122 Bassini Repair of Inguinal Hernia

Melissa Garrett

Indication

- Inguinal hernia (direct, indirect)

Essential Steps

1. Verify and mark side of surgery.
2. Groin incision (approximately two finger-breadths above and parallel the groin crease).
3. Expose the external oblique aponeurosis and external ring.
4. Incise the external oblique aponeurosis in the direction of fibers.
5. Identify and protect the ilioinguinal nerve.
6. Mobilize flaps of the external oblique.
7. Gently encircle the spermatic cord (*or round ligament*, *if female*) at the external ring with a Penrose drain.
8. Identify the indirect hernia sac on the antero-medial surface of the cord *or round ligament*.
9. Dissect indirect sac free of surrounding structures and open.
10. Reduce contents.
11. *Suture ligate and reduce the sac/suture ligate and divide the round ligament with the sac in female*.
12. Assess the floor of the canal.
13. Identify the conjoint tendon and assess mobility to the shelving edge of the inguinal ligament.
14. *Relaxing incision of the internal oblique fascia/anterior rectus sheath if any tension*.
15. Suture the conjoint tendon to the shelving edge of the inguinal ligament with interrupted nonabsorbable sutures.
16. *In male*: *Leave enough room to pass Kelly clamp through the internal ring next to the cord*.
17. *In female*: *Completely close the internal ring*.
18. *A single stitch lateral to the internal ring is sometimes needed in males*.
19. Check hemostasis.
20. Close aponeurosis of the external oblique.
21. Close Scarpa's fascia (optional).
22. Close the skin.
23. After applying dressing, pull the testis down into normal position in the scrotum.

Note These Variations

- Type of suture material.
- Completely close the canal in females.
- In males, a dilated internal ring may require an additional stitch lateral to the cord.

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- Relaxing incision.
- Type of anesthesia, including local anesthesia and ilioinguinal nerve block.
- If done for incarceration, note findings, including viability of the bowel.
- Cord lipoma may be present and excised.

Complications

- Hematoma, including scrotal hematoma
- Recurrence
- Neuropraxia
- Femoral vessels injury
- Bowel injury

Template Operative Dictation

Preoperative Diagnosis *Left/right* indirect inguinal hernia

Procedure Bassini repair of *left/right* inguinal hernia *with local anesthesia by the surgeon*

Postoperative Diagnosis Same

Indications This ___-year-old *male/female* developed a symptomatic *left/right reducible/incarcerated* inguinal hernia *with/without* symptoms of obstruction. Repair was indicated, and because of the *patient's age/sex/nature of the hernia*, a Bassini repair was elected.

Description of Procedure The patient was taken to the operating room. Time-outs were performed using both preinduction and pre-incision safety checklist to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure.

[Choose One:]
***If not local anesthesia*: *General/epidural/spinal anesthesia was induced*.** The *left/right* groin was prepped and draped in the usual sterile fashion. An incision was marked in a natural skin crease parallel to the inguinal ligament, two finger-breadths above the groin crease, and planned to end near the pubic tubercle.

If local anesthesia: *A field block was produced by raising skin wheals along the proposed skin incision, along a vertical line lateral to it, and along a horizontal line superior to it. A skin wheal was raised 1 cm lateral and superior to the anterior superior iliac spine, and a fascial injection of __% lidocaine was made to block the ilioinguinal nerve. Additional local anesthesia was injected during the procedure under the external oblique aponeurosis, at the internal ring, and as needed. A total of ___ mL of 0.5/1 % lidocaine was used.*

[*Note*]: *The ilioinguinal nerve block could be performed either at the beginning or at the end of the procedure.*

The skin crease incision was made with a knife and deepened through Camper's and Scarpa's fascia with electrocautery until the aponeurosis of the external oblique was encountered. This was cleaned and the external ring was exposed. Hemostasis was achieved in the wound. An incision was made in the midportion of the external oblique aponeurosis in the direction of its fibers. The ilioinguinal nerve was identified and protected throughout the dissection.

If neurectomy performed: *Specify if neurectomy is routine* versus *selective* and *main* versus *peripheral branches*. After additional infiltration of the nerve origin with anesthetic solution, the __ *nerve* was circumferentially dissected and sharply divided proximally under gentle traction, allowing the stump to retract back into the internal oblique muscle. Distally, the nerve was divided at the level of the pubic tubercle (*ilioinguinal nerve*) or rectus sheath (*iliohypogastric nerve*).

Peripheral (or connecting) branch was sharply divided as needed for further dissection preserving the main trunk of the nerve.

Flaps of external oblique were developed cephalad and inferiorly. The cord was identified. It was gently dissected free at the pubic tubercle and encircled with a Penrose drain. Attention was directed to the anteromedial aspect of the cord, where an indirect hernia sac was identified.

If male: *The sac was carefully dissected free of the cord down to the level of the internal ring. The vas deferens and testicular vessels were identified and protected from harm*.

If female: *The round ligament was doubly ligated and divided at a convenient point near the sac*.

The sac was opened and its contents were inspected for viability and then reduced. The floor of the inguinal canal assessed and found to be *strong/weak*. The femoral canal was palpated and *a hernia identified/no hernia identified*.

If male: *The sac was twisted and suture ligated with __ suture.*

If female: *The round ligament and sac were twisted and suture ligated*.

Redundant sac was excised. The stump of the sac was checked for hemostasis and allowed to retract into the abdomen.

Attention was then turned to the floor of the canal, which appeared to be *intact with the exception of dilated internal ring/weak*. The conjoint tendon was identified and grasped with Allis clamps. It *reached/did not reach* easily to the shelving edge of the ligament *with/without* tension.

If tension: *Decision was made to do a relaxing incision. The internal oblique fascia/ anterior rectus sheath was incised with electrocautery medial and well superior to the conjoint tendon. Hemostasis was checked. The conjoint tendon could then easily reach the inguinal ligament without tension*.

