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Comparative Study of Primary Closure versus Delayed Primary Closure of Skin in Contaminated and Dirty Abdominal Wounds / Incision

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Abstract: ***Introduction: Surgical or operative site infection is one of the most common operative complications occurring in upto 30-40% of those patients undergoing abdominal surgery, depending on the level of contamination. Surgical site infection (SSI) and associated complications can double the length of hospital stay and thereby increase the costs of health care. Primary closure of wound is the commonly practiced method. However, some surgeons prefer delayed primary closure (DPC) technique. The focus of the study is to establish the fact that delayed primary closure leads to reduction in SSI and its related complications by a significant number than primary closure. The scope of the study extends to all abdominal procedures which are pre-operatively or intra-operatively found to be contaminated or infected. Aims and objectives: To compare the frequency of surgical site infections and other complications associated with wound infection and to determine whether Delayed primary closure (DPC) of skin in contaminated and dirty wounds/Abdominal incisions reduces the rate of surgical site infections as compared to Primary closure. Patients and methods: A Prospective Comparative study on a total of 72 patients admitted and planned for Emergency abdominal surgeries in the Department of Surgery, Mahatma Gandhi Hospital from 1st December 2018 to 30st June 2020 were included in the study with a pre-set inclusion and exclusion criteria. The patients were randomised into two groups-Group A (DPC) and Group B (PC). Allocation of patients to various groups was done on a random basis. Patients in Group A underwent delayed primary closure (DPC) where skin and subcutaneous tissue were left open with saline/providone iodine soaked gauze dressings. Closure of skin was done on post-operative day 5 or even later depending upon the incision's condition. Patients in Group B underwent Primary closure (PC) where skin and subcutaneous tissue were closed with Ethilon 2/0 mattress sutures. Results: Wound infection with Groups by Pearson's chi-squared test were 2=8.025, p=0.005<0.01 which shows highly statistical significant association between Wound infection and Groups. Stitch abscess with Groups by Pearson's chi-squared test were 2=5.675, p=0.035<0.05 which shows statistical significant association between Stitch abscess and Groups. Wound dehiscence with Groups by Pearson's chi-squared test were 2=6.222, p=0.028<0.05 which shows statistical significant association between Wound dehiscence and Groups. Conclusion: By our study, we concluded that delayed primary closure is an effective method of reducing surgical site infections along with its associated complications like stitch abscess, stitch sinus, wound dehiscence and subsequent Incisional hernias.***

Keywords: Surgical site infections (SSI), Delayed primary closure (DPC), Primary closure (PC)

1. Introduction

Abdominal wall closure within the presence of intraperitoneal infection presents a challenge to the general surgeons.

It is a fairly common presentation in our society that the patients seek medical attention after hours or days of the hollow viscus perforation, making the gut oedematous due to intraperitoneal sepsis. Following laparotomy, a tight closure of abdominal wall may lead to compartment syndrome and/or superficial and/or deep dehiscence of abdominal wound, in such patients.

Prevalence of surgical site infection (SSI) can also be explained by antimicrobial-resistant pathogens emerging these days and also by the progressive number of surgical interventions being done in elderly and/or a wide variety of chronic, debilitating, or immune compromising underlying disease (1). SSIs increase significantly the length of ICU and overall hospital stay and thereby increase the costs of health care. The exuberant costs are linked to re-explorations, intensive nursing care and hospital stay, interventions and higher overall medication costs.

Delayed primary closure (DPC) could be frequently utilized for dirty/contaminated abdominal incisions. DPC significantly lowers the rate of SSIs as well as fascial deep dehiscence reducing the mean healing time, duration of hospital admission as suggested by studies. (2)

The occurrence of SSIs, wound dehiscence, incisional hernia

are common following immediate primary closure of skin in dirty / grossly contaminated wounds. (3,4,5)

Therefore, the hypothesis of the present study was to establish that delayed primary closure leads to significant reduction in SSIs and its related consequences as compared to immediate primary closure. The scope of the study extends to all abdominal procedures which are pre-operatively or intra- operatively found to be contaminated or infected.

