



Clean Surgical Wound Closure with Simple Interrupted Non-Absorbable Suture versus Absorbable Continuous Subcuticular Suture

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Abstract

Introduction: As surgical techniques for wound evolve, there is a growing emphasis on effective methods that promote rapid healing and enhance cosmetic outcomes. This study compares two commonly used suturing techniques: interrupted sutures and subcuticular sutures, aiming to evaluate their efficacy in promoting wound healing and achieving optimal cosmetic results in surgical wounds.

Materials and Methods: This prospective, interventional study included 84 patients undergoing clean surgery at the Department of General Surgery, Medical College & SSG Hospital, Baroda. All patients

received 1.2 gm IV Coamoxiclav preoperatively and underwent planned surgical procedures with skin closure using either interrupted non-absorbable sutures (Polyamide 3-0 RC) or continuous absorbable sutures (Polyglactin 3-0). Postoperative care involved paracetamol for pain management and dressing changes based on wound assessment. Follow-up was scheduled for dressing changes and suture removal as needed.

Results and Outcomes: The continuous suturing method significantly reduced postoperative pain, as indicated by lower visual analogue scale (VAS) scores on the 1st ($p=0.004$) and 3rd days. At three months, patients in the continuous group reported superior

cosmetic results on the Modified Hollander Cosmesis Scale ($p < 0.001$). Both techniques exhibited similar complication rates, but continuous absorbable sutures offered better aesthetic satisfaction and functional closure.

Conclusion: Continuous absorbable sutures represent a superior alternative to interrupted non-absorbable sutures for skin closure, leading to reduced postoperative pain and improved cosmetic outcomes, without significant differences in complication rates.

Keywords: Clean Wound Closure, Subcuticular Suture, Cosmesis in Surgical Wound Healing.

Introduction

Effective skin closure is crucial for surgeons, impacting both financial and time efficiency in countless operations performed annually. The goal is to achieve rapid healing and acceptable cosmetic outcomes while minimizing complications. Nonabsorbable sutures are traditionally standard but require removal, which can be difficult and unpleasant for patients, especially children.

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Aims

This study aims to compare the outcomes of clean surgical wound closure using simple interrupted non-absorbable sutures versus absorbable subcuticular sutures. The assessment will be based on key parameters, including:

- **Cosmesis:** Evaluating the aesthetic appearance of the wound post-healing.
- **Postoperative Complications:** Monitoring any adverse events following the surgery.
- **Frequency of Dressing Changes:** Tracking how often dressings need to be changed postoperatively.
- **Operative Time:** Measuring the time taken to complete the surgical procedure for each method.

- **Postoperative Pain:** Assessing pain levels reported by patients during the recovery period.

Inclusion Criteria

Patients having clean sutured wound were included in the study.

Exclusion Criteria

- Patients not giving consent for inclusion in the study
- Patients having Vertical Laparotomy Wounds
- Patients having contaminated wounds
- Patient BMI > 35
- Known case of Diabetes Mellitus

Material and Method

- The study was conducted in the Department of General Surgery at Medical College & SSG Hospital, Baroda. It was a prospective, interventional study involving 84 patients, selected from around 1800 surgeries performed at the hospital, with 6% meeting the inclusion criteria.
- All patients received 1.2 gm IV Coamoxiclav before their skin incision. The surgical area was prepared using betadine and spirit. After completing the surgical procedure, skin closure was done using two methods: interrupted non-absorbable sutures (Polyamide 3-0 RC) for the first group and continuous absorbable sutures (Polyglactin 3-0) for the second group. Dressings were applied in a sterile manner for both groups.
- Patients were given paracetamol for pain management for five days, and diclofenac was added for severe pain. Dressings were checked regularly, and if any local signs of infection were identified, cultures were taken, and antibiotic treatments were adjusted as needed. If patients with interrupted sutures showed signs of infection, 1 or 2 sutures

might be removed based on the condition of the wound.

- Patients were discharged on the third postoperative day if there were no complications. Follow-up appointments were scheduled for dressing changes and suture removal on specific postoperative days.

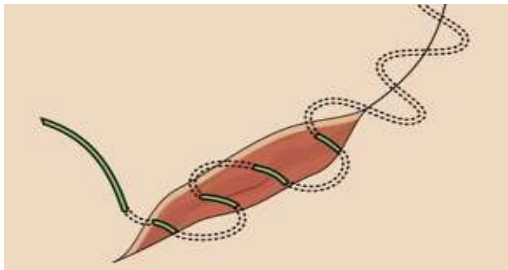


Figure 1: Subcuticular suture – continuous suture²

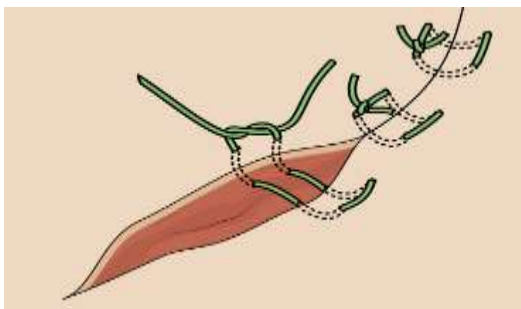


Figure 2; Vertical mattress suture³

Observation and Result

Both the techniques were compared in terms of occurrence of complication followed by surgery, VAS score and modified Hollander cosmesis score and mean time for taking suture in both the technique.