The conjoint tendon was then sutured to the shelving edge of the inguinal ligament with multiple simple sutures of ___. This suture line began at the pubic tubercle and commenced laterally to the internal ring. Care was taken not to take severely deep bites that might inadvertently injure the femoral vessels.

If male: *At the conclusion of this*, *the internal inguinal ring accommodated the tip of a Kelly hemostat*. (*Optional*: *A single suture was placed lateral to the cord to additionally tighten it*.)

If female: *The internal ring was completely obliterated at the conclusion of this procedure*.

Hemostasis was again checked. The Penrose drain was removed. The external oblique aponeurosis was closed with a running suture of 3-0 Vicryl, taking care not to catch the ilioinguinal nerve in the suture line (if neurectomy was not performed). The Scarpa's fascia was closed with interrupted 3-0 Vicryl. The skin was closed with a subcuticular *stitch of ___/skin clips/other*. A sterile dressing was applied.

If male: *The testis was gently pulled down into its anatomic position in the scrotum*.

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the postanesthesia care unit in stable condition.

Acknowledgment This chapter was contributed by Jessemae Welsh, M.D., in the previous edition.

123 Shouldice Repair of Inguinal Hernia

Evgeny V. Arshava

Indications

- Indirect inguinal hernia in adults
- Direct inguinal hernia
- Coexisting inguinal and femoral hernias (complete Shouldice groin repair)

Essential Steps

1. Verify side of surgery.
2. *Local anesthesia*.
3. Groin incision.
4. Expose the external oblique aponeurosis and external ring.
5. *Define the inguinal ligament and incise thigh fascia* (*if suspicious of femoral hernia*). The incision of the thigh fascia starts just below the level of the inguinal ligament and extends from the level of the femoral vein to the pectineus muscle.
6. Incise the external oblique aponeurosis in the direction of fibers.
7. Identify and protect the ilioinguinal and iliohypogastric nerves. *Perform ilioinguinal/iliohypogastric neurectomy* (*main or peripheral branches*).
8. Mobilize flaps of the external oblique.
9. Incise and divide cremaster muscle to expose the spermatic cord (*or round ligament*, *if female*).
10. Search for an indirect hernia sac or any peritoneal protrusion on the anteromedial surface of the cord *or round ligament* and dissect it free off surrounding structure.
11. Reduce indirect sac or peritoneal protrusion into preperitoneal space. *Suture ligate sac if neck is narrow*.
12. Assess inguinal floor for the presence of direct hernia.
13. Incise the transversalis fascia *and trim excess if needed*.
14. Assess for femoral hernia. *Reduce if present and perform complete groin repair*.
15. Identify the transversus aponeurotic arch and lateral border of rectus abdominis muscle.
16. Perform inguinal repair with four continuous lines. *Tie free sutures to close femoral canal if complete groin repair was performed*.
17. Check for hemostasis.
18. Close the external oblique aponeurosis.
19. Close Scarpa's fascia and skin.
20. After applying dressing, pull the testis down into normal position in the scrotum.

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Note These Variations

- Type of anesthesia, including local anesthesia, varies.
- Complete groin repair required if femoral hernia present.

Complications

- Recurrence
- Infection
- Post herniorrhaphy groin pain syndromes
- Retroperitoneal hematoma due to unrecognized injury to the epigastric vessels and scrotal hematoma
- Ischemic orchitis and testicular atrophy

Template Operative Dictation

Preoperative Diagnosis *Left/right* inguinal hernia

Procedure Shouldice repair (*or complete groin repair*) of *left/right* inguinal hernia

Postoperative Diagnosis *According to intraoperative findings*

Indications Patient is a ___-year-old *male/female* with symptomatic *left/right* inguinal hernia for which repair is indicated.

Description of Procedure The patient was taken to the operating room prepped and draped in usual sterile fashion. Time-outs were performed using both preinduction and pre-incision safety checklist to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure.

If local anesthesia: *A skin wheal was raised 2 cm medial and superior to the anterior superior iliac spine, and sequential subcutaneous injections of local anesthetic were performed to block the distribution of ilioinguinal and iliohypogastric nerves. Additional local anesthesia was administered during the procedure under the external oblique aponeurosis*, *cremaster muscle*, *transversalis fascia*, *and at the internal ring. A total of ___ mL of anesthetic solution* (*specify*) *were used.*

If not local anesthesia: Under g*eneral/regional anesthesia*, the *left/right* groin was prepped and draped in the usual sterile fashion.

Patient was placed in slight Trendelenburg position to facilitate operation.

An incision was made two fingerbreadths above and parallel to inguinal crease/*1 cm above and parallel to inguinal ligament*, starting midway between anterior superior iliac spine and internal inguinal ring and extending medial to the pubic tubercle.

The incision was deepened through subcutaneous adipose layer (Camper's) and superficial (Scarpa's) fascia until the aponeurosis of the external oblique was encountered. This was cleaned and the external ring was exposed. Hemostasis was achieved in the wound. An incision was made in the midportion of the external oblique aponeurosis in the direction of its fibers.

The ilioinguinal and iliohypogastric nerves were identified and protected throughout the dissection.

If neurectomy performed: *Specify if neurectomy is routine* versus *selective* and *main* versus *peripheral branches*. After additional infiltration of the nerve origin with anesthetic solution, the nerve was circumferentially dissected and sharply divided proximally under gentle traction, allowing the stump to retract back into the internal oblique muscle. Distally, the nerve was divided at the level of the pubic tubercle (*ilioinguinal nerve*) or rectus sheath (*iliohypogastric nerve*).

Peripheral (*or connecting*) *branch was sharply divided as needed for further dissection preserving the main trunk of the nerve*.

Flaps of external oblique were developed cephalad and inferiorly.

The lower edge of inguinal ligament was defined. Thigh fascia medial to the femoral vein was identified and incised to rule out presence of femoral hernia and to relax inguinal ligament for subsequent repair. Femoral hernia was found/not found.

