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Interrupted versus Continuous Suturing Techniques in Hepaticojejunostomy, a Retrospective Study

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Abstract: **Background**: Making a secure connection between the hepatic duct and the jejunum is an essential surgical procedure. since its introduction, by Dahl in 1909, hepaticojejunostomy (HJ) has been established as an essential step of many surgical procedures. like bile duct injuries, pancreatic, bile duct or liver resections, liver transplantations, also it is used as a palliative bypass in non-resectable tumours. Failure of this anastomosis may lead to considerable morbidities or even mortality. **Methods**: It is a retrospective cohort study, including patients underwent HJ in Al-Demerdash Hospital, from January 2017 to June 2018. All recruited patients underwent hepatico-jejunostomy for benign or malignant disorders. The anastomoses were done using monofilament absorbable sutures, and according to the technique of suturing the study population were divided into 2 groups; Group A where interrupted sutures (IS) were done and Group B where continuous sutures (CS) were done. Primary outcome was to compare operative time and number of full-length sutures used in both groups. Secondary outcome was to compare the complication rates between the 2 groups (the leakage, cholangitis, abscess formation and the incidence of stricture within the first year postoperative). **Results:** The 43 patients were divided into Group A (n=23) and Group B (20), females ere predominate in both groups. The time required to complete the anastomosis was longer in the IS group (Group A), where it ranged from 22 to 34 minutes (mean = 27.56 minutes, SD =3.7), while it ranged in CS group from 11 to 23 minutes (mean = 18.85 minutes, SD = 3.2), t = 8.11, this difference was statistically significant with $p< 0.001$, also number of full-length sutures were more in IS group. **Conclusion**: Continuous suturing technique significantly reduce the time required to complete the anastomosis and the number of full-length sutures needed to do the job, this means a reduction of the total operative time and cost, with no detectable increase in complications.

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Key Words: Hepatico-jejunostomy, continuous suture, interrupted suture and biliary leakage.

1. Introduction:

Making a secure connection between the hepatic duct and the jejunum is an essential surgical procedure. After trials of various methods of creating a biliary-enteric anastomosis had been published, like cholecysto-colostomy, cholecysto-jejunostomy, hepatico-duodenostomy, the first to report a hepatico-jejunostomy (HJ) was Dahl in 1909[1]. Since then, most of the surgeons had shifted to HJ and other procedures became historical with very limited indications. HJ has been established as an essential step of many surgical procedures [2,3]; like bile duct injuries, pancreatic, bile duct or liver resections, liver transplantations, and it is also used as a palliative bypass in non-resectable masses. Failure of this anastomosis may lead to considerable morbidities or even mortality [4,5].

Technically HJ can be created by interrupted sutures (IS), continuous sutures (CS) or a combination of both, posterior layer continuous while anterior layer interrupted [6,7]. Like other anastomoses, HJ may be followed by a list of short and/or long-term complications, like bile leaks, biloma, biliary peritonitis, ascending cholangitis, wound infection, intrahepatic stones, intra-abdominal abscess and anastomotic stricture [8, 9]. Usually these complications are nonfatal but can make serious problems that necessitate another intervention. However, refractory cholangitis, anastomotic stricture, and intrahepatic stones can lead to liver abscesses, secondary biliary cirrhosis, or hepatic failure in the long term [10].

Usually IS used for HJ patients with small bile duct, While CS was introduced as a simple and quick technique for HJ in dilated bile duct with the privilege of fewer knots needed to be secured [11]. The choice of technique during HJ remains controversial. In this study, we compared IS and CS techniques regarding duration, outcomes and economic wise following HJ.

2. Methods:

This study is a retrospective cohort study, including patients underwent hepatico-jejunostomy in Ain-Shams University Surgery Hospital (Al-Demerdash), in the period from January 2017 to June 2018. All recruited patients were more than 18 years old, underwent hepatico-jejunostomy for benign or malignant disorders and had at least one-year post-operative follow-up. The anastomoses were done using monofilament absorbable sutures (Polydioxanone PDS 4-0 and/or 5-0, Ethicon, Inc., NJ, USA) in all patients, and according to the technique of suturing the study population were divided into 2 groups; Group A where interrupted sutures (IS) were used and Group B where continuous sutures (CS) were used.

Primary outcome was to compare the time needed and number of full-length sutures used to complete the anastomosis in both groups. Secondary outcome was to compare the complication rates of the 2 groups (the leakage, cholangitis, abscess formation, intra-abdominal abscess and the incidence of stricture within the first year postoperative).