Patients and methods

2. Methodology

A Prospective Comparative study on a total of 72 patients admitted and planned for Emergency abdominal surgeries in the Department of Surgery, Mahatma Gandhi Hospital from 1st December 2018 to 30 st June 2020 were included in the study with a pre-set inclusion and exclusion criteria. The patients were randomised into two groups-Group A (DPC) and Group B (PC). Allocation of patients to various groups was done by computer generated random numbers. Written and Informed consent of the patients was obtained. Institutional Ethical Committee's (IEC) approval was obtained before start of the study. All procedures were done under general/spinal anaesthesia. After making an incision, turbid ascites was cultured and peritoneal lavage was performed with warm normal saline until clear effluent was restored.

Inclusion criteria

- All adults of age >18 years belonging to either sex who were diagnosed with Peritonitis, underwent abdominal surgeries and found to be contaminated intra-operatively.
- Diagnosis was made on the presence of-
  1) Signs of Peritonitis like Tachycardia with localised/generalised tenderness, rigidity and guarding of the abdomen.
  2) Raised Total leucocyte count (TLC).
  3) Free air under diaphragm on an X-ray flat plate abdomen (FPA) and Free fluid in the peritoneal cavity on an Ultrasound.

Exclusion criteria:

1) Pre-operatively diagnosed Tuberculosis
2) Diabetes
3) Malnutrition
4) (Clinical observation of muscle wasting or Albumin level <2.5gm/dl)
5) Human Immunodeficiency virus infection
6) Malignancy
7) Uraemia
8) Liver Cirrhosis
9) Patients with history of Steroid abuse

Pre-operative preparation

All patients underwent a complete part-preparation from umbilicus to the knee with removal of all hair. All patients were given a pre-operative prophylactic antibiotic coverage which were effective against gram negative, gram positive and anaerobic microorganisms. Depending upon the clinical status of the patient, duration of illness, amount of contamination and investigations, antibiotic regimens were used.

a) Inj.CEFTRIAXONE/ Inj.PIPERACILLIN-TAZOBACTAM/ Inj.MEROPENAM
b) Inj.OFLOXACIN/ Inj.AMIKACIN
c) Inj.METRONIDAZOLE

Intravenously prior to commencement of surgery and another shot after every 3 hours intra-operatively.

Operating surgeon, assistants and nurse scrubbed following Standard Hand washing protocols. All patients were scrubbed with Providone Iodine 10% W/V standardized Microbicidal Solution before painting and draping. All patients were then painted with Providone Iodine 10% liquid and draped in a sterile fashion.

Surgical Technique

The patients were randomised into two groups-Group A (DPC) and Group B (PC). Allocation of patients to various groups was done on a random basis as explained above. Informed consent of the patients were obtained.

All procedures were done under general/spinal anaesthesia. An abdominal incision was made. Turbid Ascites was cultured and peritoneal lavage was performed with warm normal saline until clear effluent was restored. A mandatory drain was placed through a separate incision in the abdominal cavity. Mass closure with a Monofilament Polydioxanone Violet loop (PDS) number 1 or Nylon loop was done and wounds were washed with Providone iodine with normal saline.

Patients in Group A underwent delayed primary closure (DPC) where skin and subcutaneous tissue were left open with saline/providone iodine soaked gauze dressings. Closure of skin was done on post-operative day 5 or even later depending upon the incision's condition.

Patients in Group B underwent Primary closure (PC) where skin and subcutaneous tissue were closed with Ethilon 2/0 mattress sutures.

Data Collection

The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups the Unpaired sample t-test was used.

To find the significance in categorical data Chi-Square test was used similarly if the expected cell frequency is less than 5 in 2×2 tables then the Fisher's Exact was used. In all the above statistical tools the probability value .05 is considered as significant.

3. Results

A total of 72 patients who underwent abdominal surgeries were enrolled in this study according to the inclusion and exclusion criteria as mentioned, they were examined

clinically, the cause of peritonitis was evaluated and randomization was done. After randomization, they were divided into two groups. Group A underwent delayed primary closure (DPC) and Group B underwent Primary closure (PC).

