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Original Research Article

COMPARATIVE STUDY OF CONTINOUS VERSUS INTERRUPTED FAR NEAR SUTURES (CARDIFF) IN CLOSURE OF RECTUS SHEATH IN EMERGENCY LAPAROTOMY IN PREVENTION OF BURST ABDOMEN

N. Mounika[1], Kowkuntla Ramya[1], T. Srinivas[2]

[1]Assistant Professor, Department of General Surgery, Government Medical College / Hospital, Kamareddy, Telangana, India
[2]Professor, Department of General Surgery, Government Medical College / Hospital, Kamareddy, Telangana, India

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Corresponding Author:
Dr. Kowkuntla Ramya,
Email: mailkranthi777@gmail.com

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ABSTRACT

Background: Emergency laparotomies carry a high risk of postoperative complications, particularly burst abdomen, which is a severe form of wound dehiscence. Optimal technique for closure of the rectus sheath is crucial to prevent this complication. This study compares the efficacy of continuous versus interrupted far-near (Cardiff) suturing techniques in rectus sheath closure to prevent burst abdomen following emergency laparotomy. The objective is to evaluate and compare the incidence of burst abdomen and other wound-related complications between continuous and interrupted Cardiff (far-near) suture techniques in emergency laparotomy cases. **Materials and Methods:** A prospective, randomized comparative study was conducted on patients undergoing emergency laparotomy. Participants were randomly assigned into two groups: Group A (Continuous Cardiff suture) and Group B (Interrupted Cardiff suture) for rectus sheath closure. Standardized surgical and postoperative protocols were followed. Primary outcome measured was the incidence of burst abdomen. Secondary outcomes included wound infection, suture sinus, hospital stay, and postoperative pain. Data were statistically analyzed using appropriate tools. **Result:** Preliminary findings suggest that the interrupted Cardiff suture technique demonstrated a lower incidence of burst abdomen compared to the continuous method. However, the continuous technique was associated with reduced operative time. There was no significant difference in wound infection rates between the two groups. Suture sinus formation was slightly more common in the continuous group. **Conclusion:** The interrupted Cardiff (far-near) technique appears to be more effective in preventing burst abdomen in emergency laparotomy cases, albeit at the cost of slightly increased operative time. Adoption of this technique may reduce morbidity associated with wound dehiscence in high-risk emergency surgeries.

INTRODUCTION

Laparotomy, also known as celiotomy, is a commonly performed surgical procedure involving a large incision through the abdominal wall to gain access to the peritoneal cavity. It is performed under both emergency and elective conditions for the diagnosis and treatment of various surgical conditions. The method of abdominal wall closure following laparotomy is crucial in minimizing postoperative morbidity, including wound infection, wound dehiscence, and incisional hernia.[1]

The sudden disruption of an abdominal laparotomy wound remains a significant cause of morbidity, mortality, and a psychological setback for both the patient and the surgeon. Acute wound failure, or wound dehiscence, is defined as the postoperative separation of the musculo-aponeurotic layers of the abdominal wall occurring within 30 days of surgery, typically requiring surgical intervention during the same hospital stay. The majority of wound dehiscence cases occur between the 6th and 9th postoperative days.[2]

Burst abdomen is associated with high morbidity and mortality of upto 16-18% in elderly and malnourished patients in whom burst represents a final additional insult to their stressed physiology. Thereby, an increase in cost of care both in terms of increased hospital stay, nursing, manpower, cost in managing the burst and its complications.

The closure of midline laparotomy would aim at bringing the wound edges together with least tissue damage, so that adequate healing can occur. The material used should cause minimum disturbance of tissue and allow the wound to gain sufficient strength to avoid herniation.

The integrity of sutured abdominal wound rests on a balance between the suture holding capacity of sutures.[2] Numerous clinical trials have compared different methods of abdominal closure and suture materials.6 Studies carried out in West, have found no significant difference in risk of burst between continuous and interrupted sutures.[3]

Some studies have shown an increased incidence of burst abdomen with layered closure, and some show no difference in these complications.[4] With recent advances in suture material and use of mass closure technique the rate of dehiscence has generally been less than 1%, although a recent report from Veterans Affairs has documented a rate of 3.2%.[5]

The method of abdominal closure may be less critical in elective laparotomies with well-nourished patients and no risk factors. However, in India, many patients present with factors like intraperitoneal sepsis, malnutrition, and strangulated bowel, which significantly increase the risk of wound failure. Therefore, identifying the safest closure technique is essential. Reported rates of wound disruption range from 10–30% in emergency cases and 0–5% in elective cases.

