

Original Article

Delayed Primary Closure of Wound Prevents Wound Infection after Surgery in Patients with Obstructive Jaundice

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Abstract:

Surgery in jaundiced patients is associated with a higher risk of postoperative complications compared with surgery in non jaundiced patients. These complications primarily consists of septic complications, hemorrhage, superficial surgical site infection (SSSI), wound dehiscence and renal disorders. Of them Surgical Site Infection (SSI) is found more commonly than other. This study was done to evaluate the effect of delayed primary closure on preventing wound infection than that of primary closure of wound after surgery in patients with obstructive jaundice. This randomized clinical trial was carried out at the Hepatobiliary and Pancreatic division of Department of Surgery in Bangabandhu Sheikh Mujib Medical University, Dhaka from July 2012 to June 2013. A total of 88 patients were included in this study who underwent surgical intervention for obstructive jaundice. These patients were divided into two groups randomly; control group (n=44) who underwent primary closure of the wound and experimental group (n=44) who underwent delayed primary closure of the wound. Patients demography, clinical presentation, co-morbidities, pre, per and post operative variables and outcome were compared between two groups. Mean age of the patients of experimental and control group was 47.91 ± 14.63 and 42.25 ± 12.13 years respectively. Duration of jaundice was significantly higher in experimental group 4.91 ± 2.87 months than in control group 3.10 ± 1.62 months. Postoperative wound infection was found significantly higher in control group (43.2%) than that of experimental group (11.4%). Postoperative hospital stay was significantly longer in control group (18.77 ± 6.24 days) than in experimental group (13.52 ± 3.61 days). Delayed primary closure of wound reduces wound infection significantly than primary closure of wound in patients with obstructive jaundice.

Key words: Obstructive jaundice, Primary closure, Delayed primary closure.

Introduction:

A wound is an interruption or break in the continuity of the external surface of the body or the surface of an internal organ, caused by surgical or other forms of injury or trauma. A Surgical Site Infection (SSI) is clinically defined as presence of pain at a surgically

created wound, which is accompanied by erythema, induration and local tenderness or presence of purulent discharge at wound site¹.

Obstructive jaundice is a common surgical problem that occurs when there is an obstruction to the passage of conjugated bilirubin from liver cells to intestine². It is the most challenging conditions managed by general surgeons and contributes significantly to high morbidity and mortality³. As patients with obstructive jaundice have high morbidity and mortality, early diagnosis of the cause of obstruction is very important especially in malignant cases, as resection is only possible at that stage².

Jaundice due to biliary obstruction may be caused by a heterogeneous group of diseases that include both benign and malignant conditions⁴. The common etiologies of obstructive jaundice vary from one centre to another and from one individual to another⁵.

The management of obstructive jaundice poses diagnostic and therapeutic challenges to general surgeons practicing in resource-limited countries^{3,6}.

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Surgery in jaundiced patients is associated with a higher risk of postoperative complications compared with surgery in non jaundiced patients. These complications primarily consists of septic complications (cholangitis, abscesses, and leakage), hemorrhage, SSI, wound dehiscence and renal disorders⁷. Our observation is that among these complications SSI is more common in such patient after surgery. As a result, patient's hospital stay become longer. This will lead to increased treatment cost and delayed return to work. If the wound infection is treated improperly it may lead to wound dehiscence and incisional hernia in future. For which another surgery may be required on those patients. Once the wound is infected, it requires exploration of wound, evacuation of pus, isolation of organism, determination of antibiotic sensitivity, application of appropriate antibiotics, daily dressing until the wound is prepared for closing. Finally secondary closure is required for wound which is time consuming.