If male: The cord was identified. *It was circumferentially dissected and encircled with Penrose drain*. The cremasteric muscle was split longitudinally and divided in two portions. The medial portion was excised and its stumps ligated. The lateral portion, containing cremasteric vessels and genital branch of genitofemoral nerve, was ligated with 2-0 absorbable suture and divided. Testicular vessels and vas were identified, encircled with Penrose drain, and protected throughout the operation.

Attention was directed to the anteromedial aspect of the cord, where a *small/medium/large indirect hernia sac/peritoneal protrusion* was identified. The indirect sac *or peritoneal protrusion* was carefully dissected free of the cord behind the level of the internal ring.

[Choose One:]
If sac is empty: *The sac was reduced into preperitoneal space*.

If sac is long and narrow or not empty: *The sac was opened and contents were reduced. The neck of the sac was twisted and suture ligated with 2-0 suture. The stump of the sac was checked for hemostasis and allowed to retract into the abdomen*.

If sac is densely adherent to the cord structures: *After division of the sac and ligation of the neck, the distal part of the sac was left attached to cord structures*.

If there was a presence of cord lipoma**:** *A cord lipoma was identified. It was left in place/freed from the spermatic cord and excised and the stump ligated*.

In females: The cremasteric muscle was divided. The indirect sac/peritoneal protrusion was dissected free and reduced into preperitoneal space. *The sac was ligated and divided and the stump was allowed to retract into the abdomen*. The round ligament was ligated at the level of internal ring and pubic tubercle and excised.

Attention then turned to the floor of the canal, which appeared to be weakened without a well-defined direct hernia. *Small/medium/large direct hernia was identified*.

An incision of the transversalis fascia was made beginning at the internal inguinal ring and extending medially to the pubic tubercle along the border of inguinal arch. Inferior-lateral flap of transversalis fascia was developed *and any excess was trimmed*. The inferior epigastric vessels were identified and protected. Femoral space was examined and found to contain no hernia.

Small/medium/large femoral hernia was found and reduced. Complete hernia repair was performed. 0 Prolene suture was passed initially through the femoral defect from below the inguinal ligament. The bites were taken in the following fashion: the first bite incorporated the Cooper's ligament, followed by the transversalis fascia and then the inguinal ligament, in a wide loop. Three sutures were then placed in the following fashion: from the pubic tubercle to the femoral sheath (adjacent to the femoral vein) to completely close the femoral canal. This was left untied extending inferiorly toward the thigh, but clamped with hemostats. The sutures were subsequently incorporated in the second, third, and fourth lines of inguinal repair and tied.

The inguinal floor was reconstructed with four continuous lines of 32 or 34 gauge stainless steel *or 0 Prolene stitch*. The first line was started at the pubic tubercle and brought the inferior-lateral flap of the transversalis fascia beneath the lateral border of the rectus abdominal muscle medially and beneath the transversus aponeurotic arch laterally. The proximal stump of cremasteric was incorporated into the end of first line during formation of the new internal ring. The suture was reversed just medial to the cord structures, and the second line brings the full-thickness layer of internal oblique, transversus abdominis muscles, and transversalis fascia to the shelving edge of the inguinal ligament. *Lateral to pubic tubercle and medial to location of the femoral vein one or two bites were taken deeper, tacking this full-thickness layer to Cooper's ligament* (not part of the classic repair). The tails of the first and second lines were tied at the pubic tubercle. The third line was started at the internal inguinal ring and incorporates the layer of internal oblique muscle and inferior-lateral flap of the external oblique aponeurosis. The suture was reversed at

the pubic tubercle, and the fourth line imbricates the same structures over the third line.

Interrupted 0-Prolene sutures on the femoral defect were incorporated in the second, third, and fourth lines of inguinal repair and were tied to complete the groin repair.

No venous congestion was appreciated in the cord after completion of the repair. The tip of a forceps was inserted through the internal ring to confirm adequate laxity and rule out preperitoneal bleeding.

The spermatic cord was repositioned in the normal anatomic position under the external oblique aponeurosis. The wound was irrigated and hemostasis ensured. The external oblique aponeurosis was then closed with a running suture, taking care not to catch nerves in the suture line. The distal stump of the cremaster muscles was included in the reconstruction of the external ring. The superficial (Scarpa's) fascia was closed with running/*interrupted* 3-0 suture. The skin was closed with running 4-0 absorbable suture. Dressing was applied.

If male: *The testicle was gently pulled down into the scrotum to assure its appropriate position.*

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the recovery area in stable condition.

Note: **Definitions of hernia sizes that may be used for dictations**:

Direct and femoral hernias
- Small <2 cm
- Medium 2–5 cm
- Large >5 cm

Indirect hernias
- Small <5 cm
- Medium 5–15 cm
- Large >15 cm
- Giant hernia – extends below the midpoint of inner thigh in standing position
- Peritoneal protrusion – an empty small gossamer thin sac (that may appear obliterated)

It is rare in males not to find a peritoneal protrusion on the anteromedial aspect of the cord. It must be identified, dissected, and reduced behind the level of the internal ring to avoid indirect recurrence.

