

Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

Introduction:

Antrectomy and Billroth 1 Gastroduodenostomy is an excellent operation for gastric outlet obstruction due to healed peptic ulcer disease or small tumors in the antrum of the stomach. It is usually not suited to active ulcer disease with inflammation in this area, or to larger tumors of the stomach. With active ulcer disease, an anastomosis to inflamed duodenum is not advised. With larger tumors, an adequate proximal margin of 5cm makes it impossible to attach the remnant stomach to the duodenal stump without tension.

As with all operations involving the duodenum, the keys to success are meticulous surgical technique and a tension-free, well vascularized anastomosis between two pieces of healthy, uninflamed, cancer-free tissue.

By definition, a patient who needs this operation is at risk for preoperative malnutrition. An experienced surgeon will understand the subtle signs of malnutrition: see “Nutrition and the Surgical Patient” for more information. For patients with severe malnutrition, consider a lesser operation such as a simple loop gastrojejunostomy. The same is likely true in cases of advanced cancer, including peritoneal metastasis or ascites. Be very cautious doing any anastomosis at all in such patients.

We discuss surgical decision-making in this section’s Introduction, “Benign Gastric and Duodenal Disease.”

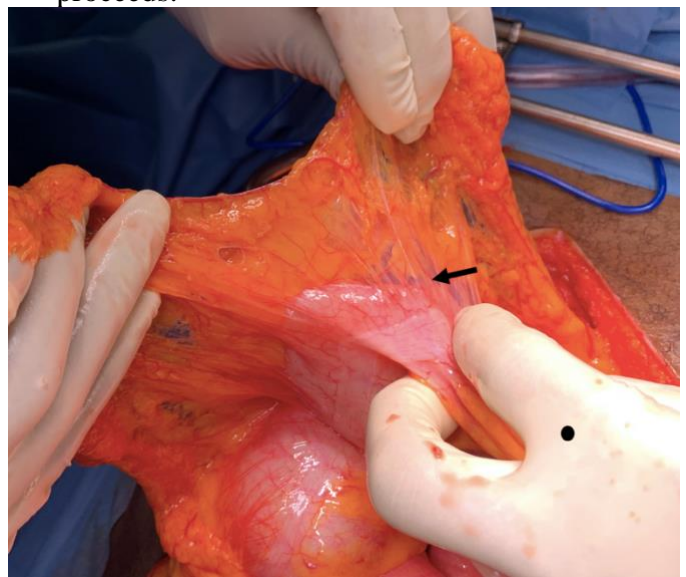
The operation proceeds according to the following general steps:

- Explore the abdomen.
- Enter into the lesser sac between the omentum and the transverse colon.
- Locate and divide the right gastroepiploic vessels at their origin.
- Mobilize the duodenum.
- Divide the duodenum distal to the pylorus, through the first or second portion.
- Locate and divide the right gastric artery.
- Plan where the stomach will be divided.
- Divide the gastric and gastroepiploic vessels
- Divide the stomach and omentum.

- Close the divided stomach at the lesser curvature side.
- Anastomose the stomach body to the duodenum.
- Place a feeding jejunostomy tube if indicated.

Steps:

1. Assess the patient for malnutrition, which is common in patients with gastric outlet obstruction. In extreme cases a simpler operation such as a loop gastrojejunostomy will be more appropriate.
2. Induce general anesthesia and place a nasogastric tube.
3. Perform midline laparotomy and explore the abdomen. The operating surgeon will stand on the patient’s left.
4. Enter the lesser sac by dividing the avascular plane between the greater omentum and the transverse colon. Take care to avoid injury to the transverse mesocolic vessels, which will be pulled in a caudal direction as the dissection proceeds.



The avascular plane between the transverse colon and the omentum is most easily entered on the left side of the abdomen. The surgeon’s non-dominant hand (Black Dot) pulls the transverse colon downwards while the assistant pulls the omentum upwards. A clear avascular plane (Black arrow) that leads into the lesser sac, behind the stomach, is visible and can be dissected.

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

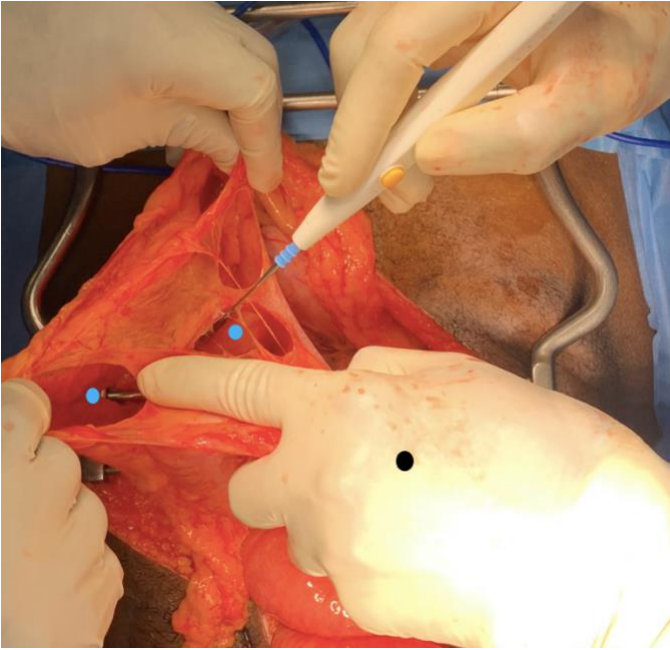
This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



Antrectomy and Billroth 1 Gastroduodenostomy

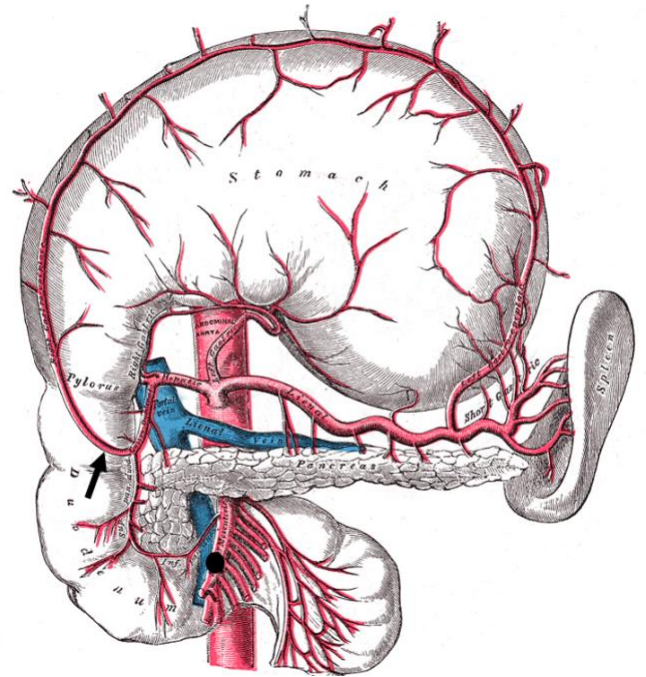
Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

5. Continue dissection in this relatively avascular plane until all of the omentum to the right of midline is divided off of the transverse colon.

