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RESEARCH ARTICLE

LAPAROSCOPIC EXPLORATION OF COMMON BILE DUCT WITH PRIMARY CLOSURE VERSUS T-TUBE DRAINAGE

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Abstract

Background: Laparoscopic exploration of the common bile duct followed by T-tube has long been a standard surgical treatment for choledocholithiasis. However the use of T-tube is not without complications. To avoid these complications we have performed primary closure of the common bile duct (CBD) after laparoscopic exploration.

Objective: To assess the benefits and harms of T-tube drainage versus primary closure after laparoscopic common bile duct exploration.

Material and methods: This is a comparative study carried out at General Surgical Deptt of Hayatabad Medical Complex Peshawar Pakistan from 6-6-2019 to 6-6-2021. Total 34 patients for laparoscopic exploration of the common bile duct were included in the study.

Results: The length of mean postoperative hospital stay was muchshorteringroupA(4.5 ± 1.4) thaningroupB(7.2 ± 1.6).Thehospitalization expenses were statistically lower in group A (15150.0 ± 2160.5) than in group B (19798.1 ± 2485.5). No significant difference was observed in the operating time in both groups i.e. (128.3 ± 25.9) in group "A" & (133.9 ± 26.7). Intraoperative blood loss were also shows no significant difference amongst both groups, (101.3 ± 56.1) in group "A" & (103.9 ± 60.2).

Bile leakage rate in group "A" is 2(5.8%) and in group "B" 3(8.8%), intraabdominal bleeding 1(2.9%) & 1(2.9%), pulmonaryinfection were 2(5.8%) & 1(2.9%), intra-abdominal infection were 2(5.8%) & 3(8.8%), gastroduodenal serosal injury 0 (0%) & 0 (0%), wound infection 1 (2.9%) & 1 (2.9%), stone recurrence 2(5.8%) & 2(5.8%) and bile stricture seen in 0 (0%) in group "A" & 1 (2.9%) in group "B" respectively. Table II

Conclusion: Primary closure of the CBD is a safe and cost effective alternative to routine T-tube drainageafter Laparoscopic exploration.

Introduction:-

The formation of common bile duct (CBD) stones following cholecystectomy or choledochotomy is still remains a troublesome problem. CBD stone formation is estimated to be 2-5 % following open and laparoscopic

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cholecystectomy and 5-15 % after common bile duct exploration.[1,2] Laparoscopic common bile duct exploration has been introduced with the advancement of laparoscopic procedures for the treatment of CBD stones.[3]

Laparoscopic common bile duct exploration followed by T-tube drainage is atraditional surgical treatment for chloledocholithiasis.[4]Although it is true that the T-tube has been used and hasproven to be a safe and effective method for postoperativebiliarydecompression,however it is not exempt from complications, which are present in up to 10% of patients.[5]Themost frequent of these is bile leakage after removal, whichis reported to occur in 1–19% of cases.[6,7] Some of thesecomplications are serious, such as bile leak, tract infectionor acute renal failure from dehydration due to inadequatewater ingestion or a very high outflow, particularly in elderly patients.[8] In addition, having bile drainage in place forat least 3 weeks causes significant discomfort in patientsand delays their return to work.[9,10]

Primary closure of the CBD after laparoscopic exploration is notnew. Halstead first described the advantages of primaryclosure. There are many papers reported by differentauthors, which support the direct closure of the ductimmediately after laparoscopic exploration.[11,12,13] With the help ofacholedochoscope during surgery, direct visualisationofthe CBD is possible and retained stones are not a problem.

Our aimis to compare the clinical short-term results of laparoscopic common bile duct exploration with primaryclosure of vs T-tube drainage, and to assess thebenefits of primary closure of CBD at a government hospital in a developing country.

