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COMPARATIVE STUDY OF INDIAN RED RUBBER AND LATEX MADE T-TUBE USED IN CBD EXPLORATION

General Surgery

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ABSTRACT

INTRODUCTION: T Tube is a draining tube placed in the common bile duct after Common Bile Duct (CBD) exploration with supra-duodenal choledochotomy. It provides external drainage of bile into a controlled route while the healing process of choledochotomy is maturing and the original pathology is resolving. T tube is named to reflect the shape of the tube used for the CBD drainage.The CBD is the continuation of the hepatic duct after the cystic duct joins it[6]. The CBD then runs medially and inferiorly until it reaches the second part of the duodenum. T tube is usually inserted at the choledochotomy site. It is part of the closure of the choledochotomy. The chosen site of choledochotomy is the common bile duct segment between the cystic duct junction and the duodenal lateral border[8]. This is the accessible site of surgery. Upon T tube placement and closure of the choledochotomy, the tube is passed in the shortest distance to the anterior abdominal wall, then through the abdominal to the skin surface in the right upper quadrant. Indications of T Tube can be summarised in one concept that is to stent and drain the common bile duct after choledochotomy. The most common reason for performing choledochotomy is extraction of biliary stones[7]. In this study we perform a comparative study of Indian red rubber and latex T tube used in CBD exploration.

MATERIAL AND METHODS A total of 120 patients are included in the study, out of which 60 have Indian red rubber T tube during CBD exploration and remaining 60 have latex made t tube during CBD exploration[1] [2] [3].

RESULTS: In our study we find that Indian red rubber T tube is better than latex T tube in many aspect, mainly when compared with tract maturation. Indian red rubber T tube have less patient related complication. Latex T tube have better availability, better handling, less tissue reaction but tract maturation is better in Indian red rubber T tube and thus less chance of bile leakage post removal of T tube.

CONCLUSION: Indian red rubber T tube have less post removal complications as compared to latex T tube.

KEYWORDS

Indian Red Rubber T Tube, Latex T Tube, Cbd Exploration

INTRODUCTION:

Common Bile Duct Exploration is a surgery that involves opening the main bile duct that drains from your liver and gallbladder into the first part of the small intestine (called the duodenum). This is needed when a gallstone drops out of the gallbladder into the duct and partially or completely blocks up the duct. This can cause jaundice (yellowing of the skin and eyes), fever and chills, severe abdominal pain due to infection / inflammation of the bile duct, gallbladder or pancreas. This most often involve admission to the hospital and urgent intervention. Most commonly, a procedure called an ERCP is used to clear out the stones from the bile duct. If this is unsuccessful, drains may be placed through the skin into the bile ducts. Your gallbladder will have to be removed soon to prevent this potentially serious condition from occurring again.

The CBD is the continuation of the hepatic duct after the cystic duct joins it[6]. The CBD then runs medially and inferiorly until it reaches the second part of the duodenum[7]. T tube is usually inserted at the choledochotomy site. It is part of the closure of the choledochotomy. The chosen site of choledochotomy is the common bile duct segment between the cystic duct junction and the duodenal lateral border. This is the accessible site of surgery. Upon T tube placement and closure of the choledochotomy, the tube is passed in the shortest distance to the anterior abdominal wall, then through the abdominal to the skin surface in the right upper quadrant.[6]

A common misconception is using the word T tube interchangeably with different tubes such as Cholecystostomy tube and PTC drain. The Cholecystostomy tube is a tube that is inserted by interventional radiology method through the abdominal wall into the gallbladder, and serves as a drain to an inflamed gallbladder in patients with acute cholecystitis who are otherwise at high risk to undergo formal cholecystectomy. On the other hand, Percutaneous Transhepatic Cholangiogram (PTC) is a drain that is inserted through the abdominal wall into a major hepatic duct, also by interventional radiology method, and serves as an external drain for bile in patients with bile duct obstruction until the underlying pathology is treated.

Bile leak is the most common complication with T tube placement and the following period. This could be immediate, delayed, or after removal.