Table 1: Age distribution

Age in years	Frequency	Percent
18 - 20 years	4	5.6
21 - 30 years	26	36.1
31 - 40 years	10	13.9
41 - 50 years	10	13.9
51 - 60 years	11	15.3
Above 60	11	15.3
Total	72	100.0

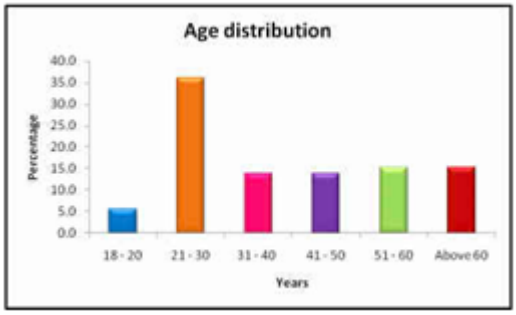

Figure 1: Age distribution

Table 2: Gender distribution

Gender	Frequency	Percent
Female	16	22.2
Male	56	77.8
Total	72	100.0

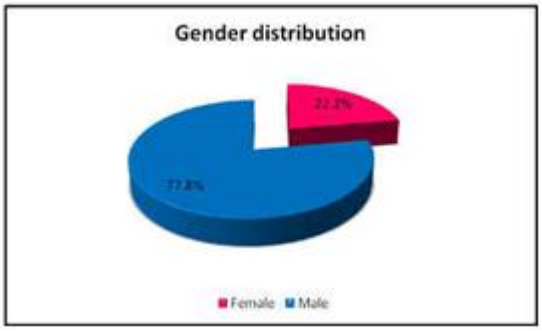

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Figure 2: Gender distribution

Table 3: Comparison between Gender with Groups

			Groups		Total	2 - value	p- value
			Group A	Group B			
Gender	Female	Count	8	8	16	0.000	1.000#
		%	22.2%	22.2%	22.2%		
	Male	Count	28	28	56		
		%	77.8%	77.8%	77.8%		
Total		Count	36	36	72		
		%	100.0%	100.0%	100.0%		
# No Statistical Significance at p > 0.05 level							

Figure 3: Comparison between Gender with Groups

Table 4: Diagnosis distribution

Diagnosis		
	Frequency	Percent
Subacute Intestinal obstruction	17	23.6
Enteric/ileal perforation	12	16.7
Peptic perforation	11	15.3
Acute Appendicitis	10	13.8
Appendicular perforation	10	13.9
Traumatic Perforation	7	9.7
Intussusception	3	4.2
Gallbladder perforation	2	2.8
Total	72	100.0

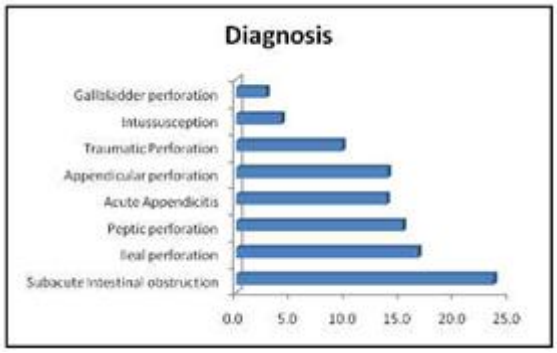

Figure 4: Diagnosis distribution

Table 5: Comparison between Wound infection with Groups

			Groups		Total	2 - value	p- value
			Group A	Group B			
Wound infection	No	Count	23	11	34	8.025	0.005**
		%	63.9%	30.6%	47.2%		
	Yes	Count	13	25	38		
		%	36.1%	69.4%	52.8%		
Total		Count	36	36	72		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

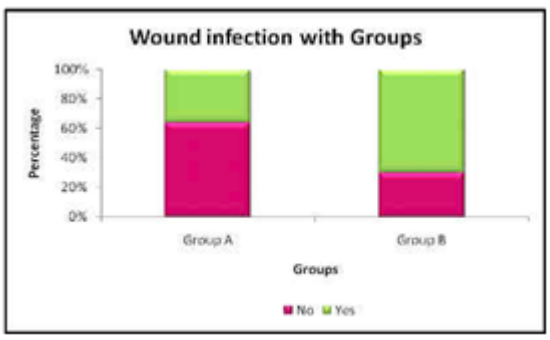

Figure 5: Comparison between Wound infection with Groups

Table 6: Comparison between Stitch abscess with Groups

			Groups		Total	2 - value	p-value
			Group A	Group B			
Stitch abscess	No	Count	33	25	58	5.675	0.035 *
		%	91.7%	69.4%	80.6%		
	Yes	Count	3	11	14		
		%	8.3%	30.6%	19.4%		
Total		Count	36	36	72		
		%	100.0%	100.0%	100.0%		
* Statistical Significance at p < 0.05 level							

