NEW MODIFICATION OF DEEP BILIARY CANNULATION USING ENDOSCOPIC–RADIOLOGIC RENDEZVOUS TECHNIQUE FOR PALLIATIVE TREATMENT OF MALIGNANT OBSTRUCTIVE JAUNDICE

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Abstract
Aim: To describe a new simple modification of deep biliary cannulation using combined endoscopic–radiologic technique and evaluate its technical and clinical success for palliative treatment of malignant obstructive jaundice.

Patients and intervention: We used this technique in 25 patients with inoperable malignant biliary obstruction and failed endoscopy procedures alone. Using angiographic methods, an introducer of long arterial sheath, over a guide wire was passed to overcome the site of obstruction. Our amendments lie in using a stiff introducer to allow support of the guide wire during its navigation through the obstruction site, followed by passage of the introducer together with the guide wire to the duodenum, while the introducer in place; the hydrophilic guide wire with its slippery end should be replaced with a long ordinary guide wire which is used in ERCP because it could be easily grasped with the dormia basket.

Abbreviations: PTBD, percutaneous transhepatic biliary drainage; PTBS, percutaneous transhepatic biliary stenting; PTC, percutaneous transhepatic cholangiography; ERCP, endoscopic retrograde cholangiopancreatography; CBD, common bile duct.

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1. Introduction

The incidence of biliary obstruction resulting from malignancies is increasing. Malignant biliary obstruction may be caused by primary biliary carcinomas and non biliary carcinomas. Malignant biliary obstruction may be managed by surgery, percutaneous transhepatic biliary drainage, or stricture stenting [1,2]. At the time of diagnosis, 90% of patients with malignant obstruction of bile ducts may benefit from palliative treatment. Palliation of unresectable malignancies requires a multidisciplinary approach including: Medical Oncologist, Radiation Oncologist, Gastroenterologist, Hepatobiliary Surgeons and Interventional Radiologist [3].

Percutaneous transhepatic biliary drainage (PTBD) is a well-established interventional radiological procedure used in patients with malignant obstructive jaundice, especially in inoperable patients, however, an external catheter has a major potential for infection and dislodgement [4].

Percutaneous transhepatic biliary stenting (PTBS) has now largely been overtaken by the endoscopic approach. This is not only because of the wide availability of endoscopic retrograde cholangiopancreatography (ERCP), but mainly because of the higher complication rate of percutaneous stenting. Obtaining deep access to the CBD through the ampulla of Vater (deep biliary cannulation) is the essential first step and probably most difficult part in providing any endoscopic stenting of the CBD. However, high obstructions (low obstruction occurs below the insertion of the cystic duct and high obstruction occurs proximal to it), or multiple strictures, as well as previous upper gastrointestinal tract surgery may render endoscopic stent placement difficult or impossible. Even the most experienced endoscopists fail to cannulate the biliary tract in 5–10% of cases [4–7].

The rendezvous procedure combines the endoscopic technique with percutaneous transhepatic cholangiography (PTC) to facilitate cannulation of the bile duct. It is a useful combined radiological and endoscopic palliative procedure for common bile duct (CBD) access in cases where endoscopic attempts have failed. The combined technique increases the success rate of biliary tract cannulation and thus facilitates the diagnosis and treatment of biliary tract disorders [7].

Aim: To describe a new simple modification of deep biliary cannulation using combined endoscopic–radiologic technique and evaluate its technical and clinical success for palliative treatment of malignant obstructive jaundice.

2. Patients and methods

This prospective study was approved by our local research ethics committees. From Jan 2011 to Feb 2012, a total of 25 consecutive patients with malignant biliary obstruction were consecutively patients with malignant biliary obstruction were consecutively included in this study. Of these, 15/25 (60%) males and 10/25 (40%) females, age ranged from 30 to 65 years. The diagnosis, disease staging and its prognosis were established by various imaging methods (US, CT, MRI) and biliary brush cytology or puncture biopsy. Patients with history of allergy to iodinated contrast agents, large volume ascites, prothrombin concentration less than 60% and lack of a safe percutaneous access route to the biliary tree intervention were excluded from the study.

