Original article

Obstructive jaundice: results after percutaneous transhepatic insertion of self-expandable metallic endoprotheses

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SUMMARY

***Background*: Evaluation of the efficacy of the percutaneous transhepatic insertion of metallic endoprothesis in 53 patients with biliary obstruction.**

***Materials and methods*: From September 1994 to December 2001, 83 patients with obstructive jaundice, 79 with malignancy and 4 with benign obstruction, aged 29-92 years (mean age 67,3 years), attended the Radiology Department of our hospital. In 3 patients, the findings of percutaneous cholangiography did not indicate any further access. 68 metallic stents were implanted in 53 out of the 80 remaining patients, whereas the other 27 patients were treated with percutaneous biliary drainage: external drainage was performed in 21 patients in order to assist a following operation, and a combined internal-external drainage in 6 patients. Hemobilia occured in one patient and required embolization of the right hepatic artery. In 5 cases a new procedure was needed because of the occlusion of the endoprotheses after 40-278 days.**

***Results*: Clinical improvement and decrease in serum bilirubin levels was achieved in all patients. The survival time in patients with malignancy ranged between 6 to 485 days (mean survival time 139 days). Obviously, the patients who were treated with implantation of an endoprothesis had a better quality of life in comparison to those treated only with external or internal-external drainages and were not subsequently operated.**

***Conclusion*: The percutaneous transhepatic insertion of metallic stents is proved to be an efficient and secure method of biliary obstruction treatment, particularly in malignant inoperable cases.**

Key-words: metallic endoprothesis - biliary obstruction - percutaneous drainage

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INTRODUCTION

The biliary tract may be approached: a) through an open surgical tract, b) perorally through the duodenum *and* c) through a percutaneous-transhepatic tract[1]. In this report, we performed the percutaneous transhepatic approach of the biliary tree in cases of obstruction, mainly due to malignancy. The method was used in order to decompress the biliary tract a) preoperative via an external or an internal-external drainage *and* b) in unresectable tumors by inserting a self-expandable metallic endoprothesis.

MATERIALS AND METHODS

From September 1994 to December 2001, 83 patients (48 men and 35 women) with a mean age of 67,3 years (29-92 years) attended the Radiology Department of our hospital, suffering from obstructive jaundice and/or acute cholangiitis, with indication of percutaneous transhepatic biliary drainage and/or placement of a metallic stent. In 3 out of the 83 patients the results of a percutaneous cholangiography did not indicate any further procedure (2 patients with misdiagnosis of obstruction and 1 with a type III stenosis because of cholangiocarcinoma and sclerosing cholangiitis with no way of access way).

In 18 out of the other 80 patients a preoperative external drainage was indicated (the number of preopera-

tive drainages decreases yearly and nowadays is almost zero). Three other patients with indication of endoprothesis placement, which finally failed because the duodenum could not be approached, were also treated only with external drainage. Hemobilia occurred in one of the above mentioned 18 patients after the percutaneous transhepatic approach, which did not allow any further procedure. This case was treated the same day with embolization of the right hepatic artery.

A percutaneous internal-external drainage was indicated in 6 patients. The cause of the obstruction was malignant in 5 of them (Table 1), whereas in 1 it was benign and had to do with paraportal masses due to von Reklinghausen disease. This patient was treated with a bilateral internal-external drainage through a right and left approach.

68 self-expandable metallic endoprotheses were implanted in 53 patients. In 50 out of the 53 patients the occlusion was of malignant etiology (Table 2), whereas metallic stents were placed in 3 patients with benign biliary obstruction, caused by stenosis of a choledochojejunostomy. In 2 patients, before the insertion of the metallic endoprothesis, a plastic one was removed towards the small intestine with a 'lasso' technique (Figure 1).