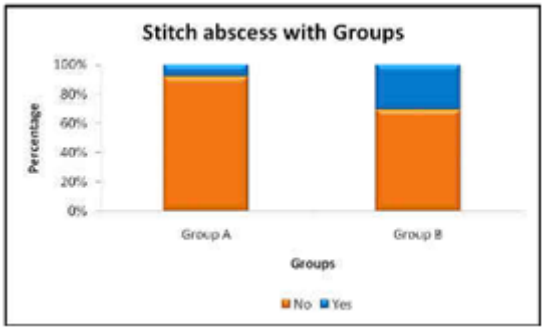

Figure 6: Comparison between Stitch abscess with Groups

Table 7: Comparison between Keloid/Hypertrophic scar with Groups

			Groups		Total	2 - value	p-value
			Group A	Group B			
Keloid/ Hypertrophic scar	No	Count	35	32	67	1.934	0.357 #
		%	97.2%	88.9%	93.1%		
	Yes	Count	1	4	5		
		%	2.8%	11.1%	6.9%		
Total		Count	36	36	72		
		%	100.0%	100.0%	100.0%		
# No Statistical Significance at p > 0.05 level							

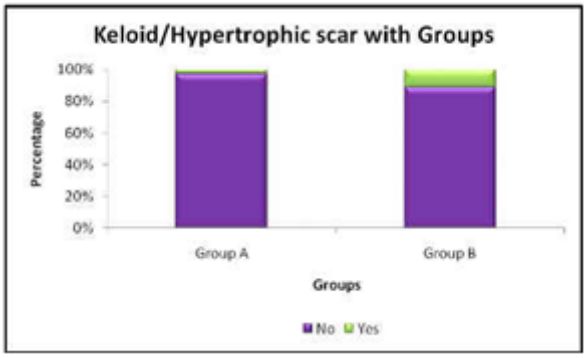

Figure 7: Comparison between Keloid/Hypertrophic scar with Groups

Table 8: Comparison between Wound dehiscence with Groups

			Groups		Total	2 - value	p-value
			Group A	Group B			
Wound dehiscence	No	Count	35	28	63	6.222	0.028 *
		%	97.2%	77.8%	87.5%		
	Yes	Count	1	8	9		
		%	2.8%	22.2%	12.5%		
Total		Count	36	36	72		
		%	100.0%	100.0%	100.0%		
* Statistical Significance at p < 0.05 level							

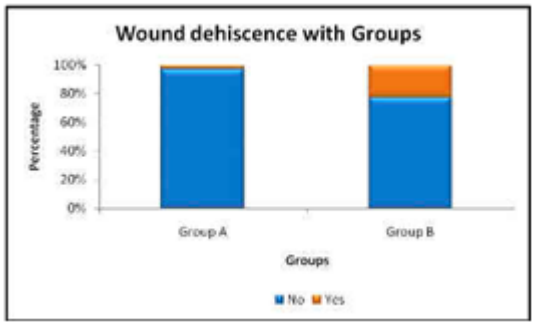

Figure 8: Comparison between Wound dehiscence with Groups

Table 9: Comparison between Incisional hernia with Groups

			Groups		Total	2 – value	p-value
			Group A	Group B			
Incisional hernia	No	Count	34	30	64	2.250	0.260 #
		%	94.4%	83.3%	88.9%		
	Yes	Count	2	6	8		
		%	5.6%	16.7%	11.1%		
Total		Count	36	36	72		
		%	100.0%	100.0%	100.0%		
# No Statistical Significance at p > 0.05 level							

