Pancreas Surgery
What is the Pancreas?

The pancreas is a very important organ found deep in the abdomen; it produces insulin to control blood sugar levels, in addition to making pancreatic juice that contains pancreatic enzymes that help with digestion. It is located deep in the abdomen, behind the stomach and on top of the spine in the back.

Pancreas Anatomy

The pancreas is divided to a head and neck part, which is the big bulky part of the pancreas gland, the body and the tail. Pancreatic juice is secreted into a series of ducts that make the main pancreatic ducts that empties into the first part of the intestines called the duodenum. It is located deep in the abdomen, behind the stomach and on top of the spine in the back.

Common Symptoms of Pancreatic Diseases

Pancreas disease symptoms vary between benign diseases and cancerous diseases. Common symptoms depend on the nature of the problem but in general include:

- A dull type pain beneath the breast bone that radiates to the back. In benign diseases of the pancreas like pancreatitis, the pain is due to the inflammation of the pancreas gland. In tumors
or cancers of the pancreas, pain is usually due to compression of the tumor to surrounding organs in the abdomen.

- Nausea, upset stomach, or vomiting
- Jaundice (a buildup of bile chemicals in the blood), which causes yellowing of the skin and eyes, dark urine, and itching. This is usually caused by a blockage of the bile duct that carries bile from the liver to the intestine.
- Weight loss, poor appetite and aversion to food.
- Fatigue, depression.

What are Pancreas Diseases?

Pancreatic Tumors

Tumors of the pancreas originate from multiple types of cells that constitute the pancreas. Not all pancreas tumors are malignant and some of them can be pre-malignant or benign. Tests and sometimes biopsies need to be done to assess for malignancy. The most common type of pancreatic malignant tumors originates from pancreas cells that line the pancreatic duct, and it is called pancreatic ductal adenocarcinoma. Another type of cells called endocrine cells give rise to a tumor called pancreatic neuroendocrine tumor. Treatment and prognosis of these two different
pancreatic tumors differ significantly, thus the importance of understanding which type of tumor the patient has. Pancreatic papillary pseudotumors are a rare entity with a malignant potential.

Risk factors for pancreatic cancer include smoking, prolonged history of chronic pancreatitis, certain familial cancer syndromes, obesity, diabetes.

**Diagnosis and Treatment of Pancreatic Cancer**

Signs and symptoms of pancreatic cancer include:

- Jaundice
- Weight loss
- Decreased appetite
- New onset diabetes
- Abdominal or back pain

Tests done to diagnose pancreatic cancer include:

- Blood tests: pancreatic cancers can produce certain types of chemicals called tumor markers like Carbohydrate Antigen 19-9 (CA19-9) or Carcinoembryonic Antigen (CEA), these are not diagnostic but can be used to track tumors.
- Scans: Computed Tomography (CT), Magnetic Resonance Imaging (MRI), or Positron Emission Tomography (PET) are multiple imaging techniques used to detect pancreatic tumors including size and location, in addition to sites of disease spread to other areas of the body.
- Endoscopic Retrograde Cholangiopancreatography (ERCP): this is an endoscopic test done by your gastroenterologist, usually used to diagnose and sometimes treat blocked bile ducts by placing a stent inside of the duct in order to drain the liver and treat jaundice.
- Endoscopic Ultrasound and Fine Needle Aspiration (EUS/FNA): this is also an endoscopic test done to visualize the tumor using an ultrasound probe mounted on the tip of an endoscope, this can scan the pancreas from inside the stomach or the intestine and get biopsies for diagnosis.

Treatment of pancreatic cancer should be performed by a team of specialists in various medical disciplines, including surgeons/surgical oncologists, medical oncologists, radiation oncologists, gastroenterologists, endocrinologists, radiologists, nutritionists and support groups. Pancreatic cancer treatment is a multimodality treatment and includes surgery, chemotherapy and sometimes radiation therapy. Recent advances include immunotherapy if other treatments fail, in addition to palliative therapy.

**Chemotherapy**

Most pancreatic cancer patients will require chemotherapy at some point in their treatment. Current recommendations suggest chemotherapy being given after surgical resection is achieved, in tumors that can be surgically resected. We have moved to give chemotherapy to patients who have a tumor
that cannot be fully removed by surgery, and then offer surgery if the tumor responds to chemotherapy.

**Radiation Therapy**
Similar to chemotherapy, radiation therapy is an important part of the multimodality approach to pancreatic cancer, it might be given before or after surgery depending on the stage of the disease.

**Surgery**
Surgery pancreatic cancer is done for curative or palliative reasons. As a curative surgery, the goal is to surgically remove the cancer in its entirety. Palliative surgery is done of the tumor cannot be fully removed, then bypass procedures will be done to correct the bile duct obstruction and the stomach obstruction that are resulted from involvement by the neighboring tumor.