Technique:

First creation of Roux loop of jejunum usually 50 cm from DJ, A window in the transverse mesocolon is created to the Rt of middle colic, through which loop reach hepatic duct then end to side anastomosis between hepatic duct and intestinal loop either IS or CS was done.

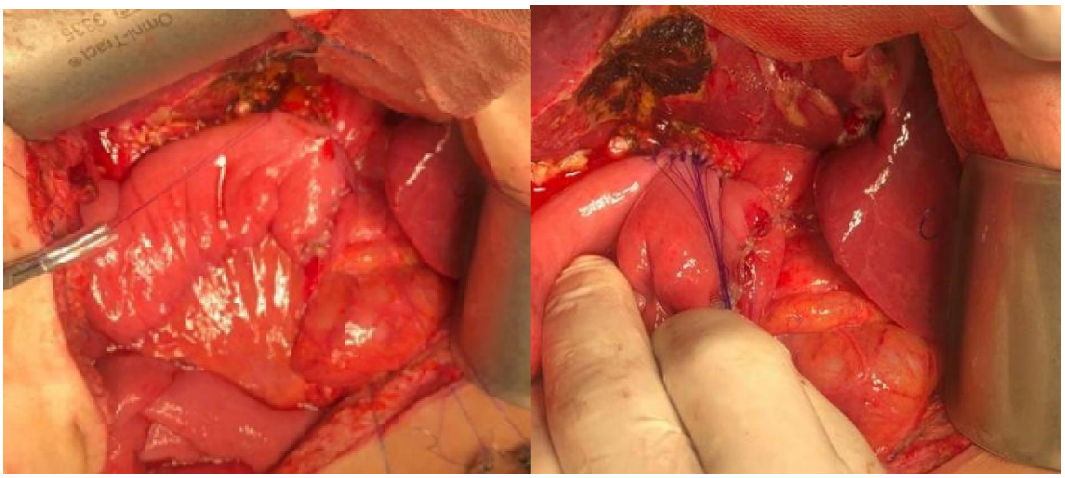

Fig 1(a, b): Interrupted Sutures Anastomosis

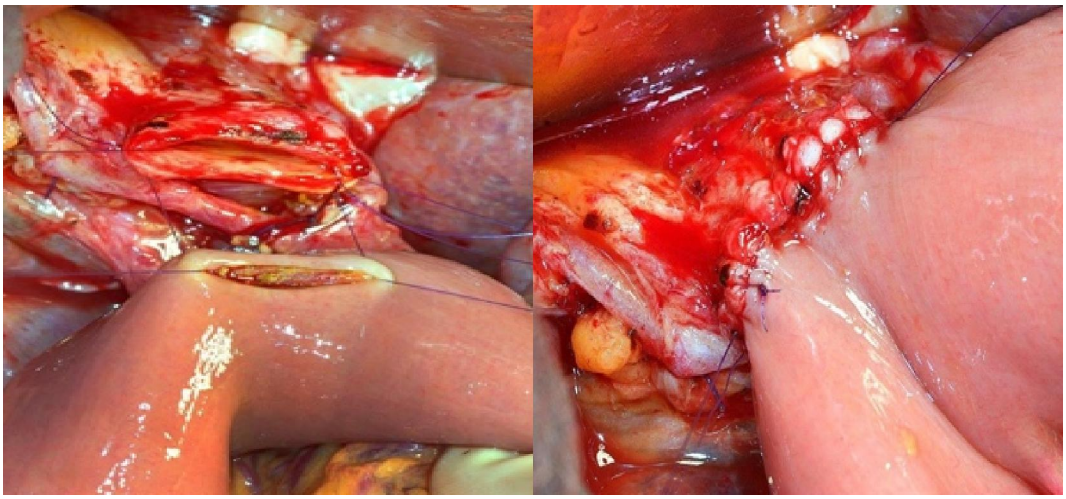

Fig 2(a, b): Continuous sutures anastomosis

The interrupted-sutures anastomosis Fig (1) was performed with 4.0 PDS sutures. Starting from 3 o'clock, the back row sutures were placed, till 9 o'clock and tied, placing the knots in the mucosa. Then, anterior sutures were placed and tying the knots on the outside of the anastomosis. The continuous anastomosis was performed with 5.0 PDS sutures Fig (2). Sutures were placed starting at the 3 o'clock

position and tied with the knot outside the lumen. Then, the sutures were run to the 9 o'clock position, another suture placed at 9 o'clock which was tied with the first suture, then the suture ruin to the 3'oclock and tied their with the knot again outside anastomosis.