In the patients who underwent an endoprothesis insertion, the stenosis of the biliary tract was of type I in 23 patients, of type II in 28 patients and of type III in 2 patients (Figure 2). The whole procedure was performed by a right approach in 34, by right and left approach in 10 and by left approach in 7 patients, whereas in one patient the procedure started with a left approach and was followed by a right one due to failure in catheteriza-

Table 1. Causes of biliary obstruction in patients who were treated with internal-external drainage

Cause of obstruction	Patients
Cholangio-Ca	3
Pancreas Ca	1
Common bile duct Ca	1
Benign: von Reklinghausen	1

Table 2. Causes of biliary obstruction in patients who were treated with metallic endoprotheses

Cause of obstruction	Patients
Pancreas Ca	12
Cholangio-Ca	12
HCC	6
Ca of stomach	5
Ca of gallbladder	2
Ca of Vater	2
Ca of the duodenum	1
Liver metastases	3
Leukemia nodules	1
Lymph nodes	1
Unknown mass	5
Benign:choledochojejunostomy stenosis	3

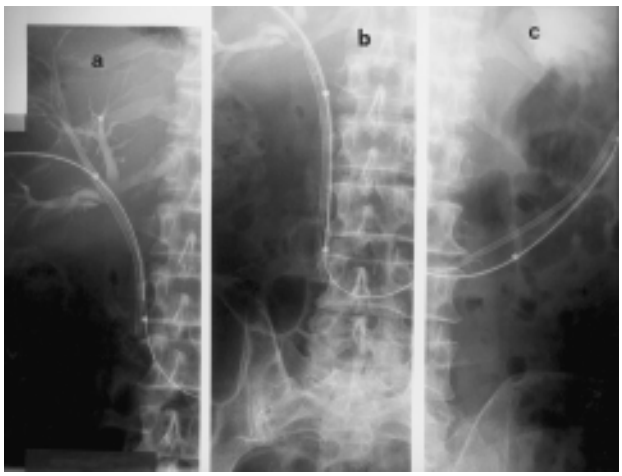

Figure 1. Percutaneous access of duodenum with a sheath and a folden guide-wire, arrest of the end of the plastic endoprothesis, and removal towards the small intestine.

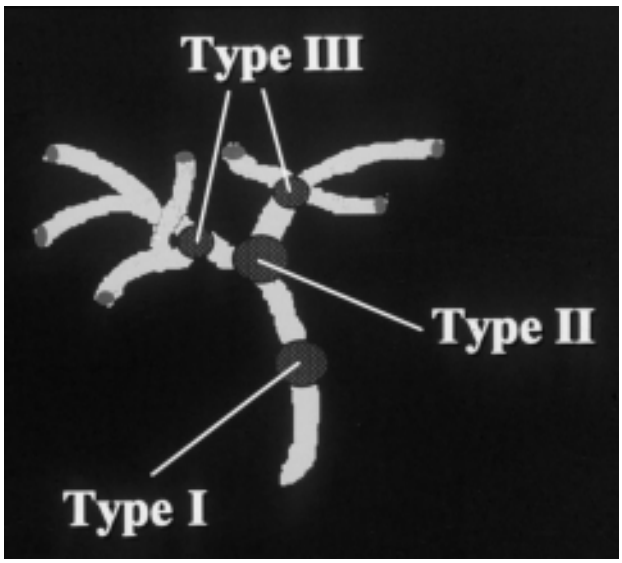

Figure 2. Schematization of the type of biliary stenosis according to its location in the biliary tree.

tion. In another patient the procedure was performed through the biliary T-tube dermal stoma. In 5 out of 30 patients with a type II or III biliary stenosis, 2 metallic stents were inserted in each in a T-type way (Figure 3) only by right approach, whereas in 10 of the remaining 25 patients 2 metallic endoprotheses were needed in each case with right and left approach (Figure 4). In the other 15 patients with type II occlusion, only the main hepatic lobe was drained, usually the right one, in order to decompress the other lobe, only in cases of cholangiitis or poor decrease of the bilirubin levels (Figure 5).

RESULTS

The endoprotheses patency after their insertion was satisfactory in all patients. Clinical improvement and significant decrease of hepatic enzymes and bilirubin levels was achieved in all patients.