**Pancreatic Cysts**
Pancreas cysts are common findings on imaging studies. Certain cysts are benign in nature and do not require surgery however other cyst can be premalignant in nature and can degenerate into cancers, some of these include Intraductal Papillary Mucinous Neoplasms (IPMN), or Mucinous Cystic Neoplasms (MCN). There are specific indications for surgery when a pancreatic premalignant cyst is diagnosed. Pancreatic pseudocyst are also cystic lesions of the Pancreas resulting from inflammation of the pancreas, these do not carry a malignant potential, however they can cause local compression symptoms and can require surgery.

**Pancreatitis**
Pancreatitis, also known as inflammation of the pancreas occurs in acute and chronic forms. Acute pancreatitis is usually self-contained, and resolves spontaneously as soon as the triggering factor for the inflammation is corrected, and this is most likely related to gallbladder stones obstruction the pancreas or alcohol use. Chronic pancreatitis is a very different disease, most commonly related to chronic alcohol use, however can also be related to biliary stone disease, autoimmune where the body’s own immunity turns against the pancreas, it can be familial and happens in families who have a certain gene mutation and it can also happen because of undiscovered small tumors of the pancreas. Chronic pancreatitis harbors a 20% lifetime risk of pancreatic cancer if left untreated. Chronic pancreatitis is a common indication for pancreatic surgery in very specific cases.

**Surgery of the Pancreas**
The extent of surgery of the pancreas is mainly dictated by the location of the disease, or whether it is done for tumors or pancreatitis. Pancreas surgery is one of the biggest and most involving surgeries in the abdomen, and that is due to the proximity of the pancreas to vital organs, in addition to important blood vessels.
The Whipple Procedure

For some patients who happen to have the disease in the head or neck of the pancreas, a Whipple procedure is indicated. The classic Whipple procedure is named after Allen Whipple, who was the first surgeon to perform the operation in 1935. The procedure is also known as pancreaticoduodenectomy, and it involves removal of the head of the pancreas, the first part of the small intestine (duodenum), in addition to a part of the bile duct, gallbladder, and a small part of the stomach. The pancreas, bile duct and the stomach are then reconnected to the intestines.
Total Pancreatectomy

Very rarely, certain tumors involve the whole gland and thus a total pancreatectomy is required.

- Disease in the head and tail of the pancreas
- Organs removed during a total pancreatectomy
- Reconstruction after the total pancreatectomy
Distal Pancreatectomy

When the disease is found in the body or the tail of the pancreas, surgery is usually shorter and less challenging as it involves less organs. The body and tail of the pancreas are removed in addition to the spleen most of the time as it would be close and involved by the disease. Distal pancreatectomy can be easily done using minimally invasive surgery, using the small incisions camera technique, and we recently started performing these procedures using robotic surgery.

Other Procedures for Chronic Pancreatitis

There are a few other procedures done for chronic pancreatitis, and these are called drainage procedure, examples are Beger, Frey and Puestow procedures. These are usually done in certain circumstances where the aim of the procedure is to drain the pancreatic duct into the intestine as the usual drainage channel is obstructed or involved by the disease.

Pancreatic Pseudocyst Surgery

A pancreatic pseudocyst is a false cyst of the pancreas that results after inflammation of the pancreas called pancreatitis. The pancreas leaks pancreatic juice into the surroundings. The body tries to contain this pancreas juice leak by forming a wall or membrane around the leaked fluid thus forming a pseudocyst. These form over a long period of time and become mature. The majority of pseudocysts are reabsorbed by the body and do not cause symptoms. Rarely these are large enough and compress surrounding organs and needs to be surgically drained into a nearby organ, usually the stomach and sometimes the intestines.
Before Surgery

- There is no need to stop taking baby aspirin, ibuprofen, or naproxen. Ask your doctor what to do if you take prescription blood thinners such as Coumadin (Warfarin), Lovenox, Eliquis, or others. Plavix or full dose Aspirin need to be stopped 7 days before surgery.
- Have any tests, such as blood tests, that your doctor recommends, have your clearance done by your primary care doctor or heart doctor as required by your surgeon.
- Don’t eat anything after midnight, the night before your surgery. You may have clear liquids up until 4 hours before the procedure.
- It is recommended that you shower the morning of surgery.
- Smoking cessations for 2 weeks before surgery is strongly recommended.

