Preoperative procedures

Given the length and difficulty of the procedure, regardless of the diagnosis, certain assurances must occur prior to offering a patient a pancreaticoduodenectomy, the so-called “Whipple procedure”. The surgeon must assure that the patient is a fit candidate for surgery. Simplistically, patients must be able to walk at least a block or two and up a flight of stairs. They should be eating and drinking with some sense that their nutritional state will allow them to heal their abdominal wounds as well as the intestinal hook-ups inside the body. All patients will have an electrocardiogram, chest x-ray and routine lab tests (hemoglobin, white blood cell count, creatinine, etc) to assure there blood volume is sufficient, they do not have an ongoing infection, and their kidney function is acceptable. Some patients may undergo a pulmonary function test that assures adequate lung function and a cardiac stress test to assure of cardiovascular fitness. Physicians attempt to assure patients are cable of undergoing a five hour operation with as low a risk as is possible. Once these clearances are in place, the surgery can begin.
Intraoperative procedures

In the case of a diagnosis of adenocarcinoma, the surgeon will examine all structures laparoscopically to ensure that there are no metastatic lesions prior to a larger abdominal incision. He or she may use an ultrasound examination of the liver and the omentum to ensure there is no tumor involvement. Once it has been established that the pancreas tumor/cancer is contained (not metastatic), the surgeon will either do a midline incision, from the xyphoid process to the umbilicus, a bilateral subcostal incision (just below the rib cage on each side), or more rarely, some surgeons do the entire operation laparoscopically. There are two main versions of a pancreaticoduodenectomy: the standard Whipple procedure removes the lower part of the stomach, and the pylorus preserving Whipple keeps the stomach intact; many surgeons believe the latter does a better job of restoring digestive function.

Simplistically, this technically challenging operation involves keeping the blood supply intact to the stomach, liver, small bowel, and half of the pancreas while carefully removing the head of the pancreas, duodenum, gallbladder and the common bile duct. During the operation, the surgeon may find cancerous tissue in lymph nodes far from the pancreas – this means metastatic disease and the operation will likely be stopped before any more organs are removed or damaged. If no sign of spread is seen, the first key part of the operation to remove the cancer and surrounding organs. This is accomplished by exposing the duodenum, pancreas, gallbladder and bile duct. These structures are carefully removed being extremely cautious to avoid harm to major blood vessels of the liver and intestine (portal vein, hepatic artery, superior mesenteric artery and vein) The pancreas lies deep to the stomach and just in front of the portal and superior mesenteric vein, and
the surgeon creates a tunnel between the portal vein and the pancreas. If there is no tumor stuck to this vein, the operation proceeds by dividing the duodenum (pylorus preserving Whipple) or stomach (standard Whipple) with a stapling device, dividing the bile duct, removing the gallbladder, and carefully dividing the pancreas and the other end of the duodenum (small bowel called the jejunum. The entire specimen, about the size of a grapefruit is sent to pathology for frozen section analysis.

Reconstruction

The reconstruction involves creating three separate hook-ups, each called an ‘anastomosis’, to reconvene a useful gastrointestinal tract. In most cases the pancreatic anastomosis is done first by attaching the cut end of the pancreas into the side of the jejunum. This is called a pancreaticojejunostomy (P-J). Many surgeons place a small stent in the pancreatic duct as a guide for insertion of the sutures. The stent helps keep the hook up open early on and eventually is passed from the body several weeks later. Sometimes drains are placed near this pancreatic anastomosis to help divert potential leaking fluid outside the body. A leak of the P-J occurs in about 20% of patients. Pancreatic juice contains powerful digestive enzymes (amylase) that may cause harm to the body. An uncontrolled leak can cause bleeding, infection, or abscess. Surgeons may send fluid from a drain to the lab to see in amylase lies within. If there is no amylase in the fluid, the drains will most likely be removed prior to patient discharge. If there is evidence of a P-J leak, and interventional radiologists will likely insert a percutaneously placed drain to help with removing this fluid. In most cases, trouble can be averted and patients will be discharged from the hospital 5 to 10 days after the operation.
The second anastomosis, a hepaticojejunostomy (H-J) reconnects the bile duct to the small intestine. This allows the bile from the liver to help digest nutritional intake. This anastomosis rarely leaks but may stricture (narrow) over time; surgeons are ever watchful that the H-J is created meticulously to avoid this problem. The final hook-up, the duodenojunostomy (pylorus preserving Whipple) or the gastrojejunionostomy, is crucial to allow swallowed contents to enter the gastrointestinal track for breakdown and utilization of nutrition. Usually relatively easy to create, this anastomosis may ulcerate or narrow with time. Ongoing followup for this and a variety of other reasons is necessary.

Originally described over 100 years ago, and made popular by Dr. Allen Oldfather Whipple in the 1930s, the Whipple procedure is a technically challenging operation. However, if performed by experienced surgeons on fit patients, surgical resection of the offending pancreas cancer can be safely removed and patient gain real benefit with improved long term survival.

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