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Leading article

Biliary obstruction is best managed by endoscopists

The profusion of new techniques now makes it possible to manage biliary obstruction in a bewildering variety of ways. While in some hospitals patients are treated almost exclusively by non-operative methods, in many others traditional surgical paths are still being followed. Probably only a proportion of the new techniques will stand the test of time, but some are already revolutionising the treatment of biliary obstruction. Here I will argue that the time has come when all patients with biliary obstruction should be treated first by interventional endoscopists and only if they fail, should the help of radiologists or surgeons be sought. It is in our patients' best interests that this policy is now widely adopted.

What are the objectives of the treatment of biliary obstruction? Clearly the first criterion must be safety, measured in terms of the morbidity and mortality of the procedure. Second is the patient's comfort during and after the procedure. Third comes cost of the procedure and the hospital stay that it entails. The management of a patient with biliary obstruction includes reaching the diagnosis and relieving the obstruction. The arguments for the appropriate methods for each of these stages will be considered separately.

Investigation of biliary obstruction

Patients are first examined by a non-invasive technique such as ultrasound (US) or computed tomography (CT). This determines whether the bile ducts are dilated and sometimes indicates the cause. It is now customary that the first investigation is ultrasound. I think this is a mistake because ultrasound is notoriously poor at detecting bile duct stones (bowel gas often ruining the examination) and the interpretation of the images is very operator dependent. Computed tomography with contrast enhancement is preferable, because bowel gas does not obscure gall stones, the image of the extent of pancreatic masses is much better and the pictures can be readily interpreted by clinicians.

The second investigation will be either endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC). The preferred first test is ERCP, not only because ERCP is less traumatic than PTC, but also because of the therapeutic potential of the former. At the one investigation stones may be removed by papillotomy, or a malignant obstruction relieved by endoprosthesis. The only exception to this rule is where a polya gastrectomy has been done (a diminishing problem): ERCP in those patients is definitely for the fanatic with time to kill.

Obstruction caused by gall stones

The options are surgery or endoscopic papillotomy. Both techniques clear the bile duct of stones in about 90% of patients. The mortality of surgery for stones in the common duct is of the order of 6–8%[1,2] although lower figures have been reported.[3] Postoperative complications such as wound infection, intra-abdominal sepsis, cholangitis, fistula or renal failure develop in about 46% of patients.[3] In contrast, the mortality of endoscopic papillotomy is around 1·5% and the incidence of complications (haemorrhage, pancreatitis, or perforation) around 10%.[4]

Clearly endoscopic papillotomy is the choice in patients who have retained stones, are elderly, frail, very obese or have a pre-existing disease which precludes surgery. Endoscopic papillotomy is also the proper emergency treatment for patients with acute gall stone cholangitis and acute gall stone pancreatitis. These indications are clearcut.

The real issue now is what should be done with younger patients with stones in the bile duct and a gall bladder *in situ*. Should surgeons doing a cholecystectomy stop worrying about whether stones remain in the bile duct because endoscopic papillotomy can simply remove them later? Taking the argument further, should surgeons now abandon peroperative cholangiography, the commitment to exploring the bile duct and inserting T-tubes because retained stones can be removed endoscopically? A related strategy is preoperative papillotomy to clear the bile duct of stones before cholecystectomy. One study did show that preoperative papillotomy reduced mean hospital stay, but mortality was not influenced (probably because patient numbers were too small).[5] It is clear that the attitudes of surgeons are changing towards an approach of more limited and safer biliary surgery, when they are confident that a competent endoscopist is available to remove residual bile duct stones. Should the stones be removed endoscopically and the gall bladder left in place? The evidence indicates that very few patients treated this way have further problems needing cholecystectomy and the majority will have escaped this operation.[6]

But if papillotomy is to be adopted as the treatment of choice for bile duct stones, what can be done for the 10% of patients where papillotomy fails to clear the bile duct? Failure is because stones are too big to pass through the papillotomy, or because there are so many stones that the bile duct is packed solid. The dangers of haemorrhage and perforation are directly related to the size of the papillotomy. A mismatch between the papillotomy and the stone leads to the embarrassing situation of an impacted basket. Balloon catheters are safer because they can be removed even if the stone cannot. Help is at hand for these patients in the newer techniques, including extracorporeal shock wave lithotripsy (ESWL) and dissolution with methyl tertbutyl ether (MTBE). Extracorporeal shock wave lithotripsy and MBTE require the endoscopic insertion of a nasobiliary drain either to visualise the stones for aiming ESWL, or to administer the ether. Lithotripsy is effective and its application will increase.[7] Reports of the effectiveness of MTBE at dissolving bile duct stones are conflicting, but it is undoubtedly effective in some.[8] It is not clear which treatment will come to be preferred, but I suspect it will be lithotripsy in patients with one or two large calculi and MTBE in those with multiple stones. When all these techniques fail and surgery is undesirable, an endoscopic endoprosthesis in a bile duct full of stones is an

effective way of relieving symptoms. But what if the endoscopic papillotomy fails because the endoscopist cannot pass his catheters into the bile duct? Here a combined approach where a percutaneous transhepatic guidewire is first passed through the ampulla, usually allows a later successful papillotomy. Experience is still limited with ESWL and MBTE. A series of integrated treatments will emerge which make use of the different techniques. The thrust of this argument is simple. Endoscopic papillotomy, supported by the imaginative use of other non-operative techniques, can now remove bile duct stones in most patients, increasing a 90% success rate for papillotomy alone to nearly 100% and saving patients from the discomfort, disability and risks of bile duct exploration and general anaesthesia. And as if the presently available techniques were not sufficient there are more on the horizon! These include physical and pharmacological dilatation of the sphincter of Oddi, new mixtures for *in situ* gall stone dissolution, gall stone fragmentation by ultrasound, electrohydraulic instruments and even pulsed dye lasers.[9] The objective now is to do away with the necessity of a papillotomy and its inherent complications.