The T-tube is prepared by cutting two limbs at lengths that will not traverse into the left or right hepatic duct proximally or into the duodenum distally, and by excising the back wall of the horizontal portion of the T (to minimise the risk of tube occlusion and to facilitate tube removal). The tube is inserted through the choledochotomy, and the remainder of the duct is closed with fine absorbable sutures around the tube. Care should be taken to leave enough redundancy in the intraperitoneal portion of the tube to avoid tension (and possible tube dislodgement) in the event of significant postoperative abdominal distension. Postoperatively, the T-tube is placed to dependent drainage until resolution of postoperative papillary oedema allows physiologic flow of bile into the duodenum. If persistently elevated output or drainage around the tube occurs, investigation via cholangiography can identify malfunction, dislodgement, or distal obstruction secondary to retained stone. If a repeat cholangiogram at approximately 6 weeks is normal, the T-tube may be removed.

In this study we select patient with clinical features of obstructive jaundice and proceed with ultrasonography of whole abdomen and MRCP. Those who are detected with CBD stones are follow up and basic pre operative investigations are carried out. 60 patients randomly selected to have Indian red rubber T tube and remaining 60 patients are randomly selected to have latex T tube placed during surgery. Similar post operative care is administered in both set of patients and a T tube cholangiogram is done on 10th post operative day. Patient is discharged with T tube in place and follow up is done for 6 weeks. Post removal of T Tube patient is discharged with basic 24 hours observation and rest follow up is done for any post operative complications.

MATERIAL AND METHODS:

It is an institutional based study conducted in department of general surgery midnapore medical college and hospital.

SAMPLE SIZE:

A total of 120 patients are included in the study. Out of these 120

patients 60 are gone through Indian red rubber T tube placement during CBD exploration and remaining 60 patients gone through latex T tube placement during CBD exploration.

Sample size is calculated considering 9% prevalence of choledocolithiasis from previous studies [1][2][3], and taking 95% confidence limit.

Inclusion Criteria:

.Diagnosed patients of CBD stones (choledocolithiasis)
.Cholelithiasis along with choledocolithiasis
.Age group - 13 to 70 years

Exclusion Criteria:

.Co morbid conditions like heart disease , etc.
.Pregnant female
.Patient below 12 year of age
.Immuno compromised
.Patients in which ERCP can be performed.

STUDY DESIGN:

Prospective comparative observational study.

STUDY TOOL:

Red INDIAN rubber T tube, Latex T tube, paper, pen, sterile gloves, disposable gloves, liquid hand wash, calculator, computer.

STUDY TECHNIQUE:

The study began after receiving approval from Institutional Ethics Committee of midnapore medical college, Paschim medinipur.
1.A predesigned Informed Consent Form (ICF) was given to every patient under the study and a valid, legal consent was taken from each of them.
2.All the patients who undergoing CBD exploration with T tube placement are taken in my study and randomly divided in two groups.
3.60 out of 120 patients undergone Indian red rubber T tube placement during CBD exploration and remaining 60 patients undergone latex T the placement after CBD exploration.
4.Similar post operative care is provided to both group of patients.
5.T tube is removed after 6 week post operatively and patient is discharged with 24-48 hours of observations.
6.Any complication observed immediate post removal is managed in hospital itself.
7.Follow up is done for every patients in OPD and look for any post removal complication mainly pain abdomen and sign of bile leak in peritoneum.
8. All data was captured in a predesigned Case Data Sheet and analysis of all the data was done from the CDS using master chart or grand chart.

Statical Analysis:

Total 120 patients are considered in this study with randomly divided two groups. 60 patients undergone Indian red rubber T tube placement and remaining 60 patients undergone latex T tube placement. Patient is followed up, post removal of T tube and data and tables are formulated.

Final result is formed on the basis of patients who attended OPD for any post removal of T tube.

RESULTS:

Table 1 showing comparative results between Indian red rubber T tube and latex T tube for presence of pain abdomen following removal of T tube. Patient present with pain abdomen mainly right Hypochondrium following removal of T tube is included in the study with follow up time of 4 weeks following T tube removal. Removal time of all T tube remain constant at 6 weeks post operative with same method used for removal in both Indian red rubber T tube and Latex T tube. All patients presented with pain abdomen following T tube removal in General Surgery outdoor patient department are treated irrespective of nature of pain and further treated and investigated. Results shows that around 28 patients (23 percent) presented with pain abdomen following removal of T tube and around 92 patients (77 percent) do not face any complain following T tube removal. 8.