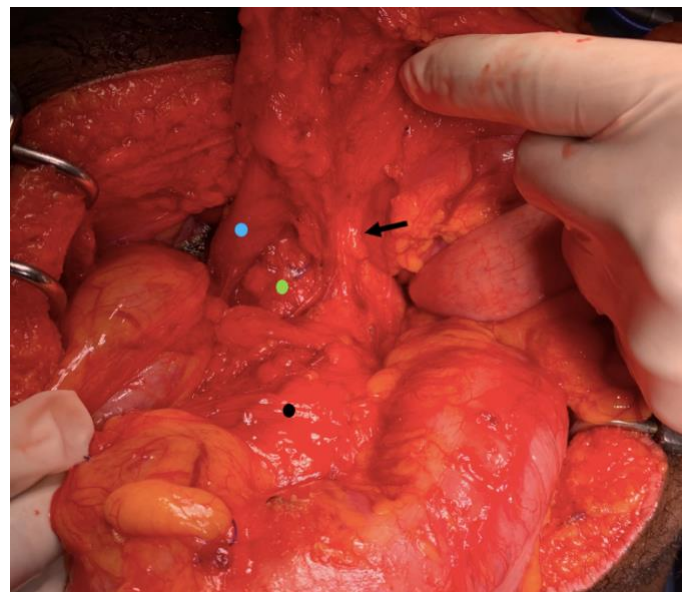


Continued dissection of the plane between the omentum and the transverse colon. As the surgeon pulls the colon down with the non-dominant hand (Black Dot,) dissection continues in this plane. The lesser sac, an open space posterior to the stomach (Blue Dots) becomes more visible. This space is variable and is not present at all in some individuals; in that case, continue dissection in this plane until the stomach is completely mobilized.

6. Elevate the stomach anteriorly and dissect posterior to it, proceeding to the origin of the gastroepiploic vessels. Divide and ligate them. If this is an operation for cancer, sweep adjacent lymph nodes up with the specimen.



With the stomach dissected from its posterior attachments and retracted anteriorly, the origin of the right gastroepiploic artery (Black Arrow) can be found by following the greater curvature distally. The transverse mesocolon, not seen in this drawing, is represented by a Black Dot over the superior mesenteric artery.



The same view as above, with the stomach held anteriorly. The transverse mesocolon (Black Dot) has been preserved during the dissection. The second portion of the duodenum (Blue Dot) and the pancreatic head (Green Dot) are visible. The right gastroepiploic artery (Black Arrow) can now be encircled,

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)

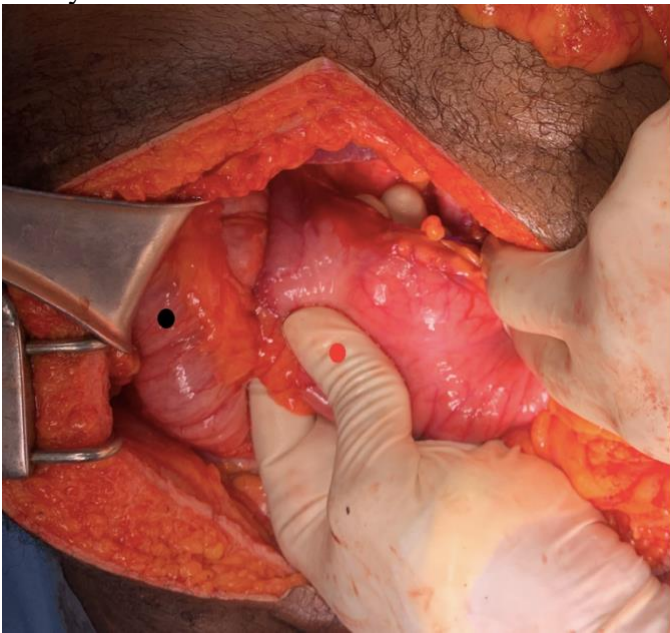


Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

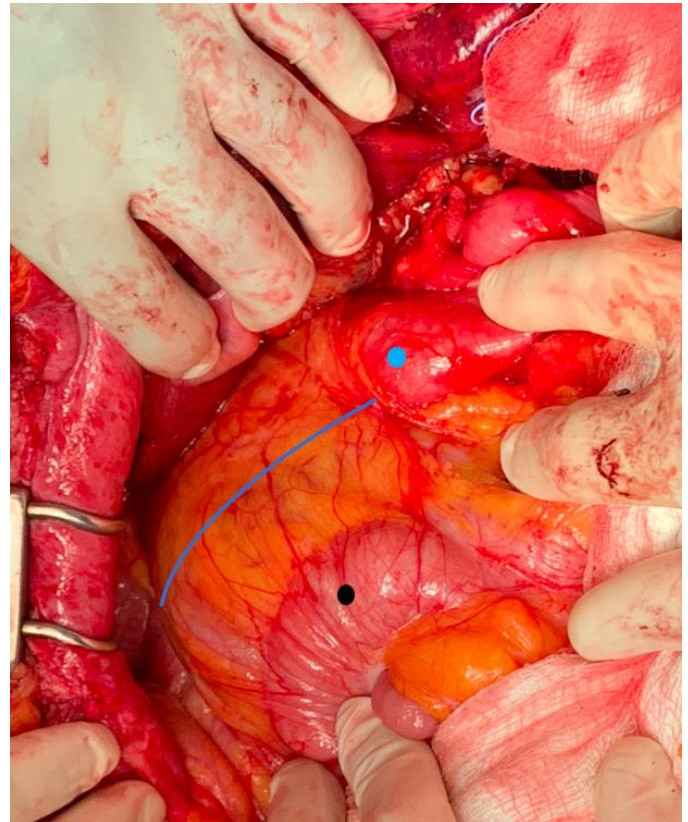
ligated and divided. Directly behind this ligated vessel, a plane between the pancreas and the duodenum can be dissected.

7. Dissect the plane between the pancreas and the first and second portion of the duodenum, being mindful of where the pylorus is. There will be some variable small blood vessels between the duodenum and pancreas in this plane. The goal is to divide the duodenum in an area where it is not tethered to the pancreas, but distal to the pylorus. Excessive inflammation in this area sometimes makes this distinction difficult. If the stomach is divided instead of the duodenum, some of the antrum can be left behind, leading to continued gastrin secretion and “Retained Antrum Syndrome.”



The surgeon has dissected the plane posterior to the first portion of the duodenum and is able to grasp behind this structure. The pylorus is directly below the thumb of the surgeon's non-dominant hand (Red Dot.) The transverse colon (Black Dot) will need to be mobilized in a caudal direction to allow full visualization of the pancreatic head for the next step.

8. Mobilize the right transverse colon and hepatic flexure of the colon downwards away from the liver, exposing all of the 3rd portion of the duodenum.