Perihepatic bile collection occurred in one patient on the 7th day after the procedure, followed by percutaneous drainage under ultrasonographic guidance. Severe hemobilia occurred in one patient on the day of the intervention, necessitating urgent embolization of the right hepatic artery. 6 out of the 53 patients with metallic endoprotheses (6/53 or 11.3%) presented again with signs of biliary obstruction 40 to 278 days later (mean primary patency 129 days). The percutaneous insertion of new stents was successful in 4 cases, but failed in the other 2 cases. In one patient with benign biliary obstruction (stenosis of a choledochojejunostomy) the metallic en-

Figure 4. Percutaneous insertion of a metallic endoprothesis in the two main hepatic ducts (right and left) with access from the right intercostal spaces and the epigastrium in a patient with type II stenosis (infiltration of the porta hepatis by Ca of stomach).

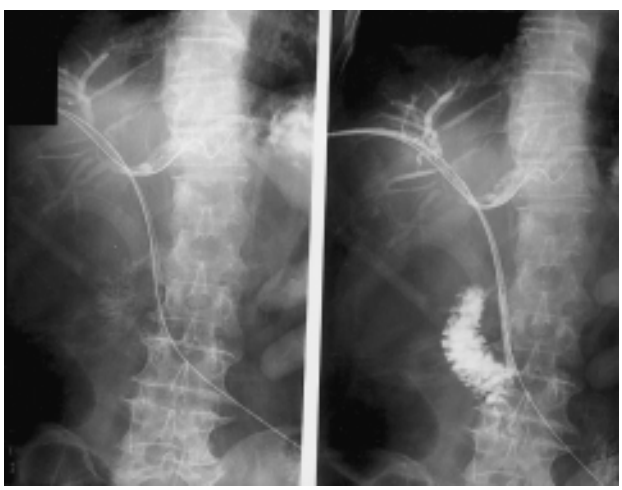

Figure 3. Percutaneous insertion of 2 metallic endoprotheses with right approach (T- type) in patients with type II biliary obstruction.

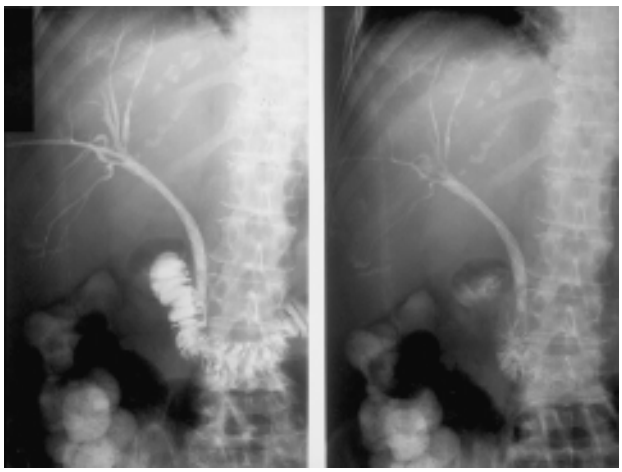

Figure 5. Percutaneous insertion of metallic endoprothesis in the right hepatic duct towards the duodenum with a right intercostal access in a patient with type II stenosis (cholangio-Ca).

doprothesis became obstructed after two years and two new endoprotheses were inserted. The mortality within 30 days was 7.5% (4/53), a percentage which agrees with the literature[10,13]. None of the deaths was a result of acute hemorrhage or sepsis related to the procedure, but rather to the underlying disease itself or other causes. The survival time of patients with malignancy ranged between 6 to 485 days (mean survival time 139 days).

DISCUSSION

The obstruction of the biliary tree can be palliated sufficiently with a percutaneous drainage and/or endoprothesis insertion[2-4]. The most common types of drainage catheters are the external and the internal-external, inserted either before an operation in order to decompress the biliary system or before chemotherapy with factors which are excreted through the biliary system, for palliation of a non-accessable obstruction, as a preparation method before the implantation of an endoprothesis and also in cases of benign diseases in high-risk patients[1,3,5].