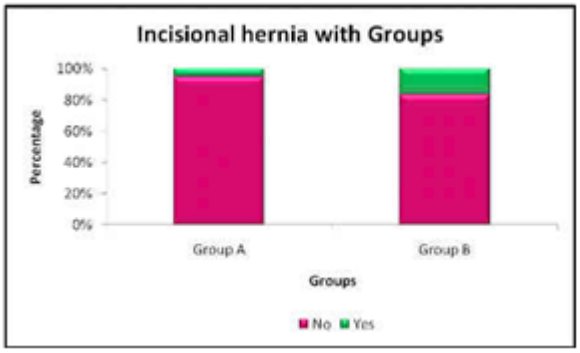

Figure 9: Comparison between Incisional hernia with Groups

Table 10: Comparison of Age with Groups by Unpaired t-test

Variable	Groups	N	Mean	S.D	t-value	p-value
Age	Group A	36	43	17	1.634	0.107 #
	Group B	36	37	16		
# No Statistical Significance at p > 0.05 level						

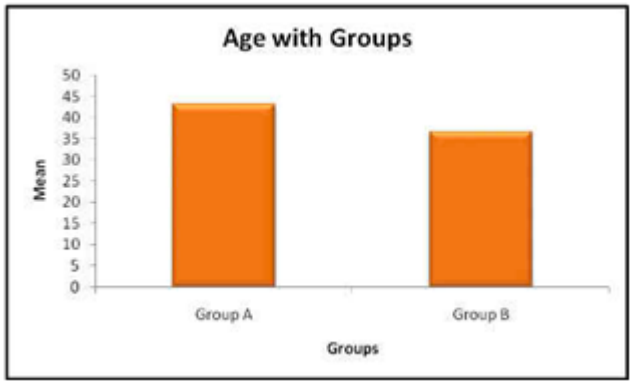

Figure 10: Comparison of Age with Groups by Unpaired t-test

Table 11: Comparison of Duration of Stay with Groups by Unpaired t-test

Variable	Groups	N	Mean	S.D	t-value	p-value
Duration of Stay	Group A	36	8	2	0.905	0.368 #
	Group B	36	9	5		
# No Statistical Significance at p > 0.05 level						

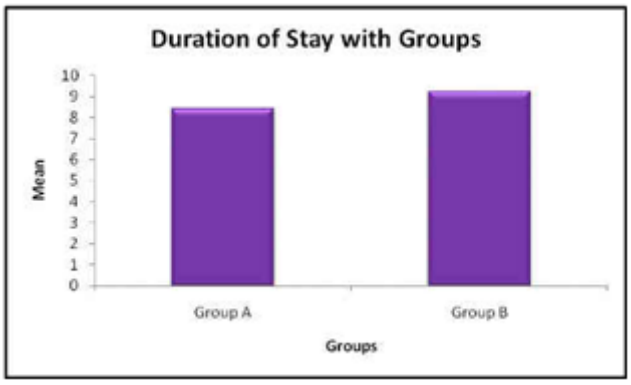

Figure 11: Comparison of Duration of Stay with Groups by Unpaired t-test

Primary Closure

Delayed Primary Closure

Wound Dehiscence

Incisional Hernia

Stitch Sinus and Stitch Abscess

4. Review of Literature

Ruey-An Chiang et al. [5] conducted a randomised controlled trial in 2011 and reported that wound infection developed after incision closure in 21.4% of the patients. The PC group had a higher incidence of wound infection (38.9% vs. 2.9%, p < 0.001) and longer length of stay (8.4 days vs. 6.3 days, p 1⁄4 0.038). They concluded that delayed primary closure is an optimal management strategy for perforated appendicitis wounds as it significantly reduces the wound infection rate and length of stay.

A comparative study was done by Imrana Aziz et al. in 2015 [6] suggested that wound healed normally with no signs of

infection in 23(46%) out of 50 patients. The overall infection rate was considerably low in delayed closure group (40%) when compared to the primary closure group which was 68% ($p<0.05$). There was significant decrease in other complication related to wound infection like stitch abscess formation and wound dehiscence in delayed closure group ($p- < 0.05$). They also concluded that the delayed primary closure technique is a better technique with low frequency of wound infection and other related complications when compared with primary wound closure technique.

