| # | Question | Professor Siriwardena Response | Professor Heinrich Response | Professor Jorba Response |
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| 1 | Do you perform a frozen biopsy of hilar lymph nodes? if this is (+) continue with the intervention? | In Manchester I usually do a careful lymphadenectomy of the station 12, 8 and 9 nodes. If these look positive, they are simply removed. There is a valid question about whether one should biopsy a station 9 or aorto-caval node as if these are positive, UICC would regard this as N1 disease. We also nowadays used FDG-PET pre-operatively. If nodes are FDG negative I would probably not biopsy. | In Mainz, we do the same. LN metastases usually don`t affect the treatment concept. However, interaortocaval nodes do. If they appear enlarged upon imaging, we would send them for fresh frozen section. | only when intraoperatively any adenopathy suspected of malignancy is detected beyond the hepatoduodenal ligament, considered M1. |
| 2 | Can I ask you what is the best way to perform spyglass choledoscopy: is the per- cutaneous way best to predict distal infiltration in order to adjust or refine the choice of the lobe to be resected (i.e. left or right in case of unclear cholangio MRCP)? | This is a very good question. In Manchester we do not routinely use spyglass. I use it in situations where there is doubt over diagnosis - so for example when there is PSC and the question is whether there is a cholangiocarcinoma. Endoscopic spyglass has quite a high reported incidence of post-procedure pancreatitis so I would marginally favour percutaneous but there is then a risk of trauma to the future liver remnant as the external drain will typically be in the FRL to be.<br>It would be a good question to put to the speakers. | Spy glass endoscopy is performed via ERCP route. We have it available and it is used. However, the rate of positive histologies has not dramatically been increased | It depends on the experience of the endoscopist and angioradiologist. Probably in case of doubtful diagnosis between perhihilar cholangiocarcinoma or another benign stenesosis (PSC, hepatolithiasis, ..) the percutaneous approach is better to prevent pancreatitis. However, this approach also carries a risk of bleeding and cholangitis. In some cases, rendezvous by both routes may be useful: percutaneous and endoscopic. |
| 3 | Do you always try to have preoperative histological confirmation of malignancy? Do you have good experience with spyglass choledoscopy? | This is a very good question. It is not always possible to have a pre-operative tissue diagnosis. Therefore I always explain to patients that our clinical/radiological diagnosis is PH-CCA but in the absence of tissue confirmation there is a small possibility of a benign diagnosis. | | It is not always possible to have a preoperative tissue diagnosis. There is a risk of a benign diagnosis of the final specimen. |
| 4 | What about preoperative biliary drainage prior to PVE? If PVE is necessary, shouldn't the FLR be drained? | we would typically undertake biliary drainage first. This allows diagnostic information to be gained. Also, if the bilirubin does not fall there is information about the feasibility of resection. | PVE needs some time to hypertrophy the liver. We would always drain the bile duct before PVE to 1.) prevent cholangitis and pruritus during the waiting time and 2.) improve liver regeneration (cholestasis is suspected to interfere with regeneration), | In the absence of cholangitis, it is not mandatory to drain the biliary system from the embolized lobe, as unilateral cholestasis may even have a synergistic effect on the hypertrophic response of the non-embolized lobe. Usually when the FLR is <40% we first perform drainage and then PVE. |
| 5 | Any recommendation about FDG PET in the assement of patients with cholangiocarcinoma?? | There are increasing data that FDG-PET is useful. In Manchester this is a routine step: we are proposing an exceptionally complex operation. We want to reduce non-therapeutic laparotomy rates so please consider FDG_PET. | This is a difficult topic. Perihilar CCC are mostly mass-forming tumors. Consequently, one cannot expect a clear FDG uptake in the primary lesion. Cholangitis and liver abscesses would be FDG-positive. Therefore, PET is not very helpful in the diagnosis of the primary tumor... It might be helpful to detect extrahepatic lesions (interaortocaval nodes, peritoneal implants).We do not use PET routinely due to the drawbacks and cost. | Although there may be false positives, we want to rule out remote disease as much as possible, before proceeding with an exceptionally complex operation to avoid non-curative resections. |