Statistical analysis:

Collected data were tabulated and analyzed using the Statistics Open for ALL (SOFA) version 1.5.3. The quantitative data were presented as medians and ranges and means with standard deviation while qualitative variables were presented as number and percentages. The Chi-square test was used to compare categorical data, while the Mann-Whitney U-test or the t-test were used for comparison of quantitative data. A *p*-value less than 0.05 is considered to be significant.

3. Results

Data were collected for 46 patients fitting the inclusion criteria, but 3 were excluded due to early post-operative death. Patients (n=43) were allocated, according to the suturing technique, which was based on surgeon's preference and size of bile duct, into 2 groups, Group A (n=23) where interrupted sutures technique was used and Group B (n=20) where continuous sutures technique was used.

In both groups there were female predominance where they represented 70% (n=14) of Group A, and 65% (n=15) of Group B. In Group A the age ranged from 25 to 67 years (mean = 44, SD =13), while it ranged from 25 to 66 years (mean = 48 years, SD = 42).

The pathology of the diseases requiring the HJ procedures are blotted in Fig (3).

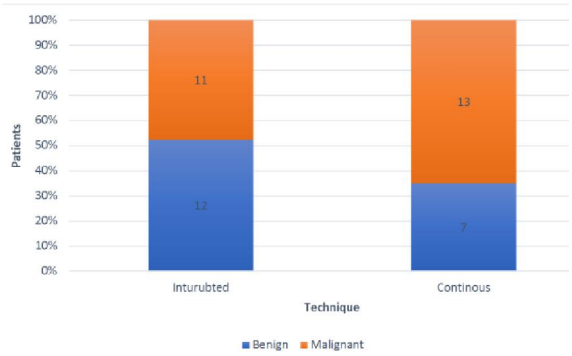

Fig (3): Pathology of the diseases.

The time required to complete the anastomosis was longer in the interrupted sutures group (Group A), where it ranged from 22 to 34 minutes (mean = 27.56 minutes, SD =3.7), while it ranged from 11 to 23 minutes (mean = 18.85 minutes, SD = 3.2), t = 8.11, this difference was statistically significant with $p< 0.001$. This is shown in Fig (4).

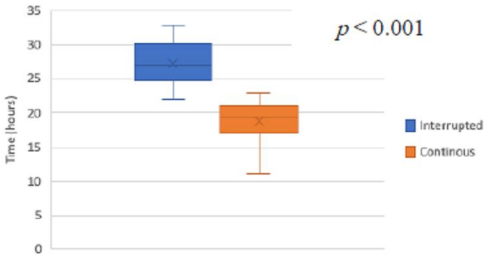

Fig (4): Showing anastomosis time.

Regarding the number of full-length sutures used for the anastomosis, it ranged from 6 to 13 sutures (median = 10) in Group A and ranged from 2 to 3 sutures (median = 2) in Group B, where U was 0, this was a statistically significant difference with $p < 0.001$. Fig (5).

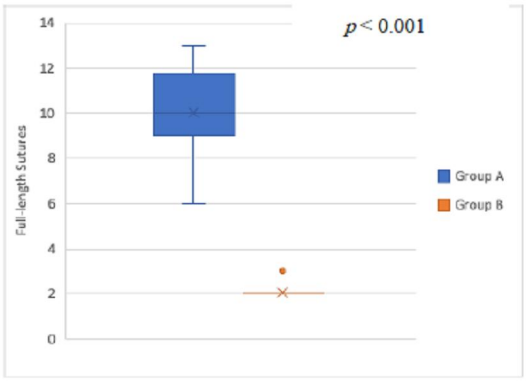

Fig (5): Full-length sutures used in each group.

The hospital stays ranged from 5 to 15 days (median = 7 days) in Group A, while they ranged from 5 to 18 days (median = 8 days), U was 185.0 and this difference wasn't statistically significant, $p = 0.26$.

Over-all HJ-related complication rates were 13% (3 patients) in Group A and 20% (4 patients) in Group B, Chi Square is 0.38, p =0.53. In Group A, (IS group), a patient suffered of intra-abdominal abscess, cholangitis and biliary stricture, a case of cholangitis and the last case suffered of intra-abdominal abscess, while in the CS group, complications were in the form of cholangitis and stricture in the first patient, another one suffered of cholangitis only, one suffered of cholangitis and liver abscess and the last patient suffered of leak complicated with intra-abdominal abscess. Complications are shown in Table (1).