A study published by Duttaroy et al. [7] suggested that SSI developed after incision closure in 23% of the patients. Infections were significantly more common in the PC group (42.5% vs. 2.7% for DPC; p=0.0000375). There also were significantly more cases of abdominal dehiscence in the PC group (DPC 1 [2.7%] vs. PC 10 [25%]; p 0.005). The mean complete incision healing (CIH) time and length of hospital stay (LOS) were longer after PC (18.52 days) than DPC (13.86 days), resulting in a significant difference in the end point of healing and LOS (p=0.0207). Short-term cosmetic results for PC incisions were significantly inferior to those for DPC (p=0.03349). They concluded that Delayed primary closure is a sound incision management technique that should be utilized for dirty abdominal incisions. It significantly lowers the rate of superficial SSI as well as fascial dehiscence and reduces the mean CIH time and hospitalization. The short-term cosmetic appearance is superior.

Another study conducted by Anis Ahmed et al. in 2013 [8] suggested that out of 86 patients, SSI was diagnosed in 19.8% patients. 30.2% in the PC group and 9.3% in the DPC group developed SSI. Hence significantly greater proportion of PC group patients developed SSI as compared to DPC patients; p=0.015. The severity if infection (superficial, deep or organ space) was not significantly different between the PC and DPC groups; p= 0.378. Significantly greater wound dehiscence was encountered in PC group; p=0.011. They concluded that frequency of SSI was significantly lower after delayed primary closure of contaminated wounds as compared to primary closure.

Another comparative study was done by Mukhtar Ahmad et al. (2014) [9] which compared a total of 158 patients, 56 (35.4%) male and 102 (64.6%) female in the study. Primary closure group had a total number of 79 patients with 26 (32.9%) male and 53 (67.1%) female. Delayed primary group had also a total number of 79 patients with 30 (38%) male and 49 (62%) female. The mean age of patients in the primary closure group was 26.67±7.32 years while in the delayed primary group was 28.15±6.88 years. In the entire series, 36 (22.8%) patients developed wound infection. There was a significant association between wound infection and type of skin closure (Delayed Primary Closure 6.3% vs. Primary Closure 39.2%, $p<0.000$). They concluded that Delayed Primary closure is the optimal management strategy in case of perforated appendicitis as it decreases the incidence of wound infection.

Another study published in the ISRA medical journey by Muhammad Taimur et al. in 2016 [10] on 258 patients showed that surgical Site Infection (SSI) was significantly high in primary closure (PC) group with 63.4% patients and more infection was seen after 3rd post-operative day with about 54.2% patients having infection but only 9.7% had SSI on 4th post-operative week. However patients with delayed primary closure (DPC) had a frequency of SSI to about 26.2% with 16.6% patients having SSI on 3rd post-operative day while 10.0% at 4th post- operative week. They also concluded that delayed primary closure in laparotomy wound is effective method of wound closure in contaminated abdominal Surgery.

Another study conducted by Jadesh Bhadragoudra et al. in 2016 [11] from the Indian subcontinent showed that wound infection developed after incision closure was 33% .The primary group had a higher rate of wound infection 54% and delayed primary closure was 12% ($P<0.001$) and longer length of hospital stay 19.4days in primary closure group and 16.5days in delayed primary closure group ($P<0.002$). They also concluded that Laparotomy wound complications are multifactorial. A strategy of DPC of dirty abdominal wound, clinically appears to decrease the rate of wound infection, when compared with PC without increasing the length hospital of stay.