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McVay Repair of Inguinal Hernia

124

Melissa Garrett

Indications

- Inguinal hernia
- Femoral hernia

Essential Steps

1. Verify and mark side of surgery.
2. *Local anesthesia and ilioinguinal nerve block.*
3. Groin incision.
4. Expose the external oblique aponeurosis and external ring.
5. Incise the external oblique aponeurosis in the direction of the fibers.
6. Identify and protect the ilioinguinal nerve.
7. Mobilize flaps of the external oblique.
8. Gently encircle the spermatic cord (*or round ligament*, *if female*) at the external ring with Penrose drain.
9. Seek the indirect hernia sac on the anteromedial surface of the cord *or round ligament*.
10. Dissect free the surrounding structures and open.
11. Reduce contents.
12. Suture ligate and reduce the sac. Suture ligate and divide the round ligament with the sac in female.
13. Assess the floor of the canal.
14. Identify the conjoint tendon and assess quality and mobility to Cooper's ligament.
15. Make relaxing incision in the anterior rectus sheath.
16. Suture the conjoint tendon to Cooper's ligament with interrupted sutures; begin at the pubic tubercle and progress laterally.
17. At the femoral canal, place transition stitch that incorporates the following structures: conjoint tendon, Cooper's ligament, femoral sheath, and shelving edge of the inguinal ligament.
18. Remaining sutures are placed from the conjoint tendon to the inguinal ligament.
19. *In male*: *Leave enough room to pass Kelly clamp through the internal ring next to the cord.*
20. *In female*: *Completely close the internal ring*.
21. *A single stitch lateral to the internal ring is sometimes needed in males*.
22. Check hemostasis.
23. Close the aponeurosis of external oblique with running 3-0 Vicryl.
24. Close Scarpa's fascia with interrupted 3-0 Vicryl.
25. Close the skin.
26. After applying dressing, pull the testis down into normal position in the scrotum.

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Note These Variations

- Type of suture material varies.
- Completely close the inguinal canal in females.
- In males, a dilated internal ring may require an additional stitch lateral to the cord.
- Type of anesthesia, including local anesthesia, varies.
- If done for acute incarceration, note findings, including viability of the bowel.

Complications

- Hematoma, including scrotal hematoma
- Femoral vein injury
- Recurrence
- Neuropraxia
- Hydrocele
- Obstruction of the vas deferens
- Testicular artery injury, testicular atrophy

Template Operative Dictation

Preoperative Diagnosis *Left/right indirect/direct inguinal/femoral* hernia

Procedure McVay repair of *left/right inguinal/femoral* hernia

Postoperative Diagnosis Same

Indications This ___-year-old *male/female* developed a symptomatic *left/right reducible/incarcerated* inguinal hernia *with/without* symptoms of obstruction. Repair was indicated.

Description of Procedure The patient was taken to the operating room. Time-outs were performed using both preinduction and pre-incision safety checklist to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure.

[Choose One:]
If not local anesthesia: *General/epidural/spinal anesthesia was induced*. The *left/right* groin was prepped and draped in the usual sterile fashion. An incision was marked in a natural skin crease parallel to the inguinal ligament and planned to end near the pubic tubercle.

If local anesthesia: *A field block was produced by raising skin wheals along the proposed skin incision, along a vertical line lateral to it, and along a horizontal line superior to it. A skin wheal was raised 1 cm lateral and superior to the anterior superior iliac spine, and a fascial injection of lidocaine was made to block the ilioinguinal nerve. Additional local anesthesia was injected during the procedure under the external oblique aponeurosis, at the internal ring, and as needed. A total of ___mL of 0.5/1 % lidocaine was used.*

The skin crease incision was made with a knife and deepened through Camper's and Scarpa's fascia with electrocautery until the aponeurosis of the external oblique was encountered. The external ring was exposed. An incision was made in the midportion of the external oblique aponeurosis in the direction of its fibers. The ilioinguinal nerve was identified and protected throughout the dissection. Flaps of external oblique were developed cephalad and inferiorly.

The cord was identified. It was gently dissected free at the pubic tubercle and encircled with a Penrose drain. Attention was directed to the anteromedial aspect of the cord, where an indirect hernia sac was identified.

If male: *The sac was carefully dissected free of the cord down to the level of the internal ring. The vas deferens and testicular vessels were identified and protected from harm.*

If female: *The round ligament was doubly ligated and divided at a convenient point near the sac.*

The sac was opened and contents were inspected for viability and then reduced. A finger was passed into the peritoneal cavity, and the floor of the inguinal canal assessed and found to

be *strong/weak*. The femoral canal was palpated *and a hernia identified/no hernia identified*.

If male: *The sac was twisted and suture ligated with 2-0 silk*.

If female: *The round ligament and sac were twisted and suture ligated with 2-0 silk*.

Redundant sac was excised and submitted to pathology. The stump of the sac was checked for hemostasis and allowed to retract into the abdomen.

Attention was then turned to the floor of the canal, which appeared to be *intact with the exception of dilated internal ring/weak*. The conjoint tendon was identified and grasped with Allis clamps. A relaxing incision was then made along the cephalad aspect of the anterior rectus sheath. The conjoint tendon then reached easily to the shelving edge of the ligament *with/without* tension.

The conjoint tendon was then sutured to Cooper's ligament with multiple simple sutures of ___. A transition stitch was placed incorporating the conjoint tendon to Cooper's ligament, the medial portion of femoral sheath, and the shelving edge of the inguinal ligament. Remaining repair then consisted of sutures placed between the conjoint tendon and the shelving edge of the inguinal ligament.

If male: *At the conclusion of this*, *the internal inguinal ring accommodated the tip of a Kelly hemostat*. (*Optional*: *A single suture was placed lateral to the cord to additionally tighten it*).

If female: *The internal ring was completely obliterated at the conclusion of this procedure*.

Hemostasis was again checked. The Penrose drain was removed. The external oblique aponeurosis was closed with a running suture of 3-0 Vicryl, taking care not to catch the ilioinguinal nerve in the suture line. Scarpa's fascia was closed with interrupted 3-0 Vicryl. The skin was closed with a *subcuticular stitch of ___/skin clips/other*. A dressing was applied.

If male: *The testis was gently pulled down into its anatomic position in the scrotum*.

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the postanesthesia care unit in stable condition.

Acknowledgment This chapter was contributed by Peter C. Fretz, M.D., in the previous edition.