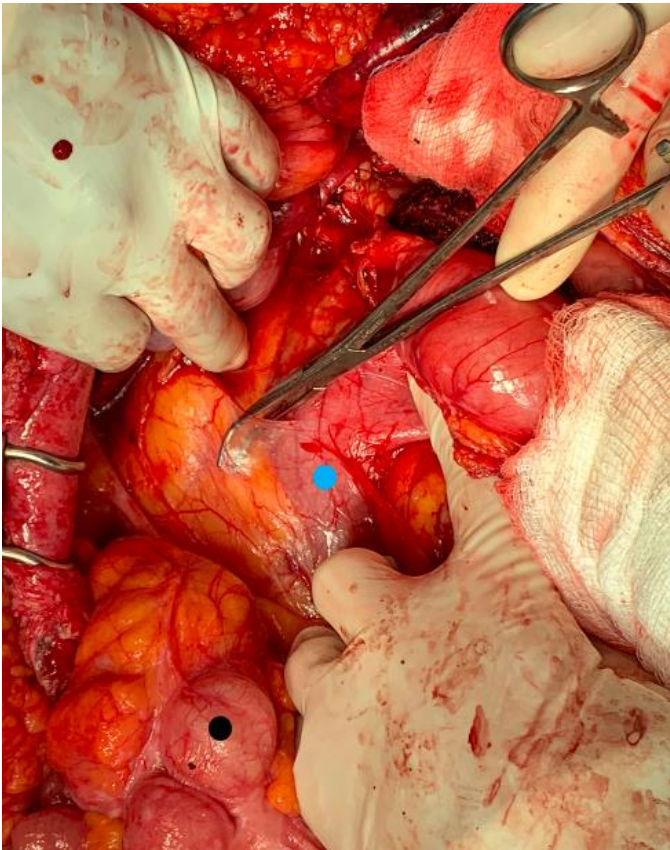


The first portion of the duodenum (Blue Dot) has been exposed but the second and third portions remain hidden. Pull the colon (Black Dot) downwards gently to apply tension to the peritoneal layer that holds it in the right upper abdomen. Once this layer has been divided (along the Blue Line,) the plane between the colon and retroperitoneum is relatively avascular and the colon can be swept downwards, revealing the head of the pancreas and “C” loop of the duodenum.

9. Mobilize the duodenum by dividing the lateral retroperitoneal attachments of the 2nd and 3rd portions, until all of the head of the pancreas is free from the retroperitoneum. This maneuver allows a tension-free anastomosis. It also delivers the anastomosis to the center of the operative field, making it technically easier to perform. During this dissection, grasp and pull gently on the antrum of the stomach with your non-dominant hand as you dissect with the right-angle clamp and your assistant divides the tissue you elevate with electrocautery.

Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga



Dissection of the duodenum and head of the pancreas off the retroperitoneum, sometimes called the Kocher maneuver. The colon (Black Dot) has been reflected downwards and the duodenum (Blue Dot) can be seen. The attachments between the duodenum and retroperitoneum are now elevated with a Right Angle clamp and divided with electrocautery. This maneuver will bring the duodenum into the center of the operative field.

10. If the location of the pylorus is clear, the first portion of the duodenum should also be clear. This is the part of the duodenum that has no attachments to the head of the pancreas. In cases of excessive inflammation, this area may be difficult to distinguish. External clues such as the prepyloric vein of Mayo may help. If you encounter excessive inflammation here, or if the anatomy is at all unclear, divide the duodenum proximally and examine the inside of the divided tissue. Duodenal mucosa has a characteristic “sparkle” that gastric mucosa will not. It is acceptable to divide further distally if one has divided gastric tissue proximal to the pylorus; it

is unacceptable to divide the duodenum too distally and damage the Ampulla. Attempt also to identify the right gastric artery, which should enter the stomach proximal to the pylorus. Again, if the location of the pylorus is not clear, do not divide any vessels.

If this is an operation for peptic ulcer disease, divide the right gastric artery where it is found. If this is an operation for cancer, locate its origin at the common hepatic artery and ligate it here, leaving at least a 5mm stump to avoid narrowing the common hepatic artery as you ligate the right gastric. Sweep lymphatic tissue around the artery inferiorly so it comes with the specimen. It is not worth risking injury to the hepatic vessels or the common bile duct in order to remove a few more lymph nodes here, so be careful.

Again, divide only a vessel that is clearly entering into the body of the stomach, proximal to the pylorus, to avoid the possibility of damaging the common hepatic artery or the common bile duct.

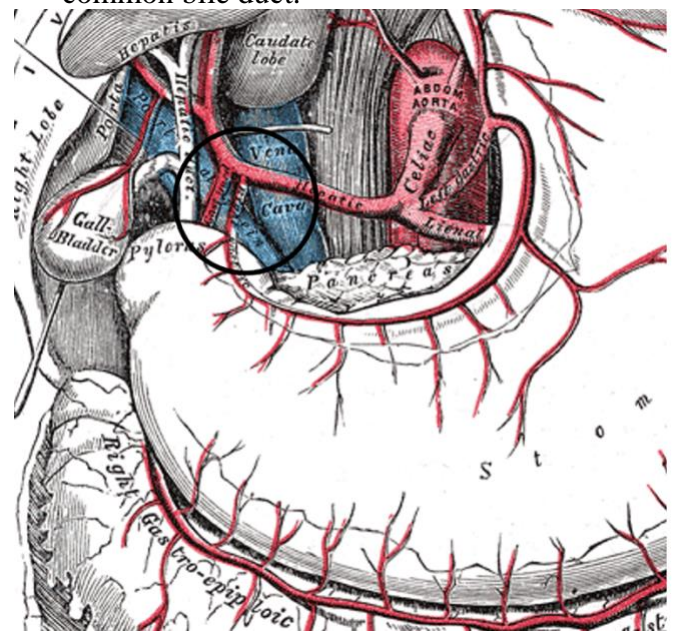


Illustration of the relationship between the right gastric artery, the common hepatic artery, and the gastroduodenal artery. Note also that the structures of the porta hepatis are nearby. Note that the right gastric artery enters the stomach proximal to the pylorus. If the location of the pylorus is not clear, do not

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

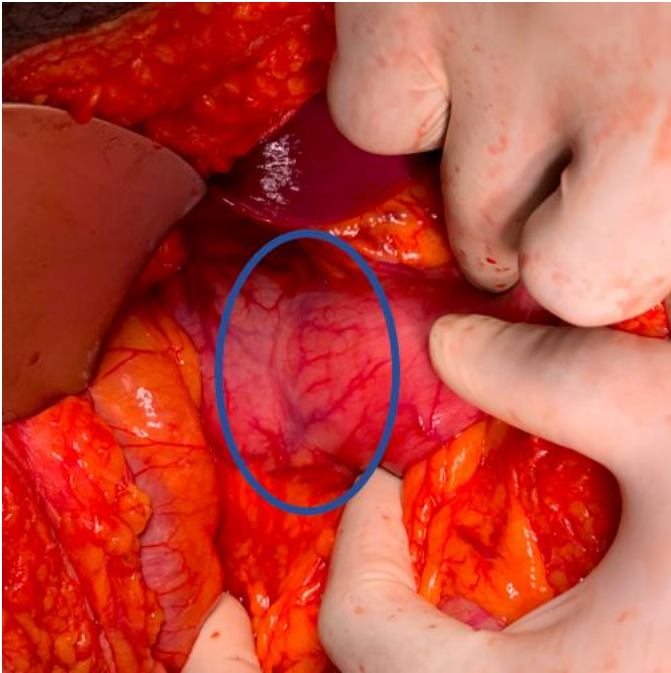
This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



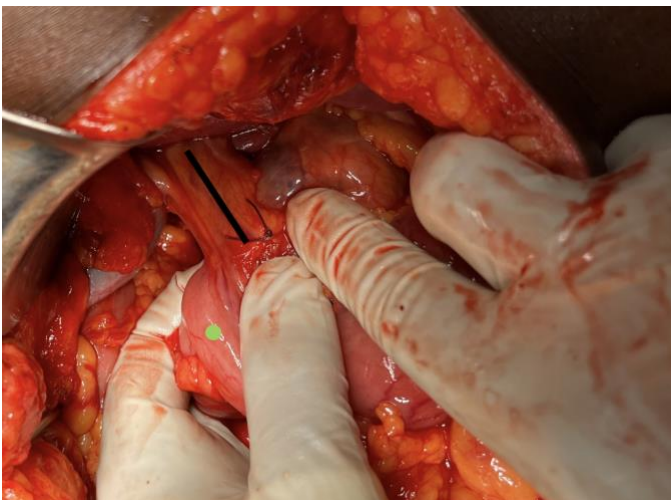
Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

divide any vessels until it is, to avoid damaging the common bile duct or the proper hepatic artery.



