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Percutaneous Stent Placement for Malignant Hilar Biliary Obstruction: A Comparison between T- and Crisscross-configuration Techniques

악성 간문부담관 폐쇄에서의 경피적 스텐트 설치술: T-와 Crisscross-configuration 기법의 비교

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Percutaneous Stent Placement for Malignant Hilar Biliary Obstruction: A Comparison between T- and Crisscross-configuration Techniques

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ABSTRACT

Introduction: To compare the clinical efficacy of percutaneous stent placement between T- and crisscross-configuration techniques in patients with advanced malignant hilar biliary obstruction.

Methods: Between April 2006 and December 2013, 51 patients (mean 69.0 years, range 47–88 years) who underwent percutaneous stent placement for malignant hilar obstruction were included in this retrospective study. T-configured stent placement (T group) was performed in 30 patients and crisscross-configured stent placement (crisscross group) in 21 patients. Technical and clinical success, complications, stent patency, and patient survival were compared between the two groups.

Results: Stent placement was technically successful in all patients of the two groups. Hemobilia caused by tumor bleeding was observed in two patients of T group (6.7%, p = .341). Clinical success was achieved in 25 (83.3%) patients of T group and 18 (85.7%) of crisscross group (p = .570). During follow-up period (20–541 days [median, 112 days]), stent occlusion occurred in 14 (56.0%, 14 of 25) of the patients in T group and 4 (22.2%, 4 of 18) of the patients in crisscross group (p = .027). Additionally, re-intervention was required for initially undrained hepatic

section in 4 patients of T group (p = .103). Stent patency of crisscross group (median 315 days) was longer than that of T group (median 157 days) (p = .047).

Conclusions: Early clinical effectiveness is comparable between the two techniques. However, crisscross-configured stent placement was better than T-configuration providing longer stent patency and less requirement of re-intervention.

Keywords: Malignant hilar biliary obstruction, Percutaneous stent placement, Crisscross-configuration

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INTRODUCTION

Malignant hilar biliary obstruction is caused by a heterogeneous group of tumors including cholangiocarcinoma, gallbladder cancer, or metastatic cancers. Because only 10%–20% of patients have resectable diseases at the time of diagnosis, the majority of patients receive palliative treatments (1-3). Percutaneous placement of self-expandable metallic stent is an accepted palliation to relieve unresectable malignant hilar obstruction. Although the necessity of bilateral drainage remains controversial, drainage of as much of the liver as possible is desirable to preserve the functional volume of the liver and to prevent cholangitis of undrained hepatic segments (4-7).

For percutaneous bilateral biliary drainage, stent-in-stent (T-configuration) and side-by side (Y-configuration) stent deployment has been representative techniques (8, 9). The benefit of T-configured stent placement is achieving bilateral biliary drainage via a single percutaneous transhepatic access. However, in patients with hilar malignancies extending beyond the segmental ducts, drainable liver volume is limited, inevitably leaving one hepatic section undrained (right anterior duct [RAD] or right posterior duct [RPD]) (4). Recently, crisscross-configured stent placement was described. This technique provides three intrahepatic limbs of the stents which facilitate "trisectoral" drainage (RAD, RPD, and left hepatic duct [LHD]). However, the procedure is more complicated and requires two or more percutaneous transhepatic routes, therefore, is potentially associated with more procedure-related morbidities (4, 10).

Several studies demonstrated that both T- and crisscross-configured stent placements can provide effective biliary drainage and acceptable long-term stent patency in patients with advanced malignant hilar obstructions (4, 8, 11). However, to date, there has been no study comparing clinical outcomes between T- and crisscross-configured stent placements. The purpose of this study was to retrospectively compare clinical efficacy of the two techniques of biliary stent placement.

MATERIALS AND METHODS

Patient Population

The institutional review board of our hospital approved this study and waived informed patient consent. A retrospective review of our institution's data base identified 143 patients who had undergone percutaneous biliary stent placement for malignant hilar biliary obstruction between April 2006 and December 2013. Inclusion criteria were 1) pathologically proven malignant hilar obstructions, 2) Bismuth type III or IV disease based on multiphase computed tomography (CT), magnetic resonance cholangiopancreatography (MRCP), and/or percutaneous transhepatic cholangiography, 3) surgically unresectable disease, 4) stent placement with T- or crisscross-configuration. Sixty-six patients fulfilled these criteria. We excluded 15 patients for short follow-up duration (less than 2 weeks). Therefore, total 51 patients (30 patients with T-configured stent placement [T group] and 21 patients with crisscross-configured stent placement [crisscross group]) were enrolled in this study.

The patient characteristics of the two groups are shown in Table 1. Cholangiocarcinoma was the most common cause of hilar obstruction in both groups. There was no statistical difference in gender, age, cause of biliary obstruction, serum total bilirubin level (STBL), and performance status. Bismuth classification was significantly higher in crisscross group than T group; T group had more type IIIA disease and crisscross group had more type IV disease.

Stent Placement

Percutaneous transhepatic biliary drainage (PTBD) was performed under ultrasonographic and fluoroscopic guidance 3–14 days before stent placement. A drainage catheter was placed for unilobar drainage, or if possible, positioned in contralateral bile duct across the hilar obstruction for bilobar drainage. In patients with persistent cholangitis despite an initial PTBD, an additional drainage catheter was placed at contralateral intrahepatic bile duct 2–3 days after the initial procedure. Stent placement was indicated when STBL decreased more than 30% of baseline measurement and/or less than 3.0mg/dL (4). Two PTBDs were required to achieve these criteria in 2 patients of T group and 21 patients of crisscross group (Table 1).

Stent placement was performed within 2 weeks after PTBD procedures. All patients received broad-spectrum antibiotics for 12 hours before stent placement. Monitored sedation during the procedures was carried out with intravenous administration of fentanyl and midazolam. The technique of T-configured stent placement was previously described in detail (8) (Fig 1). Briefly, the hilar obstruction was negotiated with a 0.035-inch, 150-cm-long hydrophilic guidewire (Terumo, Tokyo, Japan) and 5-F angiographic catheter (COOK, Bloominton, USA) into the contralateral duct. When the obstruction was tight, dilation was achieved with use of a balloon catheter 6 or 8 mm in diameter to facilitate stent delivery and expansion (pre-dilation). A self-expandable stent dedicated to T-configured placement (8 or 10mm in diameter, 4–7cm in length; TaeWoong, Seoul, Korea) was deployed in a transverse direction with large central mesh positioned at hilar obstruction. A 5-F angled tip catheter was introduced over the guidewire, and was

manipulated to advance into the common bile duct (CBD) through central mesh of the transverse stent. The vertical stent (8 or 10mm in diameter, 6–10cm in length; TaeWoong, Seoul, Korea) was then introduced over the guidewire and deployed. Consequently, half the transverse stent overlapped the vertical stent. If expansion of the stents was less than 50%, the stents were dilated with 6 or 8mm balloon catheter (post-dilation).

