ABSTRACT

To study the time for T-tube sinus formation, provide theoretical basis for selecting optimal moment for T-tube removal, and prevent the accompanied choleperitonitis after tube removal. T-tube was implanted for drainage after the excision, calculus removal and exploration of choledoch. However, T-tube removal occasionally caused choleperitonitis, and even the second operation even death. Its main reason is T-type tube sinus formation incompletely with the result that, as a result, before pull out T-tube understanding formation of sinus circumstance very necessity. In 30 patients with excised and explored choledoch, a catheter with side hole was implanted near T-tube. From post-operative 3 days, sinus radiography was made with 20% urografen once every 2d until complete sinus formation. The sinus formed completely at post-operative 3 days, 5 days, 7 days, 9 days and 35 days in 12 (40%), 13 (43.3%), 2, 2 and 1 cases respectively. In 97% of patients, T-tube sinus formed completely before post-operative 9 days. Sinus radiography before tube removal could better understand the condition of sinus formation and select the optimal moment for tube removal.

KEYWORDS: T-Tube Removal; Choleperitonitis; A Catheter With Side Hole Was Implanted Near T-Tube; Prevent

INTRODUCTION

Generally, T-tube was implanted for drainage after the excision, calculus removal and exploration of choledoch. T-tube removal occasionally caused choleperitonitis, and even the second operation. In order to prevent this complication, we studied the condition of sinus formation in 30 patients with T-tube. We implanted catheter near T-tube, regularly made sinus radiography via catheter after the operation, and did not remove tube in patients with incomplete sinus formation. This research aimed to select the opportunity of tube removal so as to reduce the incidence rate of choleperitonitis after tube removal.
Method
Take a hard plastic tube (diameter: 2.5mm). Cut 2 side holes at the position 2cm and 4cm from one tube end (or one more side hole for fat patients), and stitch with #3 suture onto the position of long arm of T-tube 3cm from its short arm (Fig.1). Cut the other tube end into same length as T-tube, drain at same hole of abdominal wall, and fix onto skin with suture. Before T-tube radiography, contrast medium was injected via catheter, so as to easily observe whether sinus was formed. Before such injection, T-tube was pushed toward abdominal cavity to form a small gap between catheter and sinus, so as to facilitate the diffusion of contrast medium in sinus. If contrast medium was diffused beyond sinus, sinus was formed incompletely, and re-examination should be made regularly until its complete formation.

Clinical Materials
General Materials: 30 patients after choledoch exploration, 13 male and 17 female, age 8~74 (mean 53); including 25 cases of bile duct calculus and 5 cases of exploration operation due to significant choledoch expansion; and including 17 cases (56.7%) and 13 cases (43.3%) of one and more than one biliary passage operations respectively.

Sinus Radiography: From post-operative 3d, sinus radiography was made with 20% urografin once every 2d for 2~6 times (mean: 3 times each case) until complete sinus formation (Fig.2A). Results of sinus radiography (Table 1).
### Table 1

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### Discussion

T-tube sinus was formed through the surrounding of T-tube by greater/smaller retina, hepatoduodenal ligament, gallbladder wound, liver, hepatocolic ligament, stomach and duodenal wall (mainly greater retina). In this research, 97% of sinus formed completely during post-operative 3 days ~9 days, T-tube could be safely removed after 4~5 days stabilization (generally at post-operative 13 days) \(^1\), and the time for complete sinus formation was longer in very few cases (for example, at post-operative 35 days in 1 case). In the research of Quan Yilu \(^2\), after T-tube removal at post-operative 92 days, 1 case still had choleperitonitis, underwent the second operation, and most sinuses did not formed as verified by this operation. In case of incomplete sinus formation at any post-operative time, T-tube removal could cause bile leakage and then choleperitonitis.

T-tube removal could diminish the cholangitis inside and outside liver, fully smoothen the lower end of choledoch, cause no narrowness at T-tube radiography, and form no residual calculus \(^3\). In the viewpoints of authors, the completeness of sinus formation should be additionally understood so as to remove tube more safely. However, it might be impractical to generally adopt sinus radiography clinically. Under the following conditions of easily incomplete sinus formation, it was still very beneficial to make T-tube sinus radiography: (1) Age >70; (2) Systemic malnutrition; (3) Serious hypoproteinemia; (4) Long-term steroids administration; (5) Accompanied choleperitonitis after T-tube removal, and second operation for drainage; (6) Early T-tube removal; (7) Excised retina, or past operation on upper abdomen. The authors also experienced I case with second operation due to accompanied choleperitonitis after T-tube removal. Retina was completely adhered to left upper abdomen, most part of T-tube at right side was not winded by tissue, and sinus would not form if T-tube was not winded with retina through the operation. Therefore it was important to promote complete sinus formation by winding T-tube with a small amount of retina tissue during the operation. Complete sinus formation was one of essential conditions for T-tube removal, and otherwise sinus radiography should be made regularly until the complete formation.
At present, it was ideal to understand the condition of sinus formation through sinus radiography by implanting catheter near T-tube \cite{4}. It was easy and simple to operate without any influence on wound healing, and sinus could be visualized through any proper catheter position and operation. The length of sinus determined the design of side hole in catheter and the fixing position at tube end. As ever measured on the distance of 100 implanted T-tubes at section of abdominal cavity, sinus was generally 10~12cm long, 2 side holes of catheter were just in the middle of sinus, and the injection of contrast medium could facilitate its diffusion and sinus visualization.

Biliary fistula after pulling out T tube, first should from the sinus drainage tube of the inserted into the corresponding thickness within the tao, keep the bile drainage unblocked, invalid to consider surgery, available line of laparoscopic ligation of antrum \cite{5}. Parra-Membrives \cite{6} think T biliary complications after pulling, laparoscopic 18.2% higher than laparotomy group 12%, but the two groups have no difference after statistics processing.

References