Aim of the Study

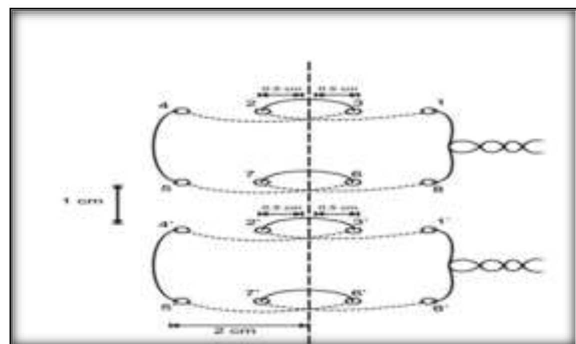
1. To perform continuous suturing and interrupted far-near suturing for closure of the rectus sheath in patients undergoing midline laparotomy.
2. To evaluate the efficacy of the far-near suturing technique in the prevention of burst abdomen.

Clinical photograph of a patient with burst and evisceration of bowel and management with retension sutures.

MATERIALS AND METHODS

This was a descriptive comparative study conducted over a period of two years, from December 2022, to November, 2024, in the Department of General Surgery, Government Medical College /Hospital, Kamareddy. The study included 50 patients undergoing emergency midline laparotomy, who were randomly assigned into two equal groups: 25 patients in Group A (continuous suturing) and 25 patients in Group B (interrupted far-near/Cardiff suturing). All patients admitted for emergency midline laparotomy during the study period were considered eligible, based on inclusion and exclusion criteria. The aim was to compare the incidence of burst abdomen and assess the efficacy of the far-near suture technique versus the traditional continuous method in rectus sheath closure.

Group 1: patients who underwent far near near far technique of abdominal wall closure. This technique includes suture approximation of rectus sheath with peritoneum, muscle in an interrupted fashion. The entry and exit of prolene was 2 cm from wound edges and 0.5 cm from edge of linea alba. Following this skin closed.



Far and Near Double Horizontal Mattress Suture Developed by Prof. L. E. Hughes at Cardiff

Group 2: patients who underwent conventional continuous closure included closure of rectus fascia with muscle and peritoneum. The sutures are placed 2cm from the edge of linea alba on both sides and 1cm was maintained between two adjacent sutures. Following this skin closed

Inclusion Criteria

- Patients aged above 18 years and below 65 years.

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- Both sexes undergoing emergency midline laparotomy.

Exclusion Criteria

1. Patients younger than 18 years or older than 65 years.
2. Patients with a history of previous laparotomy or prior abdominal surgery presenting as acute abdomen.
3. Pregnant patients.
4. Patients with poorly controlled diabetes or confirmed malignancy.
5. Patients who refused to give informed consent.

RESULTS

Table 1

Sex / Group of patients	Interrupted far near closure group No. of patients (%)	Continuous closure group No. of patients (%)	P Value
Male	16 (64)	19 (76)	0.35
Female	9 (36)	6 (24)	
Total	25	25	

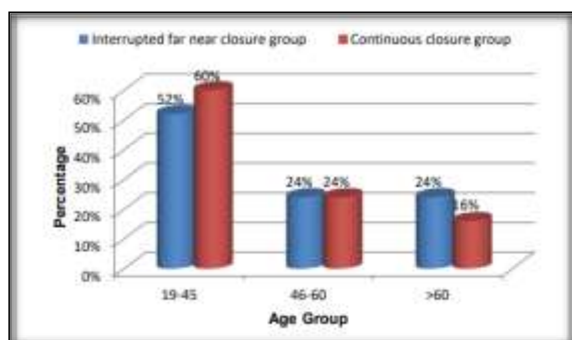

Figure 1: Patients were distributed according age Vs type intervention

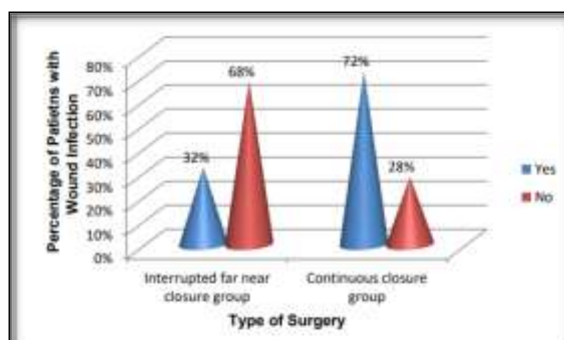

Figure 2: Patients were distributed according Wound Infection Vs Type Intervention.