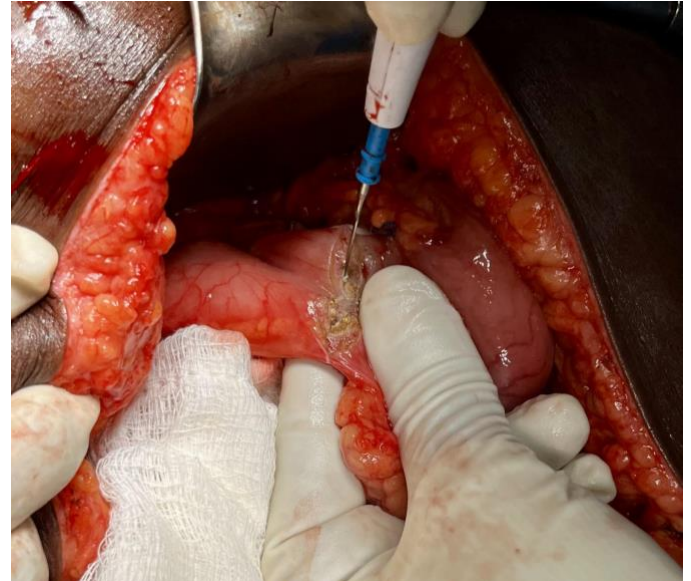
In the absence of inflammation or scarring, the pylorus can easily be felt as a thickening of the sub-serosal tissue. If the patient has had longstanding ulcer disease, the pylorus can be difficult to palpate. However it is crucial to divide the duodenum, distal to this structure. One external clue to the pylorus' location is the prepyloric vein of Mayo, which has the appearance of a "Crow's foot" and is more distinct than the other veins on the anterior stomach.



Another image of the porta hepatis, containing the common bile duct (Black line) and the duodenum; the vertical part of the duodenum is the 2nd portion, under the Green dot. This

relationship can easily be seen, as the entire duodenum and head of pancreas have been mobilized.

11. Divide the duodenum in a location where it is not attached to the pancreas with electrocautery, controlling bleeding as you proceed. We prefer to not use bowel clamps here, to avoid trauma to the small vessels of the duodenal wall which would increase the risk of anastomotic leak.



Dividing the duodenum with electrocautery. Proceed slowly, it is easier to get hemostasis during division than afterwards.

12. If there is excessive inflammation in the duodenal stump, consider an alternative method of reconstruction. Safe closure of the inflamed duodenal stump is discussed in the Chapter, "Gastrectomy and Reconstruction."

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

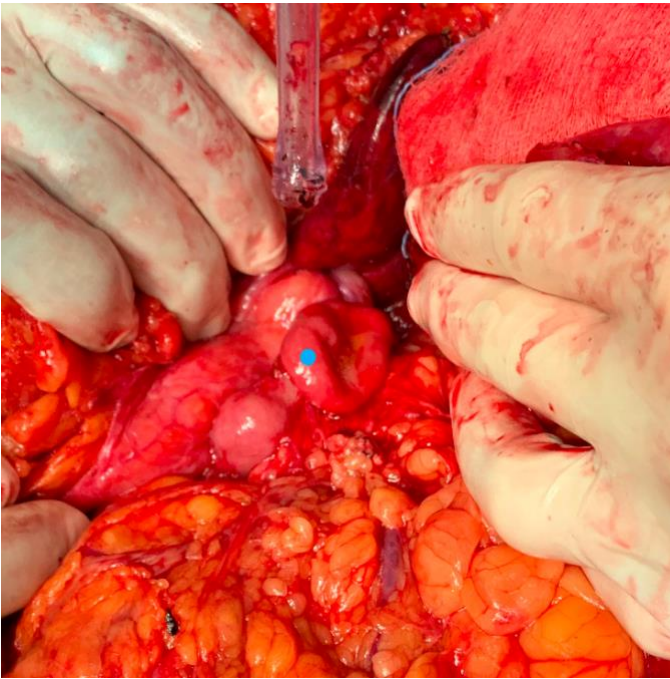
www.vumc.org/global-surgical-atlas

This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



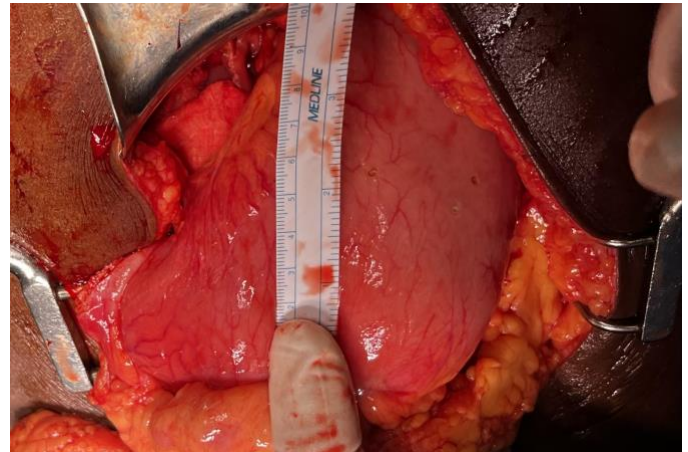
Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga



The divided duodenum, showing normal eversion of the mucosa. This tissue is soft and healthy, reaching the midline easily after Kocher's maneuver. It can be safely anastomosed to the stomach if the two structures reach each other without tension. Alternatively, it could be closed in 2 layers as described in the chapter, *Gastrectomy and Reconstruction*.

13. The entire stomach antrum and first portion of the duodenum should now be free from the surrounding pancreas head, gastrohepatic ligament, and any attachments to the lesser sac. Choose where the body of the stomach will be divided. For peptic ulcer disease, locate the incisura angularis, the right angle along the lesser curvature that denotes the junction between the body and antrum of the stomach. For cancer, divide the stomach at least 5cm proximal to the most proximal palpable extent of the tumor. Mark the planned line of division by scoring the serosa with the electrocautery.



If available, a ruler is helpful for measuring a 5cm proximal margin from a gastric tumor.

14. Divide the vascular arcade of the lesser curvature adjacent to where the stomach is to be divided. This will likely require separate ligation of tissue several times. Continue until the serosa of the lesser curvature is plainly seen. Careful attention to this step avoids bleeding from these vessels when the stomach is divided.