3. Intervention

For all patients, clinical assessment was performed and informed consent was obtained before the procedure. Intravenous antibiotics are administered on the day of the procedure and continued for 24 h after it. After an overnight fasting, intravenous sedation and analgesia is administered under an institutional conscious sedation protocol and physiologic monitoring. The patients were positioned in the supine or a slight right anterior oblique position, preferably with the arm elevated above the head or extended to the side. Before skin preparation, examination of both right and left liver lobes by ultrasound was done to determine the optimal access of the biliary tree. Proper sterilization of the skin overlying the selected puncture site was prepared using Betadine or chlorhexidine containing solution. The duct selected for drainage was the most feasible duct to approach and which was in straight continuity with the common hepatic duct. A right duct approach was used in all patients. A fine 18 G needle was inserted in the anterior axillary line, angled a little dorsally toward the porta hepatis. Access to the bile duct was obtained under fluoroscopic guidance in all patients. Percutaneous transhepatic cholangiography (PTC) was performed after an initial percutaneous transhepatic bile duct puncture. A .035 hydrophilic J shaped guide wire was advanced from a 18-G needle to access the bile duct. The puncture tract was dilated using 5, 6 and 7 Fr dilators sequentially. An introducer of 7 Fr long arterious sheath was introduced over the wire to the level of the obstruction. The relatively stiff introducer allows better support of the hydrophilic guide wire and facilitates its navigation through the stricture. When the obstructing lesion was traversed by the hydrophilic guide wire, the introducer was advanced over it down to the duodenum.

While the introducer in place we replaced the hydrophilic guide wire which was grasped by the endoscope with difficulty due to its slippery surface, by a long ordinary guide wire (.025) used in endoscopic retrograde cholangiopancreatography (ERCP) and easily grasped by dormia basket. The latter was introduced through the introducer till the duodenum. Once a sufficient length of the long ordinary guide wire (.025) was in the duodenum, it was caught by dormia basket by combined navigation of the wire under fluoroscopy and the basket under

Results: Technical success rates were 100%, internal biliary stents were successfully placed in a one-step procedure at the appropriate position in all patients with adequate duct drainage. Clinical success rates were 92% within 48–72 h and 8% within 7 days. Minor complications occurred in 4/25 (16%) patients, with no reported major complication. The median procedure time was 40 min.

Conclusion: This simple modification was technically and clinically successful for palliative treatment of inoperable malignant biliary obstruction with failed endoscopy procedures alone.
endoscopic visualization. An inside stent was placed over the guide wire. The proximal side of the stent was located sufficiently covering the stricture, and the distal side of the stent passed 1–2 cm outside the major papilla. Once adequate duct drainage has been established, the percutaneous introducer and guide wire could be withdrawn (Fig. 1).

3.1. Data analysis

Technical success, clinical success, and complication rates were recorded. Technical success was defined as a successful deployment of a stent in an appropriate position. Clinical success was defined as a decrease in serum bilirubin level not less than 10–15% relative to baseline within next 48–72 h after stent insertion. In an attempt to report any procedure-related complications, patients were evaluated, first at the time of completion of procedure, second at the time of discharge, and finally during 2–3 days after the procedure.

4. Results

Our simple new modification has been attempted in 25 patients (15 (60%) males and 10 (40%) females) of age ranged from 30 to 65 years. All patients presented with obstructive jaundice caused by inoperable malignant biliary strictures. The etiology of biliary obstruction was pancreatic carcinoma in 10/25 patients (40%), cholangiocarcinoma in 9/25 patients (36%), periampullary carcinoma in 3/25 patients (12%) and metastases originating from a variety of primary sites in 3/25 patients (12%). The obstructing lesion involved the common bile duct in 13/25 patients (52%) and common hepatic in 12/25 patients (48%). Causes of failure of standard cannulation were: anatomical variations of the papillae in 6/25 patients (24%), duodenal distortion by extrinsic mass in 5/25 patients (20%), abnormal papillary orientation in 5/25 patients (20%), ampullary carcinoma in 4/25 (16%), mass fungating inside the duodenum in 2/25 patients (8%), periampullary diverticulum in 2/25 patients (8%), and papillitis in 1/25 patient (4%).

Successful inside stent insertion at the appropriate position was achieved in all patients with technical success rate (100%). The biliary stents were placed in a one-step procedure in all (100%) patients. All procedures were completed in an average of 40 min (range: 30–50 min), 50 min procedure time was reported only in 2/25 patients (8%) in whom two stent fixation was required. Single internal biliary plastic stent was inserted in 23/25 patients (92%), while two internal biliary stents were inserted in 2/25 patients (8%). The mean diameter of the inside

