



# Strictureplasty and Small-Bowel Stricture Bypass (Open and MIS Approaches)

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## Indications

- Symptomatic partial small-bowel obstruction due to stricture as diagnosed by small-bowel contrast study, CT, or MRI enterography
- Weight loss, intolerance of feeds, abdominal cramping, most commonly patients with known inflammatory bowel disease such as Crohn's disease

## Benefits

- Correction of obstruction
- Preservation of bowel length and absorptive surface

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## Risks and Alternatives

- Standard risks (bleeding, infection, need for additional procedures, risks of anesthesia).
- Injury to major vessels, stomach, small or large bowel, injury to bladder, liver or spleen or other organs.
- Post-operative bowel obstruction from adhesions or inflammation.
- Anastomotic leak of side-to-side bypass or from strictureplasty site.
- Bacterial overgrowth in cases with side-to-side antiperistaltic bypass (Finney strictureplasty).
- Alternatives: Small-bowel resection in case of a long-segment stricture. If multiple resections are performed, the patient may be at risk for short-bowel syndrome.
- If the stricture is located too close to the ileocecal valve, an ileocectomy may be safer due to increased risk of postoperative leakage.

## Essential Steps

1. Place a 12-mm umbilical port and induce pneumoperitoneum.
2. Perform standard general inspection of the abdomen.
3. Depending on the location of the expected stricture site, place two additional 5-mm working ports.

4. Run the small bowel with two bowel graspers from the ileocecal valve to the ligament of Treitz.
5. Identify the site with strictures and stenosis.
6. Perform stricturoplasty, either with a laparoscopic intra-abdominal technique or open extra-abdominal by extending the small umbilical incision. Then, place a wound retractor and eviscerate the small bowel for an outside stricturoplasty.
  1. A *Heineke–Mikulicz* stricturoplasty is usually performed if a short stricture is found. Two stay sutures (e.g., silk 4-0) are placed in the center of the incision in the area of the stricture; these are going to be the most lateral sutures of the stricturoplasty. A longitudinal enterotomy is then made along the antimesenteric border across the stricture using electrocautery or scissors. The incision should extend at least 1–2 cm proximal and distal beyond the stricture. The enterotomy is then closed in a transverse fashion with interrupted vicryl or silk sutures. Additional interrupted seromuscular sutures (Lembert sutures) as a second row are optional.
  2. In case of medium length strictures (up to 20 cm), a *Finney* stricturoplasty is a better option. The bowel is brought into a U-shaped fashion, and a total of three stay sutures are placed at the base and the end of the U. Two enterotomies at the base of the U are used to perform a side-to-side stapled anastomosis along the length of the bowel. Alternatively, a longitudinal antimesenteric incision is made extending 1–2 cm beyond the stricture. A side-to-side anastomosis is then fashioned with either interrupted or running Vicryl sutures along the backwall. Additionally, interrupted seromuscular sutures (Lembert suture) are placed with Vicryl 4-0.
  3. A *side-to-side isoperistaltic stricturoplasty* is performed for long-segment strictures or in case of multiple stric-

tures in close proximity. The bowel and its mesentery are divided in the middle of the segment with the stricture. The proximal bowel is positioned to overlay the distal bowel loop in a side-to-side fashion. Multiple interrupted seromuscular nonabsorbable sutures that approximate the two bowel loops are placed. The bowel loops are opened longitudinally with cautery on its antimesenteric border. Both ends are spatulated and anastomosed in a tapered fashion. Alternatively, a stapled anastomosis can be performed.

7. Check the intestinal closure or anastomosis for adequate patency and leak.
8. If extra-abdominal, reposition the small bowel into the abdominal cavity.
9. Assure hemostasis.
10. Irrigate abdominal cavity and suction all fluid.
11. Remove all ports under vision and deflate abdomen.
12. Close port sites.

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### Note These Variations:

- Stricturoplasty can either be accomplished by intra-abdominal suturing or stapling or through an extended umbilical incision with a wound retractor (minilaparotomy) and evisceration of the small bowel for extra-abdominal stricturoplasty.
- The three different techniques (*Heineke–Mikulicz* or *Finney* stricturoplasties as well as isoperistaltic side-to-side small-bowel bypass) can either be performed open, completely laparoscopic, or laparoscopically assisted with an extra-abdominal anastomosis. The anastomosis can either be performed with a hand-sewn or stapled technique. A number of mostly retrospective studies that reported on surgical recurrences showed recurrent stricture to occur less likely with a stapled anastomosis in comparison to a hand-sewn technique.

## Template Operative Dictation

**Preoperative Diagnosis** Small-bowel obstruction due to stricture

**Postoperative Diagnosis** Same

**Findings** Small (or large)-bowel obstruction due to short- or long-segment stricture

**Procedure Performed** Exploratory laparotomy and stricturoplasty of small (or large) bowel

**Anesthesia** General

**Specimen** None

**Drains** None

**Implants** None

**Estimated Blood Loss** Minimal

**Indications** Partial obstructive symptoms due to small (or large)-bowel stricture with weight loss and intolerance of oral feeds

**Procedure in Detail** Following induction of general anesthesia, the patient was placed in supine position. All exposed bony sites have been padded appropriately. Timeouts were performed using both pre-induction and pre-incision safety checklists with participation of all present in the operative suite. These confirmed the correct patient, procedure, operative site, instrumentation, and additional critical information prior to the start of the procedure. The abdomen was prepped and draped in the usual sterile fashion. A single shot antibiotic (coverage for aerobic and anaerobic bacteria) was given intravenously 30 min prior to the incision.