Delayed primary wound closure was performed by Brown et al⁸ in 146 patients considered at risk of developing wound infection. These patients were matched individually for age, weight, diagnosis, and the use of prophylactic antibiotics with 146 patients undergoing immediate wound closure in one sitting. In all categories the incidence of wound infection was significantly lower in the patients with delayed closure. These findings, thus, indicate that delayed primary wound closure provides a safe, simple, effective means of reducing the incidence of wound infection. This study was designed to assess the effect of delayed primary closure in particular patients with obstructive jaundice that needs operative treatment.

Materials and Method:

This randomized controlled trial was carried out at the Hepatobiliary and Pancreatic Division of Department of Surgery, Bangabandhu Sheikh Mujib Medical University over a period of one year from July 2012 to June, 2013. Eighty eight patients with obstructive jaundice (ASA Grade I and II) who underwent surgical management for obstructive jaundice were enrolled in this study. Of them who received the procedure of delayed primary closure of wound were included in experimental and who received the procedure of primary closure wound were included in control group. Patients with postoperative complications other than superficial and deep surgical site infection were excluded from this study.

Prior approval was taken from Institutional Review Board, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka to carry out this study. Appropriate data were collected by using a preformed data

collection sheet. All other necessary data were collected from history sheet and investigation papers. Patients demography, clinical presentation, co-morbidities, pre, per and post operative variables and outcome were compared between two groups.

Statistical analyses of the results were obtained by using SPSS-15. Data were presented in the form of tables. In case of normally distributed continuous data t-test and for asymmetric distributed continuous data Mann Whitney U test was done and Chi-square test was done for comparison of categorical data. For any analytical test the level of significance was set at 0.05 and a p value < 0.05 was considered significant.

Results:

Table I: Distribution of patients by age and gender (n=88)

Demographic parameter	Group		p value
	Experimental n(%)	Control n(%)	
Age [mean(sd)]	47.91 ±14.63	42.25 ±12.13	0.031
Gender			
Male	24(54.5)	24(54.5)	1.000
Female	20(45.5)	20(45.5)	

The mean age of the experimental group was 47.91 ±14.63 and the control group was 42.25 ±12.13. The difference between these two groups was statistically significant (p<0.05) (Table I).

Table II: Distribution of patients by clinical presentations (n=88)

Findings	Group		p value
	Experimental (n=44)	Control (n=44)	
Jaundice	44 (100.0)	44 (100.0)	1.000
Abdominal pain	16 (36.4)	17 (38.6)	0.826
Fever	14 (31.8)	13 (29.5)	0.817
Duration of jaundice (year)	4.91 ±2.87	3.10 ±1.62	0.001

All patients presented with jaundice. However 36.4% patients in experimental group and 38.6% in control group had abdominal pain and 31.8% patients in experimental group and 29.5% in control group had fever. The mean length of suffering from jaundice was 4.91±2.87 months in experimental group and 3.10 ±1.62 months in control group. The difference between these two groups was statistically significant (p<0.05) (Table II).

Table III: Distribution of patients by disease profile (n=88)

Disease profile	Experimental (n=44)	Control (n=44)
Benign		
Choledocholithiasis	6 (13.6)	9 (20.5)
Postoperative biliary stricture	9 (20.5)	8 (18.2)
Choledochal cyst with cholelithiasis	1 (2.3)	0 (0.0)
Biliary ascariasis	0 (0.0)	1 (2.3)
Malignant		
Ca head of pancreas	7 (15.9)	9 (20.5)
Periampullary Ca	16 (36.4)	13 (29.5)
Cholangio Ca	5 (11.4)	3 (6.8)
Ca Gall Bladder with invasion to CBD	0 (0.0)	1 (2.3)

Ca-Carcinoma

In experimental group, 16 (36.4%) cases had periampullary carcinoma followed by 9 (20.5%) cases had postoperative biliary stricture, 7 (15.9%) cases had carcinoma head of pancreas, 6 (13.6%) cases had choledocholithiasis, 5 (11.4%) cases had cholangiocarcinoma and 1 (2.3%) case had choledochal cyst with cholelithiasis. In control group, maximum 13 (29.5%) cases had periampullary carcinoma followed by 9 (20.5%) cases had choledocholithiasis, 9 (20.5%) cases had carcinoma head of pancreas, 8 (18.2%) cases had postoperative biliary stricture, 3 (6.8%) cases had Cholangiocarcinoma, 1 (2.3%) case had Biliary ascariasis and 1 (2.3%) case had Carcinoma Gall Bladder with invasion to CBD (Table III).

