A New Exchangeable Long Biliary Endoprosthesis for Percutaneous Transhepatic Internal Drainage

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Abstract

A newly devised long biliary stent which can be removed by only a small skin incision was applied to the patients who have obstructive jaundice. This long stent showed many advantages compared to the conventional short stent. A survival period as well as complications were also discussed.

Introduction

Nonsurgical biliary decompression using an endoprosthesis is a widely accepted interventional technique in the treatment of obstructive jaundice¹⁻¹⁰⁾. Complications requiring catheter change include dislodgement, endoprosthesis obstruction due to sludging or tumor growth, acute pancreatitis and erosion of the duodenal mucosa^{1, 11-14)}. Several innovative methods for endoprosthesis removal have been reported^{1, 2, 16-18)}. However, these are not always successful, and some patients have required an external drainage catheter placed parallel to the non-functional endoprosthesis.

We have devised a new long endoprosthesis with a securely fixed proximal end button which permits removal of the endoprosthesis by only a small skin incision. The unique aspect of this device is the extension of the endoprosthesis to the subcutaneous tissue and the button which is inserted into the proximal end.

Materials and Methods

Equipment

A new 12 French endoprosthesis stent and a subcutaneous button were fabricated from a biocompatible polymer. The stent has two large distal holes and a gentle distal curve to conform with the duodenal wall (**Fig. 1**).

Insertion

The technique for biliary decompression in malignant obstructive jaundice by cannulation of a dilated intrahepatic duct and the passage of various guides and cannulae have been well described^{12, 19-23}. We use this established technique for placement of our new endoprosthesis. In the usual manner, a guide wire is used to determine the distance from the skin surface to the duodenal lumen and the pre- and post-stenotic portion lengths. Using these values, the endoprosthesis is modified by perforating it with numerous side holes proximal and distal to the obstruction (**Fig. 2**).

In cases with high or middle stenosis/obstruction, the distal tip can be easily straightened by heating it and the stent tip can be placed within the papilla.

The tract is then dilated with a 12 French dilator, and the endoprosthesis is passed over the guide wire to a point just beyond the stenosis or the ampulla. The position is determined radiographically using contrast medium. After determining the proper positioning of the endoprosthesis, the proximal end is cut at the level of the skin surface.

Fig. 1 Long endoprosthesis and silicon button

Fig. 2 Demonstration of side hole punching

Fig. 3 Picture of button inserted into the end of the endoprosthesis and secured with nylon suture

The silicone button is placed in the proximal end and tightly secured with a nylon suture (Fig. 3).

The endoprosthesis is advanced one centimeter to permit closure of the skin. The proximal end of the endoprosthesis is buried under the skin. To prevent dehiscence of the suture line, both the subcutaneous tissue and skin are sutured over the button. No external temporary drainage is necessary (Fig. 4).

Removal

To remove the endoprosthesis, a small incision is made over the subcutaneous button, exposing the proximal end of the endoprosthesis and permitting removal. If desired, a guide wire may be passed through the catheter into the post-stenotic area or duodenum prior to removal.

Fig. 4 Schematic of endoprosthesis in place

Results

Internal biliary drainage using an endoprosthesis was performed in 79 patients.

Our overall success rate was 97% (77 of the 79 patients). The median survival time in our series was 29 weeks, and during the survival period they were able to stay at home in good condition for a mean of 11 weeks.

The conventional short endoprosthesis was indwelled in 25 patients, whereas, our newly devised long endoprosthesis was used in 52 patients. The disease states for which those two types of endoprosthesis were inserted are shown in Table 1.

Table 1 Diseases for which Insertion of Endoprosthesis were Attempted

Carcinoma of the bile duct	40 cases
Carcinoma of the pancreas	16 cases
Malignant insulinoma.....	1 case
Primary hepatoma	2 cases
Metastasis/invasion to the porta hepatis	
from gallbladder ca.	6 cases
from gastric ca.	12 cases
from colonic ca.	1 case
from osteogenic sarcoma	1 case
Total	79 cases

Table 2 COMPLICATIONS (n : 77)

(Initial)	(Late)
Pancreatitis 2 cases	Dislodgement 5 cases
Dislodgement 3 cases	Obstruction/infection 16 cases
Obstruction 1 case	Courvoisier's sign 4 cases
Duodenal ulcer 1 case	Failure of the sutures 7 cases
Infection 2 cases	

Table 3 COMPLICATION

	Short stent (n : 24)	VS	Long stent (n : 27)
Infection/Obstruction	6		10
Dislodgement	6		2
Failure of the suture	0		7

The complications encountered are listed in **Table 2**, and also the comparative complication rates of the two types of endoprosthesis were analyzed in 51 patients who were followed up until death (**Table 3**).

Catheter removal or change was necessary in 12 of the 24 patients treated with a conventional short endoprosthesis and in 19 of the 27 patients in the new long endoprosthesis group.

Several patients in whom the inserted conventional short endoprosthesis had to be done exchanged were treated by means of an endoscopic approach or repeated percutaneous trans-hepatic external approach. The remaining patients were untreated because of difficulty in exchanging the endoprosthesis.

For the patients treated with the new long endoprosthesis, the exchange rate of the stent was 70%. This rather high incidence was mainly due to the ease of changing it by only a small skin incision, compared to the conventional short endoprosthesis (50%).

However, the ratio of malfunction of these two types of endoprosthesis did not show a big difference in the ratio of malfunction.

Discussion

Decompression of obstructive jaundice by means of an endoprosthesis is an established intervention. Wide-bore catheters maintain better patency and position. However, endoprosthesis dysfunction requiring removal of the device occurs frequently (35 of our patients). Due to the difficulty of removal of the standard biliary drainage endoprosthesis, we have devised a new long biliary endoprosthesis with a fitted proximal end button. This device can be secured

under the skin and removed through a small skin incision.

The unique aspect of this system is the extension of the proximal end of the catheter to the subcutaneous tissue. Initially, we were concerned about this proximal dead space becoming a focus for infection. However, in our experience, infection occurred in only 10 cases (37%). Distally, the stent function of the endoprosthesis has been similar to other wide bore catheters in established use^{23-25).}

We have found this endoprosthesis to be easier to remove than the device reported by Miskowiak et al.¹⁶⁾, a subcutaneous button connected by a transhepatic suture to the biliary endoprosthesis. The advantages of our new long endoprosthesis with its inserted proximal end button are its stability of position due to its length and its ease of removal through a small skin incision. In 19 cases, it has shown its safety, reliability, and ease of removal.

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