Endoprotheses are inserted into the biliary system in patients with irresectable neoplasms, which cause obstruction to the bile flow, in order to decompress it. Under certain circumstances they may be used in cases of choledocholithiasis in high-risk patients or in complex benign biliary strictures, such as secondary strictures after pancreatitis, strictures of choledochojejunostomy and sclerosing cholangitis[7,9]. The advantages of the endoprotheses are the absence of the external catheter, which surcharges these already stressed patients, and the minimal possibility of contamination of the tube. There are two types of biliary endoprotheses: the plastic and the metallic[4,7,10-13]. The plastic stents have been used for a long time, but are prone to several complications, such as migration of the stent (15%), cholangitis and occlusion due to bile encrustation. Furthermore, when the distal end of the stent protrudes inside the duodenum, it may cause lesions to its wall. The insertion of plastic stents has certain technical difficulties as well: in order to avoid their occlusion, the use of large stents is necessary, which requires a large transhepatic tract, which is associated to a greater incidence of hemobilia[4,7,9,11].

The main advantage of the metallic endoprotheses is that they can be inserted through a small calibre percutaneous transhepatic tract (7F), which decreases the possibility of hemobilia, and that they achieve, when they are fully expanded inside the biliary tree, a large internal lumen (24-30F equal to 8-10mm). This prevents their occlusion due to bile encrustation. As the metallic stents are embedded in the bile duct wall, the chance of a possible migration is extremely low. Another advantage is that more than one stent can be implanted through one transhepatic tract[4,5,7-9,12].

However, the procedure has a number of potential complications involving bleeding, biloma, cholangitis, skin infection, hemobilia, pancreatitis, peritonitis, sepsis[1,3,4,6-8]. Transient hemobilia may occur due to vessel wall lesions, which can lead to a vessel-bile duct fistula. Therefore, many authors believe that it is prudent to leave an external biliary drain in place for 24-48 hours before the insertion of the stent[5,12]. Massive bleeding in the biliary tree may be palliated by replacing the catheter with another of a greater diameter. If the bleeding persists, an arteriography is indicated in order to locate the lesion and selectively embolize according to the findings[14].

The number of stents needed in order to decompress the biliary tree in case of occlusion, depends on its type (Figure 2). In type I occlusion an endoprothesis is inserted into the common bile duct, either from the left or the right side (Figure 6). Type II occlusion is treated by inserting 2 stents, one in each hepatic duct (Figure 3). Finally, a stent is implanted in every occluded hepatic duct, in case of type III occlusion. However, in fragile patients with a type II obstruction we performed decompression of almost half of the liver using only one stent and the bilirubin serum levels decreased significantly. Furthermore, cholangitis did not occur in the rest of the biliary tree indicating that further procedures were not necessary, thus reducing the possibility of complications (Figure 5).

Figure 6. Percutaneous insertion of metallic endoprothesis in the distal segment of the common bile duct with a right approach in a patient with a type I stenosis (pancreas Ca).

Occlusion remains the main complication of metallic stents, which can be caused by sludge, bile encrustation, ingrowth or overgrowth of the tumor through the endoprothesis. The changes produced by the stent on the wall of the bile duct consist of focal denundation, proliferation of the mucosa associated with chronic inflammation and fibrosis of the submucosa, acting additionally to the ingrowth of the tumor[8,9].

The symptoms of the obstruction of the stents do not differ from those of the obstruction of the biliary tree, that is, cholangitis, fever and jaundice. In addition to them, bile leak may occur at the contaminated end in the case of the existence of an external catheter because of the increased pressure inside the biliary system[11]. An effective way of dealing with this complication is the insertion of a second endoprothesis through the preexisting one.

In conclusion, metallic endoprotheses in patients with malignant or benign obstruction seem to be patent for a significant period of time and in case of percutaneous implantation appears to decreased the frequency of complications.

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