HOW TO TIE INTRACORPOREAL KNOTS

A manual for tying knots using the Endo Stitch™ suturing device
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### KNOT TYING TECHNIQUES

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This manual will help you understanding basic intracorporeal knot tying techniques using the Endo Stitch™ suturing device. It includes instructions for use of the device, as well as instructions for loading and following the step-by-step instructions. With a little practice, you’ll be able to master these time-saving techniques in a very short time.

This manual does not replace or substitute the product user manual. Please refer to the package insert for complete product details.
The Endo Stitch™ suturing device enhances advanced laparoscopic procedures that require endoscopic suturing. Compared to conventional suturing, it saves 45 to 70 percent of laparoscopic suturing time.\(^1\)–\(^4\) And when used with our barbed V-Loc™ wound closure device, which eliminates the need to tie knots, it saves an additional 35 to 42 percent of intracorporeal suturing time.\(^5\)

The Endo Stitch™ suturing device is a one-handed, auto-suturing device that’s easy to operate — even in the tightest spaces.\(^1\)–\(^5\) It accommodates a variety of tissue thicknesses with jaws that open to a depth and width of 19 mm. Plus, it has a 9 mm tapered point needle to allow for larger tissue bites.

There are 50 suture combinations available for the Endo Stitch™ device. These include absorbable and nonabsorbable sutures as well as our proprietary barbed V-Loc™ wound closure device.
Instructions for Use

The handles of the device are fit comfortably into the user’s hands.

The handle section consists of two toggle levers, two black unloading buttons (one on the front and one on the back), and two handles.

Schematic View and Nomenclature

Product description

The needle is passed back and forth between the device’s jaws by completely squeezing the handles and activating either toggle lever forward or backward. (If a suture and needle are not loaded into the device, the suture can be loaded into the jaws per the loading instructions.)

To close the jaws, fully squeeze the handles. To open the jaws, release the handles. Adjust the amount that the jaws are opened by simply varying the amount that the handles are squeezed. This allows for access to tight operative sites.
Before inserting the device into the trocar, be sure to place the jaws in the closed, neutral position. To align the jaws, completely squeeze the handles and align the toggle levers with the arrows on the device body. The jaws are now ready to be inserted into the trocar.

Once the device has been inserted through the trocar, squeeze the handles and move either toggle lever completely forward or backward.

Then release the handles and open the jaws, exposing the needle. The device is now ready to place a stitch.

Expose the tissue to be sutured by using an Endo Grasp™ instrument.
Place the jaws of the device around the tissue to be sutured.
Squeeze the handles completely to close on the tissue.

To pass the needle through tissue, the jaws of the Endo Stitch™ device must first be placed in the open position (i.e., either toggle lever is activated to the forward position).
Note: The needle is always in the jaw on the side that has the toggle lever pushed forward.

Once the jaws are fully closed, activate either toggle lever completely forward or backward (depending on their original position) to pass the needle from one jaw to the other jaw.

Once the needle has been completely pulled through the tissue, the jaws of the device should be returned to the closed, neutral position. The closed, neutral position should be used any time that the surgeon is pulling the suture through tissue.
Neutral position

The neutral position provides three important advantages:

- It allows the jaws of the device to be easily inserted into the trocar.
- It protects both needle tips from inadvertently puncturing tissue.
- It fully supports the needle. If the jaws are not in the neutral position and you pull on the suture, you run the risk of bending the needle. You may also risk pulling the needle out of alignment with the empty hole located on the opposite jaw. If the needle is not properly aligned or the needle is bent, the jaws may not close and the needle may need to be unloaded and retrieved manually.
First ensure that the jaws are in the open position with the metal bars fully extended. The teal toggle levers should be in a forward position and the red indicator boxes should be fully exposed.

If the device is not in the ready to load position (i.e., the metal bars are not exposed), follow the instructions to unload the device — even if there is no needle in the jaws — to expose the metal bars.
STEP 1
Insert the jaws into the single use loading unit (SULU) with the Autosuture™ logo facing up. Press down at the apex of the jaws to ensure that the jaws are fully seated.

STEP 2
Completely squeeze the handles together with one hand while using the other hand to pull both toggle levers back from the jaws until an audible click indicates that the needle is properly loaded. Note that the red indicator boxes are covered by the black button.

STEP 3
Gently press down on the tab located at the top of the SULU. The jaws will release from the SULU. Pull the SULU away from the jaws to unreel the suture from the spool. When using longer lengths of suture, ensure that the suture does not fall from the sterile field. Suture SULUs are offered in 7” and 48” sizes; other lengths can be manually cut.

Test to be sure the needle is fully seated by passing the needle back and forth between the jaws of the device. The device is now ready for use. (If the needle does not pass smoothly, unload the needle and reload.)
Unloading the Device

**STEP 1**
Squeezing the handles together, align the toggle levers with the arrows on the body of the handles.

**STEP 2**
Keeping the handles squeezed together, simultaneously press the two black reloading buttons located on the front and rear of the device. Slide the buttons forward, exposing the red indicator boxes marked on the body of the device.

**STEP 3**
Keeping the jaws of the device over a suitable needle disposal site, release the handles and remove the needle. The Endo Stitch™ device is now ready to be reloaded.
Knot Tying Techniques

Square Knot

**STEP 1**
Pass the sutured needle through the tissue.

**STEP 2**
Lay the suture that extends directly from the needle over the top of the empty jaw.

**STEP 3**
Grasp the suture tail with an Endo Grasp™ instrument. Bring the suture tail in between the jaws of the device. Close the jaws and pass the needle.