Obstruction caused by cancer

Cancers causing biliary obstruction are, in order of frequency, cancers of the pancreas, bile ducts and ampulla of Vater. The only curative treatment is surgical resection, but a very small number of these tumours are resectable and surgical bypass is usually all that is provided. Such surgery carries a mortality of around 33%.[10] Although there are enthusiasts for surgical resection, most believe that resectable tumours are so rare that a non-operative approach is the preferred primary treatment. This argument has gained greater weight as the methods for assessing the extent of tumour spread preoperatively (computed tomography, magnetic resonance imaging, and arteriography) are now so precise, and because relieving malignant obstructive jaundice non-operatively does not jeopardise a later curative resection, where this is possible.

The non-operative options for relieving malignant obstruction are the insertion of stents or prostheses by the percutaneous or endoscopic routes. Percutaneous stents were the first to be used, before advances in endoscope design and technique allowed the insertion of endoscopic stents. Now therapeutic endoscopes permit the insertion of stents of a similar size (12 French) to the percutaneous method. The question is which of the techniques, surgical bypass, percutaneous or endoscopic stents, which are all equally effective at relieving malignant biliary obstruction, do so with the lowest morbidity and mortality? The clinical trial data on this point is incomplete, but there are two studies which together indicate to me what the final judgement will probably be. The Capetown trial[11] compared the efficacy of bypass surgery and percutaneous stents in 50 patients with biliary obstruction due to 'incurable' cancer of the pancreas. It is significant that 'incurable' cancers were identified preoperatively on the basis of CT, ERCP, PTC and angiography. The success rates of each procedure at relieving biliary obstruction were similar (around 80%) and the complication rates (percutaneous stents 28%, surgery 32%) and 30 day mortality rates (percutaneous stents 8%, surgery 20%) were not significantly different in these small groups. Most significantly, the median survival times were the

same in both groups: percutaneous stents 19 weeks, surgery 15 weeks. Clearly percutaneous stents are at least as good a treatment as surgery in most patients with pancreatic cancer. How then do the results of percutaneous stents compare with those of endoscopic stents? The results of the trial from the Middlesex and London Hospitals are unequivocal.[12] In this study 75 patients with malignant biliary obstruction were randomised to receive a biliary stent inserted either endoscopically or percutaneously. The success rate for relieving jaundice was significantly greater for endoscopic stents (81% *v* 61%) and the endoscopic method had a significantly lower 30 day mortality (15% *v* 33%). The higher mortality after percutaneous stents was because of the complications of liver puncture: haemorrhage and bile leaks. These data show that endoscopic stents are the preferred treatment for pancreatic cancer and bile duct cancer. For patients in whom the endoscopic method fails, the best option appears to be a combined percutaneous and endoscopic approach. Endoscopic stenting fails because the ampulla, or stricture, cannot be negotiated, or in the case of some hilar bile duct cancers, only one liver lobe can be drained. The hazardous part of percutaneous stenting is not the insertion of catheter and guidewire, but the railroading of a large stent over this through the liver. In a combined approach a percutaneous catheter and guidewire is passed through the stricture and the ampulla, allowing the endoscopist to place a stent from below.[13] This method combines the edge the percutaneous technique has in negotiating selected strictures and the low morbidity of an endoscopic stent. Percutaneous transhepatic stents should be reserved for patients in whom the combined method has failed. Surgery should be reserved for the small proportion of patients with potentially resectable tumours and for ampullary cancer. There are two reasons for this attitude to ampullary cancer: firstly a realistic proportion of these cancers are surgically resectable and secondly, an unacceptable proportion (25%) of patients with ampullary cancer treated with stents will develop duodenal obstruction.[14] There are other treatments advocated for malignant bile duct strictures, including external radiotherapy, local irradiation with iridium wires and chemotherapy, but none of these are of proven value and can for the present be disregarded.

Obstruction caused by benign strictures

Benign strictures of the bile ducts are usually post-traumatic after surgery. The only definitive treatment remains reconstruction by an experienced surgeon. Non-operative treatments such as stents or balloon dilatation are treatments of last resort, when further surgery is not possible.

Conclusion

The preferred tests for the diagnosis of bile duct obstruction are CT scanning followed by ERCP. Developments in therapeutic ERCP now make these techniques the first choice for the relief of biliary obstruction caused by stones or cancer. Percutaneous transhepatic methods and surgery are equally effective but have higher morbidity and mortality rates. Percutaneous methods should be used in combined approaches to aid placement of endoscopic stents. Surgery should be reserved for the rare cases of benign bile duct stricture, potentially resectable tumours and ampullary cancer.

The widespread adoption of this approach requires not only changes in attitudes but more endoscopists, machines and money. How can this claim compete with all the other demands such as extending the provision of liver transplantation? The most powerful argument must be the scale of the problem. For each patient needing a liver transplant, 74 are discharged from hospital after treatment for biliary disease.[15]

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