Crisscross-configured stent placement was performed as described previously (4) (Fig 2). Through left PTBD tract, the hilar obstructions were negotiated with a 0.035-inch hydrophilic guidewire and a 5-F catheter into the RAD, which constituted transverse direction. When transductal access to RAD failed due to acute angulation, dilated RAD was percutaneously accessed with a 21-gauge needle and a 0.014-inch guidewire. The guidewire was advanced into CBD, which was snared and pulled out from left PTBD tract using a snare catheter. An angiographic catheter was advanced along the 0.014-inch guidewire into RAD from left PTBD tract (through-and-through technique). The 21-gauge needle and 0.014-inch guidewire were removed, and a 0.035-inch stiff guidewire (Terumo, Tokyo, Japan) was introduced through the angiographic catheter. Another guidewire-catheter assembly was introduced through right posterior PTBD tract, and manipulated to pass into the CBD, which constituted vertical direction. After pre-dilation, the first stent (8 or 10mm in diameter, 4–8cm in length) was introduced in a transverse direction (LHD-RAD) and the second stent (8 or 10mm in diameter, 6–10cm in length) introduced in a vertical direction (RPD-CBD). Both stents were deployed simultaneously with side-by-side fashion, followed by post-dilation as

needed.

After stent deployment, biliary drainage catheters were placed through the PTBD tracts. A follow-up cholangiography was performed 3–5 days after stent placement. After confirmation of patency of the stents, the drainage catheters were removed.

Definitions and Outcome Measurement

Study endpoints were rates of technical success, clinical success, complications, stent patency, and patient survival. Technical success was defined as stent placement as planned configuration and patent contrast passage through recanalized hilar obstruction on cholangiogram obtained immediately after the procedure. Clinical success was defined as successful removal of drainage catheters and STBL less than 3.0mg/dL or a decrease in STBL to <75% of the pre-treatment value within one month after stent placement (4, 9). All complications of the procedures were divided into major and minor categories in accordance with the reporting standards of the Society of Interventional Radiology (12). Major complications were defined as complications necessitating major therapy, requiring an unplanned increase in the level of care or prolonged hospitalization (>48 hours), or resulting in permanent adverse sequelae or death; the remaining complications were considered minor.

The patients were encouraged to visit the outpatient department and evaluated by laboratory examinations and imaging studies (CT or MRCP) at 1 and 3 months and then every three months after stent placement. Patients with recurrent

jaundice were evaluated by CT. If stent occlusion was suspected, PTBD was performed and cholangiogram was obtained to confirm the stent occlusion. When stent occlusion occurred, an attempt at correction was made by additional stent placement. Primary stent patency was defined as the time interval between initial stent placement and stent occlusion. If there was no evidence of stent occlusion during a patient's lifetime, the patency period was considered equal to the patient survival time. All patients were followed up until death.

Statistical Analysis

The Student's t-test was used for continuous data comparison. Fisher's exact probability test and Pearson's $\chi 2$-test were used for comparison of categorical data as appropriate. Primary stent patency was estimated by the Kaplan-Meier method and supplemented by the log-rank. If no evidence of stent occlusion was found during follow-up examinations or at the patient's death, the patients' data were censored at the time of patency analysis. $P < .05$ was considered to indicate a statistically significant difference. All analyses were performed with SPSS statistical software (version 18.0.0; SPSS, Chicago, Illinois).

RESULTS

Technical Outcomes

In T group, 28 patients had unilateral PTBD (17 RPD, 4 RAD, and 7 LHD) and 2 patients had bilateral PTBDs (RPD and LHD) before stent placement. In 19 patients with unilateral RPD PTBD (n=17) and bilateral PTBDs (n=2), stent placement was performed through right access with a transverse stent to cover RPD-LHD and a vertical stent to cover RPD-CBD, therefore, leaving RAD undrained. In four patients with unilateral RAD PTBD, a transverse stent was placed to cover RAD-LHD, and a vertical stent to cover RAD-CBD leaving RPD undrained. Seven patients with unilateral left PTBD received stent placement to cover LHD-RPD and LHD-CBD leaving RAD undrained.

In crisscross group, all patients had bilateral PTBDs (RPD and LHD). A transverse stent was placed at LHD-RAD and a vertical stent at RPD-CBD in all patients, which enables “trisectoral” drainage. In six patients the negotiation of the obstruction from left PTBD tract failed, but through-and-through technique was successful to place a transverse stent.

Technical success was achieved in all patients of both groups (100%) (Table 2). All stents were deployed as planned configuration. Correct stent positioning and patency was verified on cholangiogram obtained immediately after the procedures. Pre-dilation was required in 8 (T group) and 10 patients (crisscross group) and post-dilation were performed in all patients in both groups.

Clinical Outcomes

Clinical success was achieved in 25 of 30 patients (83.3%) in T group and 18 of 21 patients (85.7%) in crisscross group (p = .570). Five patients in T group and 2 patients in crisscross group had a huge central tumor with multiple separated segmental biliary ducts. The stented bile ducts were recanalized, but failed to decrease bilirubin level due to separated undrained bile ducts. The other patient in crisscross group showed aggravated jaundice after stent placement. Follow-up cholangiogram and CT revealed patent stents with decompressed intrahepatic bile ducts. The cause of clinical failure was assumed to be duodeno-biliary reflux.

Hemobilia caused by tumor bleeding occurred immediately after stent placement in 2 patients in T group (6.7%), which was spontaneously cleared on follow-up cholangiogram. There were no major complications in crisscross group (p = .341). Minor complications occurred in 15 patients; 9 had self-limiting fever (5 in T group and 4 in crisscross group) and 6 patients experienced transient abdominal pain (4 in T group and 2 in crisscross group). They were treated successfully conservatively in 5 days. There was no procedure-related death.

