Title:

Utilising the Gallbladder as a conduit in treating biliary obstruction: a historical perspective

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Biliary decompression is readily achieved through surgical, percutanous and endoscopic methods, and new techniques such as biliary drainage using endoscopic ultrasound are evolving. Surgical choledochojejunostomy is a reliable and well-recognized technique of biliary bypass. However, there are cases in which the surgeon is faced with challenging anatomy or pathology, where customary techniques of biliary drainage may not be available. In such cases, familiarity with various historical open drainage procedures may be an expedient solution in a difficult situation. This article aims to provide a historical perspective on the use of the gallbladder as a biliary conduit; from its initial evolution in trauma and orthotopic liver transplants (OLT) to its utility in managing malignant and benign strictures.

The use of the gallbladder as a conduit was described in 1973 in the setting of hilar trauma, or in unresectable pancreatic carcinomas where tumour encroaches the union of the cystic and hepatic ducts. The techniques described by Waddell and Grover[1] include a cholecysto-duodenostomy, where the gall bladder was used to form a conduit between the right hepatic duct and duodenum in a case of hilar trauma, or a cholecysto-jejunosotomy to a Roux loop. Other techniques described

include a hepatico-cholecysto-jejunostomy; anastamosing the infundibulum of the gallbladder to the CBD, the fundus of the gallbladder to the right hepatic duct, and the body of the gallbladder to the jejunum[2].

The gallbladder as a conduit has also been described in the context of orthoptic liver transplants. In Calne's series[3] of seven OLT in 1976, the gallbladder is described as a pedicle graft anastomosed to obliquely cut ends of the donor and recipient common ducts over T-tubes. The theoretical advantages of this approach are a wide, well-vascularised anastomosis, reduced mesenteric tension and retention of Spincter of Oddi function. Calne believed that utilizing a gallbladder for biliary reconstruction circumvents the potential complications of bile leakage, stenosis and ascending cholangitis in OLT. He reported no complications from the procedure. In the Kings College/Cambridge series on OLTs in 1980, Macdougall et al similarly described a significant reduction in biliary stenosis and fistula formation following the use of gallbladder conduits[4].

However, the formation of gallstones within the gallbladder conduit with subsequent complications has precluded the widespread use of the gallbladder as a conduit. In their 31-year perspective, Professor Starzi[5] et al reported on the use of the donor gallbladder as a conduit between the donor bile duct and the recipient anastomotic site as described by Waddell and Grover, following resection of an

obstructed cystic duct. However, nearly half the patients who had this type of reconstruction experienced blockage secondary to stone and sludge formation within the gall bladder conduit[2]. McMaster showed that this could be prevented if bile is carefully washed out of the ducts and the gallbladder with cold plasma-protein fraction in the setting of OLT prior to being stored in ice[6].

For the palliation of symptoms of obstructive jaundice in the setting of terminal cancer, sustainable biliary drainage should be achieved with the aim of preserving quality of life and function. Toumi et al describe how this can be achieved successfully through laparoscopic cholecystojejunostomy[7]. In their review, which included 89 patients, resolution of jaundice was achieved in 98.9% with an overall morbidity of 12.3% and mortality of 5.6%. Their technique involved a single jejunal loop brought antecolically with side-to-side anastomosis with the gallbladder. The requirements for the use of this technique are preoperative radiological confirmation of a patent cystic duct, and a cystic duct insertion more than 1cm above the biliary stricture. Given these requirements, only a small proportion of patients with malignant obstructive jaundice would be suitable for a bypass to the gallbladder. [8]

Furthermore, a cohort study by Urbach[9] et al of 1919 patients who underwent surgical bypass for palliation of jaundice, showed that patients bypassed

using the gallbladder were 4.4 times more likely to have additional biliary surgery and 2.9 times as likely to have any subsequent biliary intervention, compared to patients with choledochojejunostomy. This translated to improved median survival with bile duct bypass over gall bladder bypass. Other complications of using the gallbladder as a conduit, although rarely reported, include liver abscess, intussusception, late haemorrhage and anastomotic varices[10]. These factors have prevented the widespread use of the gallbladder for biliary bypass.

The use of the gallbladder as a conduit is largely a historical procedure due to a high rate of complications with stone formation and cholangitis, and the availability of more durable and effective procedures for biliary drainage. Nevertheless, it is a well-described technique and there may be exceptional cases where using the gallbladder as a conduit may prove to be a useful exit manouevre, particularly in the palliative setting.

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