Endoscopic insertion of biliary stents in 18 patients with metallic duodenal stents who developed secondary malignant obstructive jaundice

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SUMMARY

Aim — The aim of this work was to evaluate the feasibility of endoscopic insertion of biliary stents in patients with duodenal stents who develop secondary malignant obstructive jaundice.

Patients and methods — The study population included 133 patients with unresectable malignant duodenal obstruction. In 106 patients a biliary stent was inserted before or at the same time as the duodenal stent. Malignant biliary obstruction appeared secondarily in 18 patients; fifteen of these patients already had a biliary stent. We present our experience of biliary stent insertion in these 18 patients with metallic duodenal stents.

Results — Biliary obstruction was successfully alleviated in 17 out of 18 patients (94%) without complication. Insertion of a new biliary stent failed in one patient because the mesh of the duodenal stent passed over the metallic biliary stent already in place. Mean duration of endoscopic insertion was 95 minutes (range: 60 - 180). All patients remained free of biliary complications to death (57 days, range: 30 - 120).

Conclusion — Our report shows that endoscopic insertion of a biliary stent is feasible in patients who have metallic duodenal stents. Technical difficulties exist especially if the mesh of the duodenal stent passes over the papilla.

Endoscopic insertion of self-expandable metallic enteral stents (either duodenal or gastro-duodenal) has been shown to be a reliable and reproducible method for palliation of unresectable malignant upper gastrointestinal obstruction [1-4]. Most patients develop duodenal obstruction secondary to growth of a malignant tumor head of the pancreas. Prior palliation with a biliary stent inserted after an inaugural episode of jaundice is common. In the event of concomitant obstruction of the common bile duct and the duodenum, it is recommended to insert the biliary stent first, either using a first-intention metallic stent or by replacing a former plastic stent, then to proceed with insertion of the duodenal stent during the same endoscopic procedure [1-5]. Occasionally however, biliary obstruction is secondary, developing in patients whose survival has been prolonged with increasingly effective treatment of the gastrointestinal cancer. We report our experience with endoscopic insertion of a new metallic biliary stent in patients who already have a duodenal stent.

Methods

One hundred thirty-three consecutive patients were seen from June 1997 to December 2003 for symptomatic duodenal obstruction due to an unresectable malignant tumor (pancreatic cancer; 75%). Curative surgery not being a valid option, endoscopic palliation using one or more self-expandable metallic duodenal stents was proposed after a collegial discussion between the referring gastroenterologist and the university oncologists and surgeons. Patients and/or their family were given appropriate information and patients provided their informed consent for endoscopic treatment.
Various models of non-coated duodenal endoprostheses were used. Diameters ranged from 18 to 22 mm with lengths from 6 to 9 cm. For the initial patients (up to March 1998), we used Schneider stents (Bülach, Switzerland). We then switched to Enteral Wallstent® (Boston Scientific, Watertown, MA) during the same endoscopic procedure, we inserted a metallic biliary Wallstent® (Boston Scientific, Watertown, MA) in 84 patients who had concomitant biliary obstruction due to tumor progression. For 22 other patients, a formerly inserted plastic biliary stent was removed and replaced with a metallic stent before insertion of the duodenal stent. This precaution was necessary because insertion of a duodenal stent may cover the papillary orifice and prevent later replacement of a plastic biliary stent in the event of secondary obstruction.

Eighteen patients (11 men and 7 women, mean age 72 years; range: 60-83) were subsequently hospitalized after the development of secondary purpuric jaundice or cholangitis; mean time after the prior endoscopic treatment was 56 days (range: 25-280). Endoscopic cannulation of the biliary ducts was undertaken. Various problems were encountered and for the purpose of the present study, these 18 patients were divided into four categories (figures 1 and 2) by order of increasing difficulty. Group I included three patients who already had a biliary stent below the duodenal stent. Group II was composed of two patients with a duodenal prosthesis above the papilla which had not been cannulated due to the lack of jaundice or cholestasis. In the eleven patients in Group III the mesh of the duodenal stent passed over a metallic biliary stent. Group IV included two patients without a biliary stent whose duodenal stent passed over the papilla. An endoscopic procedure was attempted under general anesthesia (propofol) using Olympus duodenoscopes TJF 140 and JF 140R (Tokyo, Japan). Selective biliary cannulation was achieved with a triple-lumen Tritome® spincterotome (Cook, Winston-Salem, NC) or a single-lumen Contour® catheter (Boston Scientific, Watertown, MA) using a rigid guidewire with a hydrophilic tip (Jag Wire® Boston Scientific, Watertown, MA, or Metro II® Cook, Winston-Salem NC). A 6-mm hydraulic dilatation balloon (Boston Scientific, Watertown, MA) was used as needed to

![Diagram of patient groups](image-url)

**Fig. 1** – Patient groups defined by order of difficulty in cannulating the common bile duct. Group I (3 patients): lower end of the duodenal stent above the biliary stent — Group II (2 patients): lower end of the duodenal stent above the papilla which had not been cannulated previously — Group III (11 patients): duodenal stent passing over the metallic biliary stent — Group IV (2 patients): duodenal stent passing over the papilla.