Patients were followed for 20–541 days (median, 120 days) in T group and 33–444 days (median, 104 days) in crisscross group. Among the patient with clinical success, stent occlusion occurred in 14 (56.0%, 14 of 25) of the patients in T group and 4 (22.2%, 4 of 18) of the patients in crisscross group (p = .027). The cause of stent occlusion was tumor ingrowth and/or overgrowth, which was evident on follow-up CT and cholangiogram. The primary stent patency were 96.6%, 72.3%, and 26.2% at 1-, 3-, and 6-month in T group (median 157 days, CI 113–191 days)

and 100%, 92.3%, and 67.3% at 1-, 3-, and 6-month in crisscross group (median 315 days, CI 178–321 days), respectively. (p = .047) (Fig 3).

Repeated PTBD was performed in all the 14 patients. Unilateral drainage with one drainage catheter was sufficient to relieve jaundice in 12 patients (9 of T group and 3 of crisscross group), whereas 2 patients (one of each group) required bilateral drainage with two PTBDs. Six in T group and one in crisscross group underwent additional stent placement. Other 4 patients of T group and three patients of crisscross group refused further treatment.

In addition to stent occlusion, 4 patients in T group (4 of 25, 16.0%) (vs. 0 of 18 in crisscross group, p = .103) experienced recurrent obstructive cholangitis. Follow-up CT revealed dilatation of intrahepatic bile duct with liver abscess confined to initially undrained liver section (1 patient in RAD, 3 in RPD). These patients were treated with percutaneous external drainage for liver abscesses (Fig 4).

In subgroup analysis including Bismuth IV disease (15 patients of T group and 18 patients of crisscross group) (Table 3), clinical success was achieved in 10 of 15 patients (66.7%) in T group and 15 of 18 patients (83.3%) in crisscross group (p = .240). Stent occlusion occurred in 8 of the patients in T group (80.0%, 8 of 10) and 3 (20.0%, 3 of 15) of the patients in crisscross group (p = .001). Three patients of T group (30.0%) (p = .052) developed liver abscesses in initially undrained section, which required additional external drainage.

All patients died of progression of their underlying malignancies (20–541 days in T group and 33–444 days in crisscross group). One (3.3%) patient in T group died within 30 days after stent placement of unexpected rapid disease

progression. Median survivals of the two groups were not statistically different (120 days vs. 104 days, $p = .466$) (Fig 5).

Table 1. Baseline characteristics of the patients

	T (n=30)	Crisscross (n=21)	*p* Value
Gender (M/F)	17/13	14/7	.180
Age (years)*	72 (47–88)	70 (51–81)	.881
Cause of biliary obstruction			
Cholangiocarcinoma	10 (33)	12 (57)	.057
Gallbladder cancer	10 (33)	2 (10)	.040
Pancreas cancer	3 (10)	3 (14)	.300
Metastasis	7 (23)	4 (19)	.256
Bismuth classification			
IIIA	14 (47)	3 (14)	.009
IIIB	1 (3)	0 (0)	
IV	15 (50)	18 (86)	
Initial STBL (mg/dl)*	7.3 (0.7–32.9)	6.9 (1.0–21.5)	.536
Pre-stenting STBL (mg/dl)*	4.4 (0.5–18.2)	3.1 (0.8–13.5)	.619
Required PTBD			
Single	28 (93)	0 (0)	.000
Multiple	2 (7)	21 (100)	

Note.— PTBD: percutaneous transhepatic biliary drainage, STBL: serum total bilirubin level.

Data are number of patients, and data in parenthesis are percentages except where indicated.

* Data are median and data in parenthesis are range.

Table 2. Technical and clinical outcomes

	T group	**Crisscross group**	***p* Value**
Technical success	30/30 (100)	21/21 (100)	-
Clinical success	25/30 (83.3)	18/21 (85.7)	.570
Stent occlusion	14/25 (56.0)	4/18 (22.2)	.027
Requirement of intervention for undrained section	4/25 (16.0)	0/18 (0)	.103

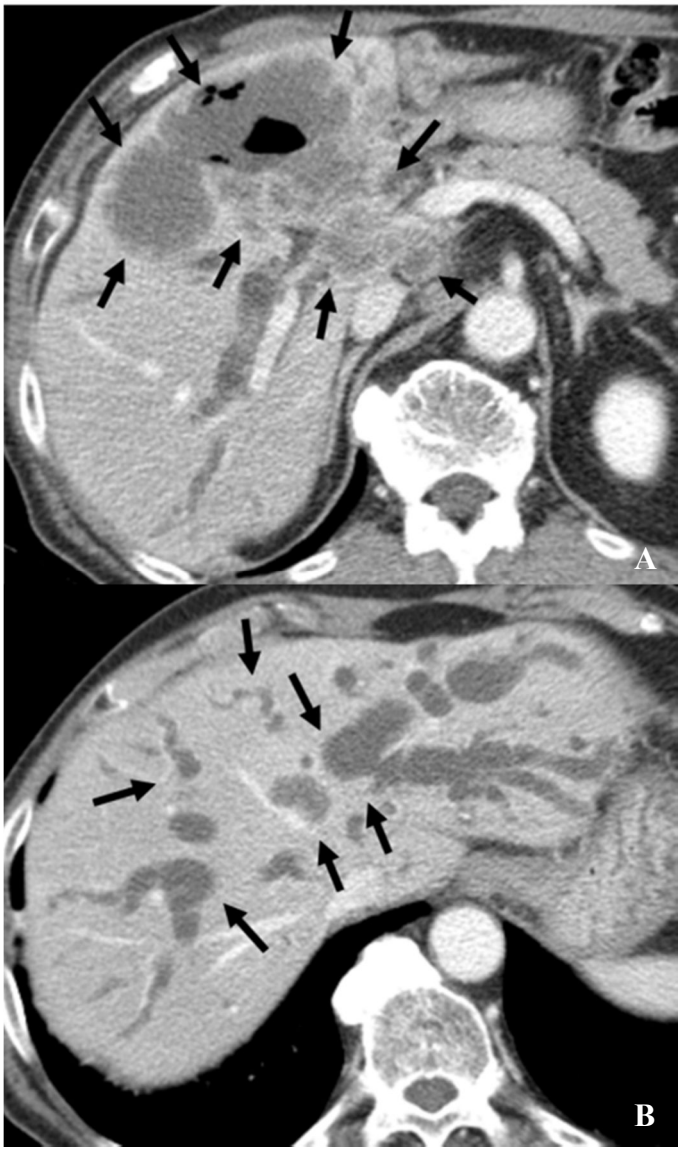
Note. — Data are number of patients, and data in parenthesis are percentages.

