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To Evaluate Continuous V/S Interrupted Method of Abdominal Aponeurotic Sheath Closure in Patients with Acute Perforation Peritonitis

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Abstract

Background: Laparotomy is a critical procedure in managing emergency and elective surgical cases, particularly in conditions like perforation peritonitis. While continuous and interrupted suturing techniques are both employed for abdominal wall closure, the optimal method remains a subject of debate due to varying outcomes in wound complications and patient recovery.

Objectives: This study aimed to compare the efficacy of continuous and interrupted suturing techniques in abdominal aponeurotic sheath closure concerning immediate, early, and late wound-related complications, patient satisfaction, and overall surgical outcomes in cases of acute perforation peritonitis.

Methods: A total of 50 patients with bowel perforation peritonitis undergoing exploratory laparotomy at Guru Nanak Dev Hospital, Amritsar, were randomly divided into two groups. Group A (25 patients) underwent interrupted closure, while Group B (25 patients) underwent continuous closure, using non-absorbable monofilament sutures. Data on wound infection, dehiscence, suture sinus, incisional hernia, patient satisfaction, and recovery parameters were collected and analyzed.

Results: Continuous suturing significantly reduced closure time (mean: 12.82 vs. 20.64 minutes, $p<0.001$) and required less suture material. However, higher incidences of wound dehiscence (25% vs. 15%), suture sinus (5 vs. 2 cases), and incisional hernia (15% vs. 5%) were noted in the continuous group compared to the interrupted group. Wound infection rates were slightly higher in the continuous group (30% vs. 25%), though not statistically significant. Hospital stay duration and overall satisfaction were comparable between the groups.

Conclusion: While continuous suturing offers efficiency in closure time and material use, interrupted-X suturing demonstrated a tendency to reduce critical complications such as wound dehiscence and incisional hernia. These findings suggest that interrupted-X suturing may be preferred in emergency laparotomies for maintaining long-term wound integrity, despite the practical advantages of continuous suturing. Further studies are warranted to confirm these outcomes and optimize surgical techniques.

INTRODUCTION:

Laparotomy, a frequently performed surgery for both emergency and elective cases, serves as a vital tool for diagnosing and treating various surgical and gynecological conditions, including abdominal injuries, acute stomach problems, and advanced-stage cancers. Exploratory laparotomy, often used for diagnostic purposes in patients with sudden or unexplained abdominal discomfort, may transition into therapeutic intervention or confirmatory procedures like biopsies for inoperable masses. Despite advancements in imaging and minimally invasive techniques, laparotomy remains essential for its affordability and effectiveness. In cases like perforation peritonitis, timely surgical management, including peritoneal lavage and source control, is critical, with abdominal wall closure playing a key role in outcomes. While interrupted suturing has traditionally been preferred for precise tension distribution and reduced risks of wound dehiscence, continuous suturing is gaining favor for its efficiency, reduced tissue trauma, and uniform tension distribution, potentially leading to quicker recovery in critically ill patients.[1]

Exploratory laparotomy, often via median laparotomy, is the definitive treatment for secondary peritonitis, though optimal abdominal sheath closure techniques remain debated[2]. Effective closure requires tensile strength, secure tissue approximation, and resistance to infection. Debate persists between continuous and interrupted suturing methods, with evidence suggesting interrupted sutures may reduce the odds of wound complications like burst abdomen[3]. This study aims to evaluate the efficiency of continuous versus interrupted closure methods in preventing complications such as incisional hernia, surgical site infections, and wound dehiscence, providing clarity for future surgical practice.

MATERIALS AND METHODS

AIMS AND OBJECTIVES

1. To compare the immediate, early and late wound related complications noted in patients of perforation peritonitis.
2. To compare the final outcome in continuous versus interrupted abdominal aponeurotic sheath closure in patients with acute perforation peritonitis.
3. To compare patient satisfaction (i.e. local wound pain, discomfort).
4. To study the percentage of wound dehiscence, wound infection, suture sinus

METHODS OF COLLECTION OF DATA: Methodical entry of records was maintained for patients admitted and operated on at Guru Nanak Dev Hospital, Amritsar. The study included 50 patients with bowel perforation peritonitis who underwent exploratory laparotomy. These patients were divided into two groups, with 25 patients randomly allocated to each group. Group A consisted of 25 patients who underwent continuous closure of the abdominal aponeurotic sheath, while Group B included 25 patients who underwent interrupted closure of the abdominal aponeurotic sheath.