125 Mesh Repair of Inguinal Hernia/Lichtenstein Hernioplasty

Carol E.H. Scott-Conner

Indication

- Inguinal hernia not amenable to autologous tissue repair (poor quality fascia, excessive tension, recurrent hernia)
- Recurrent inguinal hernia after laparoscopic inguinal hernia repair
- Patient or surgeon preference

Essential Steps

1. Verify side of surgery!
2. Prophylactic antibiotics.
3. *Local anesthesia*.
4. Groin incision.
5. Expose the external oblique aponeurosis and external ring.
6. Incise the external oblique aponeurosis in the direction of fibers.
7. Identify and protect the ilioinguinal nerve.
8. Mobilize flaps of the external oblique.
9. Gently encircle the spermatic cord (*or round ligament*, *if female*) at the external ring with Penrose drain.
10. Seek the indirect hernia sac on the anteromedial surface of the cord *or round ligament*.
11. *Dissect sac free of surrounding structures and open*.
12. *Reduce contents*.
13. *Suture ligate and reduce the sac*.
14. Assess the floor of the canal.
15. Place mesh and suture, beginning at the pubic tubercle.
16. Avoid narrowing the internal ring too much or catching nerves in repair.
17. Check hemostasis.
18. Close the external oblique aponeurosis.
19. Close Scarpa's fascia.
20. Close the skin.
21. After applying dressing, pull the testis down into normal position in the scrotum.

Note These Variations

- Type of suture material and mesh varies.
- Type of anesthesia, including local anesthesia, varies.

Complications

- Hematoma, including scrotal hematoma
- Recurrence
- Neuropraxia
- Injury to the cord structures
- Mesh migration
- Mesh infection

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Template Operative Dictation

Preoperative Diagnosis *Left/right* inguinal hernia (*specify if recurrent*)

Procedure Mesh repair of *left/right* inguinal hernia *with local anesthesia by the surgeon*

Postoperative Diagnosis Same

Indications This ___-year-old *male/female* developed a symptomatic *left/right* inguinal hernia. Repair was indicated, and because of the *patient's age/nature of the hernia/preference*, a prosthetic mesh repair was elected.

Description of Procedure The patient was taken to the operating room. Time-outs were performed using both preinduction and pre-incision safety checklists to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure.

[Choose One:]
If not local anesthesia: *General/epidural/spinal anesthesia was induced*. The *left/right* groin was prepped and draped in the usual sterile fashion. An incision was marked in a natural skin crease and planned to end near the pubic tubercle.

If local anesthesia: *A field block was produced by raising skin wheals along the proposed skin incision, along a vertical line lateral to it, and along a horizontal line superior to it. A skin wheal was raised 1 cm lateral and superior to the anterior superior iliac spine, and a fascial injection of lidocaine was made to block the ilioinguinal nerve. Additional local anesthesia was injected during the procedure under the external oblique aponeurosis, at the internal ring, and as needed. A total of ___ mL of 0.5/1 % lidocaine was used.*

The skin crease incision was made with a knife and deepened through Scarpa's and Camper's fascia with electrocautery until the aponeurosis of the external oblique was encountered. This was cleaned and the external ring was exposed. Hemostasis was achieved in the wound. An incision was made in the midportion of the external oblique aponeurosis in the direction of its fibers. The ilioinguinal nerve was identified and protected throughout the dissection. Flaps of the external oblique were developed cephalad and inferiorly.

The cord was identified. It was gently dissected free at the pubic tubercle and encircled with a Penrose drain. Attention was directed to the anteromedial aspect of the cord, where an indirect hernia sac was identified. The sac was carefully dissected free of the cord down to the level of the internal ring. The vas and testicular vessels were identified and protected from harm. The sac was opened and contents were reduced. A finger was passed into the peritoneal cavity and the floor of the inguinal canal assessed and found to be strong. The femoral canal was palpated and no hernia identified. The sac was twisted and suture ligated with 2-0 silk. Redundant sac was excised and submitted to pathology. The stump of the sac was checked for hemostasis and allowed to retract into the abdomen.

Attention was then turned to the floor of the canal, which appeared to be grossly weakened without a well-defined defect or sac. The *polypropylene/other mesh was cut to the appropriate size with an oval medial portion, and a longitudinal lateral opening/precut mesh prosthesis was checked for fit and trimmed as needed*. Beginning at the pubic tubercle, the mesh was sutured to the inguinal ligament inferiorly and the conjoint tendon superiorly using two continuous running 2-0 nonabsorbable sutures. Care was taken to assure that the mesh was placed in a relaxed fashion to avoid excessive tension and that no neurovascular structures were caught in the repair. Laterally, the tails of the mesh were crossed and the internal ring recreated, allowing for passage of the surgeon's fifth fingertip.

Hemostasis was again checked. The Penrose drain was removed. The external oblique aponeurosis was closed with a running suture of 3-0 Vicryl, taking care not to catch the ilioinguinal nerve in the suture line. Scarpa's fascia was

closed with interrupted 3-0 Vicryl. The skin was closed with a subcuticular *stitch of ___/skin clips/other*. A dressing was applied.

If male: The testis was gently pulled down into its anatomic position in the scrotum.

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the postanesthesia care unit in stable condition.