Table 3. Subgroup analysis including Bismuth IV disease

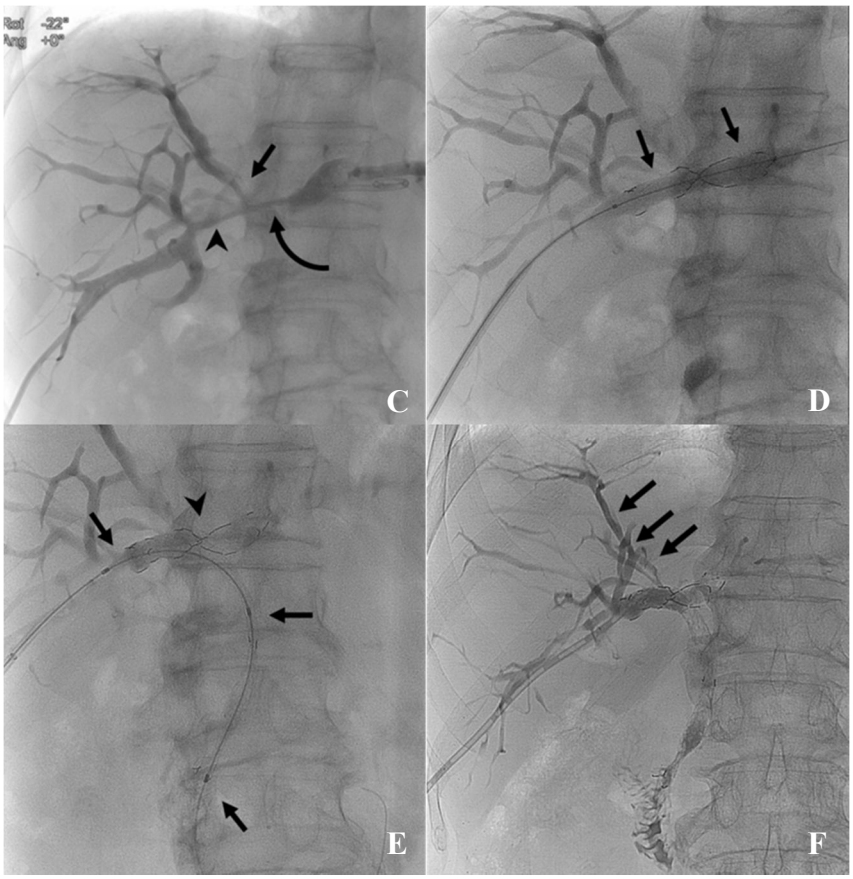
	T group	**Crisscross group**	***p* Value**
Technical success	15/15 (100)	18/18 (100)	-
Clinical success	10/15 (66.7)	15/18 (83.3)	.240
Stent occlusion	8/10 (80.0)	3/15 (20.0)	.001
Requirement of intervention for undrained section	3/10 (30.0)	0/15 (0)	.052

Note. — Data are number of patients, and data in parenthesis are percentages.

Figure 1. T-configured stent placement in a 74-year-old man with metastatic gallbladder cancer, Bismuth type IIIA.



A. B. A contrast-enhanced computed tomography (CT) transverse images shows a metastatic tumor involving hilum of the liver (arrows in A) with diffuse intrahepatic bile duct dilatation (arrows in B). Initial serum total bilirubin level (STBL) was 4.5mg/dl.

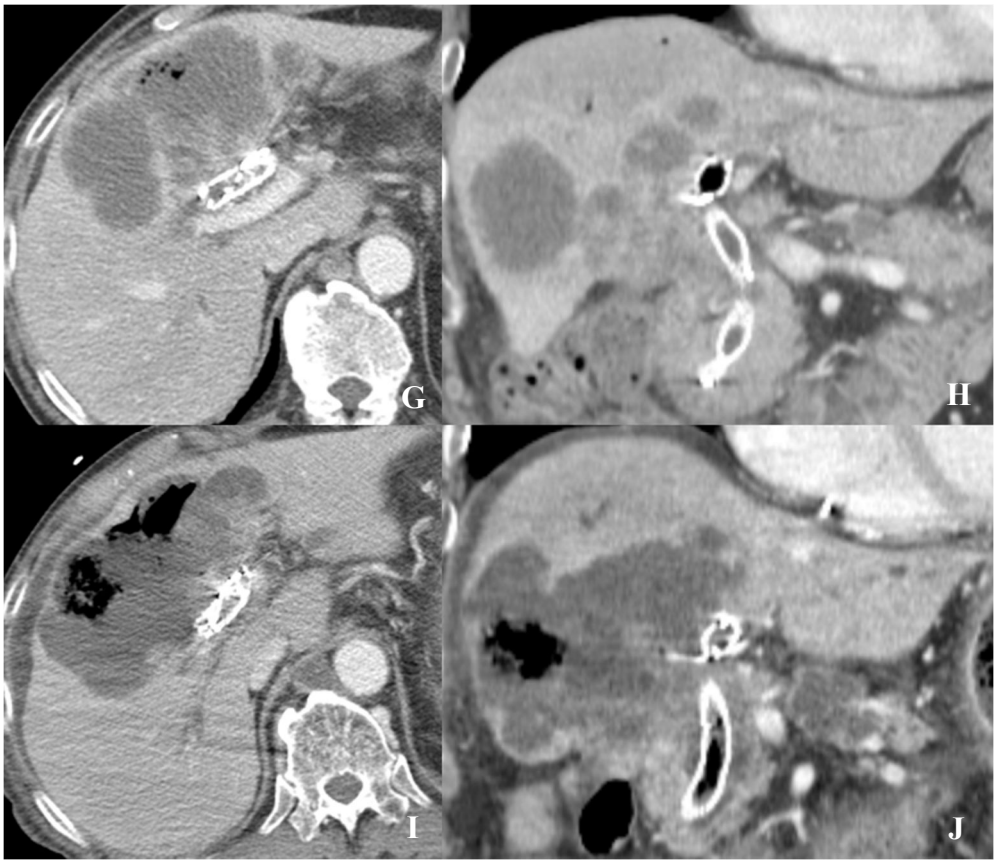


C. A catheter-directed cholangiogram revealed type IIIA malignant hilar obstruction. Separated intrahepatic ducts (IHD) are indicated with an arrow (right anterior duct, RAD), arrowhead (right posterior duct, RPD), and curved arrow (left main duct, LMD).