Material and Methods:-

This comparative study was carried out at General Surgical Department of Hayatabad Medical Complex Peshawar Pakistan between 6-6-2019to6-6-2021. Total 34patients who underwentlaparoscopic exploration of common bile ductwereincludedinthestudy. The indications for laparoscopic common bile duct exploration were as follows:

1. CBD stones are confirmed by preoperative abdominal ultrasonography or magnetic resonance cholangiopancreatography (MRCP) with no intrahepatic bile duct stone;
2. The diameter of CBD is more than 0.8 cm;
3. Severeinflammation(acutesuppurativecholangitis,acute necrotizing pancreatitis) at the porta-hepatis is absent
4. Distal common bile duct obstruction is not observed, confirmed by choledochoscope.

A writteninformed consent was obtain from patients for their data to be used for research purposes. The demographic characteristics, perioperative outcomes, complications, and follow-up data were recorded and compared between the 2groups.

Statistical Analysis

Quantitative variables were expressed as mean ± standard deviation and compared by Student's t test. P value of ≤0.05 was considered statistically significant.DataanalysiswasperformedusingSPSS27.0 software for windows 10.

Results:-

Total 34patients who underwent Laparoscopic Common Bile Duct Explorationfrom6-6-2019 to 6-6-2021 were included. Patients were equally divided into 2 groups i.e. "A" and "B". Group "A" is defined as primary closure group (n=17, 50%) and Group "B" defined as T-tube drainage group (n=17,50%).

There was no significant difference in age, gender, body mass index (BMI), ASA score, clinical presentation, CBD diameter,numberofCBDstones,andtypesofinitialbiliary operations performed between the 2groups also there is no mortality in both groups.The length of mean postoperative hospital stay was muchshorteringroupA(4.5 ± 1.4) thaningroupB(7.2 ± 1.6).Thehospitalization expenses were statistically lower in group A (15150.0 ± 2160.5) than in group B (19798.1 ± 2485.5). No significant difference was observed in the operating time in both groups i.e. (128.3 ± 25.9) in group "A" & (133.9 ± 26.7).Intraoperative blood loss were also shows no significant difference amongst both groups, (101.3 ± 56.1) in group "A" & (103.9 ± 60.2) TableI

Bile leakage rate in group "A" is 2(5.8%) and in group "B" 3(8.8%),intraabdominal bleeding 1(2.9%) &1(2.9%), pulmonaryinfection were 2(5.8%) &1(2.9%), intra-abdominal infection were 2(5.8%)& 3(8.8%), gastroduodenal serosal injury 0 (0%) &0 (0%), wound infection 1 (2.9%) & 1 (2.9%), stone recurrence 2(5.8%) &2(5.8%) and bile stricture seen in 0 (0%) in group"A" &1 (2.9%) in group "B" respectively. Table II

Table I:- Post-operative Outcomes in terms of Mean ± SD.

Post op outcome	Group A	Group B	P value
Mean hospital stay	4.5 ± 1.4	7.2 ± 1.6	0.04
Mean hospitalization expenses	15150.0 ± 2160.5	19798.1 ± 2485.5	0.05
Mean operative time	128.3 ± 25.9	133.9 ± 26.7	0.20
Mean intraoperative blood loss	101.3 ± 56.1	103.9 ± 60.2	0.50

Table II:- Postoperative Complications.

Post op complications	Group A	Group B	P value
Biliary leakage	2 (5.8%)	3 (8.8%)	0.05
Intra-abdominal bleeding	1 (2.9%)	1 (2.9%)	0.20
Pulmonary infection	2 (5.8%)	1 (2.9%)	0.04
Intra-abdominal infection	2 (5.8%)	3 (8.8%)	0.05
Gastroduodenal serosal injury	0 (0%)	0(0%)	0.30
Wound infection	1 (2.9%)	1 (2.9%)	0.20
Stone recurrence	2 (5.8%)	2 (5.8%)	0.20
Biliary stricture	0 (0%)	1 (2.9%)	0.04