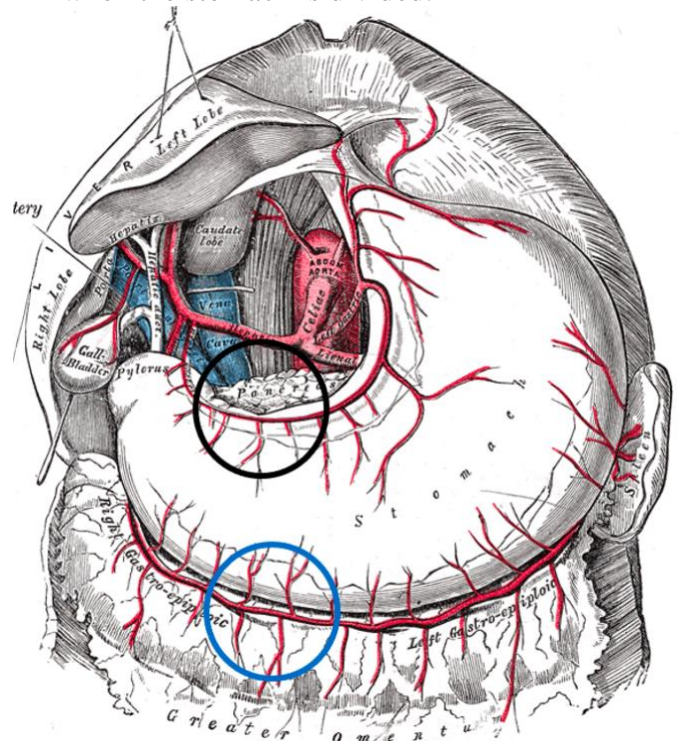


Illustration of the vascular arcades of the lesser (Black Circle) and greater (Blue Circle) curvatures of the stomach. The

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

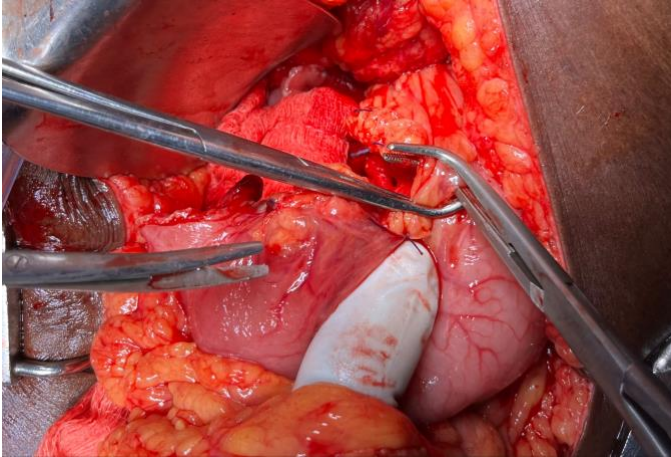
This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



Antrectomy and Billroth 1 Gastroduodenostomy

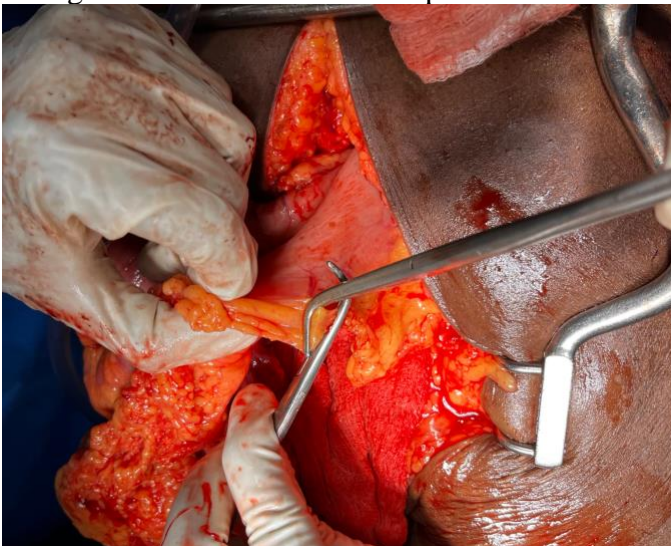
Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

vessels of the lesser curvature usually cannot be divided all at once, whereas the vessels of the greater curvature usually can. Following division of the greater curvature vessels, any omentum to the (patient's) right of the divided greater curvature vessels must be divided from the omentum that will remain.



Divide the vessels of the lesser curvature. This step usually needs several applications of the clamps, it can not be done all at once.

15. Divide the vascular arcade of the greater curvature. Compared to the lesser curvature, this is more often a single set of vessels that can be ligated and divided in one step.



Divide the gastroepiploic vessels on the greater curvature.

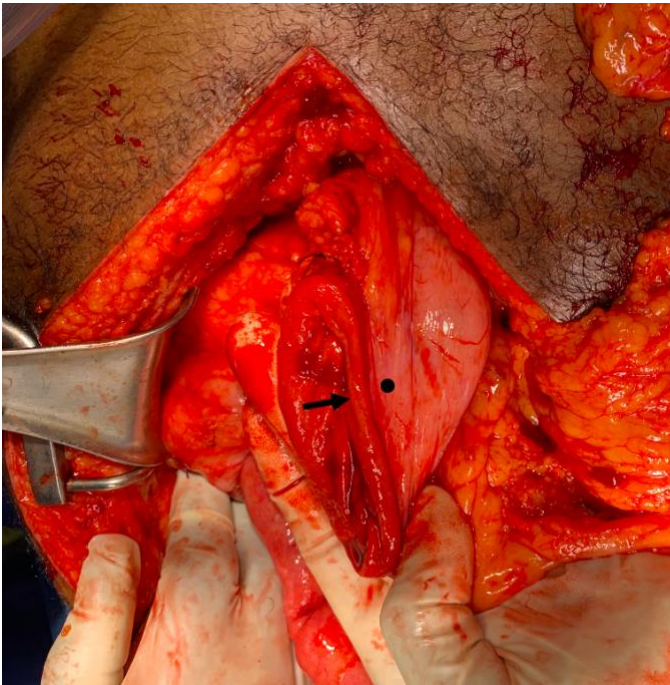
16. Divide the omentum, as it has now been separated by dividing its blood supply.
17. Assure that the nasogastric tube has been withdrawn, especially if using a stapler to divide the body of the stomach. Incorporating a nasogastric tube in a staple line would be a serious complication.
18. Divide the stomach body with electrocautery, taking care to control any bleeding points. We do not use bowel clamps on the proximal stomach, as they make the operation more cumbersome without providing a real advantage. If the stomach is obstructed and full of contaminated debris, we open the stomach in a controlled manner and remove the debris at this time, avoiding spillage as much as possible.



Division of the stomach with diathermy. As with the duodenum, going slowly and dividing the stomach in layers, as shown here, allows you to get hemostasis as you go, rather than after division which is more difficult.

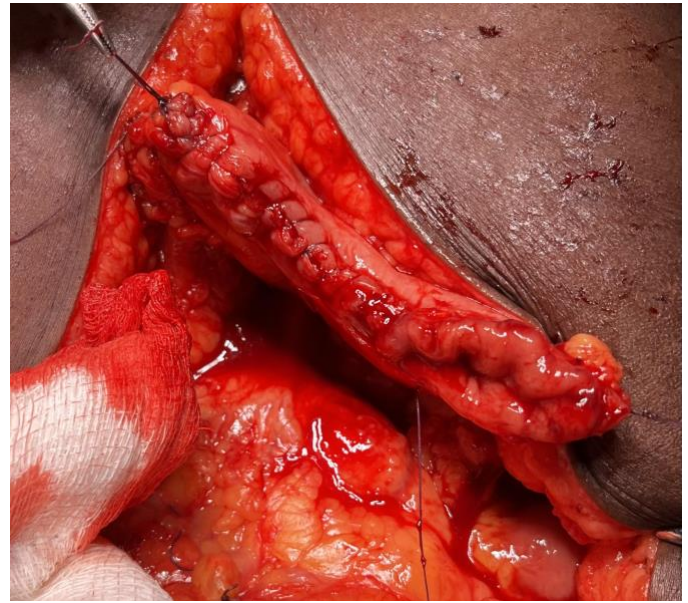
Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

