

The total study population was 380patients aged 20-70 years, (16.0%) were Businessman, (12.0%) were Farmer, (52.0%) were Housewife, (12.0%) were service and (8%) were students. Figure II demonstrated the demographic characteristics of studied population according to occupation. The total study population was 380patients aged 20-70

years, (52.0%) had diabetes mellitus and (48%) had not diabetes mellitus. Figure III demonstrated the Clinical history of pt. of studied population according to Diabetes Mellitus.

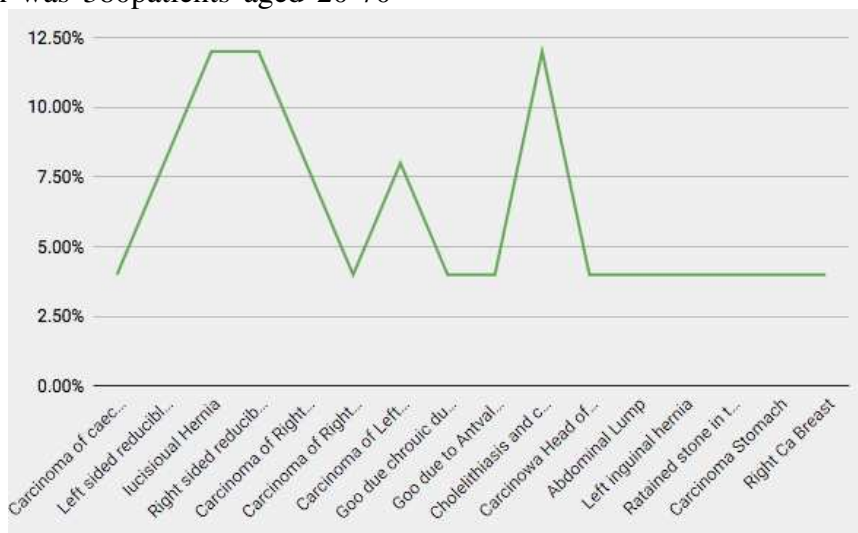


Figure IV: Pre-Operative Clinical Indication (n=380)

Figure III and Figure IV shows the clinical history of Diabetes Mellitus (DM) and the pre-operative clinical indications that led to the surgery of the patients. 52% of the clinical sign that are the most found among the examples are: Fibroadenoma of the breast,

carcinoma of the breast, Inguinal hernia, cholelithiasis and choledocholithiasis, incisional hernia and routine abdominal surgery. The All of the abovementioned indications are found in approximately 12% of the patients for each condition.

Table 2: Distribution of the study samples by differences between the mean operative variables of the study participants. (n=380)

Variable	Staples group Mean (SD)	Suture group Mean (SD)	t value	p value
Operation time (minutes)	80.26 (15.53)	73.55 (13.65)	-2.271	0.023
Skin closure time (Minutes)	11.62 (8.68)	10.71 (7.40)	-10.059	<0.001
Wound length (cm)	5.68 (3.67)	5.93 (2.63)	-0.387	0.70

Group I= Subcuticular Suture, Group II= Skin Staple

Table 2 and 3 showed the distribution of the study population by the mean operative variables and box numeric pain score (BNS) respectively among the two groups. It was observed in table 2 that operation time in group I was lesser than operation time for the same aged group II at $73.55 < 80.26$, which

makes suture more efficient. Even the standard deviation error is more prominent in the staple group at 15.53 minutes compared to the suture group at 13.65 minutes. The P value is significant at 5% significant level for the Suture group in case of operation time.

Table 3: Distribution of the study samples by Differences between the mean box numeric pain scores (BNS) of the study participants. (n=380)

Variable	Staple Mean (SD)	Suture Mean (SD)	t value	p value
Operation day	5.12 (3.14)	5.61 (3.33)	-0.711	0.479
1st day after operation	4.29 (2.61)	4.06 (2.48)	0.549	0.585
3rd day after operation	2.73 (2.17)	2.64 (2.29)	0.181	0.855
3 weeks after operation	1.89 (2.31)	2.01 (2.06)	-0.422	0.673
6 weeks after operation	0.28 (0.65)	0.25 (0.74)	-0.143	0.885

Group I= Subcuticular Suture, Group II= Skin Staple

It was observed in table 3 that operation time in group I that BNS was comparatively lower in case of group I which

indicates that the pain level was higher in case staples closure. Though not statistically significant, the assessment of the participants'

perception of the wound was done by assessing the scar pain, stiffness, thickness, itchiness, color and irregularity. The mean scores and the mean total scores for the two study groups were similar and none of these

were significant. In comparing the mean patient satisfaction scores of the study participants, the mean patient satisfaction scores for the two groups were similar.