Discussion:-

Laparoscopic exploration of the common bile duct has proven difficult in patients who have had cholecystectomy or choledochotomy. Due to thick adhesions in the upper right quadrant of the abdomen, past biliary surgical history was deemed a contraindication for laparoscopic surgery in the early laparoscopic phase. With significant advancements in laparoscopic equipment and technique, LCBDE offers improved benefits such as optical magnification, direct visibility, efficacy in removing bile duct stones, and minimum invasiveness. Furthermore, LCBDE protects the sphincter of Oddi and prevents bile juice regurgitation, which is especially important in young people. On the other hand, ERCP, which is commonly performed to treat CBD stones, can cause pancreatitis, perforation, bleeding, and even death.9.ERCP also disrupts the sphincter of Oddi's integrity and has a high stone recurrence rate. 10 LCBDE is increasingly being used in patients who have had prior biliary surgery.[14,15]

The best bile duct closure procedure after LCBDE (primary choledochotomy closure versus T-tube insertion) in patients who have had previous biliary surgery is still debated. Zhang et al conducted a randomised trial to compare the safety and efficacy of laparoscopic primary closure against T-tube drainage in patients who had never had abdominal surgery.[16] Patients with a history of upper abdominal surgery, including gastrectomy16 and bowel resection, have undergone LCBDE with primary closure. However, thick adhesion around CBD is typically observed in the context of a previous biliary surgery, which causes CBD edoema and inflammation following CBD dissection. As a result, the study compared the feasibility and safety of primary closure after LCBDE to T-tube drainage in patients who underwent laparoscopic exploration of CBD.

The debate between primary closure of choledochotomy and T-tube drainage following LCBDE still continues.Severalstudiesshowedthatprimaryductclosuredid not increase overall complication risk and mortalitycompared to T-tube drainage.[17]Our results demonstrated thatstonerecurrenceratewaslowandbileductstrictures were not observed after primary duct closure.Recently with the development of laparoscopic techniques primary choledochotomy closure has been applied successfully in emergency patients,elderlypatients,and patients with upper abdominal surgery history.[18]In a study by Zhang HW et al reported that,T-tubeusagecausesinconveniencetopatientsandmaygiverisetoseveralcomplications,suchasT-tube displacement, bile leakage, wound infection and bile stricture formation due to latex material with provoke inflammation.[19]In our institution, we also performed primary closure following LCBDE in patients with previous cholecystectomy or choledochotomyinthepast5years.Thepresentstudyrevealedthattherewasno significant difference in the incidence of biliaryspecific complications, overall complications, and stone recurrence between the primary closure group and T-tube drainage group. However thelength of postoperative hospital stay and hospitalization expenses of the primary closure group were significantly lowerthanthoseoftheT-tubedrainagegroup.Theresults suggest primary choledochotomy closure is safe and effective,andcanbeperformedasanalternativeoptiontoT-tube drainage.

Bile leakage is the most frequent postoperativecomplicationforLCBDEwithprimaryclosure.[20]In addition, LCBDE with primary closure is a technically demanding procedure. HuaJetalreported in a study that surgeons' laparoscopic experience was significantly related with bile leakage,inexperienced hands, the incidence of bile leakage decreased from 17.1% to 5.6%.[21]which is similar to our results where bile leakage found in 5.8% (2/17).Althoughnoneofthemdevelopedseverebiliary peritonitis and underwent reoperation, the bile leakage rate seems higher than previous reported.Anotherretrospective study by LiuDet al also revealed that a higher bile leak rate was observed in non-severe acute cholangitis, a morbid conditionwithacuteinflammationandinfectioninthebileduct.[22]

ThepresentstudydemonstratedthatprimaryclosurefollowingLCBDEissafeandeffectiveforthemanagementof CBDstones.However, thisstudyis a single-center comparative research. Furtherrandomizedtrialsareneededtoexplorethepossibleriskfactorsforbileleakage and other risk factors.

Conclusion:-

T-tube drainage appears to result in significantly longer operating time,lengthy hospital stay and increased stricture rate as compared with primary closure after laparoscopic common bile duct exploration.

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