D. A metallic stent (10mm in diameter, 5cm in length, arrows) was placed transversely from the RPD to the LMD.

E. The guidewire was advanced to pass through the central mesh (arrowhead) of the transverse stent into the common bile duct (CBD), and the vertical stent (10mm in diameter, 10cm in length, arrows) was introduced along the guidewire and deployed.

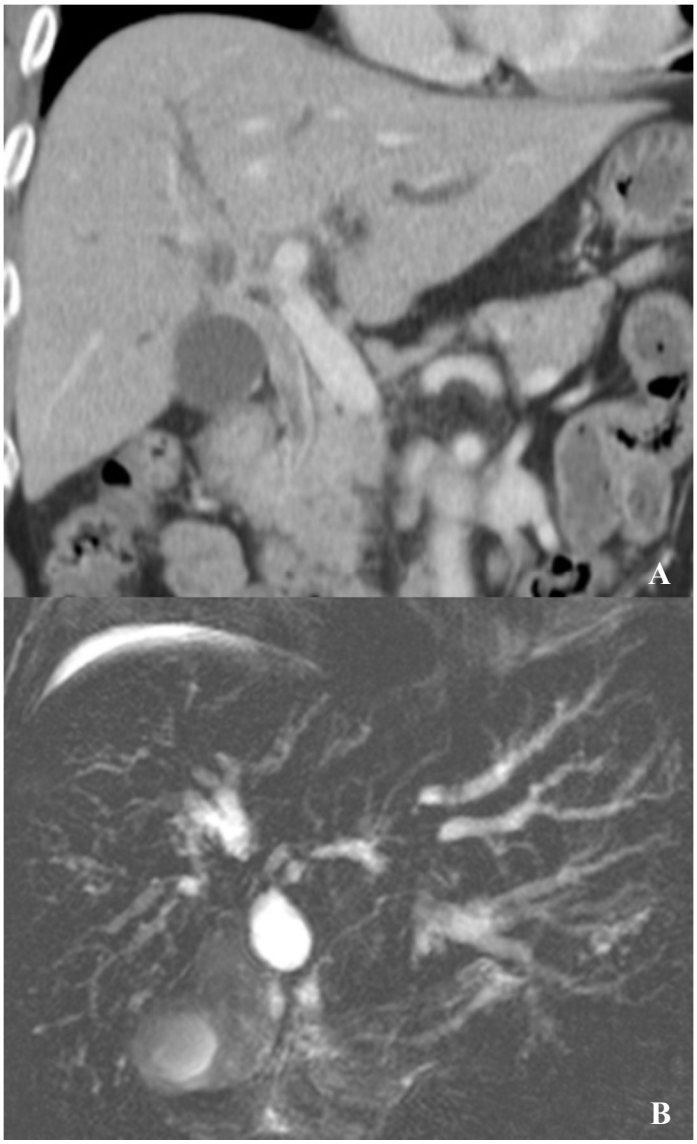
F. A cholangiogram obtained after the stent placement revealed good flow of contrast medium through the stents. Decompressed RAD (arrows) was also noted.



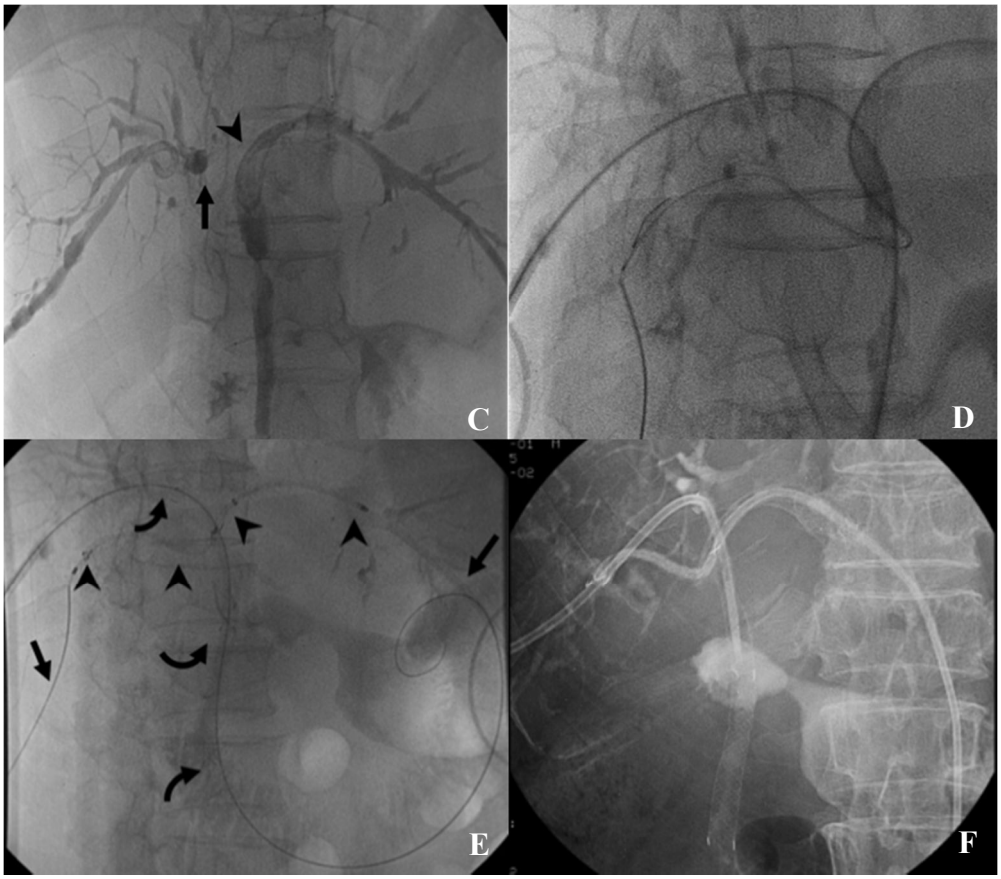
G. H. On 1-month follow-up CT axial (G) and coronal (H) images show decompression of IHD in stented section (RPD and LMD). STBL was normalized: 0.4mg/dl.