The study was conducted after obtaining approval from the Institutional, Ethical, and Thesis Committee. Informed consent was taken from all patients for closure of the abdominal aponeurotic sheath using either the continuous or interrupted method in groups A and B, respectively, with non-absorbable monofilament polypropylene sutures.

The diagnosis of acute peritonitis due to bowel perforation was established based on the patient's history, clinical examination, X-ray findings, and other relevant or special investigations. All findings were systematically recorded as per the attached proforma.

SAMPLE SIZE: Total 50 patients divided into two groups Group A: 25 patients who will undergo interrupted closure of abdominal aponeurotic sheath Group B: 25 patients who will undergo continuous closure of abdominal aponeurotic sheath

INCLUSION CRITERIA: 1) All patients having bowel perforation peritonitis. 2) Those who provide written informed consent

EXCLUSION CRITERIA: 1) Cases of primary peritonitis. 2) Severe co-morbid conditions such as severe renal and liver disease, severe anemia, uncontrolled diabetes, malignancy, patient on anticancer chemotherapy or steroids, previous laparotomy. 3) Age 70 years. 4) HCV, HIV, HBsAg positive patients. 5) In early postpartum period

The patients will be examined for: 1) Wound infection 2) Suture sinus 3) Wound dehiscence/Burst abdomen/ Incisional hernia

INVESTIGATION REQUIRED FOR THE STUDY • Complete Haemogram (Hb%, TLC, DLC, ESR) • Urine routine, microscopy, • Blood urea and serum creatinine • Serum Bilirubin, SGOT, SGPT, Serum Proteins • HIV, HCV and HBsAg. • Plain X ray abdomen - erect posture/supine • ECG • Serum Electrolytes • Blood Sugar • Chest X-ray 10 SPECIAL INVESTIGATIONS • USG abdomen/CT Scan abdomen if any • Wound swab culture and sensitivity in case of surgical site infection if any

TABLE 1: MEAN TIME TAKEN FOR CLOSURE

GROUP	N	Mean ± SD	„t" value	P value
INT-X	25	20.64 ± 1.25	25.38	<0.001**
CC	25	12.82 ± 0.9		

****p<0.001; HIGHLY SIGNIFICANT**

TABLE 2: MEAN LENGTH OF SUTURE MATERIAL USED

GROUP	N	Mean ± SD	„t" value	P value
INT-X	25	105.64 ± 11.13	14.0089	<0.001**
CC	25	72.28 ± 4.23		

****p<0.001; HIGHLY SIGNIFICANT**

TABLE 3: MEAN SL: WL

GROUP	N	Mean ± SD	„t" value	P value
INT-X	25	6.06 ± 0.42	16.475	<0.001**
CC	25	4.34 ± 0.31		

****p<0.001; HIGHLY SIGNIFICANT**

TABLE 4: WOUND INFECTION

Wound Infection	INT-X GROUP	CC GROUP	TOTAL
ABSENT	19 (76%)	18 (72%)	37
PRESENT	6 (24%)	7 (28%)	13
TOTAL	25	25	50

$x^2 = 0.104$; df = 1; P value= 0.74*

***p>0.05; NOT SIGNIFICANT**

TABLE 5: WOUND DEHISCENCE

Wound Dehiscence	INT-X GROUP	CC GROUP	TOTAL
ABSENT	21 (84%)	19 (76%)	40
PRESENT	4 (16%)	6 (24%)	10
TOTAL	25	25	50

$x^2 = 0.5$; df = 1; P value= 0.4795*

***p>0.05; NOT SIGNIFICANT**

TABLE 6: SECONDARY SUTURING

Secondary Suturing	INT-X GROUP	CC GROUP	TOTAL
ABSENT	**23 (92%)**	**20 (80%)**	**43**
PRESENT	**2 (8%)**	**5 (20%)**	**7**
TOTAL	**25**	**25**	**50**

$x^2 = 1.495$; df = 1; P value= 0.2214*

***p>0.05; NOT SIGNIFICANT**

TABLE 7: BURST ABDOMEN

Burst Abdomen	INT-X GROUP	CC GROUP	TOTAL
ABSENT	24 (96%)	21 (84%)	45
PRESENT	1 (4%)	4 (16%)	5
TOTAL	25	25	50

$x^2 = 2$; df = 1; P value= 0.1572*

***p>0.05; NOT SIGNIFICANT**

TABLE 8: INCISIONAL HERNIA

Incisional Hernia – 4 weeks	INT-X GROUP	CC GROUP	TOTAL
ABSENT	24 (96%)	21 (84%)	45
PRESENT	1 (4%)	4 (16%)	5
TOTAL	25	25	50