Table 2: Patients were distributed according wound dehsence Vs Type Intervention

Wound Dehisence / Group of patients	Interrupted far near closure group No. of patients (%)	Continuous closure group No. of patients (%)	P Value
Yes	3 (12%)	10 (40%)	0.001
No	22 (88%)	15 (60%)	
Total	25	25	

Table 3: Patients were distributed according Abdominal Sepsis Vs Type Intervention

Wound Dehisence / Group of patients	Interrupted far near closure group No. of patients (%)	Continuous closure group No. of patients (%)	P Value
Yes	12 (48%)	16 (64%)	0.001
No	13 (52%)	9 (36%)	
Total	25	25	

Table 4: Patients were distributed according Cough Vs Type Intervention

Wound Dehisence / Group of patients	Interrupted far near closure group No. of patients (%)	Continuous closure group No. of patients (%)	P Value
Yes	10 (40%)	14 (66%)	0.32
No	15 (60%)	11 (44%)	
Total	25	25	

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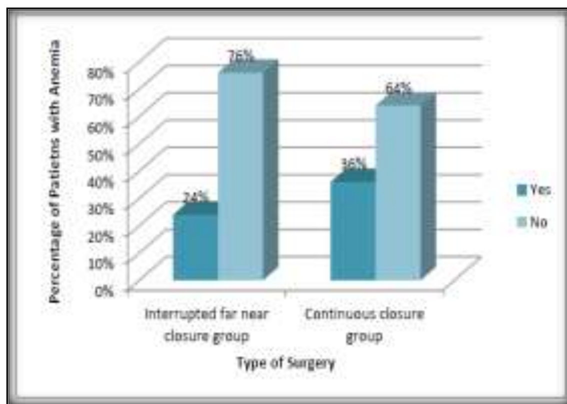

Figure 3: Patients were distributed according Anemia Vs Type Intervention

DISCUSSION

In the present study, a total of 50 patients were enrolled based on the predefined inclusion and exclusion criteria. Of these, 25 patients (50%) underwent interrupted far-near closure, while the remaining 25 patients (50%) underwent continuous closure of the rectus sheath. Among the study population, 35 patients (70%) were male and 15 patients (30%) were female, giving a male-to-female ratio of 2.3:1, indicating a male predominance.

This male predominance is consistent with findings reported by Sringeri R et al6. However, contrasting results were observed in a study conducted by Chandrashekhar et al,[7] where females comprised 76.44% and males 23.56% of the study population. Another study by El Shahid M.A.M.A. et al,[8] reported a male-to-female distribution of 56.5% and 43.5%, respectively.

Among the 25 patients who underwent interrupted far-near closure, 16 (64%) were male and 9 (36%) were female. In the continuous closure group, out of 25 patients, 19 (76%) were male and 6 (24%) were female. The difference in gender distribution between the two groups was not statistically significant (p = 0.35), indicating that gender was equally distributed across both groups.

Similar findings were reported by B. Islam et al,[9] where in the interrupted far-near group, 58.7% were male and 41.3% were female, and in the continuous closure group, 66.7% were male and 33.3% were female.

However, a contrasting trend was observed in a study by Sringeri R et al., where in the interrupted far-near group, only 19% were male and 81% were female, and in the continuous closure group, 23.14% were male and 76.85% were female.[10]

In the present study, among 50 patients, 28 (56%) were young adults (19–45 years), followed by 12 (24%) older adults (46–60 years), and 10 (20%) were geriatric patients (>60 years). Similar observations were reported in a study conducted by Sringeri R et al., where 49% were young adults, 32% were older adults, and 19% were geriatric, with a mean age of 45 years.

In present study, the mean of age of patients in study was 43.2 years. Another like Sringeri R et al. and Chandra S A et al age mean are 45 years and 36.05 respectively.

Among 25 patients interrupted far near closure surgery, 13(52%) patients were young adults (19-45 years) followed by 6 (24%) patients were old adults (46-60 years) and geriatric (>60 years). In continuous closure surgery 25 patients, 15 (60%) patients were young adults (19-45 years) followed by 6 (24%) patients were old adults (46-60 years) and 4 (16%) patients were geriatric (>60 years). Statistically (P-Value 0.13), it's indicated in both groups, age equally distributed.