Table IV: Distribution of patients by procedures performed (n=88)

Procedure	Group	
	Experimental (n=44)	Control (n=44)
With benign obstruction		
Choledocholithotomy with T tube insertion	5 (11.4)	9 (20.5)
Roux en Y hepaticoenterostomy	10 (22.7)	9 (20.5)
With malignant obstruction		
Whipple's procedure	24 (54.5)	16 (36.4)
Triple bypass	5 (11.4)	8 (18.2)
Cholecystoenterostomy	0 (0.0)	2 (4.5)

Choledocholithotomy with T tube insertion procedure was applied on 11.4% patients in experimental group and 20.5% patients in control group with benign

obstruction. Roux en Y hepaticoenterostomy was applied on 22.7% patients in experimental group and 20.5% patients in control group with benign obstruction. Whipple's procedure was applied on 54.5% patients in experimental group and 36.4% patients in control group with malignant obstruction. Triple bypass was applied on 11.4% patients in experimental group and 18.2% patients in control group with malignant obstruction. Cholecystoenterostomy was applied on 4.5% patients in control group with malignant obstruction (Table IV).

Table V: Difference of operation times and requirement of blood transfusion between two groups (n=88)

Per operative findings	Group		p value
	Experimental Mean(sd) (n=44)	Control Mean(sd) (n=44)	
Duration of surgery (hour)	3.54 ± 1.48	3.80 ± 1.29	0.359*
Blood transfusion (bag)	1.51 ± 0.50	1.71 ± 0.46	0.088*

There was no significant difference in duration of surgery and amount of blood transfusion between two groups (Table V).

Table VI: Post operative outcome between two groups (n=88)

Post operative outcome	Group		p value
	Experimental (n=44)	Control (n=44)	
Post-operative surgical site infection (SSI)	5 (11.4%)	19 (43.2%)	0.001
Post-operative hospital stay (days)	13.52 ± 3.61	18.77 ± 6.24	0.001
Wound swab culture status (growth positive in SSI)	2 (40.0)	17 (89.5)	0.015

Post operative SSI was significantly lower in experimental group (11.4%) than control group (43.2%). Mean duration of post-operative hospital stay was significantly lower in experimental group (13.52 ± 3.61 days) than control group (18.77 ± 6.24 days). Wound swab culture was growth positive in 40.0% and 89.5% patients in experimental and control group respectively among SSI. The difference between these two groups was statistically significant (p < 0.05) (Table VI).

Discussion:

This study was taken to find out the rates of complications subjected to surgical site closure. There are various studies since World War I on delayed primary closure of the wound⁹⁻¹². In the present study, the delayed primary closure procedure was applied prospectively to 44 patients of obstructive jaundice after surgery. The result was compared with same number of similar patients where primary closure was performed. Wound infection rate was found significantly lower in patients with delayed primary closure (11.4%) than that of control group (43.2%). This result is similar to other studies^{8,13,14}.

Although many studies support this study result, two meta-analyses concerning primary versus delayed primary closure showed no benefit for delayed primary closure in the treatment of burst/gangrenous appendicitis in children¹⁵. Lemieur et al¹⁶ found incidence of wound infection in perforated appendicitis 24% when the incision was closed primarily whereas Yellin et al¹⁷ found incidence of wound infection approximately 4% after DPC of all their advanced appendicitis wounds.