The Day of Surgery

- Arrive at the hospital or surgery center on time. You will be given an IV to provide fluids and medications.
- An anesthesiologist will talk with you about the medications used to prevent pain during surgery. Pancreatic surgery is done using general anesthesia. This lets you sleep during the procedure.
Discharge Instructions after Pancreatic Surgery

You just had pancreatic surgery and completed your hospital stay after the procedure. It is now safe to be discharged home. Your surgeon will be keeping a close eye on your progress even if are at home. Healing from a pancreatic surgery usually takes weeks.

**Activity:**
We encourage resuming walking and light activity immediately; as soon as you are sure you are not going to have issues with dizziness or lightheadedness. You may resume driving when it is comfortable to walk up and down stairs, when you feel safe driving and when you are not taking narcotic pain medications. You should be able to slam on the brakes to avoid an accident without causing any pain. Don’t plan on any strenuous activities, like sports or going to the gym, until your postoperative office appointment. Your surgeon may have specific instructions to add to this; usually these are outlined to you before surgery. The bottom line: if it hurts, don’t do it!

**Eating:**
The basic rule is take in what your body is telling you. It takes about two-three weeks at least after pancreas surgery in order to resume a normal diet. Your stomach will be slow at digesting food especially after a Whipple procedure, this process might be faster if you had a distal pancreatectomy with the small incisions technique. Some find it easier to digest bland foods, light foods, or predominantly liquids. Whipple patients have strict instructions given to them by their surgeon prior to discharge home. It is not uncommon that you will be discharged home on a liquid diet for the first two weeks after surgery. Make sure you stay hydrated, and avoid excessive caffeine. Raw fruits, raw vegetables, dairy products and carbonated beverages should be avoided as they cause gas pain. Alcohol is not allowed for a few months after pancreatic and liver surgery. Most Whipple patients will have a feeding tube and will be sent home on tube feeds; very specific instructions will be given to you regarding the tube feed formula and the way these are administered. We strongly recommend being on supplements like Ensure or Boost after surgery for a few weeks.

**Elimination:**
Constipation is very common after surgery. We recommend staying well hydrated, and using over the counter stool softeners if it happens, try to avoid laxatives. Do not let more than 48 hours go by without a bowel movement without starting the above medications. If they fail to help within another 24 hours, call our office. Diarrhea is common if you are taking antibiotics. If you have this problem, we would suggest either probiotics while you are on the antibiotics, or eating yogurt with active cultures. If diarrhea occurs more than 4-6 times daily for more than 48 hours, call us. Make sure your doctor is aware of any chronic difficulties with urination (like prostate trouble) before surgery.

**Wound care:**
Surgical wounds will have either glue or steri-strips (butterfly tapes) on them, often covered with gauze. Glue, steri-strips, or waterproof plastic dressings can all get wet the day after surgery (unless your surgeon advises differently). Wounds with visible staples or sutures can get wet in the shower after 48 hours. Do not submerge your wound (tub bathing or swimming) for one week. If you have a feeding tube, do not submerge in water until this tube is removed. If you have a surgical drain, do not submerge in water until that drain is removed. While soap will not harm the wound, do not scrub it. Do not apply peroxide or other chemicals. After 48 hours, change or remove gauze dressings or Band-aids. Do not leave soiled or wet dressings on the wound beyond 48 hours. Most wounds can then remain uncovered, unless you have been told otherwise. Light
gauze covering to prevent chafing is acceptable if you wish. You may notice a slight drainage (usually pink or reddish in color) from the incision site. This is normal and not a cause for concern. Light pinkness immediately surrounding the incision, and not spreading over time, is normal. Bruising is common and may extend for up to an inch. Spreading redness, progressive swelling with bruising, and malodorous drainage are not normal and should prompt a call to our office.

Drains:
If you are sent home with surgical drains, you will likely be given instructions at the time of discharge for care of them, and a log sheet to record the output. It is important to note the daily output of the drain(s) so we will know when to remove them. Drains that empty into a suction bulb or attached bag can get wet in the shower. If there is gapping of the skin around the drain, Neosporin or similar ointment may be used to protect the area while you shower. Do not submerge the drain site underwater, such as tub bathing or swimming. Slight pinkish or yellowish drainage from around the tube is normal while it is in place, as is a small amount of redness at the site. Gauze over the site may help protect your clothing from staining. Foul smelling or copious drainage around the drain, or spreading redness around the drain, is not normal and should prompt a call to our office. If the drain reservoir fails to hold suction when you squeeze it, or if the drainage suddenly drops to near zero, call our office.

Normal care of drains includes emptying the fluid in the reservoir every 8 hours and recording the amount per 24 hour period. Bring this record to your postoperative appointment. The fluid may need to be emptied more frequently if the drainage is heavy. Fluid will often be red at first, then pink, then yellow as the wound heals. Stringy material in the tubing or reservoir is normal.