126 Laparoscopic Totally Extraperitoneal (TEP) Inguinal Hernia Repair

Jessica K. Smith

Indications

- Recurrent hernia
- Bilateral hernias
- Surgeon or patient preference

Essential Steps

1. Verify side of surgery.
2. Supine position, general anesthesia, arms tucked, and Foley catheter if preferred.
3. Trendelenburg position.
4. Make skin incision for the first trocar (10–12 mm) at the umbilicus. If the patient is tall, adjust the incision inferiorly so that you will clear the posterior sheath.
5. Open the anterior rectus sheath on the ipsilateral side and retract the muscle laterally to expose the posterior rectus sheath.
6. Insert finger over the posterior rectus sheath and develop space.
7. Insert a transparent balloon-tipped trocar or other device into this space directed toward the pubic symphysis.
8. Place laparoscope in the trocar and inflate the balloon under direct vision to create the extraperitoneal space. Deflate balloon and start CO_2 insufflation of the preperitoneal space. Alternatively, start CO_2 insufflation and create the space with the laparoscope itself using blunt dissection.
9. Place two additional trocars in the midline or bilateral lower quadrants under direct vision. For midline ports place:
   - The second (5 mm) just distal to the umbilical balloon trocar.
   - The third (5 mm) two fingerbreadths away from the second trocar. For lateral lower quadrant ports, place laterally and superiorly with respect to the bilateral anterior superior iliac spines (ASIS).
10. Use a 30 or 45° angled laparoscope for best visualization.
11. Identify the inferior epigastric vessels keeping them always anterior to the plane of dissection in their investing fat.
12. Beginning at the pubis dissect Cooper's ligament to its junction with the iliac vein.
13. Inspect the direct space medial to the inferior epigastric vessels and reduce any sac or preperitoneal fat with gentle traction.
14. *Direct hernias*: *Reduce the sac to the level of the iliopubic tract with gentle traction*.
15. Skeletonize the spermatic cord laterally to the inferior epigastric vessels to expose the iliopubic tract. Do not go lateral or posterior to this to avoid nerve or vascular injury.

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16. *Indirect hernias*: *If an indirect hernia sac is identified*, *mobilize the sac from the cord structures and reduce into the peritoneum. Reduce any lipomas of the spermatic cord. If the sac is exceptionally large and will not reduce with gentle traction it can be suture ligated*.
17. *Bilateral hernias*: *Repeat dissection on the contralateral side*.
18. Place mesh behind the spermatic cord structures (at least 10 × 12 cm) over the myopectineal orifice to completely cover the direct, indirect, and femoral spaces. A keyhole can be cut in the mesh, but there must be overlap of the mash encircling the cord.
19. *Bilateral hernias*: *Either two separate pieces or one large piece of mesh may be used*.
20. A minimum number of absorbable Vicryl or titanium tacks are used to secure the mesh. One tack is placed in the anterolateral abdominal fascia (above the anterior superior iliac spine) to secure the mesh as it is unfurled. If the mesh lies perfectly in position without tacks, it is not necessary to use them.
21. A second tack is placed to Cooper's ligament to secure the medial side of the mesh.
22. Additional tacks, if needed, can be placed in Coopers or the lateral anterior abdominal wall while palpating the end of the tacking device to avoid intraperitoneal injury.
23. Avoid placing staples directly into the pubic tubercle.
24. Ensure hemostasis.
25. Deflate preperitoneal space while gently holding mesh in position.
26. Withdraw trocars.
27. Close anterior sheath and skin incisions.

Note These Variations

- Type of mesh, balloon dissector, tracking device, and number of tacks used varies.
- Midline or lateral operating port placement.
- Bilateral hernias can be repaired with the use of either a single large prosthesis or two separate pieces.
- A keyhole can be precut in the mesh to accommodate the cord structures or the mesh can be left whole.

Complications

- Bladder injury
- Vascular injuries, especially the inferior epigastric artery or spermatic vessels
- Nerve injury, especially the branches of the genitofemoral nerve, lateral femoral cutaneous nerve, and femoral nerve
- Vas deferens and testicular complications
- Recurrence of hernia
- Osteitis pubis

Template Operative Dictation

Preoperative Diagnosis *Left*/*right*/*bilateral* inguinal hernia

Procedure Totally extraperitoneal laparoscopic (TEP) repair of *left*/*right*/*bilateral* inguinal hernia

Postoperative Diagnosis Same

Indications This ___-year-old *male*/*female* developed a *symptomatic*/*recurrent left*/*right*/*bilateral* inguinal hernia. Repair was indicated, and, because of the *patient's age*/*sex*/*nature of the hernia*/*patient preference*, laparoscopic repair was elected.

Description of Procedure The patient was taken to the operating room and the side of surgery was verified. Time-outs were performed using both preinduction and pre-incision safety checklist to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure. After induction of general anesthesia, the *arm opposite the hernia site*/*bilateral arms* were tucked. The patient's abdomen was prepped and draped in standard sterile fashion. The skin incision for the first trocar was made just below the umbilicus. The anterior rectus sheath on the ipsilateral side of the hernia was opened and the

muscle retracted laterally to expose the posterior rectus sheath. This extraperitoneal space was gently developed with blunt dissection and a balloon-tipped 10-mm trocar placed into the space, directed toward the pubic symphysis. An angled laparoscope was placed into the trocar and the balloon inflated under direct vision to create the extraperitoneal space. A 5-mm trocar was placed just below the umbilical balloon trocar site, and a second 5-mm trocar placed two fingerbreadths away from the second trocar. *Alternatively*, *two additional 5-mm trocars were placed under direct visualization in the bilateral lower quadrants*. The patient was placed in the Trendelenburg position.

The preperitoneal space was further developed by exposing the inferior epigastric vessels and keeping them anterior to the dissection plane. Cooper's ligament was dissected laterally to its junction with the iliac vein. The dissection was continued inferiorly to the iliopubic tract, with care taken to avoid injury to the femoral branch of the genitofemoral nerve and the lateral femoral cutaneous nerve. The cord structures were dissected. The direct hernia sac was identified and reduced by gentle traction.

[Choose One:]
If indirect hernias: *The indirect hernia sac was noted to be small and was easily mobilized from the cord structures and reduced into the peritoneal cavity/the indirect hernia sac was noted to be large and was therefore suture ligated and divided just distal to the internal ring leaving the distal sac* in situ *while the proximal sac was dissected away from the cord structure*.

If bilateral hernias: *The procedure was repeated on the contralateral side*.

A 10 × 12 cm piece of mesh was marked for orientation and rolled longitudinally into a compact cylinder and passed through the camera trocar. The mesh was placed along the inferior aspect of the working space and unrolled into place to completely cover the direct, indirect, and femoral spaces. The mesh was tacked into place laterally and superiorly to the iliopubic tract and inferior and medially to Cooper's ligament. *Excess mesh was trimmed and removed*.