Table 4: Comparison of independent parameters between two groups of study population (n=380)

Parameters	Group-I (n=190)		Group-II (n=190)		P value
	n	%	n	%	
Poor Alignment of Scar					
Yes	38	20.00	79	41.58	.001 ^s
No	152	80.00	121	58.42	
Hypertrophic Scar					
Present	39	21	41	22	
Absent	151	79	149	78	
Mean±SD	52±3		49.2±1.6		0.90 ^{ns}
Keloid					0.783 ^{ns}

s=significant, ns= not significant, p value reached from Unpaired t-test, **Group I= Subcuticular Suture, Group II= Skin Staple**

Table 4 shown comparisons of independent post-operative parameters between two groups of study population. It was observed that majority patients in the poor alignment variable belonged to 'No' parameter. The poor alignment of scar variable is significant at 1% significant level. The suture group had lower people belonging in the poor alignment of scar than that of the staple group at 20%<41.58. It can be observed that group II has almost double the samples that have poor alignment of scar than that of the group I.

DISCUSSION

Skin Incision methods have advanced from the soonest improvement of stitching materials to engineered absorbable stitches, staples, tapes, and glue compounds. [15] Wound Incision materials are separated into three significant classes: Suture materials, staples, and tissue (fibrin) stick. Stitching has been the most broadly utilized strategy for skin closure in light of the high unwavering quality of stitch materials. kinfolk Incision method has advanced broadly throughout the timeframe.

Different techniques for skin closure are accessible like subcuticular suture and skin staples mixes. [16] The study is led to pick up information about post-operative medical clinic stay period, wound inconvenience rate, restorative result between subcuticular suture and skin staples in skin closure patients having to go through elective surgical procedure in Bangladeshi population which may assist the specialist with taking suitable choice for wound closure.

The Surgery Patients who attended the study center during study period needing skin closure due to surgery incision(s) were considered as study population.

In a study shows that, of the 106 participants recruited, 94 completed the study, 12 were lost to follow up and the mean ages of the participants in the skin staple and suture group were 31.6 (±4.50), and 31.1 (±4.27) years, respectively. [17] Our study shows that age conveyance of the examination population, it was seen that a large portion of the (40%) examples had a place with age 54-70 years in group I and in (36%) group II. The

mean age was 35.28 ± 2.74 years in group I and 31.35 ± 3.07 years in group II. Fifty two percent of the examples were female. Most of the investigations were female housewife. The age variable was irrelevant according to the investigation led here and other examination, as Tulle. [18]

Our present study demonstrated the dissemination of the investigation population by the mean employable factors, and box numeric agony score (BNS) separately among the two gatherings. It was seen that activity time in group I was more prominent than activity time for a similar matured gathering II at $73.55 < 80.26$, which makes stitch more proficient. Indeed, even the standard deviation mistake is more conspicuous in the staple gathering at 15.53 minutes contrasted with the stitch group at 13.65 minutes.

In our study, the activity time in group I was more prominent than skin Incision time for a similar matured gathering II at $10.71 < 11.62$, which makes stitch more productive. Indeed, even the standard deviation blunder is more noticeable in the staple gathering at 8.68 minutes contrasted with the stitch group at 7.4 minutes. It was seen that activity time in group I that BNS was similarly lower if there should arise an occurrence of gathering I which demonstrates that the agony level was higher on the off chance that staples. In spite of the fact that not actually huge, the appraisal of the members' impression of the injury was finished by surveying the scar torment, solidness, thickness, irritation, shading, and abnormality. The mean scores and the mean absolute scores for the in the two examination groups were comparable and none of these were significant. In contrasting the mean patient fulfillment scores of the investigation members, the mean patient fulfillment scores for the two gatherings were comparable.

