

Since the first successful laparoscopic cholecystectomy (LC) by doctor Mouret in 1987, the concept of minimally invasive surgery (MIS) has been gradually accepted by surgeons. MIS has become one of the main directions of surgery in 21st century with obvious advantages in the diagnosis and treatment of diseases. And in recent years, MIS represented by laparoscopy has been extensively and deeply developed in various fields of surgery. It has been the first choice of surgeons as also as patients because of its small incision, clear vision, less intraoperative bleeding, less postoperative pain and quick recovery. As a matter of fact, laparoscopic technique is the most influential progress made in the modern field of surgery worldwide. Laparoscopic surgery has penetrated into all fields of surgery and has also brought unprecedented changes to abdominal surgery. Along with social progress and the continuous development of medical technology, surgical operations increasingly focus on MIS which need more specialized too.

With the development of modern surgical techniques, laparoscopic surgery such as LC has gradually become the preferred surgical treatment for many abdominal surgical diseases. However, the role of laparoscopy was difficult to assess for complex hepatobiliary and pancreatic surgery, because the size of incision is not as significant as that of cholecystectomy. Later, with the in-depth study of the laparoscopic technique especially in the department of surgical oncology, surgeons found that the laparoscopic surgery had some other advantages in addition to small incision and fast recovery. On the one hand, laparoscopic surgery had more benefit for tumor patients as it could reduce postoperative inflammatory response, reduce the patient's immunosuppression and was more compliance with the no-touch principle. On the other hand, the enhanced intraoperative visualization facilitate precise and accurate manipulation, which was beneficial to the exposure of vessels, the dissection of lymph nodes and surrounding tissue and finally reduce the intraoperative bleeding. In conclusion, MIS can be widely accepted and sustained as patients ultimately benefited from it. Compared with open surgery, the goal of laparoscopic surgery is not only faster postoperative recovery, but also a quest for a better outcomes

In the recent thirty years, despite continuous progress had been made in MIS, the development of MIS in pancreatic surgery was very slow. Laparoscopic techniques for pancreatic disease were first attempted in the 1960s, although a wide variety of pancreatic laparoscopic resections, ranging from enucleations to distal resections, had since been performed with limited successful outcomes. The difficulties of this technique are because of retroperitoneal location, complicated surrounding anatomy, and high rate of dangerous complications such as pancreatic fistula (PF). Therefore, laparoscopic pancreatic surgery is the most challenging operation in the department of general surgery.

Throughout the history of laparoscopic pancreatic surgery, hard work and sweat were still paid by several generations of laparoscopic surgeons. In 1992, Ganner and Pomp performed the first laparoscopic pancreatoduodenectomy (LPD) for a patient with chronic pancreatitis. The operation lasted 10 hours. The postoperative period was complicated by a jejunal ulcer and delayed gastric emptying necessitating a prolonged hospitalization and intravenous hyperalimentation. No fistulas occurred, a follow-up CT scan revealed no pancreatic abnormalities, and the patient was discharged in good condition on the 30th postoperative day. In 1994, doctor Soper reported animal experiments of LPD and laparoscopic distal pancreatectomy (LDP). In the same year, doctor Cuschieri reported the clinical study of LDP as it didn't need to reconstruct the digestive tract which means lower difficulty and risk, easier to master and spread. In the following 10 years, with more LDPs reported, it was further confirmed that LDP has significant advantages compared with open surgery.

In 1997, Ganner reported 11 cases of LPD, which supporting LPD was safe and feasible without increasing the perioperative mortality and complications while prolonging postoperative hospital days. For quite a long time, there were only a few reports of LPD let alone normalization. During this period, laparoscopic surgery was more commonly used for staging of pancreatic cancer and palliative surgery for periampullary carcinoma.

In the next 14 years (from 1997 to 2011), only 341 LPDs were reported in 14 English articles worldwide. The technical complexity, the inherent instrument limitations, and a requirement of a long learning curve delayed the widespread acceptance and application of this challenging surgery. Therefore, it is not difficult to understand that the interval between the first and the second large series reports ($n \geq 10$ cases) of LPD approached 8 years. Afterwards, an increasing number of studies have been published, indicating the safety and acceptable outcomes of this technique. However, these results were limited by highly selected patients, specialized surgeons, and high-volume institutions. And the comparison between LPD and OPD was still a concern. With the development of techniques and instruments in 14 years, LPD entered a stage of rapid development after 2012. From 2012 to 2016, in a short period of 5 years, there were more than 100 reports of LPD including large series reports which comparing LPD with OPD worldwide and LPD combined with resection and reconstruction of

blood vessels had also been reported.

In addition, laparoscopic central pancreatectomy and total pancreatectomy are far behind the other laparoscopic pancreatectomy, which are related to the complicated reconstruction of the digestive tract and the limited indication. However, with the rapid development of LPD, the implementation of these two operations are safe and feasible for surgeons with skilled laparoscopic techniques to achieve well short-term and long-term results.

With the improvement of surgical technique and the development of laparoscopic and robotic surgery technology, more and more robot-assisted surgeries are used in patients underwent pancreatic surgery. Compared with the traditional laparoscopic surgery, the robot-assisted surgery is more expensive, because of its advantages of anastomosis and reconstruction. The robotic platform provides a magnified three-dimensional image, 7 degrees of freedom, and eliminates hand tremor and the fulcrum effect of rigid laparoscopic instruments—allowing for precise suturing, easier tissue handling, better control of large blood vessels, and the ability to work at angles not possible with the laparoscopic surgery. With the increasing number of robotic pancreatic operations and the accumulation of surgical experience, the robot surgery technology almost covers all pancreatic operations. In the past, the forbidden area of laparoscopic pancreatic surgery has now become a routine procedure in some high-volume robotic pancreatic surgery centers. However, the expensive cost and traditional operation concept of robot surgery in our country not only restrict more patients to experience the technological innovation advantages brought by robot surgery, but also restrict the development of robot surgery in China. However, with the extensive application of robot surgery and the actual benefits of patients, more and more patients have accepted the revolutionary surgical method of robot. Although robotic pancreatic surgery has started late in China, the number and quality of pancreatic surgery in some robot surgery centers in China has been at the international advanced level. With the increasing number of robot applied in our country and the establishment of more robot pancreatic surgery team, the application of robot to treat pancreatic cancer will have a good prospect in our country.



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