After ensuring adequate hemostasis using electrocautery, the preperitoneal space was deflated while the mesh was held in position. The trocars were removed and the balloon deflated. The anterior rectus sheath was closed using ____. The trocar incisions were closed using ___ and dry dressings/skin adhesive were applied.

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the postanesthesia care unit in stable condition.

127 Laparoscopic Inguinal Hernia Repair: Transabdominal Preperitoneal (TAPP)

Jessica K. Smith

Indications

- Recurrent hernia
- Bilateral hernias
- Patient preference for laparoscopic repair rather than open repair

Essential Steps

1. Verify side of surgery.
2. General anesthesia.
3. Patient supine with both arms tucked.
4. Trendelenburg position, surgeon on the opposite side of table from the hernia, single video monitor at the foot of the operating table.
5. First trocar (10–12 mm) placed at the umbilicus.
6. Two additional trocars (5 mm) lateral to the rectus sheath on either side just below the level of the umbilicus. Alternatively one or both of these may be placed in the midline.
7. Angled laparoscope (*30°/45°*) provides best visualization.
8. Inspect both inguinal regions; identify:
   - The median umbilical ligament (remnant of urachus)
   - The medial umbilical ligament (obliterated umbilical artery)
   - The lateral umbilical fold (inferior epigastric artery)
9. *Divide the median umbilical ligament if necessary to improve exposure*.
10. Incise the peritoneum along a line superior to the hernia defect, extending from the anterior superior iliac spine to the median umbilical ligament.
11. Mobilize the peritoneal flap superiorly for several centimeters along the umbilical ligament.
12. Create the preperitoneal space with scissors and/or electrocautery beginning laterally and extending medially to the inferior epigastric vessels.
13. Cooper's ligament is identified and exposed medially to its junction with the femoral vein.
14. Identify the iliopubic tract.
15. Identify the cord structures and reduce any indirect or direct hernia contents.
16. *Direct hernia*: *Reduce the sac and preperitoneal fat from the hernia orifice*.
17. *Indirect hernia*: *Reduce with gentle traction. For a large sac*: *Divide the sac distal to the internal ring*, *leaving the distal sac* in situ *and dissect the proximal sac away from the cord structures*.
18. Ensure hemostasis.

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19. Place the mesh (at least 11 × 6 cm) over the myopectineal orifice and spermatic cord to completely cover the direct, indirect, and femoral spaces. The mesh may also be placed under the cord structures.
20. Fix the mesh superiorly to the abdominal wall inferiorly to the Cooper's ligament and medially to the pectineal ligament, avoiding the inferolateral edges to stay away from the triangle of pain (nerves) and the triangle of doom (vessels).
21. Excise redundant mesh.
22. Close the peritoneal flap over the mesh securing with tacks in similar positions of safety. Alternatively, endoscopic hernia clips can be used, or the peritoneal flap sutured back into position.
23. *Bilateral hernias can be repaired using one long transverse peritoneal incision extending from one anterior superior iliac spine to the other or*, *alternatively*, *with two separate peritoneal incisions preserving the peritoneum between the medial umbilical ligaments*.

Note These Variations

- Direct vs. indirect hernia.
- Sac of indirect hernia reduced or divided and left in situ.
- Bilateral hernia; can be repaired with a single large sheet of mesh or through two peritoneal incisions.
- In women, the round ligament is usually divided to complete the peritoneal flap.

Complications

- Vascular injuries, especially the inferior epigastric artery or spermatic vessels
- Nerve injury, especially the branches of the genitofemoral nerve, lateral femoral cutaneous nerve, and femoral nerve
- Vas deferens and testicular complications
- Recurrence of hernia
- Bowel injury or obstruction
- Osteitis pubis

Template Operative Dictation

Preoperative Diagnosis *Left*/*right*/*bilateral* inguinal hernia

Procedure Transabdominal preperitoneal laparoscopic (TAPP) repair of *left*/*right*/*bilateral* inguinal hernia

Postoperative Diagnosis Same

Indications This ___-year-old *male*/*female* developed a *symptomatic*/*recurrent left*/*right*/*bilateral* inguinal hernia. Repair was indicated, and because of the *patient's age*/*sex*/*nature of the hernia*/*patient preference*, laparoscopic repair was elected.

Description of Procedure The patient was taken to the operating room. Time-outs were performed using both preinduction and pre-incision safety checklists to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure. The patient was placed supine with arms tucked at the sides. After obtaining adequate anesthesia, the patient's abdomen was prepped and draped in standard sterile fashion. The patient was placed in the Trendelenburg position.

A Veress needle was placed at the *umbilicus*/*Palmers point* and pneumoperitoneum created with insufflation of carbon dioxide to 15 mmHg. After the Veress needle was removed, a 10-mm trocar was placed via an infraumbilical incision and the *30°*/*45°* angled laparoscope inserted. Two 5-mm trocars were then placed lateral to the rectus sheath under direct visualization. Both inguinal regions were inspected and the median umbilical ligament, medial umbilical ligament, and lateral umbilical fold were identified. The median umbilical ligament was divided sharply with electrocautery to achieve optimal exposure. The peritoneum was incised with endoscopic scissors along a line 2 cm above the superior edge of the hernia defect, extending from the median umbilical ligament to the anterior superior iliac spine. The peritoneal flap was mobilized inferiorly using blunt and sharp dissection. The

inferior epigastric vessels were exposed and the pubic symphysis was identified.

Direct hernia: *The direct hernia sac was identified and reduced by gentle traction*.

Cooper's ligament was dissected to its junction with the iliac vein. The dissection was continued inferiorly to the iliopubic tract, with care taken to avoid injury to the femoral branch of the genitofemoral nerve and the lateral femoral cutaneous nerve. The cord structures were identified.

