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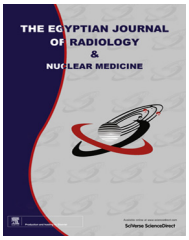

ORIGINAL ARTICLE

Evaluation of different percutaneous modalities for managing malfunctioning biliary stents

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KEYWORDS

Metal stent;
Biliary strictures;
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Abstract *Background:* There is no consensus regarding optimal management of biliary metal stent occlusion.
Aim: To evaluate the efficacy of different percutaneous methods for managing biliary metal stent occlusion.
Patients and methods: Thirty-eight patients were included in the study. Metal biliary stent occlusions were managed by insertion of another metal stent in 18 patients (group 1), insertion of an internal–external catheter in 15 patients (group 2), and mechanical cleaning in 5 patients (group 3).
Results: The clinical success was achieved with bilirubin decreased from 16.0 (7.5–34.3) to 4.1 (1.2–5.7) mg/dl ($p < 0.05$) with no significant differences among all groups. No major complications occurred. The median duration of metal stent patency was 75 days (43–107) after insertion of another metal stent (group 1), 90 days (71–109) after insertion of plastic internal–external catheters (group 2), and 54 days (30–68) after mechanical cleaning (group 3) with no significant difference. Incremental cost effective analysis showed that plastic internal–external catheters insertion is the most cost effective option.
Conclusion: Although the three methods are equally effective in managing an occluded metal stent, the most cost effective method appears to be plastic internal–external catheters insertion.

1. Introduction

Self expandable metallic stents such as Wallstent (Schneider Stent Inc., Minneapolis, Minnesota, USA) have been used for the management of biliary strictures to provide permanent bile drainage. The commercially available metal stent is a tubular stainless steel uncovered super-alloy mesh delivered in a constrained form on an 8 or 7.5 French gauge catheter system which, when deployed, expands to a final diameter of 24 or 30 French gauge (8 or 10 mm) and shortens to a length of 42, 68, or 80 mm. The stent is deployed using the Unistep system which allows easy retraction of the covering membrane after internal wetting of its inner hydrophilic coating.

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The main advantage of metal stents over plastic stents for the palliation of malignant biliary obstruction is that they have a longer patency and despite the initial cost, have been shown to be cost effective (1). Metal stents still occlude after a median interval of nine months 12 unlike plastic stents, and metal stents cannot be extracted or pushed in the duodenum.

Several methods have been used in the management of the occlusion such as insertion of another metal stent, or internal–external catheter, or mechanical cleaning. There are currently no data comparing the efficacy of the different management options and follow up of the metal stent occlusion. Such data would be useful in deciding on optimal management. The aim of our study was to compare the efficacy of different ways used to manage the occluded metal biliary stents.

2. Patients and methods

This retrospective study was undertaken in the National Liver Institute from the period of 2008 till 2013 on patients who were treated for biliary metal stent occlusion. The patients included 28 men and 10 women, with a median age of 66 years (range, 42–71 years). All primary metal stents were correctly deployed across a biliary stricture to allow bile drainage. Patients characteristics are seen in Table 1.

2.1. Procedures

All procedures were performed after informed written consents. The technique for insertion of the stents was carried out in the standard fashion (2) after doing the multi-slice CT to define the cause and level of obstruction. After selection of the proper entry site, the Chiba needle was inserted through the left/right transhepatic route to reach the dilated duct. Contrast injection was done to do cholangiography to evaluate the pathological cause. Tumor ingrowth was assumed when cholangiography showed a tight stricture within the stent, the appearance of which was similar to the original malignant stricture, and passage of a diagnostic catheter was difficult. Tumor overgrowth was assumed when cholangiography showed a new stricture proximal or distal to the stent. Debris or sludge occlusion was diagnosed when cholangiography showed filling defects within the lumen of the stent and further instrumentation showed passage of debris through the distal portion of the stent confirmed percutaneously. Stent migration was diagnosed when the site of the stent is compared to that of the previous position. When the metal stents became occluded, they were managed either by insertion of another metal stent within/beside the first one (group 1) (Figs. 1–4), an internal–external catheter within/beside the first metal stent (group 2) (Figs. 5 and 6), or mechanical cleaning of the metal stent (group 3) (Fig. 7). Mechanical cleaning was defined as passage of an instrument (balloon or catheter) to allow recanalization of the metal stent to allow biliary drainage. Plastic internal–external catheters were either the curved 10 French pigtail catheters (in 86%) (HS, Italy and Boston Scientific Medical Inc., USA) or the straight Maliicot catheters (in 14%) (Wilson-Cook Medical Inc., Winston-Salem, North Carolina, USA).

2.2. Study of endpoints and definitions

Follow up data were obtained from the patient's medical record and/or by contacting their primary care physician. Management of the metal stent occlusion was considered successful if there was clinical improvement with a significant fall in bilirubin following intervention. Second biliary patency represented the interval between the time of treatment of the stent occlusion and the time of its re-occlusion or the death of the patient with jaundice and fever. Survival represented the interval between the time of treatment of the metal stent occlusion and the patient's death. Death without jaundice or sepsis was assumed to be due to causes other than stent occlusion. All complications of the procedure were divided into major and minor categories according to the reporting standards of the Society of Interventional Radiology. Major complications included postprocedural sepsis or cholangitis, hemorrhage requiring blood transfusion, abscess, peritonitis, cholecystitis, pancreatitis, pneumonia or pleural infection. All other complications were considered minor, including self-limited hemorrhage, biliovenous fistula, subcapsular biloma, catheter dislodgement, and stent migration, which were all either treated promptly with simple maneuvers by the interventionist or did not require further intervention, blood transfusion, or an extended stay in the hospital. The cost for all treatment strategies differed only with respect to the specific equipment price.

Table 1 Patient characteristics on entry to study (n = 84).

Parameter Liver and renal functions	Group 1 (n = 18) Mean + SD	Group 2 (n = 15) Mean + SD	Group 3 (n = 5) Mean + SD
– Bil T	28 ± 9	28 ± 9	26 ± 8
– ALT	189 ± 112	189 ± 112	211 ± 145
– AST	233 ± 18	233 ± 18	202 ± 17
– ALK	1079 ± 125	1079 ± 125	1214 ± 133
– Creatinine	1 ± 0.2	1 ± 0.2	1.1 ± 0.12
Co-morbid diseases			
– HCV	4	3	1
– Diabetes	0	0	0
– Cardiac	1	1	0
Causes of obstruction			
– Distal	14	12	4
– Hilar	5	2	1