In present study interrupted far near closure surgery age mean is 42.76 and continuous closure surgery patient's age mean is 43.84. Same was observed Sringeri R et al. study 44 years and 46 years in continuous closure surgery and interrupted far near closure surgery patients respectively.

Among the 25 patients who underwent interrupted far-near closure, 8 (32%) developed wound infection, whereas in the continuous closure group, 18 (72%) patients experienced wound infection. This difference was statistically significant (p = 0.01), indicating a higher risk of wound infection with continuous closure.

Similar findings have been reported in other studies. For instance, Sringeri R et al. observed wound infection rates of 12.3% in the far-near group compared to 32.4% in the continuous closure group. Likewise, Sharma S et al. reported wound infection rates of 55% in the far-near group and 60% in the continuous group. Another study by Rajasekaran et al10. found infection rates of 20% with far-near closure and 26% with continuous closure.

All three studies consistently demonstrate that the continuous closure technique carries a higher risk of wound infection compared to interrupted far-near closure.

Among the 25 patients who underwent interrupted far-near closure, 3 (12%) developed wound dehiscence, while in the continuous closure group, 10 (40%) patients experienced wound dehiscence. This difference was statistically significant (p = 0.001), indicating that continuous closure carries a higher risk of wound dehiscence.

Similar results were observed in other studies. In the study by Sringeri R et al., wound dehiscence occurred in 1% of patients with far-near closure compared to 14.9% in the continuous closure group. Sharma S et al. also reported higher rates of wound dehiscence in the continuous closure group (20%) compared to the far-near group (10%). Additionally, Rajasekaran et al. found dehiscence rates of 20% with far-near closure and 26% with continuous closure.

All three studies consistently indicate that the continuous closure technique is associated with a greater risk of wound dehiscence compared to interrupted far-near closure.

Among the 25 patients who underwent interrupted far-near closure, 24% had anemia, while in the

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continuous closure group, 36% of patients had anemia. This difference was not statistically significant (p = 0.06), indicating that both surgical procedures carry a similar risk of developing anemia. Similar observations were reported in other studies. In the study by Chandra Shekar et al., anemia was present in 30.91% of patients in the far-near group and 28.93% in the continuous closure group. Additionally, B. Islam et al. reported anemia in 49% of patients undergoing interrupted far-near closure.

Among 25 patients interrupted far near closure surgery, 12 (48%) patients had abdominal sepsis and 13 (52%) patients free from abdominal sepsis. Continuous closure surgery 25 patients, 16 (64%) patients had abdominal sepsis and 9 (36%) patients free from abdominal sepsis. Statistically (P-Value 0.39), its indicated both surgical procedure are equally risk to develop abdominal sepsis.

Among the 25 patients who underwent interrupted far-near closure, 40% experienced cough, while in the continuous closure group, 66% had cough. This difference was not statistically significant (p = 0.32), indicating that both surgical procedures carry a similar risk of developing postoperative cough.

Similar findings were reported in other studies. For example, Chandra Shekar et al. observed cough in 4.55% of patients with far-near closure and 7.44% with continuous closure. Additionally, B. Islam et al. reported that 36.1% of patients undergoing interrupted far-near closure experienced cough.

CONCLUSION

- Abdominal wound dehiscence remains a serious postoperative complication with high morbidity and mortality.
- Burst abdomen was significantly higher with continuous rectus sheath closure (40%) than with interrupted far-near (Cardiff) closure (12%).
- Therefore, interrupted far-near (Cardiff) suturing is more effective in reducing burst abdomen after emergency midline laparotomy.
- Intraperitoneal infection and patient factors such as old age, male sex, anemia, malnutrition, obesity, peritonitis, and intestinal obstruction increase the risk of dehiscence.
- Postoperative wound infection and respiratory complications (cough, chest infection) further raise the risk due to increased intra-abdominal pressure.
- Early identification of risk factors through basic investigations (Hb%, RBS, LFT, serum proteins, chest X-ray) is essential.
- Prevention focuses on optimizing nutrition, maintaining asepsis, controlling respiratory issues, and ensuring proper surgical technique.
- Partial dehiscence can be managed conservatively or with secondary suturing, whereas complete dehiscence needs tension suturing.
- Larger randomized prospective studies are required to validate these results.

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