Percutaneous transhepatic placement of plastic biliary stents.

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Learning objectives

Plastic biliary stent insertion is most commonly performed by endoscopists while percutaneous transhepatic metal biliary stents are commonly placed by interventionalists. Here we review a single centre experience of plastic percutaneous transhepatic biliary stent (PTBS) insertion.
Background

Biliary stents are well established in the management of both malignant and non-malignant biliary obstruction. In general terms, stents are preferentially placed retrograde at ERCP with percutaneous transhepatic biliary stent (PTBS) insertion reserved for those in whom ERCP has failed or is inappropriate, for example due to altered anatomy. Biliary stents are either plastic or metal. Metal stents have superior duration of patency, however are not easily if at all exchangeable at ERCP or percutaneously. Plastic stents have higher rate of occlusion but may be easily exchanged endoscopically.

Currently there is no commercially available plastic biliary stent specifically designed for percutaneous placement. To our knowledge, there is only one case report describing plastic PTBS placement in a single patient. Here we describe a series of 15 patients who underwent PTBS using plastic stents (e.g. Fig. 1 on page ). We describe the method used and review the outcomes.
Findings and procedure details

Procedure Details:

All procedures were carried out in the same manner under a combination of local anaesthesia and conscious sedation, observing sterile technique throughout. The procedures were performed by four separate operators. The majority of patients underwent a two stage procedure, with initial decompression of the biliary system through insertion of an internal/external drain with diagnostic brushings or clamshell biopsy of the obstructing lesion followed by internalisation of the drain once the diagnosis was confirmed.

Both primary placement of PTBS and internalisation of the internal/external drains are performed by advancing an O35 guide wire across the obstructing lesion and into the duodenum, either via the in situ internal/external biliary drain or via de novo percutaneous access. The procedure then proceeds as follows:

- The length of the plastic stent to be inserted is measured off against both the sheath and the inner stylet which are then marked (Fig. 3 on page 7).
- The sheath is advanced over the wire and its tip positioned beyond the level of the obstruction within the duodenum.
- The inner stylet of the sheath is withdrawn and cut transversely at the level marked previously (Fig. 4 on page 8).
- The plastic stent is then loaded into the sheath (Fig. 5 on page 9) and, using the inner stylet as a pusher, is advanced to the tip of the sheath under fluoroscopy.
- Once in position, the sheath may be withdrawn uncovering and deploying the stent across the level of the obstruction (Fig. 6 on page 10 & Fig. 7 on page 11).
- A final cholangiogram via the sheath can then be performed to confirm the accurate deployment of the stent.

Findings:

A review of all biliary interventional procedures performed over a 4 year period was carried out to identify all patients who had undergone plastic PTBS insertion. The demographics, indications, success rate, complications and outcomes were compiled.
Between April 2012 and August 2016 fifteen patients were identified who underwent plastic PTBS insertion. There were 7 males and 8 females with an average age of 68 years (range 47-86 years).

Fourteen of these were referred following failure to cannulate the ampulla at ERCP. Eleven patients first underwent percutaneous transhepatic cholangiography with diagnostic brushings or biopsy and placement of an internal/external biliary drain before subsequent internalisation using plastic stents following histological confirmation of the diagnosis. Eleven patients had malignant causes obstruction, most commonly pancreatic head adenocarcinoma but also including cholangiocarcinoma and metastatic colorectal and non small cell lung cancer. Four had benign causes of biliary obstruction; two with benign common bile duct strictures, one with CBD stones and one who developed a bile leak post cholecystectomy.

Plastic stents were successfully deployed in all 15 cases. One patient developed an 8 cm right subcapsular perihepatic biloma at the puncture site from the initial PTC and insertion of an internal/external biliary drain. This was drained percutaneously and fully resolved on follow up imaging. There were no complications directly related to the placement of the plastic PTBS.

Pre- and post-procedure bilirubin was available in 8 patients. The post procedure bilirubin fell by an average of 172 µmol/L (or by an average of 61% relative to the pre-procedure bilirubin), indicating successful relief of the obstruction.

Two patients subsequently underwent successful stent exchange at ERCP while another went on to have a metal stent inserted. Four patients died with the stent in situ.
Fig. 1: A plastic biliary stent.

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Fig. 2: The stent (blue), the sheath (white) and the inner stylet of the sheath (yellow).

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Fig. 3: Measuring the length of the stent against the sheath.

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Fig. 4: Cutting the inner stylet of the sheath.

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Fig. 5: The stent is loaded into the sheath over an 035 wire using the cut inner stylet of the sheath as a pusher.

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**Fig. 6:** By withdrawing the sheath, the stent is uncovered and deployed.

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Fig. 7: A fully deployed stent in situ.

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**Fig. 8:** Patient B: Cholangiogram showing a tight stenosis in the CBD. The stenosis has been traversed with a wire and the stent advanced into position. The sheath has been pulled back partially uncovering the stent.

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**Fig. 9**: Patient B: The fully deployed stent in situ.

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Conclusion

While retrograde placement of plastic biliary stents is a well established practice, there is a dearth of literature surrounding percutaneous transhepatic placement of plastic stents. Here we demonstrate that percutaneous transhepatic placement of plastic biliary stents is a safe and effective procedure and is suitable in a certain patient cohort in whom ERCP is unsuccessful or not feasible and in whom metal stents are undesirable.