I. J. On 3-month follow-up CT axial (I) and coronal (J) images show metastatic tumor was remarkably progressed. There was no evidence of stent occlusion. STBL was 0.8mg/dl.

Figure 2. Crisscross-configured stent placement in a 64-year-old woman with cholangiocarcinoma, Bismuth type IV.



A. A contrast-enhanced CT coronal image show diffuse bile duct dilatation with hilar obstruction. STBL was 14.7mg/dl.
B. A magnetic resonance cholangiopancreatography (MRCP) image show diffuse bile duct dilatation with hilar obstruction.



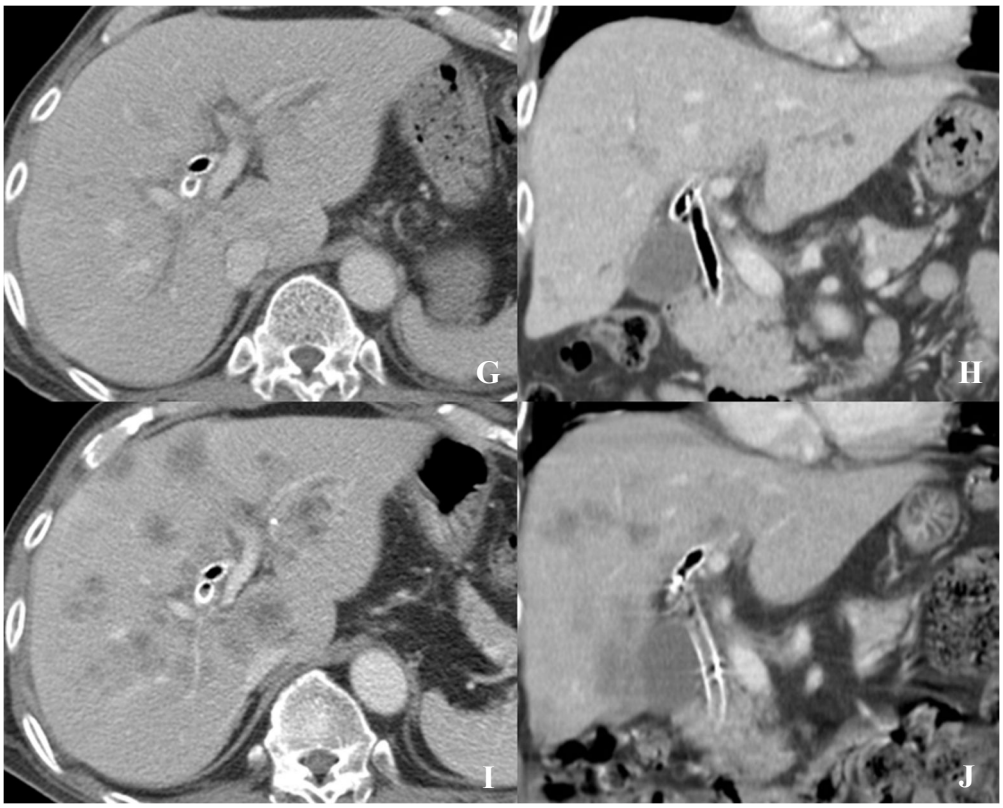
C. Two drainage catheters were inserted via B6 and B3 for bilobar drainage. A cholangiogram revealed Bismuth type IV hilar obstruction causing separation of the RAD (not opacified), RPD (arrow), segment 2, and segment 3 IHD (arrowhead). Pre-stenting STBL was 12.9mg/dl.

D. An angiographic catheter and guidewire were introduced from the left percutaneous transhepatic biliary drainage (PTBD) tract, and manipulated to cross the hilar obstruction, but failed. The dilated segment 5 IHD was percutaneously accessed and a 0.014-inch guidewire was advanced into segment 5 IHD, which was retrieved using a snare catheter from left PTBD tract.

E. A metallic stent (10mm in diameter and 8cm in length, arrowheads) was

introduced transversely to cover the segment 3 IHD and the segment 5 IHD (arrows). Another guidewire introduced through segment 6 IHD was advanced into the CBD, and the vertical stent (curved arrows) was placed.

F. A cholangiogram obtained after the stent placement revealed good flow of contrast medium through the stents. Nine days later, bilateral PTBD catheters were removed. Post-stenting STBL was 2.0mg/dl.



G. H. 1-month follow-up CT axial (G) and coronal (H) images show patent stents with complete decompression of IHDs; STBL was normalized: 1.8mg/dl.

I. J. 4-month follow-up CT axial (I) and coronal (J) images show disseminated metastatic tumors in the liver, but the stent is still patent; STBL was 1.0mg/dl.

Figure 3. Kaplan-Meier estimation of primary stent patency. A statistically significant difference was observed between the T group (blue line; median, 157 days) and the crisscross group (green line; median, 315 days) (p = .047).