Fig. 1  (A) .035 J shaped hydrophilic guide wire seen inserted in the CBD through a right duct approach. (B) An introducer of 7 Fr arterial sheath along with .035 J shaped hydrophilic guide wire seen passed the obstruction to the duodenum. (C) The hydrophilic guide wire is changed by long ordinary one (.025) used in ERCP, the latter is advanced down to the duodenum. (D) The tip of the wire is caught by dormia basket by combined navigation of the wire under fluoroscopy and the basket under endoscopic visualization. (E) An inside stent introduced over the guide wire. (F) The proximal side of the stent was located sufficiently covering the stricture with adequate duct drainage. (G) Stent covering the stricture with adequate duct drainage and withdrawal of percutaneous introducer and guide wire.
and dislodgement. Percutaneous transhepatic biliary intervention is a useful procedure for our patients in whom stenting by ERCP failed in our patients. The main causes of failure of deep biliary cannulation by endoscopy procedure alone in the current study were anatomical variations of the papillae, duodenal distortion by extrinsic mass and ampullary carcinoma. Martin [7] stated that the success rate of endoscopic sphincterotomy varies and this technique cannot be used if it is not possible to cannulate the papilla at all. Chang et al. [9] reported that stenting by ERCP is difficult in some patients because of the presence of angulated or twisted strictures, or because of a distorted antrum. Chespak et al. [10] stated that endoscopy is frequently used to treat biliary abnormalities; however, controlling the catheter is difficult when tortuous strictures or specific intraductal ducts must be negotiated.

We performed our technique in all patients in one session, this allowed avoidance of PTBD catheter complications, such as pain, cholangitis, leakage, dislodgement, and discomfort caused by carrying a PTBD catheter that reduces the patient’s quality of life. This agrees with the study reported by Martin [7] which revealed that multiple stage procedure had increased the risk of infection of the catheter entry site. This is not in agreement with Mönkemüller et al. [14] who preferred to perform PTC and establish external drainage within 48 h of failed ERCP and then to proceed to stent insertion by combined percutaneous and endoscopic approach in the next 48 h, he stated that in this way the patient is not submitted to prolonged procedures and drainage for a short period reduces the risk of severe cholangitis, however he concluded that there is no data supporting the preference of either single stage or multiple stage combined procedure. In reviewing our data we found that the procedures did not take long to perform and its median time was 40 min. Speer et al. [15] stated that the technique can be performed in one session.

Using angiographic methods, an introducer of long arterial sheath, over a guide wire was passed to overcome the site of obstruction. Our amendments lie in using a stiff introducer to allow support of the guide wire during its navigation

PTBD is a well-established interventional radiological procedure used in inoperable patients with malignant obstructive jaundice, however it has a major potential role for infection and dislodgement [4,5]. Percutaneous transhepatic biliary stenting (PTBS) has now largely been overtaken by the endoscopic approach because of the higher complication rate of percutaneous stenting. Martin [7] stated that even the most experienced endoscopists fail to cannulate the biliary tract in 5–10% of cases. The rendezvous procedure combines the endoscopic technique with percutaneous transhepatic cholangiography (PTC) to facilitate cannulation of the bile duct. It is a useful combined radiological and endoscopic palliative procedure to facilitate common bile duct (CBD) access in cases where previous endoscopic attempts have failed [5–7].

In the current study a non-operative method of palliation was used in 25 patients with malignant obstructive jaundice, all of them were poor candidates for surgery because of unresectable tumors. Our objective of palliation was to achieve internal biliary drainage to relieve biliary obstruction-related symptoms, prevent liver failure, prevent cholangitis, and to improve patient’s quality of life. We were in line with Brountzos et al. [1] and Žilvinas et al. [3] who reported that at the time of diagnosis, 90% of patients with malignant obstructive jaundice may benefit from palliative treatment only. Zhai et al. [4] stated that early and effective biliary drainage was necessary for inoperable malignant obstructive jaundice to improve the prognosis. Abraham et al. [8] pointed out that bile drainage as a palliative therapy for malignant obstructive jaundice improves life quality.

Our endoscopist was well trained, however placement of internal biliary stent by ERCP failed in our patients. The main causes of failure of deep biliary cannulation by endoscopy procedure alone in the current study were anatomical variations of the papillae, duodenal distortion by extrinsic mass and ampullary carcinoma. Martin [7] stated that the success rate of sphincterotomy varies and this technique cannot be used if it is not possible to cannulate the papilla at all. Chang et al. [9] reported that stenting by ERCP is difficult in some patients because of the presence of angulated or twisted strictures, or because of a distorted antrum. Chespak et al. [10] stated that endoscopy is frequently used to treat biliary abnormalities; however, controlling the catheter is difficult when tortuous strictures or specific intraductal ducts must be negotiated.