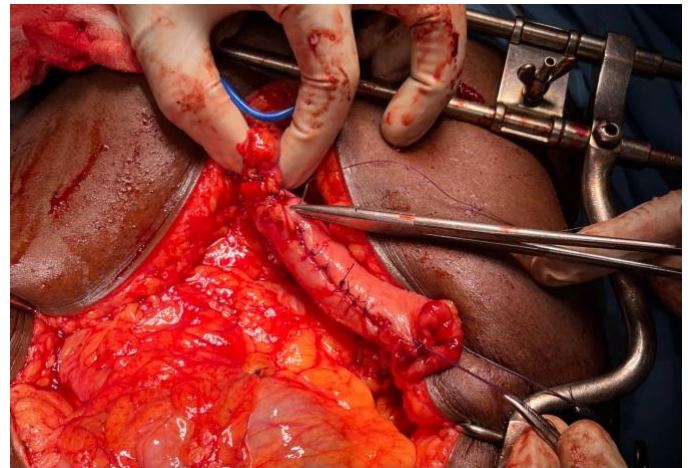


Stomach after division with diathermy. The mucosa (Black Arrow) typically protrudes beyond the serosa (Black Dot.) Two layer closure is easily accomplished; the first layer of closure involves the mucosa and submucosa only and the second layer closes the serosa over the first layer.

19. Close the stomach in two layers, beginning with a running suture of the mucosa and submucosa, beginning at the lesser curvature and proceeding until there is a defect remaining that matches the size of the duodenum. Then invert and “bury” this suture line with a second layer of interrupted seromuscular sutures.



Closure of the divided stomach proceeds from the lesser curvature downwards, in two layers, leaving a portion of the stomach unclosed of the same diameter as the duodenal stump. This photo is taken after closure of the first layer.

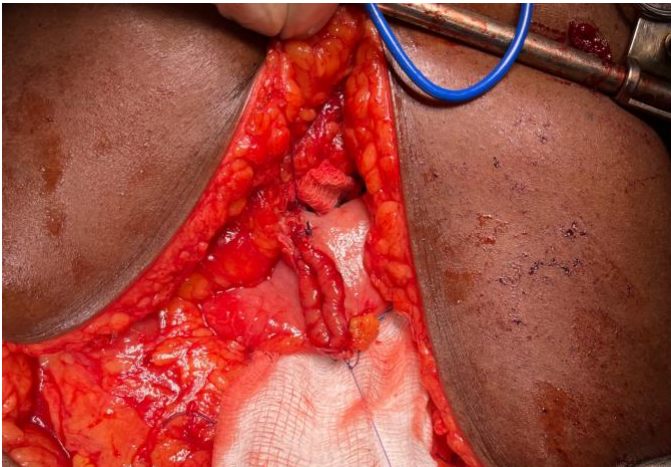


The second layer of sutures, interrupted in this case, is seromuscular. It completely inverts and “buries” the first layer of sutures

20. Place seromuscular retention sutures at the cranial and caudal side of the anastomosis through both the stomach and the duodenum, bringing them into apposition.

Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

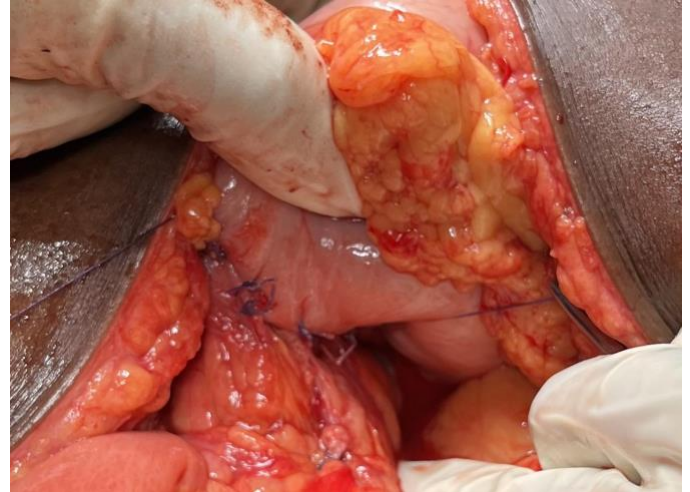


Retention sutures at the cranial and caudal side of both structures align the stomach and the duodenum.

21. If at this point the tension is excessive, consider whether a complete Kocher maneuver has been done. Examine the body of the stomach for adhesions to the lesser sac, splenic flexure of the colon, or left upper quadrant. If there are adhesions that can be easily divided and the stomach can be mobilized, do so. If the stomach and duodenum can not be brought together without tension, use an alternate form of reconstruction. We prefer Roux-en-Y reconstruction over Billroth 2 in almost all situations (See Chapter, Gastrectomy and Reconstruction.)
22. Perform a hand-sewn, two layer anastomosis. Start with interrupted seromuscular sutures to make the posterior outer anastomosis.

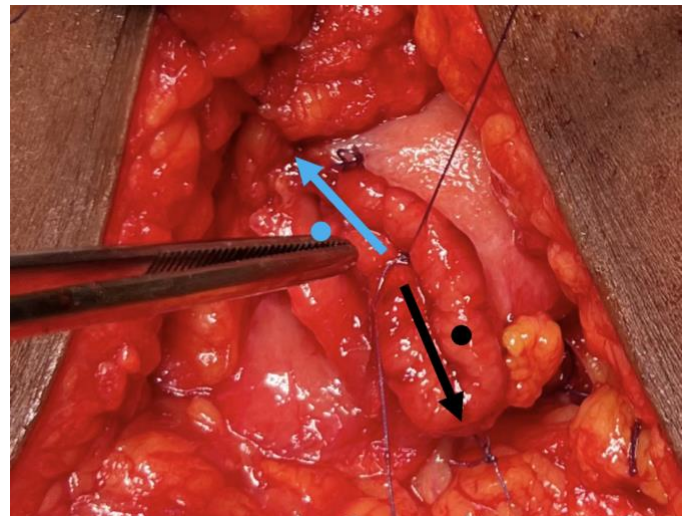


By passing the cranial side retention suture below and behind the planned anastomosis, and gently retracting the caudal side suture anteriorly, the posterior outer layer of sutures can be placed from behind the planned anastomosis.



The completed posterior outer layer of interrupted sutures. The retention sutures can now be returned to their proper cranial and caudal orientation.

23. Suture the posterior inner layer with a running suture through the mucosa and submucosal layer. Surgeon and assistant both start in the center of the anastomosis and work towards either side.