TABLE 4. RESULTS OF STUDIES OF DELAYED PRIMARY CLOSURE VS. PRIMARY CLOSURE IN DIRTY ABDOMINAL INCISIONS

Authors	Type of wound	DPC n	DPC SSI (%)	PC n	PC SSI (%)	Comments on difference in infection rate
Grosfeld (1968)[16]	Wounds after perforated appendicitis	44	1(2.3%)	41	14(34.1%)	Significant
Andersen (1972)[18]	Wounds after perforated appendicitis	58	15(26%)	58	20(34%)	Not significant
Harlan Stone (1973)[19]	Contaminated incisions	135	21(15.6%)	154	75(48.7%)	Significance not mentioned
Paul (1976)[20]	Incisions after colonic surgery	52	3(5.8%)	127	15(11.8%)	Significance not mentioned
Brown (1977)[21]	Gynecological surgery with pre-existing infection	23	1(4.4%)	23	6(26.1%)	Significant
Pettigrew (1981)[27]	Gangrenous and perforated appendicitis	42	23(54%)	41	15(37%)	Not significant
Tsang et al. (1992)[28]	Perforated and gangrenous appendicitis	25	6(24%)	38	8(21%)	Not significant
Smilanich (1995)[24]	Contaminated abdominal wounds	32	1(3%)	118	32(27%)	Highly significant
Adesunkanmi (1996)[29]	Typhoid ileal perforation	24	17(70.8%)	20	14(70%)	Not significant
Lemieur (1999)[25]	Perforated appendicitis	27	0(0%)	29	7(24%)	Significance not mentioned
Cohn (2001)[13]	Dirty abdominal wounds	26	3(12%)	23	11(48%)	Significant
McGreal (2002)[35]	Acute appendicitis, all types	86	10(11.6%)	88	5(5.6%)	Not significant
Velmahos (2002)[14]	Incisions after surgery for colonic injuries	22	8(36%)	26	17(65%)	Highly significant
Lahat (2005)[33]	Wounds after ileostomy closure	20	4(20%)	20	2(10%)	Not significant
Ussiri (2004)[31]	Clean-contaminated and contaminated abdominal wounds	43	12(27.9%)	47	2(4.2%)	Significant
Vermulst (2006)[34]	Wounds after ileostomy and colostomy closure	37	2(5%)	25	9(36%)	Significant

DPC = delayed primary closure; PC = primary closure; SSI = surgical site infection.

Duttaroy DD, Jitendra J, et al. Management Strategy for Abdominal Incisions: Primary or Delayed Primary Closure? A Randomised Trial. Surg. Infect. (Larchmt).2009 Apr;10(2):129- 136 [11]

5. Discussion

The present study was conducted with the primary objective of comparing delayed primary closure (DPC) versus immediate primary closure (PC) of laparotomy and/or other abdominal incisions, to determine the surgical wound infection, dehiscence and its consequences. The study comprised of 72 patients undergoing emergency abdominal operations. Out of the 72 patients, 36 were randomised in group A (DPC) forming the study population and 36 in group B (PC) as control group, which has been the standard practice at our centre.

Age

The mean age of the patients was 40.05 +/- 16.86 years in our study. Duttaroy et al. [7], Ruey-An Chiang et al. [5] and Aziz et al. [6] reported similar mean age groups. However, Ahmed et al [8], Mukhtar et al [9], Asma et al [10] and Bhadragoudra et al. [11] quoted a younger population with 28 years as mean age.

Sex

In the present study Male {56 (77.8%)} to female {16 (22%)} ratio was 3.5 Male:1 Female. On comparing with the available literature, male preponderance was reported by Duttaroy et al. [7], Ruey-An Chiang et al. [5], Aziz et al. [6] and Bhadragoudra et al. [11]. In one study by Ahmed et al. [8] female predominance has been reported (Male 0.59:Female 1).

Cause of Peritonitis

Amongst the diverse causes of generalised peritonitis in our series, maximum cases were of Intestinal obstruction perforation (20, 27.8%), followed by enteric perforation (12, 16.7%), peptic perforation (11, 15.3%), appendicular perforation (10, 13.9%), traumatic bowel perforation (7, 9.7%) and gall bladder perforation (2, 2.8%). However a study conducted by Duttaroy et al. [7] found peptic perforation (59.7%) as the commonest cause then followed by traumatic perforations (10.4%), appendicular perforation (10.3%) and enteric perforation (7.8%). Other causes included were peritonitis of unknown cause (5.19%), appendicular abscess (3.89%) and ruptured liver abscess (2.59%). Similar studies were conducted by Ahmed et al. [8] with 50% patients of enteric perforations, Aziz et al. [6] with 32% cases of traumatic and appendicular perforations. Asma et al. [10] and Bhadragoudra et al. [11] included varied causes of peritonitis in studies they conducted. Ruey-An Chiang et al. [5] and Mukhtar et al. [9] reported 70 and 158 patients with perforated appendix only.