Indirect hernia: *The indirect hernia sac was noted to be small and was easily mobilized from the cord structures and reduced into the peritoneal cavity/the indirect hernia sac was noted to be large and was therefore divided just distal to the internal ring*, *leaving the distal sac* in situ, *while the proximal sac was dissected away from the cord structures*.

A large piece of mesh (*measurement*) was rolled longitudinally and passed through a trocar. It was unrolled into place to completely cover the direct, indirect, and femoral spaces. *The mesh was secured into place superiorly to the anterior abdominal wall and inferiorly and medially to Cooper's/pectineal ligaments with absorbable/titanium tacks*. Care was taken to avoid the inferolateral triangles containing the iliac vessels and genital nerves. The peritoneal flap was closed over the mesh and secured with tacks in similar positions of safety. After ensuring adequate hemostasis, the trocars were removed and the pneumoperitoneum allowed deflate. The trocar incisions were closed using ___ and dry dressing/skin adhesive dressings applied.

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the postanesthesia care unit in stable condition.

128 Open Repair of Femoral Hernia

Jessemae L. Welsh

Indication

- Femoral hernia

Essential Steps

1. Verify and mark side of surgery.
2. Skin line incision *above the inguinal ligament/directly over the hernia*.
3. Develop flaps to expose the sac.
4. Reduce the hernia and open the sac if possible.
5. If not reducible:
   - *Divide the inguinal ligament cephalad to the sac, protecting the underlying cord structures*.
   - *Enlarge the femoral orifice*.
   - *Open the sac and inspect contents*.
   - *If viable, replace contents in the abdomen*.
   - *If nonviable, perform segmental bowel resection*.
6. Close the sac with suture ligature.
7. Excise the redundant sac and allow it to retract into the abdomen.
8. Close the femoral canal with mesh plug.
9. *Close defect in the inguinal ligament*.
10. Attain hemostasis.
11. Close the wound.

Note These Variations

- Femoral hernia may also be repaired through the inguinal canal (see McVay repair, Chap. 124) or via a laparoscopic totally extraperitoneal approach (Chap. 126) or laparoscopic transabdominal preperitoneal approach (Chap. 127).
- Incision directly over the hernia for small, easily reduced herniae.
- Incision over the inguinal canal allows better access and exposure.
- Type of mesh, suture, and local anesthesia used.
- Repair with autologous tissue rather than mesh is possible.
- Local anesthesia or regional block instead of general anesthesia for patients with medical comorbidities.
- Aberrant obturator artery may be encountered deep to the inguinal ligament.

Complications

- Superficial wound infection
- Hematoma
- Urinary retention

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- Injury to the bowel
- Reduction of compromised/strangulated bowel into the abdomen
- Injury to the femoral vessels
- If the inguinal ligament divided: injury to the cord structures or ilioinguinal nerve or bleeding from an aberrant obturator artery
- Postoperative neuralgia/persistent groin pain
- Mesh migration or erosion
- Mesh infection
- Recurrence

Template Operative Dictation

Preoperative Diagnosis *Left/right incarcerated* femoral hernia

Procedure Repair of *left/right* femoral hernia

Postoperative Diagnosis Same

Indications This ___-year-old *male/female* presented with *symptomatic/incarcerated left/right* femoral hernia *with/without* symptoms of obstruction. Repair is indicated.

Description of Procedure The patient was taken to the operating room and positioned supine on the operating table. All pressure points were properly padded. Preoperative antibiotic was administered.

[Choose One:]
If not local anesthesia: *General anesthesia was induced. Epidural/spinal anesthesia was administered. IV sedation with monitored anesthesia care was initiated*.

If local anesthesia: *The area of the planned surgery was infiltrated with lidocaine/bupivacaine. A total of ___ mL of 0.5%/1% lidocaine/0.25%/0.5% bupivacaine was used*.

Time-outs were performed using both preinduction and pre-incision safety checklists to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure. The *left/right* groin was prepped and draped in the usual sterile fashion. An incision was made *over the hernia bulge/over the inguinal ligament*.

The incision was deepened through the subcutaneous tissues. Hemostasis was maintained throughout the procedure with electrocautery. *A flap was developed inferiorly to expose the hernia sac/the hernia sac was exposed*. The sac was gently dissected free of surrounding tissues. It was found to be *reducible/irreducible*.

If hernia reducible: *The sac was opened, and the hernia contents were inspected and reduced as no compromised bowel was noted. The hernia sac was suture ligated with ___. Redundant sac was excised and the sac allowed to retract into the peritoneal cavity*.

If hernia not reducible: *The inguinal ligament was divided cephalad to the femoral canal taking care to avoid injury to the underlying cord structures and ilioinguinal nerve. The hernia sac was opened and the contents inspected and found to be viable/nonviable* (*if nonviable, include details of segmental bowel resection*). *The hernia contents were reduced and the redundant sac amputated and ligated with ___*.

Note: *If nonviable bowel was noted and resected, permanent mesh in the groin should be avoided, and a primary tissue/McVay repair is performed* (Chap. 124).

Note: *If no compromised bowel was noted, mesh may be used for a tension-free repair*.

A plug of ___ mesh was fashioned in such a way as to completely fill the defect without encroaching upon the femoral vein. It was placed in the femoral canal and sutured in place with multiple interrupted sutures of ___. Care was taken to protect the femoral vessels from harm. *The inguinal ligament was then reconstructed with multiple interrupted sutures of ___, with care taken to protect the underlying cord structures and ilioinguinal nerve*.

The wound was irrigated and closed in layers with *interrupted/running* 3-0 Vicryl for Scarpa's fascia and *skin staples/running subcuticular of 4-0 Monocryl*.

A debriefing checklist was completed to share information critical to postoperative care of the patient. The patient tolerated the procedure well and was taken to the postanesthesia care unit in stable condition.