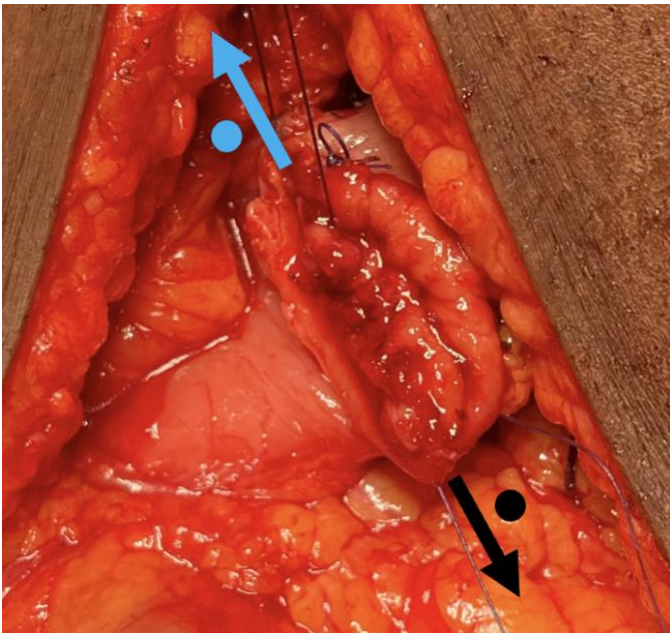
Beginning the posterior inner layer of the anastomosis. The mucosa is already opposed because of the previously placed (posterior outer) stitches. On each side, the operator sutures through the full thickness of the bowel in the center of the lumen and each sews towards the edge in a direction that is most "anatomic" for each. In this case, the suture going in the

Antrectomy and Billroth 1 Gastroduodenostomy

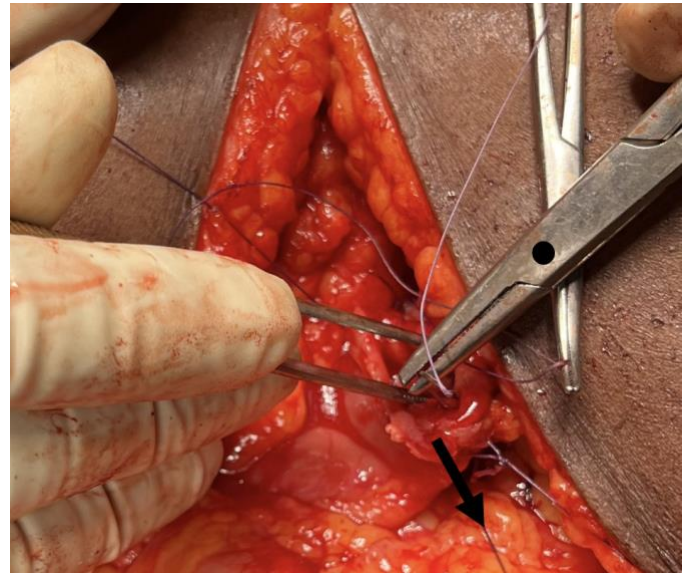
Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

direction of the Black arrow is sewn by the surgeon on the side of the Black dot, and likewise for the Blue arrow and the Blue dot.

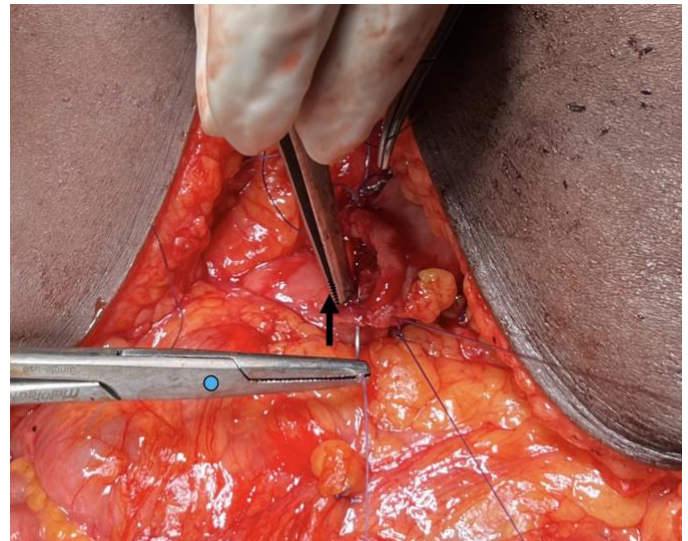
24. Upon reaching the farthest lateral point of the anastomosis, the transition must be made from posterior inner layer, to anterior inner layer. The needle will be passed from one operator to the other at this point, allowing both surgeon and assistant to sew the side that is most “natural” for each.



The posterior inner layer is complete, both surgeons have sewn to the edge. Each arrow must now change direction. At this point, each bite that is taken will be either inside-out, or outside-in. For clarity, both surgeons will take their last stitch inside-out, as in the next photo. .



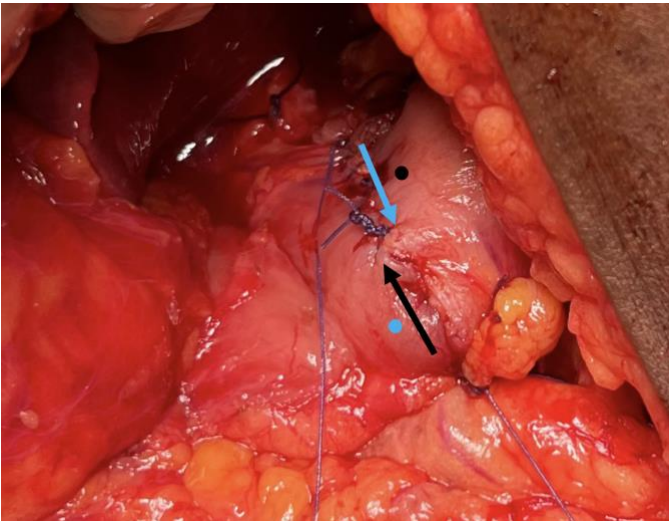
The surgeon on the side of the black dot takes their final stitch with this needle, inside-out.



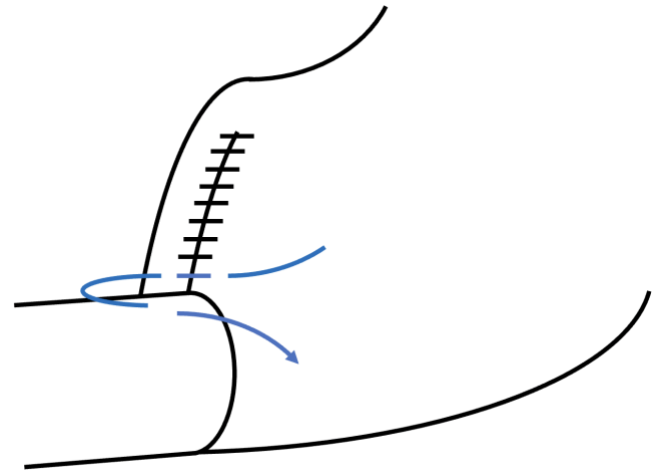
The surgeon on the side of the Blue dot now takes over and changes the direction of the suture represented by the Black arrow. Now the anterior inner layer of the anastomosis has begun. Because the last stitch was inside-out, this one is outside-in.

Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga



The completed and tied anterior inner layer. The suture represented by the Black arrow has been sewn all the way to the anterior midline by the surgeon on the side of the Blue dot. The suture represented by the Blue arrow has been sewn all the way to the midline by the surgeon on the side of the Black dot.

