Department of Surgery
Division of Digestive Surgery

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General Summary

The number of operations performed in the Division of Digestive Surgery has been increasing each year. Technically complex operations, such as esophagectomy, laparoscopic total gastrectomy, major hepatectomy, and pancreaticoduodenectomy, have better outcomes when performed at high-volume medical centers than at low-volume centers. However, the quality of surgical care is not only related to volume but also to specific training and interest in particular pathologic conditions, which would be associated with research activity. Publications in eminent peer-reviewed journals are the main determinant of such academic activity. The quality of our publications needs to be improved; therefore, we must continue to conduct critical basic research that can be translated into clinical medicine and to advance ongoing clinical trials.

Research Activities

Upper gastrointestinal surgery

Advantages and disadvantages were intensely examined in each method of laparoscopic surgery for achalasia and reflux esophagitis, because the reputation of our technique enabled us to evaluate many patients despite these diseases being rare. Also, in surgery for esophageal cancer, hand-assisted laparoscopic-thoracoscopic surgery has been performed, and such advantages as less invasiveness and short hospitalization impressed many surgeons at various surgical meetings. Basic research in esophageal cancer led us to search for molecular markers indicating prognosis.

We have established a new technique of sentinel node navigation surgery without radioisotopes for patients with early gastric cancer using indocyanine green under infrared ray observation. A multicenter trial that evaluated our technique with an infrared ray laparoscopy systems was performed, and the rate, accuracy, and sensitivity of sentinel node detection were 100%. This method was, therefore, judged safe and efficient.

Colorectal surgery

To improve the quality of laparoscopic operations we have been evaluating the usefulness and reliability of the Virtual Reality Surgical Simulator for laparoscopic colectomy. We are also using enzyme-linked immunosorbent assay to examine the relationship between the reactions of various immunoglobulins in the serum of patients with cancer and several factors related to cancer status. We are evaluating bowel function after colorectal surgery by means of the [^{13}C] breath test to determine the appropriate postoperative duration of bowel rest. Preoperative diagnosis of lymph-node metastasis in colorectal cancer by diffusion magnetic resonance imaging (D-MRI) is ongoing. A total of 119 patients (52 with rectal cancer; 67 with colon cancer) were enrolled. Lymph-node metastases were judged with D-MRI and were compared with pathological findings. The form of metastasis was classified as abundant or scarce. We had analyzed the results at the end of the first year (Period I [n=79]) and re-audited our sensitivity and specificity after our meeting (Period II [n=40]). The difference was related to the ability to detect metastasis with D-MRI (Period I: sensitivity, 61%; specificity, 73%; positive-predictive value (PPV), 55%; and negative-predictive value (NPV), 77%. Period-II: sensitivity, 79%; specificity, 95%; PPV, 94%; and NPV, 83%). The specificity and PPV for Period II were significantly higher than those for Period I ($p<0.05$). The diameters of lymph nodes judged with D-MRI to be positive for metastasis (32 nodes in Period I and 16 nodes in Period II) were 10.3±5.4 mm (range, 3–28 mm) and 9.1±3.0 mm (range, 4–14 mm); those of true-positive nodes (18 nodes and 15 nodes) were 11.5±6.2 (range, 4–28 mm) and 9.2±3.1 mm (range, 4–14 mm); and those of false-positive nodes (14 nodes and 1 node) were 6±3.8 mm (range, 3–14 mm)/8 mm. On the other hand, the diameters of lymph nodes judged with D-MRI to be negative for metastasis (47 nodes in Period I and 24 nodes in Period II) were 5.9± 2.4 mm (range, 3–16 mm) and 5.7±2.8 mm (range, 2–15 mm); those of true-negative nodes (36 nodes and 20 nodes) were 5.9±2.1 mm (range, 3–16 mm) and 5.3±2.1 mm (range, 2–8 mm), and those of false-negative nodes (11 nodes and 4 nodes) were 5.7± 2.7 mm (range, 3–12 mm) and 7.8±4.9 mm (range, 4–15 mm). We have concluded that hot nodules with diameters 9 mm or greater are clearly positive for metastasis.

Hepatobiliary and pancreatic surgery

The ongoing research activities in hepatobiliary and pancreatic surgery are as follows: 1) living donor liver transplantation (LDLT), regenerative medicine, and artificial liver (especially, implantable artificial liver), 2) chemotherapy for advanced pancreatic cancer; 3) expansion of surgical indications for hepatic resection in cases of multiple hepatic tumors; 4) laparoscopic surgery for hepatobiliary and pancreatic tumors; 5) development of a navigation system for intraoperative evaluation of biliary surgery; and 6) the significance and clinical application of the lipid mediator and high mobility group box-1 for hepatocellular carcinoma and liver diseases.

The first LDLT was successfully performed for a patient with cirrhosis and postnecrotic hepatocellular carcinoma on February 9, 2007. Our fourth LDLT was performed for a patient with primary biliary cirrhosis on July 25, 2008. All four recipients were discharged 19 to 32 days after surgery with a good clinical course. Our ongoing

research on regenerative medicine and artificial organs is expected to have a synergistic effect with liver transplantation medicine. We have performed a unified clinical trial for pancreatic cancer chemotherapy at our 4 university hospitals. Furthermore, at the university hospitals, translational research has been started into combination chemotherapy with gemcitabine and a naive protease inhibitor, FUT-175, which has the dual functions of nuclear factor κ-B inhibition and apoptosis induction in pancreatic cancer cell lines. Research activities 3, 4, 5, and 6 are ongoing after they were approval by the Ethics Committee of our university.

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