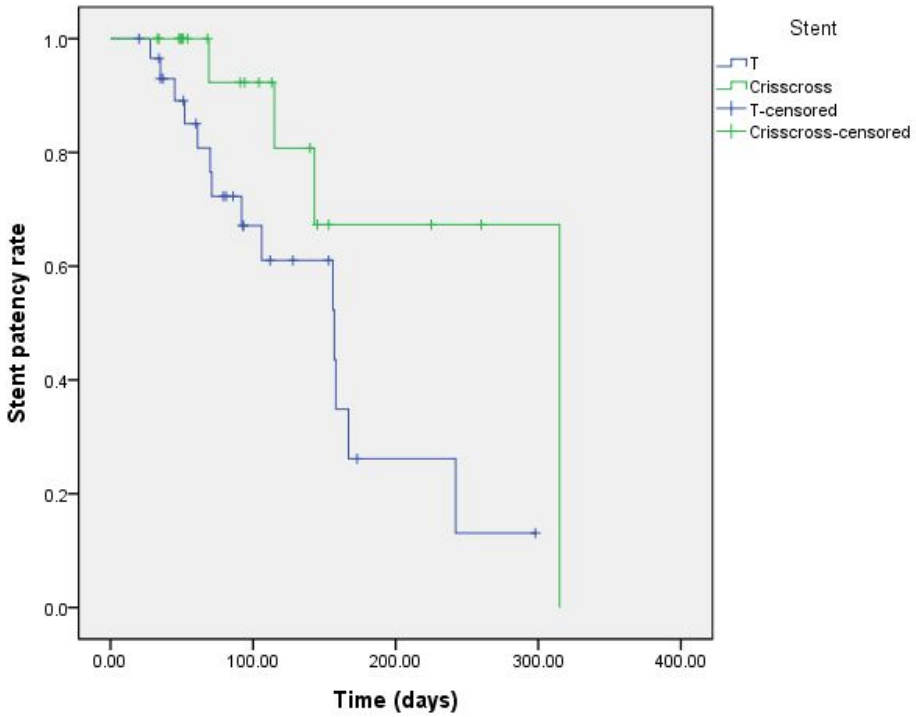
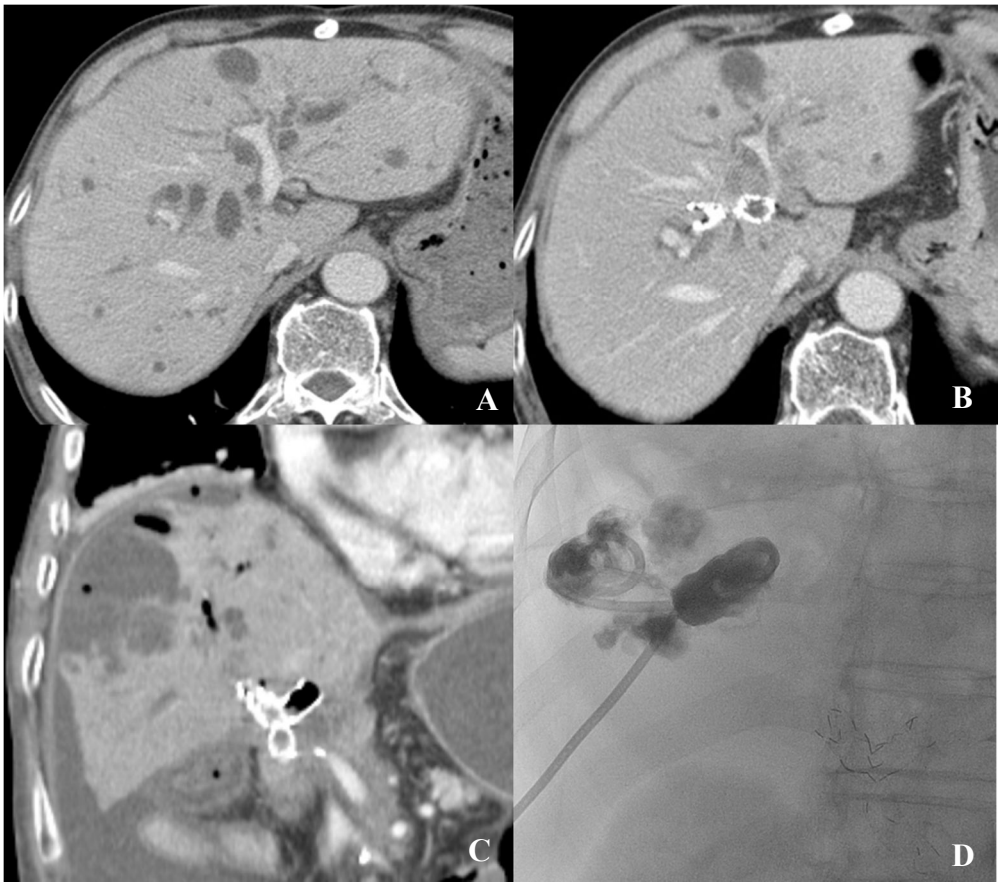
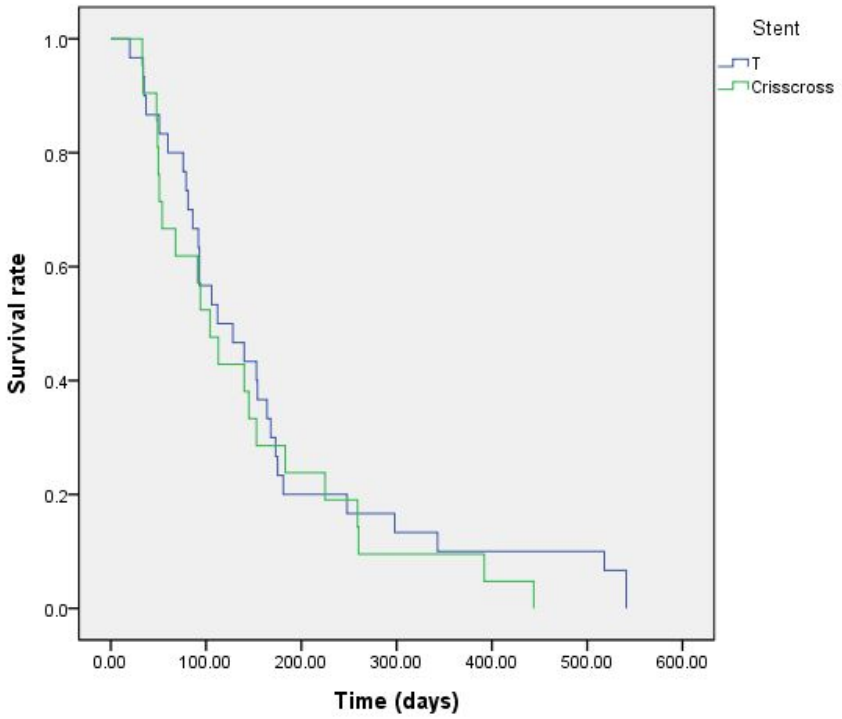


Figure 4. T-configured stent placement in a 68-year-old man with pancreatic cancer with metastasis, Bismuth type IV.