Table1 Showing Total Patients Presented With PainAb DoMen	
Painabdomenpresent	28
Painabdomenabsent	92

Table showing comparative results of pain abdomen following removal of T tube.

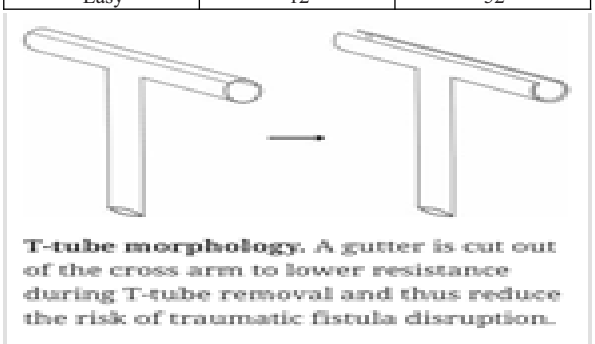
Table 2 shows all the patients who visit OPD of general surgery department of Midnapore Medical College and Hospital with pain abdomen following T tube removal and are treated or further investigated for pain abdomen . All the patients with pain abdomen following T tube removal are gone through basic treatment for pain abdomen. Further investigations with USG whole abdomen and basic blood investigations are done in all those patients who did not relieved by basic treatment. 11patients out of total 28 patients presented with pain abdomen shows decrease in pain abdomen with basic medications at OPD only and are discharged with oral medications only. Out of these 11 patients 5 are those who undergo Latex T tube placement while surgery and 6 are those who undergo Indian red rubber T tube placement during surgery. Remaining 17 patients out of total 28 presented with pain abdomen need to get admitted in Indore patient department of general surgery at Midnapore Medical College and Hospital. All 17 patients are those who undergo Latex T tube placement during surgery and no patients with Indian red rubber T tube placement need to be admitted since they get decrease in symptoms by basic treatment at OPD only. USG whole abdomen and basic blood investigations are done in all the patients admitted. Out of total 17 patients admitted with pain abdomen 7 patients received by IV medication at Indore patient department within 7 days and USG whole abdomen shows no sign of collection in the billiard fossa and hepatorenal pouch. Remaining 10 patients out of total 17 admitted in Indore patient department shows significant USG whole abdomen finding of collection in biliary fossa and hepatorenal pouch. 6 patients out of total 10 patients with significant USG finding are discharged from hospital after prolonged hospital stay of more then 2 week but no need of explorative laparotomy needed in them. 4 patients out of total 10 patients with significant USG finding need explorative laparotomy and operative procedure and long follow up.

Table2 Showing Patients Presented With Pain Abdomen Categorised On The Basis Of Type Of T Tube	
Ttube	Painabdomen
Indianredrubber	6
Latex	22

Table showing that 11 patients out of total 28 patients presented with pain abdomen are discharged within 2-3 hours and with oral medications and need no admission while 17 patients out of total 28 patients need admission and investigated further for the cause of pain abdomen.Out of total 11 patients who presented with pain abdomen and discharged within 2-3 hours, 6 are those who undergo Indian red rubber T tube placement and 5 are those who undergo Latex T tube placement.

Table3 Showing Total Patients Presented With Pain Abdomen And Categorised Into Those Who Need Admission And Those Who Discharged Within 2-3Hours	
Discharged within 2-3 hours and oral medications	11
Need admission and further treatment	17

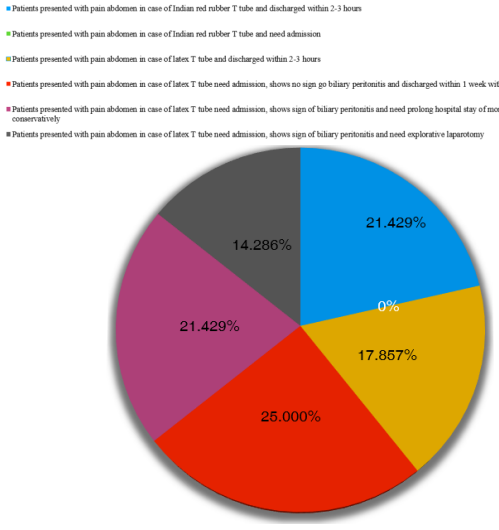
Table4		
Modifications	Redrubber	Latex
Easy	12	52



T-tube morphology. A gutter is cut out of the cross arm to lower resistance during T-tube removal and thus reduce the risk of traumatic fistula disruption.