This study indicates the correlations of free post-employable boundaries between two gatherings of study populace. It was seen that

greater part patients in the helpless arrangement variable had a place with 'No' boundary. The helpless arrangement of scar variable is significant at 1% huge level. The stitch group had lower individuals having a place in the helpless arrangement of scar than that of the staple gathering at $20\% < 41.58$. it tends to be seen that group II has practically twofold the examples that have helpless arrangement of scar than that of the gathering I.

Other postoperative perceptions, for example the presence of hypertrophic scar and keloid not significant. All things being equal, the examples in the gathering II appears to have a bigger number of patients that have hypertrophic scar than group I; despite the fact that the uniqueness is truly miniscule. Then again, Keloid is nearly non-existent for both gathering which approves it not being significant to the investigation.

The conclusion of the study which indicates that the subcuticular suture is a more convenient and effective procedure than skin staples is supported by various studies. [19] A deliberate survey and meta-examination (SRMA), differentiated the adequacy of stitches with staples after surgery. [20] They revealed that the danger for the postoperative disease was more than three times more prominent in patients who get staples for skin closure as contrasted with the individuals who get sutures. [21]

LIMITATION OF THE STUDY

Due to covid-19 pandemic situation it was difficult to collect data timely. Sampling and non-sampling error is another limitation and, in some cases, missing data calculation is also limitation. The study was conducted in a selected area. So, the study population might not represent the whole community. In spite of maximum effort by the researcher due to time and resource limitation, the sample size was small; a larger sample size would have given a better result.

CONCLUSION

The study comes to conclusion where it suggested indicates that subcuticular suture is comparatively better than skin staples according to BNS score, and postoperative observations. Also, the efficiency of the surgeons in Bangladesh are better with suture procedure during operation than the skin staple procedure. Furthermore, the skin apposition which was highly significant to the study is comparatively much better in the suture procedure than the staple.

RECOMMENDATION

Staples may be simpler, stronger, and speedier to use to close large, open wounds than traditional stitches and may be used after major contaminated surgery. For example, staples are often used after abdominal surgery because they help to close the skin incision faster while also reducing scar appearance.

REFERENCES

- Varghese F, Gamalial J, Kurien JS. Skin stapler versus sutures in abdominal wound closure. *Int Surg J.* 2017 Sep;4(9):3062-6 [doi: [10.18203/2349-2902.isj20173888](https://doi.org/10.18203/2349-2902.isj20173888)].
- Sanz L, Smith S. Mechanisms of wound healing, suture material, and wound closure. In: *Strategies in gynecologic surgery*; 1986. p. 53-76 [doi: [10.1007/978-1-4612-4924-5_5](https://doi.org/10.1007/978-1-4612-4924-5_5)].
- Chitrabalam TG, Chandrasekar S, Vinodkumar J, Selva U. Glue versus Staples versus Sutures in Elective Wound Closures: A 3 years Comparative Study. *Int J Sci Stud.* 2016;4(8):53-6.
- Tajirian AL, Goldberg DJ. A review of sutures and other skin closure materials. *J Cosmet Laser Ther.* 2010 1 Dec;12(6):296-302 [doi: [10.3109/14764172.2010.538413](https://doi.org/10.3109/14764172.2010.538413)] [PubMed:21142740].
- Reece TB, Maxey TS, Kron IL. A prospectus on tissue adhesives. *Am J Surg.* 2001 Aug;182(2);Suppl:40S-4S [doi: [10.1016/s0002-9610\(01\)00742-5](https://doi.org/10.1016/s0002-9610(01)00742-5)] [PubMed:11566476].
- Ciocchi R, Randolph JJ, Montedori A, Cochetti GG, Arezzo A, Mearini EE et al. Staples versus sutures for surgical wound closure in adults. *Cochrane Database Syst Rev.* 2018 May;2018(5):CD011250.
- Lal V, Shaikh TP, Narayan P, Ansari S, Deolekar S. Study of comparison between skin sutures and skin staplers: 400 case studies. *Int J Res Med Sci.* 2015;3(1):277-81 [doi: [10.5455/2320-6012.ijrms20150150](https://doi.org/10.5455/2320-6012.ijrms20150150)].
- Chauhan A, Iqbal M, Singhal A, Niranjan S. Comparative Study of Stapled Skin Closure versus Conventional Skin Closure in Elective Surgeries. *JMSCR.* 2018;06(06):322-6.
- Newman JT, Morgan SJ, Resende GV, Williams AE, Hammerberg EM, Dayton MR. Modality of wound closure after total knee replacement: are staples as safe as sutures? A retrospective study of 181 patients. *Patient Saf Surg.* 2011 Dec;5(1):26 [doi: [10.1186/1754-9493-5-26](https://doi.org/10.1186/1754-9493-5-26)] [PubMed:22011354].
- Bailey and Love's short practical of surgery. 27th ed. CRC Press; 2018. p. 42 (Williams NS, Ronan P, O'Connell AW. Mccaskie).
- Kochar MP, Singh SP. Incised surgical wound closure with sutures and staples. *Int Surg J.* 2015;2(3):369-72.
- Li GQ, Guo FF, Ou Y, Dong GW, Zhou W. Epidemiology and outcomes of surgical site infections following orthopedic surgery. *Am J Infect Control.* 2013 Dec;41(12):1268-71 [doi: [10.1016/j.ajic.2013.03.305](https://doi.org/10.1016/j.ajic.2013.03.305)] [PubMed:23890741].
- Edmiston Jr CE, McBain AJ, Roberts C, Leaper D. Clinical and microbiological aspects of biofilm-associated surgical site infections. In: *Biofilm-based*

