



## Hepatectomy for Bile Duct Injury – When Repair is not enough!

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### Editorial

Laparoscopic cholecystectomy is associated with a 0.4-0.6% risk of bile duct injury (BDI). Early surgical repair of an acute bile duct injury is not recommended [1]. Management of an acute bile duct injury is non-surgical - percutaneous catheter drainage of the biloma and endoscopic stent drainage of the bile duct; this converts the acute BDI into a controlled external biliary fistula which closes to form a benign biliary stricture BBS [2]. Management of a post cholecystectomy iatrogenic BBS is in the form a Roux-en-y hepatico-jejunostomy (HJ) at the hilum of the liver [3].

A vascular (hepatic artery and/ or portal vein) injury is associated with BDI in a significant number of cases [4]. Reported vascular injury in as many 20/76 patients with BDI - more often (11/33) with high BDI than with low BDI (9/43). The incidence may be higher if the vascular injury is looked for e.g. by Doppler US, CT angiography or MR angiography.

Urgent hepatectomy may be required, though very rarely, in the early postoperative period (within few weeks) for liver parenchymal necrosis and sepsis (liver abscess). As many as 5/10 hepatectomies in one report [4] and 2/11 in another [5] were urgent hepatectomies. Mortality of early hepatectomy for massive hepatic necrosis is very high- in a review, 4 out of 9 patients who underwent early hepatectomy died [6].

Vascular injury in itself is not an indication for hepatectomy in BDI; it is vascular injury along with a high (Strasberg E4/E5) BDI/ (Bismuth Type IV) BBS which may require hepatectomy [7]. In a review of 99 hepatectomies among 1,756 BDIs reported in 31 publications, patients with combined high (Strasberg E4/E5) BDI and hepatic arterial injury were 43 times more likely to need hepatectomy [6]. Elective (planned) hepatectomy should be considered as an alternative option to repair (HJ) in patients with complex BBS, i.e. proximal (high) BBS involving the biliary ductal confluence associated with a vascular injury (bilio-vascular injury) because even if repair in the form of HJ is technically feasible, the anastomosis, if done to ischemic and fibrosed ducts, is very likely to stricture. Elective (planned) hepatectomy should also be considered in patients with isolated stricture of segmental/ sectoral bile duct.

Patients who undergo HJ for BBS are prone to develop anastomotic stricture [8]. Treatment of choice for an anastomotic stricture is percutaneous transhepatic balloon dilatation and long term stenting; re HJ may be feasible in some patients with an available bile duct at the hilum. Delayed hepatectomy may be required, especially after failed surgical repair of BBS, because of recurrent cholangitis, cholangiolytic abscess and atrophy-hypertrophy complex. Atrophy hypertrophy results in rotation of the hepatic hilum and makes repair of BBS technically difficult [5,9] Hepatectomy in 11 patients at a median of 58 months after BDI [7]. Hepatectomy in 9 (6%) of 148 BDIs but after mean 2.4 attempts at surgical repair.

Truant reviewed 460 publications and found need for hepatectomy in 99 (5.6%) out of 1,756 patients with BDI reported in 31 publications. The largest experience is from Belghiti's unit of 18 liver resections for BDI [9,10] need for hepatectomy in 10/355 (3%) patients who had undergone HJ for BDI [11]. Hepatectomy in 10/76 (13%) patients with BDI managed from 1998-2007 in Tubingen Germany; the high proportion of hepatectomies in this report probably reflects the referral bias of a transplant center [5]. Report need for hepatectomy in 11/800 (1.4%) patients with BDI managed from 1990-2012 at the Academic Medical Center, Amsterdam.

Most patients with BDI who require hepatectomy need right hepatectomy but few patients may need left hepatectomy - 1/9 in one report [7] and 2/10 in another [9]. These are patients who have undergone HJ for BBS but develop recurrent anastomotic stricture causing recurrent cholangitis.

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Right hepatectomy offers an advantage in that the exposure of the left hepatic duct is very good and an adequate hepatico-jejunostomy can be created.

Hepatectomy in patients with BBS is technically difficult because of extensive inflammatory fibrosis at the hepatic hilum making isolation of the portal pedicles (especially right) difficult. Hepatectomy for BDI is associated with significant mortality 1/10 [9], 1/10 [4], 2/11 in hospital + 1/11 long term [5]. Long term outcome of hepatectomy is good. 8 out of 9 patients who underwent hepatectomy were asymptomatic at a mean follow up of 69 months– 1 required transplant [7]. 67% of 9 patients had no or only transitory symptoms at a median follow up of 34 months [4].

There are several reports of patients with BDI requiring even liver transplant. Commonest indication for liver transplant in patients with BDI/BBS is secondary biliary cirrhosis (SBC) due to long standing biliary obstruction, recurrent cholangitis and cholangiolytic abscess. Rarely, urgent liver transplant may be required for fulminant liver failure caused by massive liver necrosis [12]. 27 patients with BDI listed for liver transplant between 1987 and 2010 in the Spanish Liver Transplant Group including 24 units. 7 of these 27 patients needed emergency transplant - 2 of these died while waiting for transplant and 5 received an emergency transplant - 4 of these 5 died within 30 days of transplant and only 1 survived beyond 30 days. 20 patients (13 with SBC) received elective liver transplant - 1 died within 30 days, 68% survived for 5 years [13]. 19 patients who received liver transplant (1 for acute liver failure and 18 for end stage liver disease at a median of 71 months) for BDI in 18 centers in Argentina– 5 year survival was 68% and 10 year survival 45% [14]. Reported that 5 (1.7%) out of 300 liver transplants performed at a center in Poland between 2002 and 2011 were for SBC due to BDI.

Liver resection (and even transplant) may rarely be required on an urgent basis in a very small number of patients with acute BDI. Elective liver resection should be considered as an alternate option to HJ in patients with complex bilio-vascular injury. Some patients with anastomotic stricture and recurrent cholangitis may require hepatectomy, during follow-up after HJ. Hepatectomy in BBS is technically difficult resulting in high morbidity and significant mortality but long term outcomes are good.

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