**STEP 4A & 4B**
Pull the jaw with the needle back through the loop of suture.
Knot Tying Techniques

Square Knot (cont’d.)

**STEP 5**
Cinch the knot with the jaws in the closed neutral position.

**STEP 6**
Return the same toggle lever back to the forward position. The needle should be in the same jaw as in step 4A-4B (the left jaw).

**STEP 7**
Lay the suture that extends directly from the needle over the top of the empty jaw.

**STEP 8**
Bring the suture tail in between the jaws of the device. Close the jaws and pass the needle.

**STEP 9**
Pull the jaw with the needle back through the loop of suture.

**STEP 10**
Cinch the knot with the jaws in a closed position. Repeat steps to place additional throws.
Knot Tying Techniques

Surgeon’s Square Knot

**STEP 1**
Pass the sutured needle through tissue.

**STEP 2**
Close the jaws and transfer the needle to the opposite jaw.

**STEP 3**
Lay the suture that extends from the needle over the top of the empty jaw.

**STEP 4**
Bring the suture tail in between the jaws of the device. Close the jaws and pass the needle to the opposite jaw.

**STEP 5**
Bring the suture tail in between the jaws of the device. Close the jaws and pass the needle to the opposite jaw.

**STEP 6**
Place the empty jaw in the loop adjacent to the tissue. Close the jaws and pass the needle to the opposite jaw.
Knot Tying Techniques

**Surgeon’s Square Knot (cont’d.)**

**STEP 7**
Pull the jaw with the needle back through the loop.

**STEP 8**
With the jaws in the closed neutral position, cinch the knot tight.

**STEP 9**
To complete the surgeon’s square knot, continue with a single throw of the square knot.
Knot Tying Techniques

Modified Fisherman’s Knot

**STEP 1**
Pass the sutured needle through tissue.

**STEP 2**
Close the jaws and transfer the needle to the opposite jaw.

**STEP 3**
Lay the suture which extends from the needle over the top of the empty jaw.

**STEP 4**
Bring the suture tail in between the jaws of the device. Close the jaws and pass the needle to the opposite jaw.

**STEP 5**
Bring the suture tail in between the jaws of the device. Close the jaws and pass the needle to the opposite jaw.

**STEP 6**
Place the empty jaw in the loop adjacent to the tissue. Close the jaws and pass the needle to the opposite jaw.
Knot Tying Techniques

Modified Fisherman’s Knot (cont’d.)

**STEP 7**
Insert the empty jaw into the loop adjacent to the tissue.

**STEP 8**
Pass the needle to the opposite jaw.

**STEP 9**
Pull the jaw back out from the loop needle.

**STEP 10**
Tighten the knot with the jaws closed and the toggle levers in the neutral position.

**STEP 11**
To secure and tie off the modified fisherman’s knot, use a single throw of the square knot.
Knot Tying Techniques

Tail Spin Knot (Alternate Square Knot)

**STEP 1**
Pass the sutured needle through the tissue.

**STEP 2**
Bring the tail in between the jaws.

**STEP 3**
Wrap the suture tail once around the empty jaw (jaw without needle).

**STEP 4**
Pass the needle to the opposite jaw.

**STEP 5**
Pull the jaw with the needle out of the tail suture loop.

**STEP 6**
Cinch the knot with the jaws in the closed and neutral position.
Knot Tying Techniques

Tail Spin Knot (Alternate Square Knot cont’d.)

**STEP 7**
Bring the tail in between the open jaws (needle in the same jaw as in step 5).

**STEP 8**
Wrap the suture once around the empty jaw.

**STEP 9**
Pass the needle to the opposite jaw.

**STEP 10**
Pull the jaw with the needle out of the tail suture loop.

**STEP 11**
Cinch the knot with the jaws closed and in the neutral position.

**STEP 12**
To create the surgeon’s knot, at step 3 only, wrap the tail suture around the empty jaw twice instead of once.
Knot Tying Techniques

Securing a Running Stitch

**STEP 1**
Pass the sutured needle through the tissue. Pull enough suture material through the tissue to ensure there is sufficient material to make the run of stitches and to tie off the knot at the end of the run.

**STEP 2**
Anchor the starting point by tying a square knot (page 10). Run the desired length of stitches.

**STEP 3**
At the end of the running stitch, make the last pass through the tissue close to the penultimate pass. The loop that this last pass forms can now be held up with an Endo Grasp™ instrument to make a tail for tying off the run.

**STEP 4**
Holding the loop with the Endo Grasp™ instrument, use this as a tail to terminate the run with a modified fisherman’s knot (page 14).

**STEP 5**
Tie off the modified fisherman’s knot using a single throw of the square knot.
**Endo Stitch™ Suturing Devices**

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<th>Device</th>
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<tr>
<td>173016</td>
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**Endo Stitch™ Single Use Loading Units — V-Loc™ 180 Absorbable Reload**

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**Endo Stitch™ Single Use Loading Units — V-Loc™ PBT Non-Absorbable Reload**

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<td>V-Loc™ PBT Non-Absorbable</td>
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**REFERENCES**

Please refer to the package insert for complete instructions, indications, contraindications, warnings, and precautions.

For more information, visit medtronic.com/covidien

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