| 6 | I was wondering how would they manage a patient with a CC supposed to be resectable based on preop image, but intraoperatively you cannot achieve an R0 resection. You have a positive margin after sending repeated frozen sections and the liver resection cannot be extended further. | Great question. One ends up accepting a positive margin. | Depending on your resection strategy, this might happen from time to time. At our centre, we discuss these patients in the tumor board and find individualized treatments depending on the general biology of the individual disease (might be radiation or chemotherapy or watch-and-wait) | You have to accept the positive margin and wait for the definitive diagnosis.<br>When it comes to the distal margin, we can extend the resection by means of a pancreatoduodenectomy, although the risk of postoperative complications increases. |
| 7 | I would like to ask you if you keep the PTBD drains in or place new if the drainage was with ERCP after resection to manage the BJ anastomosis ? or maybe you do not use at all after surgery. | If there is external drainage of the FLR, I keep this in place and try not to dislodge this during the resection. | If a PTCD had been placed preoperatively, we always keep it in the bilioenteric anastomosis. If the patient had an ERCP stent, we do not routinely place PTCD intraoperatively. In some cases we do. However, we have seen some bleeding complications from "blind" retrograde (intraoperative) PTCD placement. | Better to keep it and use it as drainage of the bile duct in the postoperative period. There is also a risk of intrahepatic bleeding when it is extracted blindly without control by Angio radiology. |

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| 8 | When you plan liver resection after PTBD if done for malnutrition??? | There needs to be a minimum of about 4 weeks of feeding. | We aim at normal bilirubin levels prior to surgery and try to optimize the patient during the waiting time. In elderly or higher-risk patients we tend to wait longer (about 2 weeks) to let the general status improve | About 4-6 weeks of feeding. |
| 9 | Any experience on y90 instead of PVE? Or PVE following y90? | This is to cause occlusion of arterial inflow and is not the same as PVE. As a treatment for PH-CCA it is ineffective. | Y90 embolization takes months to achieve sufficient hypertrophy. It is a good tool in patients under chemotherapy to induce hypertrophy and treat the patient simultaneously. For hilar CCC it is not optimal, since the patient cannot wait so long and neoadjuvant chemotherapy has not been established | I have no experience, but I think there is no evidence as a treatment for CC. |
| 10 | What is your experience with combined PVE and obliteration of the right hepatic vein for ext. HHR? (for both speakers) | | We do not have experience. The literature is very enthusiastic about hepatic vein embolization. Therefore, I believe it is worth trying either simultaneously or for insufficient hypertrophy after PVE. Stefan | I have no experience. |
| 11 | Do either of the speakers have experience with intraductal rfa for cholangio ca | No experience with this. | Intraductal RFA is performed by our endoscopists for tumor growth into a metal stent or recurrent cholangitis in case of unresectable disease in order to keep the bile duct patent. In our centre, this is a palliative intervention. | No |
| 12 | Any role for staging laparoscopy +/_ Lap IOUS to exclude undetected peritoneal or liver mets prior to exploration. | Widely practised. | Staging laparoscopy is a helpful tool whenever peritoneal mets are suspected (on imaging or clinically). If peritoneal mets have been excluded during diagnostic laparoscopy, we would always add laparoscopic ultrasound. However, both are not suitable to judge local resectability. | It should be performed during preoperative staging laparoscopy |
| 13 | Does fall in bilirubin level help us to decide to go for PVE? | Yes | Adequate fall in bilirubin after ERCP or PTCD would be the prerequisite for PVE and surgery at our centre. Inadequate fall would suggest underlying liver disease or insufficient decompression of the bile duct. The indication for PVE should be made independently. | Yes |
| 14 | Which patients benefit for only resection of the biliary duct? It's the effort worthy in terms of survival? | Patients with the very rare type I Klatskin tumors. Once the tumour is at the hilus, it requires hepatic resection. | Excellent question. Actually, R0-resection is the main aim of surgery for hilar CCC. Therefore, it may be worth trying in patients with increased perioperative risk and those with cancer of the mid common bile duct. Due to the higher risk of an R0-resection, I would not try in young patients with tumors extending into the bifurcation | Patients with Bismuth I tumors. In some cases, in patients with high morbidity, although with the certainty that it will be a palliative intervention. When the tumor is in the hilum, it requires liver resection and if this is not possible, due to comorbidity, is better a palliative drainage. |
