Laparoscopic Solid Organ Surgery

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Solid organs include liver, pancreas, spleen and adrenal gland. Kidney and prostate glands are also solid organs but managed by laparoscopic urologist and will not be discussed here. In the past decade, there has been rapid development in laparoscopic surgery in dealing with various pathologies of these solid organs on both diagnostic and therapeutic aspects. Trauma of solid organ operation is basically divided into two elements, the access trauma and trauma related to the ablative procedure. The laparoscopic solid organ surgery involves the creation of pneumoperitoneum, use of small trocar incisions and laparoscopic solid organ surgery is carried out. Despite the maturation in advanced laparoscopic surgery. Moreover, assessment by laparoscopic ultrasound is widely adopted as a standard to replace the loss of tactile assessment for those small and centrally located lesions of the pancreas and liver. In contrary to laparoscopic gastrointestinal surgery, laparoscopic solid organ operation involves mainly resection or ablation and execution of complicated anastomosis is not required and therefore problem of contamination is not as important as in biliary and colorectal operations. The difficulty of operation is closely related to the size and malignant potential of the pathology. In difficult situations, insertion of hand (handoscopy) not only regains the tactile assessment, it also helps to control bleeding and prevents air embolism even when a sizeable vein is severed. The incision for handoscopy can also be used for specimen extraction.

Laparoscopic liver surgery

Laparoscopic liver surgery includes staging and therapeutic procedures. Significant disparity often exists between findings of preoperative investigations and operative findings. It is distressing for the patient to undergo unnecessary laparotomy. It also increases patient’s morbidity and delays any oncological treatment. Laparoscopy is not a new investigation. It provides valuable information about the resectability of liver tumours particularly when its use is combined with laparoscopic ultrasound.

Laparoscopic management of liver cyst is well accepted by liver surgeons once malignancy is excluded. Options include fenestration for polycystic liver disease, marsupialization for simple liver cyst and complete excision if neoplastic cyst is suspected. It is important to watch out for biliary communication and to exclude malignancy by ample biopsy. Argon plasma coagulation can effectively control minor oozing from the liver edge after marsupialization.

Recurrent pyogenic cholangitis presents a unique clinical challenge as recurrence is often seen despite repeated lithotripsy. The stones and strictures in recurrent pyogenic cholangitis present mainly in the left lateral segment and this usually appears to be an atrophic segment packed with stones on imaging studies. Hand-assisted laparoscopic segmentectomy has been shown to be a feasible option and is able to decrease infective complications and achieve faster recovery as compared to open left lateral segmentectomy.

Laparoscopic treatment of liver tumour is much more complicated as there is concern about the safety of operation because of air embolism and bleeding complications. Adequacy of tumour control is also an important consideration. Based on the current evidence, laparoscopic liver resection is feasible and safe in experienced hands. Ideal cases would be those small tumours (< 5 cm) located at anteroinferior segments (segments 2, 3, 4b, 5, 6). Besides the common benefits shared by all laparoscopic procedures, laparoscopic liver resection is shown to result in less ascites, less blood loss and less fluid sequestration because of preservation of abdominal collaterals in case-controlled studies. The application can also be widened by combining
resection with other local ablative measures like radiofrequency ablation and alcohol injection. This type of surgery should only be carried out in centres where the required instruments as well as experienced surgical team are available.

**Laparoscopic pancreatic surgery**

Laparoscopy has been used mainly to stage pancreatic malignancy, for palliation of obstructive symptoms in advanced tumours and for drainage of pancreatic pseudocysts. Laparoscopic pancreatectomy means either laparoscopic Whipple's operation for pancreatic head tumours or laparoscopic partial pancreatectomy for pathology located at body and tail of pancreas. The literature confirms the feasibility of laparoscopic Whipple’s operation. It is, however, not yet adopted as a routine procedure in view of the technical complexity, long operation time and high incidence of postoperative complications. Conversely, favourable results are obtained in chronic pancreatitis, cystic neoplasm and small functioning neuro-endocrine tumours undergoing laparoscopic partial pancreatectomy and enucleation. This can be accounted by simple anatomy at the tail of pancreas and because complicated reconstruction is not required as in Whipple’s operation. However, it is important to close the pancreatic stump securely using laparoscopic gastrointestinal stapling device and augmented with running stitch. Although enucleation is the least extensive and adequate operation for small pancreatic neuro-endocrine tumours, extra attention should be given to ascertain the relationship with the main pancreatic duct by laparoscopic ultrasound otherwise major pancreatic leak might result postoperatively.

**Laparoscopic splenic surgery**

There is a wide range of splenic pathologies considered to be indications for splenectomy. The most common ones are autoimmune thrombocytopenic purpura (ITP) and hereditary spherocytosis. A vaccine against pneumococcal and haemophilus influenzae infection should be given 4-6 weeks before the scheduled operation. The anatomy of spleen is rather constant, but it is important to measure the size of spleen and to look for spleniciuli by preoperative computed tomography and information of which would alter the surgical approach. Patients with ITP are often treated with long-termed steroid and together with low platelet count, it is not uncommon to encounter excessive bleeding and wound complications in open surgery. Laparoscopic splenectomy, with or without handoscopy, is widely adopted to be the gold standard for this distressing pathology. However it is important to protect the tail of pancreas from injury during the control of splenic pedicles. The spleen can either be extracted through the handport incision or delivered through a transverse incision at the suprapubic region. If the extraction bag and then delivered through one of the handport incisions.

Laparoscopic adrenalectomy can be achieved with either transperitoneal or retroperitoneal approach. Retroperitoneal approach has the theoretical advantage of not violating the peritoneal cavity. It also avoids mobilization of intra-abdominal visera and eliminates the need for breaking down adhesion secondary to previous abdominal surgery. Because of the different anatomy of the left adrenal gland compared to the right adrenal gland, the retroperitoneal approach has been shown to be the preferred approach for the left adrenal gland. The small working space of this approach makes early vein control difficult and limits the size of tumour that can be safely removed. Transperitoneal approach is superior in allowing wide exposure, facilitating early vein control.

In summary, the success of laparoscopic solid organ surgery relies very much on the availability of ancillary instruments and should be carried out by an experienced surgical team. This has to be considered in most circumstances despite controversies in managing malignant pathologies. Handoscopy can be considered to widen the application of minimal access surgery if the size of adrenals is very big.

**References**

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