The combined percutaneous and endoscopic approach which originally described in 1981 appears to provide an effective and safe alternative to failed stenting by endoscopy procedure alone [11]. Several authors used this combined technique; and agreed that modified rendezvous technique is a safe and useful procedure to facilitate CBD access in cases of failed endoscopy procedure alone as it increased the success rate of biliary tract cannulation [11–15]. We used a new modified one session rendezvous technique as a useful alternative method for the successful insertion of internal biliary stent as a palliative procedure for our patients in whom biliary stenting was not possible endoscopically.

Technical success, clinical success and procedure related complication are summarized in Table 1.

### Table 1

<table>
<thead>
<tr>
<th>Technical success, clinical success and procedure related complication</th>
<th>No.</th>
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<tbody>
<tr>
<td>Technical success</td>
<td>25/25 (100%)</td>
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<tr>
<td>Clinical success</td>
<td></td>
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<tr>
<td>48–72 h</td>
<td>23/25 (92%)</td>
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<tr>
<td>3–7 days</td>
<td>2/25 (8%)</td>
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<tr>
<td>Complication</td>
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<tr>
<td>Cholangitis</td>
<td>1/25 (4%)</td>
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<tr>
<td>Stent migration</td>
<td>1/25 (4%)</td>
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<tr>
<td>Mild hemorrhage</td>
<td>1/25 (4%)</td>
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<tr>
<td>Subcapsular biloma</td>
<td>1/25 (4%)</td>
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through the obstruction site, followed by passage of the introducer along with guide wire to the duodenum, while the introducer in place we replaced the hydrophilic guide wire which was grasped by the endoscope with difficulty due to its slippery surface, by long ordinary one (.025) used in ERCP and easily grasped by dormia basket.

The corner stone of our new simple modification lies in two points: (a) an introducer of long arterial sheath, over a .035 hydrophilic J shaped guide wire was used to negotiate and overcome the site of obstruction, this relatively stiff introducer allowed better support of the guide wire and facilitates its navigation through the stricture even the tightest and tortuous one; (b) once the introducer overcame the stricture and passed to the duodenum we changed the hydrophilic guide wire which was replaced by the endoscope with difficulty due to its slippery surface by long ordinary one (.025) used in ERCP, which was easily caught by dormia basket.

We found that a simple modification proposed by us overcame many problems in the previously described modified Rendezvous technique as it provided: (a) better negotiation and crossing of stricture; (b) decrease laceration of the liver capsule and parenchyma; (c) stabilization and straightening of the papilla with subsequent better inside stent placement; (d) avoidance of the difficult grasping of the hydrophilic guide wire by the endoscope as we replaced it by long ordinary one (.025) used in ERCP and easily grasped by dormia basket and; (e) reduction of the procedure time as most of the time wasted during the procedure trying to catch the hydrophilic guide wire due to its slippery surface.

Mönkemüller et al. [14] reported that the modified rendezvous technique for biliary cannulation had some limitations, such as difficult grasping, damage, kinking or even breakage of the wire. He recommended using a protective catheter covering the guide wire while moving it through the PTBD tract to reduce liver damage. Martin [7] stated that hydrophilic polymer coated guide wires are particularly valuable for crossing stricture, especially if used in conjunction with a stiff catheter such as a biliary dilator. These guide wires will slide through even the tightest, most tortuous stricture.

The median time of our procedure time was 40 min, it was slightly longer in two patients in whom double internal biliary stenting was required. This was in agreement with Chang et al. [9] who reported that the median time was less than 30 min.

In this study deep biliary cannulation and stent insertion using our new modified radiologic–endoscopic rendezvous technique had a success rate of 100%. No major complication was reported. Adequate biliary drainage was achieved in all included patients. These results were in agreement with those obtained by Chang et al. [9] who reported that internal biliary stents were placed successfully using the rendezvous technique in 20 patients with no significant complications. Chespak et al. [10] demonstrated that the success rate and the number of conditions treatable with nonoperative interventional methods are increased with combined percutaneous and endoscopic approach. Robertson et al. [16] reported that the success rate for placing an endoscopic stent increased in his unit from 69% to 97% with the introduction of combined percutaneous and endoscopic technique, with no early complications. Mönkemüller et al. [14] successfully employed the modified rendezvous technique on five occasions with adequate biliary drainage.

6. Conclusion

Our results demonstrated that our new simple modification of well established Rendezvous technique was useful and safe for the management of inoperable patients with malignant biliary stricture for whom biliary stent could not be placed endoscopically. Our modification overcame many problems in the previously described Rendezvous Technique.

References