| 15 | What do you think about suprahepatic vein embolization? | No experience with this. | See Q10 | I have no experience |
| 16 | Also what is your experience about local recurrence in the biliary tree and along the track to the skin after use of PTBD? | Very little but it is not zero. Also can get tracking along surgical drain sites. | Needle tract metastases do occur after percutaneous biopsy as well as PTCD. However, this is an infrequent event in our experience. Once it happens, local excision should be performed, if possible. | The AMS group proposes low-dose preoperative radiotherapy 3 days before resection to prevent this complication after biliary drainage placement. In their experience, thanks to this protocol they have stopped having this complication, however, there is no evidence in the literature |
| 17 | What fo you do for hilar ca IIIA right hepatectomy or extended right ? | Try to preserve IV. | This depends on the volume of the FLR and the patient. We tend to preserve as much tissue as possible, but the main aim is R0-resection | Right hepatectomy, except if there is invasion of sIV o extension to portal vein. |
| 18 | Any experience about suprahepatic vein embolization? | see earlier. | see Q10 and 15. | I have no experience |
| 19 | Do you resect in case of positive celiac trunk nodes/common hepatic artery nodes? | CHA nodal involvement rare but can resect. Celia axis is M1 disease. | In general, positive nodes at the celiac trunk are considered distant metastases and preclude surgery. Despite this general rule, we would proceed with surgery e.g. in young patients and those with a lower surgical risk. LN in the liver hilum are not considered distant metastases and would not per se influence our decision. | Both are considered distant metastasis. |

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| 20 | Could I kindly ask you how do you discriminate the infiltration of right hepatic artery or infiltration of portal vein bifurcation in locally advanced patient for tumoral infiltration or peritumoral attachment? | This requires good quality cross-sectional imaging. | This is extremely difficult. It is basically impossible upon imaging. During exploration, peritumoral attachment can be solved, while infiltration requires resection of the vessel. Therefore, we would resect the portal vein according to the "no touch"-technique whenever an attachment is suspected. With the artery, we would only transpose or resect and reconstruct the artery if an infiltration is confirmed. On the other hand, we would only explore a potentially attached/infiltrated artery if the contralateral artery with its parenchyma would be insufficient for postoperative liver function. | With a good quality preoperative CT, reviewed jointly with radiologists specialized in HPB. |
| 21 | To: Prof Stefan, is the explored group (40%) performed after having everything done i.e. draining the FLR, PVE, and other preop prep? | | Yes. Most of these patient had probably peritoneal metastases, diseased liver parenchyma or local arterial infiltration not detected during the preoperative work-up. Also, we tend to confirm unresectability by exploration in certain cases. | |
| 22 | open question , instead of tissue biopsy or both, what about the use of liquid biopsy and do you use circulating tumor DNA in surveillance post op, as this seems to be a future perspective with advent of trending telemedicine and decreased patient to surgeon interaction | | Currently, liquid biopsy has not been established in the clinical routine. It might help in the future to confirm the diagnosis (the negative predictive value is again unknown) and to stratify patients to surgery or neoadjuvant chemotherapy etc | es, this is the future. |
| 23 | Is there a role of ALPS in cholangio? | Poor outcomes. | Theoretically, perihilar CCC is the ideal indication for ALPPS, since the portal vein is resected anyway and most patients would require an extended right resection. However, the analysis of the ALPPS registry revealed very high mortality rates in this setting. Since the outcome of ALPPS has improved in general over the past years, ALLPS should perhaps be tried again in perihilar CCC. However, patients election must be very careful and the surgical expertise very high! | No, because high mortality. |
| 24 | Liver transplantation and non-disseminated unresectable Klatskin tumour. When???? Experience??? | This is a separate topic. | In Mainz, we do not have experience with OLT in this setting, yet. We participate in a national study but have not had eligible patients, yet. However, with the availability of several measures to increase liver volume, I assume that not many patients will remain with locally unresectable disease and no histological risk factors. | See Mayo Clinic experience. |