**Fig. 2** – Illustration of the different situations according to patient group. a — Group I: lower end of the duodenal stent above the biliary stent; b — Group II: lower end of the duodenal stent above the papilla which had not been cannulated previously; c — Group III: stent passing over the metallic biliary stent; d — Group IV: duodenal stent passing over the papilla.

Présentation schématique des différentes situations anatomiques selon les groupes de patients traités. a — Groupe I : la prothèse biliaire est située en dessous de la prothèse duodénale ; b — Groupe II : massif papillaire jamais cathétérisé, situé en dessous de la prothèse duodénale ; c — Groupe III : prothèse biliaire métallique recouverte par la prothèse duodénale ; d — Groupe IV : massif papillaire jamais cathétérisé recouvert par la prothèse duodénale.
Technique

The duodenal or gastroduodenal stent was patent in all patients; thus the duodenoscope could be inserted without prior dilatation. The techniques used to remove the biliary obstruction are presented in Table 1 according to patient groups. The selective biliary cannulation was achieved in the five patients in groups I and II using a hydrophilic guidewire in a single-lumen catheter or a triple-lumen sphincterotome. Expansion of the biliary stent was uneventful in these patients. In order to facilitate insertion of the biliary stent through the mesh of the duodenal stent in the thirteen difficult cases (patients in groups III and IV), the metallic mesh of the duodenal stent covering the papilla was spread apart by erection of the sphincterotome, or in three patients by balloon dilatation, after insertion of the guidewire into the common bile duct (figure 3). For one of the patients in group III, in order to facilitate progression of a new biliary stent into the lumen of the biliary stent already in place, argon plasma had to be used to section the metallic mesh of the duodenal prosthesis covering the initial biliary stent (without immediate complications). Despite these techniques, insertion of the metallic biliary stent was successful in only twelve of these thirteen patients (10/11 in group III and 2/2 in group IV). The one failure occurred because the metallic mesh of the duodenal stent prevented progression of the new biliary stent. The guidewire was successfully inserted into the main bile duct, but dilatation of the balloon and erection of the sphincterotome both failed to open the mesh. This patient underwent a second procedure for radio-guided percutaneous insertion of a metallic stent which was successful.

Mean duration of the endoscopic procedure was 95 minutes (range: 60-120). None of the patients developed recurrent jaundice and all were followed to death. There were no complications directly related to the endoscopic procedure. None of the patients developed duodenal obstruction.

Discussion

Our experience demonstrates the feasibility and reproducibility of endoscopic treatment of biliary obstruction in patients with a metallic duodenal or gastroduodenal stent already in place. The rate of success achieved by two senior gastroenterologists (RD and JFD; having performed >7000 and >1500 endoscopic retrograde cholangiopancreatic procedures respectively) was 94%.

Tumor invasion of the duodenum worsens the prognosis of gastrointestinal cancers, particularly pancreatic cancers [8]. Several studies have demonstrated the superiority, in terms of morbidity and mortality, of endoscopic palliation of malignant biliary obstruction, in comparison with surgery [9-11]. It was also recently shown that palliative treatment with a metallic stent is superior to surgery for obstructions resulting from pancreatic tumors invading the duodenum [4]. The risk of recurrent jaundice is low after insertion of two metallic stents, one in the duodenum and one in the common bile duct. In our series of 133 consecutive patients treated with duodenal stents (including 106 who also had a biliary stent), only 18 (13.5%) developed recurrent jaundice due to secondary biliary obstruction. In all 18 this occurred late in the disease course (less than two months on average before death). The frequency of this type of obstructive complication can nevertheless be expected to increase due to continuing progress in the treatment of gastrointestinal cancers enabling not only improved quality-of-life for these patients, but also longer survival [12].

The fact that this endoscopic technique is reproducible should not overshadow the difficulties encountered. The first problem is to get the duodenoscope through the lumen of the duodenal endoprosthesis. Tumor invasion is not infrequent and the endoscope sheath may be damaged by the wire mesh of the proximal prosthesis. We did not however have to dilate the duodenal prosthesis with the balloon to achieve insertion of the duodenoscope. It is essential to know the inner diameter of the enteral stent before choosing the duodenoscope. For example the Olympus JF 140K endoscope (Tokyo, Japan), which measures 12.6 mm, is much easier to pass through a 22-mm stent than an 18-mm stent. However even with large diameter stents, it is not easy to orient the duodenoscope to correctly enter the papilla.