Table 1: Age wise distribution in both group

Age Group	Group		Chi-Square (p-value)
	Continuous (%)	Interrupted (%)	
< 30	08(20)	11(25)	0.52
31-40	13(32.50)	12(27.27)	
41-50	12(30)	13(29.55)	
51-60	05(12.50)	08(18.18)	
>60	02(05)	00	
Total	40	44	

Patient Distribution Across Age Groups: The majority of patients are 41-50 years and 31-40 years categories, indicating that these age ranges are commonly represented in the study. In the non-absorbable group, there is a higher number of patients in the <30 years, 31-40 years, and 41-50 years age categories, while Group B (absorbable) has significantly fewer patients overall, especially in the older age categories.

P-value of 0.54 indicates that there is no statistically significant difference between the age distributions of the two groups. This suggests that age is not a determining factor for the choice of suture type in this study

Table 2: Gender wise distribution

Gender	Group		Chi-square (p-value)
	Continuous Frequency (%)	Interrupted Frequency (%)	
Male	24(60)	19(43.18)	2.37(0.12)
Female	16(40)	25(56.82)	
Total	40	44	

In gender wise distribution of patients. There were 60 % males who underwent the surgery through continuous suture technique. In interrupted suture group there were nearly 43% males. The difference in gender distribution through chi-square test and the difference was not statistically significant.

Table 3: Body mass index among the group

BMI	Group		Mann-whitney U test (p-value)
	Continuous	Interrupted	
Median(IQR)	23.40(21.50-29.70)	27.03(24.90-30.10)	3.15(0.07)

BMI among continuous group and interrupted group were 23.40(21.50-29.70) and 27.03(24.90-30.10) respectively.

Table 4: Diagnosis among the group

Diagnosis	Group	
	Continuous Frequency (%)	Interrupted Frequency (%)
Breast Lump	08(20)	09(20.45)
Lipoma	07(17.50)	06(13.63)
Inguinal Hernia	10(25)	11(25)
Ganglion cyst	07(17.50)	06(13.63)
Others	08(20)	12(26.45)
Total	40	44

The main patients included in the study were operated for lipoma, ganglion cyst, Inguinal hernia and breast lump.

Table 5: Comorbidity among the group

Comorbidity (HT)	Group		Fisher-exact (p-value)
	Continuous Frequency (%)	Interrupted Frequency (%)	
Present	03(07.50)	05(11.36)	0.41
Absent	37(92.50)	39(88.64)	
Total	40	44	

There were 7.5% patients who had comorbidity in continuous suture group and nearly 11% of patients with comorbidity in interrupted suturing group. The difference among both the group was calculated through fisher exact test and it was not statistically significant.

Table 6: Median duration of suture

Median duration (in minutes)	Group		Mann-whitney U test (p-value)
	Continuous	Interrupted	
Median(IQR)	4(4-5)	3(2-3)	29.96(<0.001)

The median duration of suturing was high in continuous sutures as compared to interrupted sutures and difference was statistically significant (p value- <0.001).The difference was calculated through mann-whitney U test.

Table 7: Seroma formation among the group

Seroma	Group		Fisher-exact (p-value)
	Continuous Frequency (%)	Interrupted Frequency (%)	
Present	01(02.50)	01(02.27)	0.72
Absent	39(97.50)	43(97.73)	
Total	40	44	

There was only 1 case in each of seroma formation. There was no statistically significant difference observed in formation of seroma in both the suturing technique.

Table 8: Redness among the groups

Redness	Group		Fisher-exact (p-value)
	Continuous Frequency (%)	Interrupted Frequency (%)	
Present	01(02.50)	08(18.18)	0.02
Absent	39(97.50)	36(81.82)	
Total	40	44	

Redness was present in 8 patients in the continuous absorbable suture group and 1 patient in the interrupted non-absorbable suture group. This indicates a very low incidence of redness following surgical wound closure for both techniques, with the majority of patients showing no signs of redness postoperatively.

Table 9: Temperature at local wound site among the group

Local Temperature increase	Group		Fisher-exact (p-value)
	Continuous Frequency (%)	Interrupted Frequency (%)	
Present	00	01(02.27)	0.52
Absent	40(100)	43(97.73)	
Total	40	44	

Local temperature increase followed by surgery was less and its difference was calculated through fisher exact test and p-value of less than 0.05 was considered as significant.

Table 10: Cosmetic comparison among the group on post op day 7

Modified Hollander cosmesis scale	Group		Mann-whitney U test(p-value)
	Continuous	Interrupted	
Median(IQR)	2(1-2)	2(1-2)	1.05(0.30)

Modified Hollander cosmesis score at post operative day 7 in Median(IQR) score in continuous and interrupted suture was same i.e., 2(1-2) and there was no statistically significant difference in score among both the group.