- healthcare-associated infections: I; 2014 9 Oct. p. 47-67.
14. Owens CD, Stoessel K. Surgical site infections: epidemiology, microbiology and prevention. *J Hosp Infect.* 2008 Nov;70(2);Suppl 2:3-10 [doi: [10.1016/S0195-6701\(08\)60017-1](https://doi.org/10.1016/S0195-6701(08)60017-1)] [PubMed:19022115].
 15. Frishman GN, Schwartz T, Hogan JW. Closure of Pfannenstiel skin incisions. Staples vs. subcuticular suture. *J Reprod Med.* 1997 Oct;42(10):627-30 [PubMed:9350017].
 16. Cromi A, Ghezzi F, Gottardi A, Cherubino M, Uccella S, Valdatta L. Cosmetic outcomes of various skin closure methods following cesarean delivery: A randomized trial. *Am J Obstet Gynecol.* 2010 Jul;203(1):36.e1-8 [doi: [10.1016/j.ajog.2010.02.001](https://doi.org/10.1016/j.ajog.2010.02.001)] [PubMed:20417924].
 17. Mackeen AD, Berghella V, Larsen ML. Techniques and materials for skin closure in caesarean section. *Cochrane Database Syst Rev.* 2012 Sep;11:D3577.
 18. Abdus-Salam RA, Bello FA, Olayemi O. A randomized study comparing skin staples with subcuticular sutures for wound closure at caesarean section in black-skinned women. *Int Sch Res Notices.* 2014;2014:807937 [doi: [10.1155/2014/807937](https://doi.org/10.1155/2014/807937)] [PubMed:27437457].
 19. Singh B, Mowbray MAS, Nunn G, Mearns S. Closure of hip wound, clips or subcuticular sutures: does it make a difference? *Eur J Orthop Surg Traumatol.* 2006 Jun;16(2):124-9 [doi: [10.1007/s00590-005-0043-2](https://doi.org/10.1007/s00590-005-0043-2)] [PubMed:28755123].
 20. Khan RJ, Fick D, Yao F, Tang K, Hurworth M, Nivbrant B, Wood D. A comparison of three methods of wound closure following arthroplasty: a prospective, randomised, controlled trial. *J Bone Joint Surg Br.* 2006 Feb;88(2):238-42 [doi: [10.1302/0301-620X.88B2.16923](https://doi.org/10.1302/0301-620X.88B2.16923)] [PubMed:16434531].
 21. Shetty AA, Kumar VS, Morgan-Hough C, Georgeu GA, James KD, Nicholl JE. Comparing wound complication rates following closure of hip wounds with metallic skin staples or subcuticularvicryl suture: a prospective randomised trial. *J Orthop Surg (Hong Kong).* 2004 Dec;12(2):191-3 [doi: [10.1177/230949900401200210](https://doi.org/10.1177/230949900401200210)] [PubMed:15621905].
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