$x^2 = 2$; df = 1; P value= 0.1572*

***p>0.05; NOT SIGNIFICANT**

DISCUSSION

The optimal method for abdominal wound closure aims to balance strength during healing, proper tissue alignment, reduced infection risk, minimal inflammation, and patient tolerance while remaining practical for surgeons. Despite extensive research, no universal consensus exists on the best technique, especially in emergency cases. This study compared the interrupted-X and conventional continuous closure methods in 50 patients undergoing exploratory laparotomy for perforation peritonitis at Guru Nanak Dev Hospital, Amritsar, to evaluate their outcomes.

The study population had a similar age distribution, with a mean age of 38–40 years, reflecting the prevalence of gastrointestinal emergencies in middle-aged adults. A significant male predominance (80%)

was observed, aligning with regional sex ratios and disease patterns, where gastric perforation peritonitis was the most common diagnosis. Procedural efficiency differed significantly between the two methods. Continuous suturing reduced closure time (mean: 12.82 minutes) compared to interrupted-X suturing (mean: 20.64 minutes, $p<0.001$) and required less suture material, with a mean suture length-to-wound length ratio of 4.31:1 versus 6.09:1 for interrupted-X sutures ($p<0.001$). However, there were no statistically significant differences in hospital stay duration (approximately 10 days for both groups) or wound infection rates (27.5% overall). Infection rates were slightly higher in the continuous closure group (30%) compared to the interrupted-X group (25%), though this difference was not significant.

Wound dehiscence occurred in 20% of patients overall, with a higher incidence in the continuous closure group (25%) compared to the interrupted-X method (15%) in cases of perforated peritonitis. Predisposing factors included diabetes, malnutrition, obesity, anaemia, elevated blood urea, and hypoproteinaemia. Dehiscence most commonly occurred between postoperative days 5–12, often preceded by serosanguinous discharge. Studies by Priyadarshi et al. and Mohanty et al. highlighted that the interrupted-X technique significantly reduced the risk of burst abdomen and wound dehiscence in emergency laparotomies[5,6]. Similarly, Rafiq et al.[7] found no significant differences in wound complications between closure methods but emphasized the influence of patient comorbidities. Lakhanpal et al.[8] noted that mass closure with PDS sutures reduced complication rates compared to layered closure or prolene sutures. Meta-analyses by Den Hoed, Gurusamy, and others support interrupted-X sutures for reducing wound complications, while emerging technologies like barbed sutures show potential for further improvement[9].

The incidence of suture sinus was higher in the continuous closure group, with five cases compared to two in the interrupted-X group during a six-week follow-up. Factors contributing to this included higher wound infection rates, greater suture length-to-wound length ratios, and unique patient demographics such as reduced subcutaneous fat. Patodia et al.[10] demonstrated that delayed absorbable PDS sutures had lower rates of sinus formation and wound pain compared to non-absorbable nylon, highlighting the importance of suture material in minimizing complications.

The incidence of incisional hernia was higher in the continuous closure group (15%) compared to the interrupted-X group (5%) over a three-month follow-up. Various studies, including those by Sharma et al.[11], Patel et al.[12], and Yarlagadda et al.[13], observed similar trends, with hernia rates ranging from 2% to 16%. Factors such as patient-specific characteristics, surgical technique, and post-operative management influenced hernia development more than the closure method. Interrupted sutures demonstrated lower complication rates in emergency laparotomies, particularly for acute perforation peritonitis. While some studies, like Malekpour et al.[14], concluded no significant difference between continuous and interrupted sutures, interrupted closure remains preferred due to its association with reduced wound complications.

In this research study that compared interrupted-X and continuous suturing methods for closing abdominal fascia during emergency laparotomy, a number of important results were discovered. Both approaches showed comparable results in terms of total complication rates and length of hospital stays. Nonetheless, interrupted-X suturing demonstrated a tendency to decrease certain complications like wound dehiscence and incisional hernia after 3 months, even though statistical significance was not consistently achieved. These findings indicate that despite the benefits of faster closure time and less suture material usage with continuous suturing, interrupted-X suturing may provide advantages in maintaining long-term wound integrity.

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