The second problem is to cannulate the common bile duct or enter the lumen of an endoprosthesis already installed in the duct. We were able to insert a guidewire, then the new metallic stent (Wallsten®, in all our patients in groups I and II whose duodenal stent was situated above the papilla; the insertion was particularly easy for those who also had a biliary stent [13]. However for the patients in groups III and IV, i.e. when the mesh of the duodenal stent ran over the papilla, it was very difficult to insert the guidewire into the bile duct; the task being even more difficult in patients who did not have a biliary stent in place. When the guidewire was successfully inserted, it was sometimes very difficult to glide in the new prosthesis which often caught on the mesh of the duodenal stent. We thus found that spreading apart the duodenal mesh with the balloon or erection of the sphincterotome can be useful before attempting to expand the new stent [6]. However, the Enteral Wallsten® has shape memory and dilatation is not very effective. It is sometimes easier to insert the non-expanded stent by starting perpendicular to the mesh surface. This gives a wider surface area when crossing through the duodenal stent. It is also possible to destroy the steel or nitinal mesh wires using plasma argon. Since our earlier publication [7], we have used this method to section 31 stents, mostly biliary stents, and have had no complications (personal data). The method can be tried for duodenal meshes covering the papilla, again in order to facilitate progression of the biliary stent. In this situation however it is difficult to back up the duodenoscope far enough to correctly aim the argon fire. Moreover, there is the risk of coagulation complications since the mesh wires to be sectioned run parallel and close to the duodenal wall. Theoretically, the recently introduced wider mesh stents (Hanaro®, Lifepartner), which can be inserted through the operator channel via a gastroduodenal approach, offer a way of alleviating these
problems when inserting the biliary stent in group III and IV patients. But compared with the Enteral Wallstent®, the wider mesh stents have lesser expansion force and leave more room for tumor invasion.

It appears advisable, when anatomically possible, to avoid positioning the duodenal stent over the papilla. In this way, endoscopic palliation can still be performed in the event of secondary biliary obstruction. Consequently, a multidisciplinary discussion, where the possible need for future biliary procedures is examined considering the type of tumor involved and its potential for progression, is mandatory before undertaking endoscopic insertion of a duodenal endoprosthesis. We have also found it important to favor the use of a metallic biliary stent in patients in a palliative situation rather than using a plastic stent early in the disease course. This promotes easier repermeabilization and also facilitates repeat procedures when needed.

An alternative to endoscopic palliation of malignant biliary obstruction in patients with a duodenal stent is to use the percutaneous radiological approach. Experienced teams have reported success rates of nearly 90% [14, 15]. The currently used radiological techniques are well described and documented but to our knowledge remain to be validated for this precise indication. This is probably because the situation of biliary obstruction in patients with a duodenal stent is rather exceptional. Despite the lack of data from a randomized trial comparing percutaneous treatment versus retrograde endoscopy, the rates of secondary prosthetic obstruction and revision procedures appear to be similar [15]. The presence of tumor obstruction high in the biliary tree (suprahilar and/or intrahepatic obstruction) creates more difficult problems for the retrograde approach. The percutaneous radiological method may be preferred here. Nevertheless, in our experience, this type of obstruction (generally due to cholangiocarcinoma) is rarely the cause of the clinical presentation studied here (combined duodenal and biliary obstruction) which is typically encountered in patients with cancer of the pancreatic head. Furthermore, percutaneous transcatheter insertion of a metallic biliary stent can lead to complications, such as hemobilia, bleeding duodenal ulceration, or perforation [15-17]. If the stent is too long, it can enter the duodenal lumen and damage the contralateral mucosa. However, if the duodenal mesh covers the papilla, it can block the radiologically inserted stent and prevent this type of complication.

Fig. 3 – Placement of a metallic biliary stent through the duodenal prosthesis in a patient treated for malignant obstruction of the common bile duct (pancreatic tumor). a- fluoroscopic view of biliary cannulation with sphincterotome and guidewire. b- fluoroscopic view during insertion of the new biliary Wallstent through the mesh of the duodenal stent. c- endoscopic view of the lower end of the inserted biliary stent.

Mise en place d'une prothèse biliaire Wallstent, à travers les mailles d'une endoprothèse duodénale chez un malade déjà porteur d'une précédente prothèse métallique biliaire envahie par un cancer de la tête pancréatique. a- vision fluoroscopique du cathétérisme biliaire par sphincterotome et fil guide. b- vision fluoroscopique du largage de la nouvelle prothèse à travers les mailles prothétiques duodénales. c- vision endoscopique dans le duodénum de l'extrémité inférieure de la prothèse biliaire larguée.
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In conclusion, our work demonstrates that interventional endoscopy, in experimented hands, is a reproducible method for palliation of malignant biliary obstruction despite the presence of a duodenal stent. This technique should be re-evaluated in patients with the new wider meshed metallic gastroduodenal stents. The therapeutic choice between the radiological or endoscopic approach in patients with a duodenal stent who develop jaundice depends on the technical possibilities and the experience and skill of each team.

REFERENCES