**Diagnostic laparoscopy (with conversion to minilaparotomy) and laparoscopic Heineke–Mikulicz stricturoplasty:** A 12-mm trocar was placed through an umbilical midline incision into

the abdominal cavity and pneumoperitoneum established. A laparoscope was inserted, and a screening diagnostic laparoscopy performed. We then placed two additional 5-mm trocars under direct vision in the left (*right*) abdomen. The small bowel was then run from the ileocecal valve to the ligament of Treitz using two atraumatic bowel graspers. The location of the stricture was identified, and additional strictures of the intestine excluded.

- (a) *The umbilical incision was then extended, and a wound retractor placed into the minilaparotomy. The small bowel with the strictured segment was then eviscerated in front of the abdominal wall. Two antimesenteric 4-0 silk stay sutures were placed well proximal and distal to the stricture. A longitudinal enterotomy was made extending 2 cm beyond the strictured segment. The enterotomy was then closed in a transverse fashion using interrupted (running) Vicryl 4-0 sutures. Additional interrupted seromuscular Lembert sutures were placed with Vicryl 4-0.*
- (b) *Laparoscopically, the longitudinal enterotomy was extended beyond the intestinal stricture. We then closed the enterotomy in a transverse fashion using interrupted sutures starting with the most distant corner stitch.*

We then checked the stricturoplasty for patency and leak and assured hemostasis. *The bowel was then returned to the abdominal cavity.* We then irrigated the abdominal cavity with warm saline and removed all laparoscopic ports under direct vision. The fascia at the umbilicus was closed with Vicryl 0 sutures. The skin was re-approximated with Vicryl Rapide 5-0. Steri-strips were applied to the wound site as well as a strike dressing.

**Diagnostic laparoscopy (with conversion to minilaparotomy) and laparoscopic Finney stricturoplasty:** A 12-mm trocar was placed through an umbilical midline incision into the abdominal cavity and pneumoperitoneum established.

A laparoscope was inserted, and a screening diagnostic laparoscopy performed. We then placed two additional 5-mm trocars under direct vision in the left (right) abdomen. The small bowel was then run from the ileocecal valve to the ligament of Treitz using two atraumatic bowel graspers. The location of the stricture was identified, and additional strictures of the intestine excluded.

- (a) *The umbilical incision was then extended and a wound retractor placed into the minilaparotomy. The small bowel with the strictured segment was then eviscerated in front of the abdominal wall. The small bowel with the stricture was brought together in a U-shaped fashion, and a total of three stay sutures were placed at the base and the end of the U. A longitudinal enterotomy was made extending 2 cm beyond the strictured intestinal segment. A hand-sewn, side-to-side anastomosis was made starting initially at the back wall with interrupted (running) 4-0 vicryl sutures before completing the front wall. Additional interrupted seromuscular Lembert sutures were placed using 4-0 Vicryl.*
- (b) *A laparoscopic enterotomy was opened at the base of the U, and a 60-mm intestinal endostapler was fired along both limbs of the U across the strictured small bowel. The enterotomy was then closed with a second load of the endostapler.*

We then checked the anastomosis for patency and leak and assured hemostasis. *The bowel was then returned to the abdominal cavity.* We then irrigated the abdominal cavity with warm saline and removed all laparoscopic ports under direct vision. The fascia at the umbilicus was closed with Vicryl 0 sutures. The skin was re-approximated with Vicryl Rapide 5-0. Steri-strips were applied to the wound site as well as a strike dressing.

***Diagnostic laparoscopy (with conversion to minilaparotomy) and performing an isoperistaltic side-to-side small-bowel bypass:*** A 12-mm trocar was placed through an umbilical midline incision into the abdominal cavity and

pneumoperitoneum established. A laparoscope was inserted, and a screening diagnostic laparoscopy performed. We then placed two additional 5-mm trocars under direct vision in the left (right) abdomen. The small bowel was then run from the ileocecal valve to the ligament of Treitz using two atraumatic bowel graspers. The location of the stricture was identified, and additional strictures of the intestine excluded. The umbilical incision was then extended and a wound retractor placed into the minilaparotomy. The small bowel with the strictured segment was then eviscerated in front of the abdominal wall.

- (a) *The umbilical incision was then extended and a wound retractor placed into the minilaparotomy. The small bowel with the strictured segment was then eviscerated in front of the abdominal wall. The bowel and its mesentery were then divided in the center of the strictured segment. The proximal 50% of the affected bowel was then positioned to overlay the distal 50% in an isoperistaltic side-to-side fashion. Multiple interrupted seromuscular nonabsorbable sutures were placed. A longitudinal, antimesenteric enterotomy was opened with cautery 2 cm beyond the strictured intestinal segment. Both ends were spatulated.*
- (b) *The strictured bowel was aligned in an isoperistaltic fashion and a proximal stay suture was placed. A laparoscopic enterotomy was opened at the proximal end of the aligned bowel, and a 60-mm intestinal endostapler was fired along both limbs of the strictured small bowel. The enterotomy was then closed with a second load of the endostapler (closed with interrupted sutures).*

We then checked the anastomosis for patency and leak and assured hemostasis. *The bowel was then returned to the abdominal cavity.* We then irrigated the abdominal cavity with warm saline and removed all laparoscopic ports under direct vision. The fascia at the umbilicus was closed with Vicryl 0 sutures. The skin was re-approximated with Vicryl Rapide 5-0. Steri-strips were applied to the wound site as well as a strike dressing.

Upon completion of the procedure, a debriefing checklist was completed to share information critical to the postoperative care of the patient. The patient tolerated the procedure well, was extubated in the operating room, and was transported to the post-anesthesia care unit in a stable condition [1–4].

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## References

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