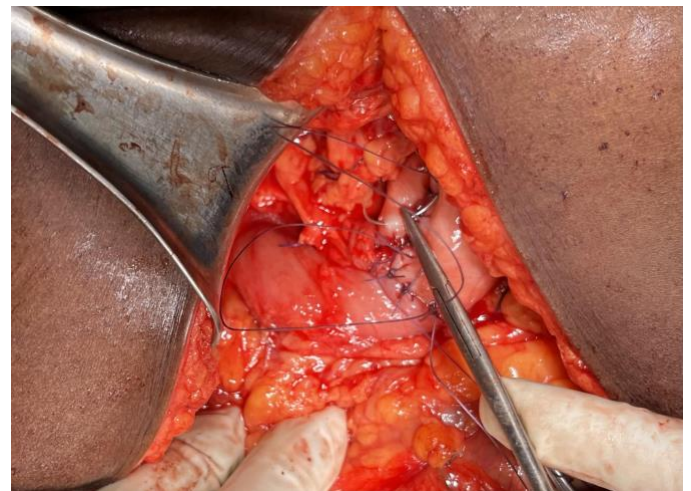


Schematic of the suture that reinforces the Angle of Sorrow. It passes through the anterior wall of the stomach, the posterior wall, and then the cranial side of the duodenum.

25. Suture the anterior outer layer of the anastomosis, using seromuscular sutures that invert the previous suture line.



The completed anterior outer layer.



The anterior stomach wall seromuscular stitch has been taken, now the needle is passed through the posterior wall.

26. Save the most cranial suture for last. This is the “Angle of Sorrow.” Your suture here incorporates both the anterior and posterior stomach, across the line where the stomach was divided, followed by the duodenum. This suture reinforces the part of the anastomosis that is under the most tension.

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

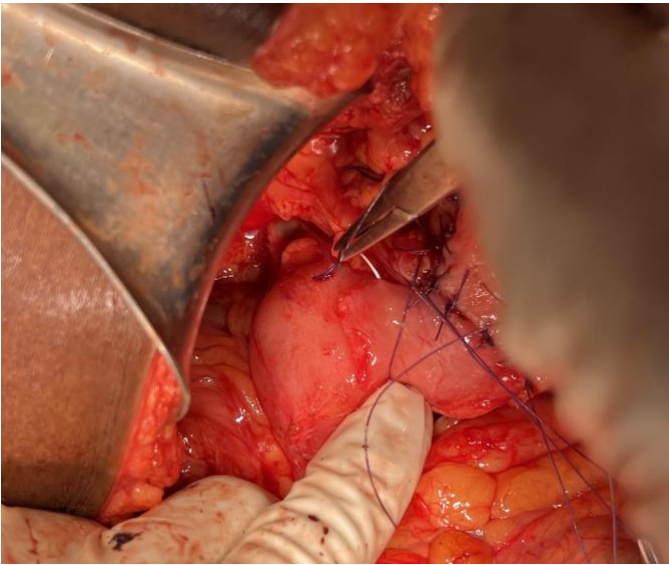
www.vumc.org/global-surgical-atlas

This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)



Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga



The suture is now passed in the opposite direction through the duodenal serosa and muscularis.

27. Inspect for hemostasis, especially from the divided right gastric artery. Some surgeons suture a piece of omentum, or the round ligament of the liver, over the artery stump to protect it from digestive juices in case of an anastomotic leak.
28. In malnourished patients (common in our setting,) we leave a closed-suction drain, behind the anastomosis extending down into the hepatorenal recess. In such situations, we often place a surgical jejunostomy tube distal to the ligament of Treitz.
29. Irrigate and close the abdomen.
30. If a jejunostomy feeding tube has been left, start tube feeds at 10cc per hour on the first or second postoperative day, when the patient is hemodynamically stable but before bowel function has returned. Irrigate the feeding tube with 10cc of water every 8 hours. A gravity bag can be used for jejunostomy feeds but excellent nursing care and periodic flushing of the tube is needed to prevent blockage.

Pitfalls

Category	Prevention/Treatment
----------	----------------------

Tension	-Be sure the duodenum is completely mobilized (Kocher's maneuver.) -If unsafe to complete the anastomosis: use Roux-en-Y reconstruction instead.
Nutrition	-Choose a lesser operation (gastro-jejunosomy bypass.) -Feed preoperatively distal to pylorus if possible. -Place a jejunostomy feeding tube intra-operatively.
Anastomotic leakage	-Meticulous technique -Avoid anastomosis in inflamed tissue (use Roux-en-Y reconstruction instead) -Recognize early and intervene

Table: Categories of complications after gastrectomy and Billroth 1 reconstruction, and their treatment.

- Attempting to reconstruct with a Billroth 1 gastroduodenostomy after too much stomach has been removed, or there is too much inflammation in the duodenum. If there is any tension or inflammation in the anastomosis, a Roux en Y gastrojejunosomy will be more appropriate. Billroth 1 reconstruction will be most amenable to healed ulcer disease with a stricture, or small antral or prepyloric tumors.
- Underestimating the patient's degree of malnutrition. All anastomoses are dangerous in malnourished patients. We have a low threshold to place a feeding jejunostomy in any patient with preoperative weight loss. The severely malnourished patient with gastric outlet obstruction will be better served by a loop

Antrectomy and Billroth 1 Gastroduodenostomy

Richard Davis, Ifeanyichukwu Ogbonnaya, Joseph Nderitu, Winnie Mutunga

gastrojejunostomy without resection. If they recover enough to suffer from alkaline reflux gastritis, they can be converted to a Roux-en-Y once they have recovered from their nutritional deficit. If possible, nutrition complications can be avoided by preoperative nutrition distal to the pylorus, either via nasojejunal tube or surgical jejunostomy tube. Jejunostomy tube feedings are very difficult to manage in a resource-limited setting, however. See the Chapter, “Nutrition in the Surgical Patient.”

- Failure to recognize anastomotic leakage: If the patient remains tachycardic, has a rising white blood cell count, or is febrile, the diagnosis is anastomotic leakage until proven otherwise. It is all too easy for the surgeon to self-deceive and blame these findings on pneumonia or urinary tract infection. This is unwise. Do not hesitate to study the patient with water soluble contrast or to resuscitate and re-explore. Do not wait for bile in the drain (or the wound!) Watch these patients very closely for the first five days. See the Chapter, “Approach to Postoperative Intra-Abdominal Complications.”
- Small amount of anastomotic leakage: evaluate the degree of leakage with a water soluble contrast study. This complication can sometimes be managed nonoperatively if all of the leaking contrast seen on the contrast study goes directly into the drain, the NG tube remains in place, and the patient is being fed by jejunostomy tube. Nutrition will be the most important element to facilitate healing.
- Large amount of anastomotic leakage: reoperate and convert to Roux-en-Y Gastrojejunostomy. Close the duodenal stump in 2 layers if you can, reinforcing the second layer with an omental patch. Leave a drain adjacent to the duodenal stump.
- Wound complications: These are to be expected in malnourished patients. If the surgeon opens the wound postoperatively due to infection, this provides a useful assessment of the patient’s nutrition. A malnourished patient will not make

granulation tissue in a fresh wound. If the fascia dehisces, try to avoid reoperation in a malnourished patient if possible. If the wound is clean, place a vacuum closure device (See Section: Wound Care.) If the fascial dehiscence is large and there is risk of evisceration, you must reoperate (See “[Closure of Laparotomy Wound Dehiscence](#).” As described above, nutrition is the root cause of this problem, so place a feeding jejunostomy tube if you have not already done so.

Richard Davis, MD FACS FCS(ECSA)
Ifeanyichukwu Ogbonnaya, MBBS
Joseph Nderitu, MBBS
Winnie Mutunga MBBS
AIC Kijabe Hospital
Kenya

May 2022

OPEN MANUAL OF SURGERY IN RESOURCE-LIMITED SETTINGS

www.vumc.org/global-surgical-atlas

This work is licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](https://creativecommons.org/licenses/by-sa/3.0/)