Medications:
Prescription pain medications are there to help you recover comfortably, but stop them as soon as you are able. Side effects of nausea, vomiting, dizziness, fatigue, poor appetite, and above all constipation, are common. If you have these issues, try to use Ibuprofen and Tylenol instead (see below). Do not use alcohol or drive if you are taking prescription pain medications. Unless you are told differently by your surgeon or primary doctor, you can take 400 mg ibuprofen every 4-6 hours, or 800 mg every 8 hours, for the first 3-5 days after surgery, for a maximum dose of about 2400 mg/day (refer to the label for specific dosing based on age and weight). It is best if you can take some food with this medication. Tylenol should also be used around the clock to help with the baseline pain after surgery. It can be taken in conjunction with ibuprofen, and with your prescription (unless your prescription already contains acetaminophen—which is Tylenol). Be very careful not to exceed the dosage on the bottle. Taking more than 4 grams/day is not advisable. Blood thinners should only be restarted after surgery according to the plan discussed with you by your surgeon or prescribing doctor before surgery. If this was not made clear to you, call our office. All other medications should be resumed once you get home. Vitamins and supplements are not necessary to help you heal, unless you have a known deficiency. You may resume them after you get home if you wish. We would suggest sleep aids not be used while you are on narcotic pain medications.

If Difficulties Arise:
Please call us if any problems or questions arise. We can be reached any time, including evenings and weekends, by calling our office number (703) 359-8640 and selecting to speak to the on call physician. Call your doctor if you have any of the following:
• Fever over 101°F or chills
• Increasing pain, redness, or drainage at an incision site
• Yellowing of the skin or eyes, or brown colored urine
• Vomiting or nausea that lasts more than 12 hours
• Prolonged diarrhea
• Chest pain or shortness of breath
• Inability to urinate within 8 hours of discharge
PANCREAS SURGERY DISCHARGE INSTRUCTIONS

WHAT TO EXPECT AT YOUR SURGICAL SITES:
- Pink/reddish drainage, bruising, swelling/lump at incisions may occur and is normal.
- Drainage and/or irritation around your drain or feeding tube (if you have one), is expected, a warm shower over the area will help.

CARE FOR THE INCISION:
- If you have white tapes on the skin (steri-strips), these will fall off over 7-10 days
- Skin glue over your incisions will dissolve over the next two weeks.
- Staples will be removed at your first post-operative office visit by your surgeon.
- Shower 48 hours after your surgery. No tub bathing, or pool/ocean for 1 week.

DIET:
- Most patients are discharged on some form of a liquid diet, keep yourself hydrated. We prefer liquid food to solid food for the first couple weeks after your surgery, as it may take your stomach 3-4 weeks to regain its normal function.
- Please add supplements (Ensure, Boost, etc…) at least 3 bottles a day
- If you have a feeding tube, you will go home on a feeding formula through, please follow directions given before discharge. It is expected to have mild drainage and irritation around the tube site.

ACTIVITY:
- If it hurts, don't do it!
- Walking & stairs are encouraged.
- Avoid strenuous physical activity & lifting until cleared by your surgeon.
- You may drive again once you have stopped taking prescription medication for pain.

MEDICATIONS:
- Resume all home medications, except the one stopped by your surgeon before discharge from the hospital.
- Use Tylenol and Motrin (Advil, Ibuprofen) for your pain, in addition to narcotics pain medications prescribed by your surgeon. Be aware that narcotics sometimes cause nausea and constipation and should be avoided if possible.
- For constipation, an over-the-counter stool softener or laxative may be taken. Please refer to attached detailed instructions or our website for this issue.
- Most patients will be taking some sort of blood thinners on discharge, please refer to discharge instructions about those specific medications. You will be taught by nurses before discharge on how to administer some blood thinner injections to yourself.
• Most patients will need acid reducing medications (Protonix, Omeprazole, etc…) on discharge, these prevent bleeding from your stomach after surgery.
• Most patients will be discharged on stomach motility medications to help in contractions of the stomach for a better digestion.

**WHAT TO LOOK FOR:**
Please call our office immediately at (703) 359-8640 or go to the ER if you develop any of the following:
• Excessive drainage, bleeding, redness or swelling at or around the incisions
• Fever over 101°F
• Increased abdominal pain
• Persistent nausea or vomiting
• Difficulty with urination
• Difficulty breathing, chest pain or calf pain
• Brown/dark yellow urine, or yellow discoloration of the skin or eyes

**FOLLOW-UP:**
• We will see you in our office 1-2 weeks after your surgery, your surgeon will tell you exactly about the timing of follow up visits.
• If not already scheduled, please call (703) 359-8640 to arrange your post op visit.