Table 5 showing comparative patients for Indian red rubber T tube and latex T tube

T Tube	Pain abdomen	Presented with pain abdomen but Discharged within 2-3 hours with oral medications	Patients need admission	Need admission abut no sign of biliary peritonitis	Need admission and sign of biliary peritonitis	need explorative laparotomy	Need prolonged hospital stay but treated conservatively
Indian red Rubber T Tube	6	6	0	0	0	0	0
Latex T Tube	22	5	17	7	10	4	6



DISCUSSION :

To ascertain the best diagnostic indicators of choledocholithiasis and to decrease the incidence of retained stones in the common bile duct after exploration, the authors carried out a retrospective review of 110 consecutive patients who underwent common bile duct exploration for calculous biliary tract disease. Conditions that were most often associated with choledocholithiasis were cholangitis and clinically obvious jaundice. The serum bilirubin level was helpful in identifying patients with stones in the common bile duct only when the value was greater than 6 mg/dl (103 mumol/l), and alkaline phosphatase only when the value was more than 250 IU (normal 110 IU). When stones are felt in the duct at operation, the diagnosis of choledocholithiasis is certain; positive operative cholangiograms are highly reliable and the coexistence of small gallstones and a dilated cystic duct is suggestive. The retention of stones is best prevented by careful exploration followed by high-quality T-tube cholangiography performed at operation after the exploration is complete. Any missed stones found in this way should be removed by re-exploration at the time of the original operation. Stones left in the common bile duct are best extracted non-operatively under radiologic control. This technique, while effective and safe, is associated with considerable morbidity.[4]

Operations on the common bile duct can result in severe long-term consequences. To prevent some of these complications, it is common practice to drain the biliary tree with a T-tube. The T-tube is usually removed 2 weeks after it was placed. There have been numerous reports of bile leak following T-tube removal in the literature. These leaks can result in bile ascites, biloma, or bile peritonitis. Control of bile leaks can be accomplished in a number of ways, including endoscopically or radiologically placed stents or drains and radiologic techniques to drain the fluid collections. We describe a novel technique that can be utilised at the time of T-tube removal that will allow immediate control of the bile leak and prevent the complications of bile accumulation within the peritoneal cavity. We have performed fluoroscopic removal of T-tubes on two patients and found no complications with the technique. We have successfully visualised the T-tube tract in both patients. The T-tube tract can be visualised at the time of T-tube removal in an effort to prevent the complications of tract disruption and subsequent bile leak.[5]

The special part of the equipment is the T tube itself. As the name refers, it is a special tube in the shape of T with a shorter transverse part (20 cm) that stays inside the CBD (after trimming) and a long longitudinal part (60 cm) that extends from the middle of the transverse part to an end that connects with a drainage bag. This portion extends from the CBD to outside the abdominal cavity when applied. It comes with different circumference sizes (10, 12, 14, 16, 18 Fr). T tube can be made of different materials like latex, silicone, red rubber and polyvinyl chloride (PVC)[10]. PVC is very inert causing the least tissue reaction with lack of tissue tract formation making it the least favourable material for T tube placement purposes. Silicon has many favourable physical properties, but it can disintegrate with poor handling making it not a practical option for long-term placement. Latex has the desired properties to be the most commonly used. Red rubber is an alternative if latex can not be used or is not available [6]

Latex T tube is easy to available as compared to Indian red rubber T tube as latex T tube have easy options to select for size. Variable sizes are available in case of latex T tube. We found easy and satisfactory gutter formation and modification in case of latex T tube while medication in case of Indian red rubber T tube is hard. Indian red rubber T tube create more rough surface when modified during operation and before fitting it to CBD. In case of latex T tube is more easy to modify as cut surfaces are smooth and have good alignment.

CONCLUSION:

Indian red rubber T tube have less post removal complication as compared to latex T tube

SOURCE OF SUPPORT: Nil

CONFLICT INTEREST: None

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