Table (1): Post-operative complications

Complication	Group A (n)	Group B (n)	Chi Square	*P*	Sig.*
Liver abscess	0 % (0)	5% (1)	1.177	0.27	
Cholangitis	8.69 % (2)	15% (3)	0.414	0.52	
Intra-abdominal abscess	8.69 % (2)	5% (1)	0.225	0.63	NS
Leakage	0 % (0)	5 % (1)	1.177	0.27	
Stricture	4.34 % (1)	5 % (1)	0.01	0.91	

*Significance.

4. Discussion

Tell now, due to the lack of solid evidence, surgeon's preference is the determinant of the suturing technique during HJ, whether IS or CS. This study was designed to compare the time and full-length sutures needed to complete the anastomosis by either techniques, also to compare the complication rates.

We have noticed a slight tendency towards CS technique in patients with malignant pathology, this tendency wasn't proved statistically, similar tendency was noted in the work reported by ***Galodha and Saxena***[12], again with no statistical evidence. This may be attributed to the experience of surgeons performing surgeries for malignancy or due to the relatively wider CBD present in malignant cases.

The most common malignancy observed in this study was the carcinoma of the head of pancreases, while the study published by ***Galodha and Saxena*** the most common malignancy was peri-ampullary carcinoma.

The time required to complete an IS anastomosis was longer than that required for a CS one; where the IS needed an average of 27.56 ± 3.7 minutes in this study, it was reported to be done from 27.0 ± 6.6 minutes up to 46.8 ± 17.5 minutes in other studies. The completion of a CS anastomosis in our study required an average of 18.85 ± 3.2 minutes, this was slightly longer than times reported from similar studies which ranged from 16.2 ± 5 to 16.7 ± 4.7 minutes. ***Tatsuguchi et al, S***[13]***. Galodha and R. Saxena.***

The number of full-length sutures used in IS technique in this study was around 13 per anastomosis, reported figures were slightly higher in other studies like that of ***S. Galodha and R. Saxena,*** who reported the use of 15 full length suture per anastomosis and ***Tatsuguchi et al*** who reported the use of 17 full length suture per anastomosis. A median of 2 full length sutures were used In CS technique, this agrees with the figure reported by ***S. Galodha and R. Saxena***; whoever ***Tatsuguchi et al*** reported the use of single full-length suture for the anastomosis.

Bile leak was noticed in a single patient (5%) in the CS group the patient also developed intra-abdominal abscess formation, he was managed by percutaneous aspiration. No overt leaks were recorded in the IS group, however 2 cases (8.69%) of intra-abdominal abscess were recorded, this may suggest the occurrence of minimal contained leaks; again, they were managed by percutaneous aspiration. ***Castaldo et al***[14], reported 3 cases (7.3%) of bile leak in the CS group and 5 (8.5%) in the IS group (P value 0.83) also ***S. Galodha and R. Saxena*** reported that 4 patients (10%) in IS technique had bile leak with 3 patients (7.5%) had per-cutaneous drainage (PCD) but, only one patient underwent re-exploration, while in CS group a single patient (2.5%) had bile leak who required percutaneous aspiration.

Cholangitis was recorded in 2 patients (8.69%) in the IS group and 3 patients (15%) in the CS group, in the work reported by ***Tatsuguchi et al,*** 9 patients (11.1%) and 6 patients (7.5%) were reported to have cholangitis in the IS and the CS groups respectively.

Liver abscess was recorded only in a single patient (5%) in the CS group, non was recorded in the IS group. ***Tatsuguchi et al,*** reported a single patient (1.2%) of liver abscess in each group.

A single patient with stricture was recorded in each group along the follow-up period this represents 4.34% of the patients of the IS group and 5% of those of the CS group. Higher figures were reported by ***Tatsuguchi et al***, where 7 patients (8.6%) had strictures in the IS group and 5 patients (6.2%) in the CS group, the followed up their patients up to 47 months. Also, in the work reported by ***Castaldo et al***, 3 patients (5.1%) were reported to have stricture in the IS group and 4 patients (9.8%) in the CS group, with follow up period up-to 28 months.

Conclusion

Hepatico-jejunostomy is a common procedure in hepatobiliary surgery, this encourages surgeons to continuously search for points to-be-improved. In this study we found that using the continuous suturing technique will significantly reduce the time required to complete the anastomosis and the number of full-length sutures needed to do the job, this means a reduction of the total operative time and cost, with no detectable increase in complications.