Duttaroy et al¹⁴ reported that wound infection developed in 42.5% of incisions for operation on obstructive jaundice patient closed primarily compared to 2.7% for delayed primary closure. Similar to the present study Brown et al⁸ revealed that the over-all infection rate was 23.3% in the control group and 2.1% in the study group after surgery in obstructive jaundice patient.

In present study, duration of post-operative hospital stay was significantly lower in experimental group (13.52 ±3.61 days) than control group (18.77±6.24 days). Similar result was reported by Duttaroy et al¹⁴; length of postoperative hospital stay was longer after primary closure (18.52 days) than delayed primary closure (13.86 days) resulting in a significant difference in the end point of healing (p<0.05).

Conclusion:

Considering all these facts it can be concluded that a strategy of delayed primary closure of potentially contaminated and immunologically compromised patients appeared to decrease the rate of wound infection when compared with primary closure without increasing the length of stay.

References :

1. Ussiri E, Mkony C, Aziz M. Sutured and open clean-contaminated and contaminated laparotomy wounds at Muhimbili National Hospital. A comparison of complications. East and Central African Journal of Surgery 2004;9(2):89-95.
2. Mohamed S, Syed AI. Management of Obstructive Jaundice. Experience in a tertiary care surgical unit. Pakistan Journal of Surgery 2007;23(1):23-5.
3. Ahmad I, Jan AU, Ahmad R. Obstructive Jaundice. J Postgrad Med Inst. 2001;15:194-98.
4. Roche SP, Kobos R. Jaundice in the adult patient. American Family Physician 2004;69:299-304.
5. Mehrdad M, Seyed AM, Mohammad TMS. Obstructive jaundice in Iran: factors affecting early outcome. Hepatobiliary Pancreat Dis Int. 2008; 7:516-19.
6. Bekele Z, Yifru A. Obstructive jaundice in adult Ethiopians in a referral hospital. Ethiop Med J. 2000; 38:267-75.
7. Uslu A, Narta A, Colak T, Aykas A, Yuzbasioglu MF, Hidir K. Predictors of mortality and morbidity in acute obstructive jaundice. Implication of preventive measures. Hepatogastroenterology 2007;54:1331-34.
8. Brown SE, Allen HH, Robins RN. The use of delayed primary wound closure in preventing wound infections. Am J Obstet Gynecol. 1977; 127(7):713-17.
9. Hepburn HH. Delayed primary suture of wounds. Br. Med J. 1999;1:181-83
10. Wilke DPD. Observations on mortality in acute appendicular disease. Br Med J. 1931;1:253-55
11. Coller Fa, Valk WL. The delayed primary closure of contaminated wounds. Ann Surg. 1940;112:256-262.
12. Wilson H. Secondary suture of war wounds. Ann Surg. 1945;121:152-56
13. Fleck TM, Koller R, Giovanoli P, Moidl R, Czerny M, Fleck M, et al. Primary or delayed closure for the treatment of poststernotomy wound infection? Annals of Plastic Surgery 2004;52(3):310-14.
14. Duttaroy DD, Jitendra J, Duttaroy B, Bansal U, Dhameja P, Patel G, et al. Management strategy for dirty abdominal incisions: primary or delayed primary closure? A randomized trial. Surg Infect. 2009;10:129-36.
15. Tsang TM, Tam PK, Saing H. Delayed primary wound closure using skin tapes for advanced appendicitis in children. A prospective controlled study. Arch Surg. 1992;127(4):451-53.
16. Lemieur TP, Rodriguez JL, Jacobs DM. Wound management in perforated appendicitis. Am Surg. 1999; 65:439-43.
17. Yellin AE, Berne TV, Heseltine PN. Prospective randomized study of two different doses of clindamycin admixed with gentamicin in the management of perforated appendicitis. Am Surg. 1993;4:248-55.
18. Stubbs RS. Wound infection after cholecystectomy: a case for routine prophylaxis. Annals of the Royal College of Surgeons of England 1983; 65:30-31.