Non-Absorbable Interrupted Sutures



Figure 3: Pod 7 Days



Figure 4: Pod 3 Months

Absorbable Continuous Sutures



Figure 5: Pod 7 Days



Figure 6: Pod 3 Months

Table 11: Cosmetic comparison among the group on post op 3 months

Modified Hollander cosmesis scale	Group		Mann-whitney U test (p-value)
	Continuous	Interrupted	
Median(IQR)	0(0-0)	0(0-1)	16.93(<0.001)

Modified Hollander cosmesis score at post operative 3 months in both the group. Median (IQR) score in continuous and interrupted suture were 0(0-0) and 0(0-1) respectively.

There was statistically significant difference in score among both the group after 3 months.

Table 12: Comparison of Pain among the group on post op day 1

VAS score	Group		Mann-whitney U test (p-value)
	Continuous	Interrupted	
Median(IQR)	2(2-3)	3(2-3)	2.57(0.10)

The intensity of pain experienced by the patient to be examined on 1st and 3rd day post-operatively using VAS (visual analogue scale). The VAS (Visual Analogue Scale) score measures pain intensity experienced by patients, with lower scores indicating less pain. Both techniques show low VAS scores, indicating that patients experienced minimal pain after surgery.

Table 13: VAS score at Post-operative Day 3

VAS score	Group		Mann-whitney U test
	Continuous	Interrupted	(p-value)
Median(IQR)	1(1-1)	1(1-2)	12.84(0.004)

The above table and chart show median (IQR) VAS score among both the suturing techniques on post-operative day 3. The median (IQR) VAS score in continuous suturing technique was 1(1-1) and 1(1-2) in interrupted suturing technique. Their difference between VAS score was calculated through Mann-Whitney U test and p value less than 0.05 was considered as statistically significant. There was statistically significant difference observed among the VAS score between two suturing techniques on day 3.

The findings suggest that the continuous suturing technique may provide better pain control on postoperative day 3 compared to the interrupted technique, which is an important consideration for improving patient comfort and satisfaction in surgical practices.

Their difference between VAS score was calculated through Mann-Whitney U test and p value less than 0.05 was considered as statistically.

Discussion

It shows that both the group are comparable to the each other on the basis of age group, gender, bmi, comorbidity there is no effect of it on the outcome of the study.

VAS is less in both techniques. The median duration of suturing was high in continuous sutures as compared to interrupted sutures. The difference was statistically significant (p value- <0.001). The findings suggest that the continuous suturing technique may provide better pain control on postoperative day 1 compared to the interrupted technique, which is an important

consideration for improving patient comfort and satisfaction in surgical practices.

A systemic review is available which is done by **Wenhao Luo et al** showed Subcuticular continuous sutures had comparatively higher visual analogue scale (VAS) scores among patients than interrupted sutures²

A randomized control trial was done by **Martínez-Galiano JM et al** for comparing continuous and interrupted suture technique in perineal injuries. There was less pain in the group in which continuous sutures were used³

A study done by **Kettle Christian et** had revealed that reduction in analgesia was good with continuous suturing as compared to interrupted suturing⁴

A study done by **D. N. L. Ralphs et al**, on 104 patients for closure of herniorrhaphy wounds with interrupted versus continuous sutures, three patients in whom the wound had been closed with interrupted nylon sutures developed a wound infection with discharge of serous fluid or frank pus, as did one patient in the subcuticular Dexon group. One patient in the interrupted group developed a wound haematoma⁵

The study finding is supported by a systemic review done by **Kim JK et al** which was aimed to compare the outcome in continuous suturing group and interrupted suture technique. The review did not find any significant difference in developing complication followed by surgery⁶.

Study done by **Haribabu MA et al**, Modified Hollander score for continuous suture was 0.59 whereas for interrupted group it was 0.80, which was aimed for comparison of continuous suture and vertical mattress suture⁷.

Study done by **Ademuyiwa AO et al**, with aim of Evaluation of cosmetic appearance of herniotomy wound

scars in African children it was found that median score in a group given subcuticular continuous suture was 6⁸.

Limitation

There was no long-term follow-up of patients so complications such as hypertrophic scar and keloid occurrence couldn't be evaluated. Another limitation is that this was a single center study, so multicenter study should be conducted and large-scale results should be published so that confounding factors resulting from the numbers of different procedures being performed are taken care of and results are more accurate. There was no consideration of the length of the sutured wound in this study which can affect the duration of suturing and thus in turn influence outcomes as we provide free services at SSG Hospital Vadodara, cost could not be evaluated in this study.

Conclusion

This study demonstrates that absorbable subcuticular sutures are superior to simple interrupted non-absorbable sutures for clean surgical wound closure. Patients receiving continuous sutures reported significantly lower postoperative pain and better cosmetic outcomes. Both techniques showed comparable complication rates; however, the continuous method enhances patient comfort by eliminating the need for suture removal, making it the preferred choice in surgical practice for optimal results.

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