A. Diffuse bile duct dilatation with malignant hilar obstruction on CT scan. Initial STBL was 4.5mg/dl. T-configured stent deployment with two uncovered metallic stents (10mm in diameter and 6cm in length).
B. Completely decompressed biliary system was noted on follow-up CT scan, STBL was normalized: 1.2mg/dl.
C. Newly developed abscess at the undrained sector was noted on 5-month follow-up CT coronal image.
D. A percutaneous drainage catheter was inserted for abscess in initially undrained right anterior sector.

Figure 5. Survival curve. No significant difference was observed between the T group (blue line; median, 120 days) and the crisscross group (green line; median, 104 days) (p = .466).



DISCUSSION

Metallic stent placement is a widely accepted palliative treatment for malignant hilar biliary obstruction. However, there remains debate regarding unilateral versus bilateral liver drainage. Unilateral stenting can often provide adequate management of jaundice or cholangitis (7), but the necessity of bilateral stent placement has been brought up in patients with advanced hilar obstruction (Bismuth III or IV disease) because of an increased risk of cholangitis in undrained ducts. Moreover, bilateral drainage is more physiological than unilateral drainage (13-15).

Many studies regarding bilateral biliary stent placement have been published (1, 6, 8, 14, 16). T- and Y-configured stent placement involves two intrahepatic limbs connecting one right sector duct (RAD or RPD) and LHD to the CBD. However, in patients with advanced hilar tumors type III or IV, T- and Y-configured stent placement cannot effectively drain another right sector duct and leave a large liver volume undrained. To overcome this limitation, crisscross-configured stent placement was developed. This technique provides three intrahepatic limbs of the stents can drain two right-sector ducts and the LHD for "trisectoral" drainage (4).

This study demonstrated that both T-configured and crisscross-configured stenting are safe and technically feasible. However, the procedure of crisscross-configured stenting is a little bit more complicated. Especially, access to initially undrained right-sector duct (RAD in this study) can be technically challenging due to acute angulation. In this study, this technical difficulty could be solved by a

through-and-through technique. RAD was accessed with a small bore needle (21-gauge), which was safely removed after the procedure without leaving a drainage catheter. There was no complication related to bile leakage from the needle tract. Requirement of bilateral transhepatic accesses is another inevitable limitation of crisscross-configured stenting, but this was not associated with increase of complication in this study.

Clinical success was achieved in over 80% of the patients without difference between the two groups. This result suggests drainage of one right sectoral duct and LHD might be sufficient to achieve symptomatic improvement, which is in accordant with previous studies supporting unilateral drainage (8, 9, 11, 14, 17). However, 4 patients (16.0%) of T group developed cholangitis during follow-up, which eventually required re-intervention for drainage of initially undrained sector. Considering possible chemotherapy in those patients after stent placement, we believe that drainage of as much of the liver as possible is desirable.

This study demonstrated that crisscross-configured stenting provides longer stent patency than T-configuration (median 315 days vs. 157 days). Considering there were more cases of Bismuth IV lesions in the crisscross group, stent patency seems to be better than that of T group. We surmise that it would take a longer time for tumor progression to compromise three intrahepatic limbs of crisscross-configuration than two intrahepatic limbs of T-configuration. Therefore, symptoms related with stent malfunction would be manifested later in crisscross group. Another possible explanation is stent expansion is essentially side by side fashion in crisscross-configuration and stent-in-stent fashion in T-configuration;

therefore, the dilation of hilar obstruction is wider in crisscross-configuration, which may preclude re-obstruction of stent by tumor ingrowth.

Several limitations should be acknowledged in this study. First, this was a retrospective study with all its inherent limitations. Especially, The choice of T-configured or crisscross configured stenting was determined on physician's discretion. Second, this study included small population, especially crisscross group consists of only 21 patients. This may affect the statistical results comparing the two groups. Third, the baseline characteristics of the two groups were different in status of disease progression; the crisscross group had more progressed diseases. However, the stent malfunction and patency was better in crisscross group. The difference in stent patency would be possibly magnified if the two groups had similar status of disease.

In conclusion, both T-configured and crisscross-configured stent placement are safe and technically feasible techniques in patients with advanced malignant hilar biliary obstruction. Early clinical effectiveness is comparable between the two techniques. However, crisscross-configured stent placement was better than T-configuration providing longer stent patency and less requirement of re-intervention.

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국문 초록

서론: 진행된 악성 간문부담관 폐쇄 환자에서의 T-와 crisscross-configuration 기법의 경피적 스텐트 설치술의 임상적 효과를 비교한다.

방법: 2006년 4월부터 2013년 12월까지 악성 간문부담관 폐쇄 환자 중 51명의 환자에서 경피적 스텐트 설치술이 시행되었다. 이 중 30명의 환자에서는 T-configuration 기법으로 (T군), 21명의 환자에서는 crisscross-configuration 기법으로 (crisscross군) 스텐트 설치술을 시행하였다. 이 두 환자군에서 기술적 성공률, 임상적 성공률, 합병증, 스텐트 폐쇄까지의 스텐트 개방기간, 생존기간을 후향적으로 비교하였다.

결과: 양 군의 모든 환자에서 스텐트 설치술을 성공적으로 시행하였다 (100%). 종양 출혈로 인한 혈담증이 T군의 2명에서 발생하였다 (6.7%, p = .341). T군의 25명(83.3%), crisscross군의 18명(85.7%)에서 임상적으로 성공하였다 (p = .570). 경과 관찰 기간 (20–541일 [중간값, 112일]) 중, 스텐트 폐쇄는 T군의 25명 중 14명(56.0%)과 crisscross군의 18명 중 4명(22.2%)에서 발생하였다 (p = .027). T군에서 스텐트 폐쇄가 생긴 14명 중 4명에서는 스텐트로 배액되지 않았던 간 구역에 생긴 농양에 대한 추가 인터벤션이 필요하였다. 스텐트 개방기간의 중간값은 T군에서 157일, crisscross군에서 315일로 crisscross군에서 오래 지속되었다 (p = .047).

결론: 초기 임상 효과는 두 가지 담관 스텐트 설치술 기법 간에 대등하다. 그러나 crisscross-configuration 기법은 T-configuration 기법에 비해 스텐트 개방기간이 길고, 재시술의 필요성이 적어 우수하다.

주요어: 악성 간문부담관 폐쇄, 경피적 스텐트 설치술, Crisscross-configuration

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