Type of Closure

72 patients were randomised with 36 (50%) in group A who underwent delayed primary closure versus 36 (50%) in group B who underwent immediate primary closure. Ahmed et al. [8], Mukhtar et al. [9], Aziz et al. [6] and Bhadragoudra et al. [11] also compared equal number of patients in both the groups. However, Duttaroy et al. [7] compared 37 (48.05%) in delayed primary closure group and 26 (33.76%) in primary closure group which was the case in Ruey-An Chiang et al. [5], Asma et al. [10] as they had unequal number of cases in their studies.

Wound Infection

In our study, 13 out of 36 patients (36.1%) in group A (DPC) as compared to 25 (69.4%) cases in group B (PC) developed wound infection. The difference between the two groups was statistically highly significant (chi-square test

2=8.025, p=<0.005). Study conducted by Duttaroy et al. [7] revealed that only 1 patient (2.7%) from the delayed primary closure compared to 17 cases (42.5%) amongst the primary closure group developed wound infection (p=<0.0000375, chi- square test). Ruey-An Chiang et al. [5] also published significantly higher wound infection in the primary closure group (n=4, 38.9%) compared to only 1 (2.9%) amongst the DPC group. Similar results have been published by Ahmed et al. [8] (13 (30.2%)PC) and 4 (9.3%) in the DPC group developing wound infection. Other studies viz. Mukhtar et al. [9], Aziz et al. [6], Asma et al. [10] and Bhadragoudra et al. [11] also corroborated with higher wound infection rate amongst patients with primary closure and a significantly lower incidence in the delayed primary closure group.

Stitch Abscess

Out of the 36 patients of group A from our study, 3 (8.3%) developed stitch abscess as compared to 11 cases (30.6%) in group B (p=<0.035, chi-square test). Aziz et al. [6] had no cases with stitch abscess in delayed primary closure group while 7 (28%) in primary closure group.

Wound Dehiscence

Amongst group A (DPC), 1 (2.8%) case and 8 (22.2%) in group B (PC) developed wound dehiscence (<p=0.028, chi-square test). The difference was found to be statistically highly significant (<p=0.028). Duttaroy et al. [7], Ahmed et al. [8] and Aziz et al. [6] had similar results with a compelling number of burst abdomen cases in patients undergoing immediate primary closure.

Incisional Hernia

In our study, out of the 36 patients is group A (DPC), 2 (5.6%) patients developed incisional hernia and 6 (16.7%) in group B (PC). Aziz et al. [6] reported 2 (8%) cases of incisional hernia in the delayed primary closure group and 5 cases (25%) in the primary closure group.

Keloid/Hypertrophic Scar

Our results showed 1 (2.8%) patient in group A (DPC) and 4 (11.1%) in group B (PC) developed keloid/hypertrophic scar (p=0.357, chi-square test), however the difference was not statistically significant. Aziz et al. [6] had no cases in the delayed primary closure group but 1 case (4%) in the primary closure group which were comparable to our results.

Duration of Stay

The mean duration of hospital stay was 8 (SD+/-2) days for delayed primary closure group and 9 (SD+/- 5) days for primary closure group in our study, the difference was not statistically significant. Ruey-An Chiang et al. [5] and Aziz et al. [6] published 6.3 days as the mean duration of stay for delayed primary closure and 8.4 days for primary closure group (p=0.038). However, Bhadragoudra et al. [11] reported a significantly longer mean hospital stay of 16.5 days for the delayed primary closure and 19.4 days for primary closure group (p<0.002).

6. Summary

In the present study delayed primary closure (DPC) was associated with significantly less number of wound infections, wound dehiscence and stitch abscesses as compared to immediate primary closure (PC) with difference being statistically highly significant between the two Groups (Pearson's chi-squared test were 2=8.025, p=0.005<0.01 for wound infection and (Pearson's chi-squared test were 2=5.675 , p=0.035<0.05 for wound dehiscence). Number of patients, who developed Incisional hernia was higher in immediate primary closure (PC) {group B} as compared to Group A (DPC) however the difference was statistically not significant.

Therefore, our recommendation is to practice delayed primary closure (DPC) in all the patients who present with generalised peritonitis due to intraperitoneal contamination (due to bowel perforation) and requiring midline exploratory laparotomy and other abdominal incisions.

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