Limitation

Limitations of this study include the relatively short follow up period, and being non-randomized; studies with longer follow up and also randomized controlled studies are required.

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References

1. Yeo CJ, Cameron JL, Sohn TA, Lillemoe KD, Pitt HA, Talamini MA, Hruban RH, Ord SE, Sauter PK, Coleman J, Zahurak ML, Grochow LB, Abrams RA (1997) Six hundred fifty consecutive pancreaticoduodenectomies in the 1990s: pathology, complications, and outcomes. Ann Surg 226:248–257 discussion 257-260.
2. Di Fronzo LA, Egrari S, O'Connell TX (1998) Safety and durability of single-layer, stentless, biliary-enteric anastomosis. Am Surg 64: 917–920.
3. Antolovic D, Koch M, Galindo L, Wolff S, Music E, Kienle P, Schemmer P, Friess H, Schmidt J, Buchler MW, Weitz J (2007) Hepaticojejunostomy–analysis of risk factors for postoperative bile leaks and surgical complications. J Gastrointest Surg 11:555–561.
4. Suzuki H, Shimura T, Mochhida Y, Wada S, Araki K, Kubo N, Watanabe A, Kuwano H (2014) To stent or not to stent Hepaticojejunostomy–analysis of risk factors for postoperative bile leaks and surgical complication. Hepatogastroenterology 61:920–926.
5. De Castro SM, Kuhlmann KF, Busch OR, van Delden OM, Laméris JS, van Gulik TM, Obertop H, Gouma DJ (2005). Incidence and management of biliary leakage after hepaticojejunostomy. J Gastrointest Surg. 2005;9(8):1163–71 discussion 1171-3.
6. Maximilian Brunner, Jessica Stockheim, Christian Krautz, Dimitrios Raptis, Stephan Kersting, Georg F. Weber and Robert Grützmann (2018): Continuous or interrupted suture technique for hepaticojejunostomy; A national survey. BMC Surgery (2018) 18:84. https://doi.org/10.1186/s12893-018-0418-z.
7. Hirano S, Tanaka E, Tsuchikawa T, Matsumoto J, Shichinohe T, Kato K (2012) Techniques of biliary reconstruction following bile duct resection (with video). J Hepatobiliary Pancreat Sci 19:203– 209.
8. Zafar SN, Khan MR, Raza R, Khan MN, Kasi M, Rafiq A, Jamy OH (2011) Early complications after biliary enteric anastomosis for benign diseases: a retrospective analysis. BMC Surg 11:19. https:// doi.org/10.1186/1471-2482-11-19.
9. Kadaba RS, Bowers KA, Khorsandi S, Hutchins RR, Abraham AT, Sarker SJ, Bhattacharya S, Kocher HM (2017) Complications of biliary-enteric anastomoses. Ann R Coll Surg Engl 99:210–215.
10. Zafar SN, Khan MR, Raza R, Khan MN, Kasi M, Rafiq A, Jamy OH (2011) Early complications after biliary enteric anastomosis for benign diseases: a retrospective analysis. BMC Surg 11:19. https:// doi.org/10.1186/1471-2482-11-19.
11. Ammori BJ, Joseph S, Attia M, Lodge JP (2000) Biliary strictures complicating pacreaticoduodenectomy. Int J Pancreatol 28:15–21 discussion 21-12.
12. S. Galodha and R. Saxena (2016): Economic and safety implications of continuous versus interrupted suturing method of hepaticojejunostomy: a prospective study; HPB 2016, 18 (S1), e385ee601.
13. Takaaki Tatsuguchi & Hidenori Takahashi & Hirofumi Akita & Shogo Kobayashi & Akira Tomokuni & Kunihito Gotoh & Hidetoshi Eguchi & Hiroaki Ohigashi & Yoshitomo Yanagimoto & Norikatsu Miyoshi (2018): Short- and long-term outcomes of choledochojejunostomy during pancreaticoduodenectomy and total pancreatectomy: interrupted suture versus continuous suture Langenbeck's Archives of Surgery 403:959–966.
14. Castaldo ET, Pinson CW, Feurer ID, Wright JK, Gorden DL, Kelly BS, Chari RS (2007) Continuous versus interrupted suture for end- to-end biliary anastomosis during liver transplantation gives equal results. Liver Transplantation 13:234–238.

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