The West Point Knot: A Sliding-Locking Arthroscopic Knot

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Abstract: Despite the advent of sutureless technology, knot tying remains an important skill for any arthroscopist. When one is choosing which knot to tie, there are a variety of options, with each possessing its own inherent strengths and weaknesses. The West Point knot is a sliding-locking arthroscopic knot that is relatively easy to learn and has excellent knot security. This article details the appropriate manner in which to tie this knot.

Despite a recent increase in the popularity of knotless suture anchors, arthroscopic knot tying remains an invaluable and important skill for orthopaedic surgeons to master. The ability to successfully approximate tissue using arthroscopic suture and to maintain that approximation for the duration of tissue healing is vital for surgical success. Many biomechanical studies have been performed to compare the effect of suture material on knot performance. Equally important, however, is the surgical technique and knot selection for arthroscopic suturing.

Many types of arthroscopic knots have been described, and they can easily be grouped by their general properties. Arthroscopic knots are typically divided into sliding and nonsliding knots, with locking and nonlocking versions of both existing. There are

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**Fig 1.** After passing the suture through the tissue, the surgeon will have 2 strands of suture exiting the patient. The surgeon pulls on 1 strand to allow the suture to slide through the tissue. This will allow identification of which strand is exiting farther from the articular surface; this strand will be the post. The surgeon holds the non-post limb (white) parallel to the post limb (purple) and pinches it between 2 fingers.
multiple aspects to consider when determining which knot to use. Most important, knots should be easy to tie and reproduce, they should slide easily through the arthroscopic cannula, and they should be able to adequately develop and maintain tension at the suture-tissue interface. Knot effectiveness is also dependent on the attributes of knot security and loop security. Knot security is the ability of the knot to resist slippage under an applied load, and loop security is the ability of the suture loop to remain tight, as the knot is tied.

The West Point knot is a commonly used arthroscopic knot; however, there is no description of the technique in the literature. The purpose of this article was to describe the proper technique to tie the West Point knot. This knot is a sliding and locking knot that has been modified from the Duncan loop; it is easy to accomplish and reproduce and can be used in a variety of arthroscopic settings.

**Technique**

**Suture Passage**

First, the repair site is identified and the suture is passed through the selected tissue. Next, both ends of the suture are retrieved through the arthroscopic cannula or portal, and 1 end is identified as the post, or the suture on which the knot will slide.

**Post Identification**

The post is usually the limb of suture that is farther from the articular surface because this will prevent the knot from lying on the articular cartilage when it is completed. The post is then shortened to roughly one-third the length of the non-post limb. The post is identified in Figure 1, on the left, as the purple suture. Both strands of the suture are then pinched between the pulp of the surgeon’s thumb and middle finger of the post hand, as shown in Figure 1. There is

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**Fig 2.** The non-post strand (white) is passed over the surgeon’s thumb and wrapped around both suture strands. This should create a small loop of suture on the side of the surgeon. The index finger is then used to dress the knot.

**Fig 3.** The non-post strand (white) is passed 3 more times around both suture strands. After each pass, the index finger of the hand holding the post (purple) should be used to dress the knot.
no suture crossing at this point. It is recommended that an assistant place a finger between the suture limbs by resting it on either the opening of the cannula or the portal. This will assist the surgeon in separating the 2 strands and aid in easier knot tying.

Tying Knot
The non-post strand is draped over the thumb and passed around both strands, as shown in Figure 2. This creates a small loop over the thumb that will be used in a subsequent step. The index finger of the post hand is then used to dress the knot as this step is repeated 3 more times for a total of 4 passes around the suture. It is imperative to use the index finger to dress the knot with each pass because these loops must not become entangled with one another. Once the 4 passes are complete, the knot should appear as it does in Figure 3. While this configuration is maintained with the surgeon’s index finger, the non-post suture is passed around itself on the side of the knot closest to the cannula to create a half-hitch, as shown in Figure 4. The non-post strand is then passed up from underneath through the loop created at the thumb in the first step, as shown in Figure 5.

Dressing Knot
The knot is dressed by pulling apart both the post and non-post strands that are closer to the cannula or portal, as shown in Figure 6. It is very important to always maintain tension on the post strand and never pull tension on the non-post strand, which will prematurely lock the knot. In addition, as discussed previously, it is equally important to keep the knot dressed and not allow each loop to become entangled with the others. This also would prematurely lock the knot and not allow it to slide. Figure 7 shows a completed knot that will slide easily through the cannula to secure the desired tissue in place.

**Fig 4.** The non-post suture (white) is looped around only itself on the side of the knot closest to the patient; this maneuver should create a half-hitch.

**Fig 5.** The non-post strand (white) is passed toward the surgeon and up through the loop of both sutures that was created in the second step.
Advancing Knot

A knot pusher placed on the post can be used to facilitate guiding the knot into place. Pulling the post will help to advance the knot to the tissue and eliminate most of the slack in the suture loop. Once adequate tension has been obtained with the knot pusher maintaining tension on the knot, the non-post free end is pulled in line with the post limb to lock the knot and set final loop and knot security. At this point, the knot is secured; however, 3 additional alternating half-hitches are thrown to back up the knot (Video 1).

Discussion

Given the wide variety of options regarding arthroscopic knot tying, it is important to take the following considerations into account to ensure the best possible outcomes. The optimal arthroscopic sliding knot must meet the following 5 criteria: (1) It must be low profile, (2) it must be easy to throw, (3) it should slide well, (4) it should be easy to set, and (5) it should have excellent initial security and holding power. In addition, the ability of the knot to resist loosening over time is of vital importance as tissue tension must be maintained until adequate healing has taken place. Other important aspects include the time it takes to tie the knot and how easy it is to manipulate within the cannula and the joint. Providers at teaching institutions must also consider the ease of learning a technique, the reproducibility of the method, and the ability of the knot to prevent premature locking.

Table 1. Step-by-Step Instructions

1. The surgeon holds the non-post limb parallel to the post and pinches it between 2 fingers.
2. The surgeon passes the non-post strand over his or her thumb and wraps it around both suture strands.
3. The surgeon continues to wrap the non-post suture around both strands, until a total of 4 passes have been completed.
4. On the patient side of the knot, the surgeon passes the non-post strand around itself to create a half-hitch and pulls tension to achieve tightening on the underside of the loops.
5. The surgeon passes the free end of the non-post strand up through the loop where the thumb was.
6. The surgeon gently pulls apart both strands on the patient side of the knot to dress it.
7. The surgeon can now advance the knot by pulling on the post suture.
When we compare the West Point knot with other arthroscopic knots such as the Tennessee slider or alternating half-hitches, it compares favorably. The West Point knot is advantageous because it is a sliding and locking knot that has excellent knot security and holds tension well once locked. In addition, it is easy to tie with relatively simple steps, making it a great knot for teaching institutions. Its low profile makes it an excellent candidate for capsulolabral repairs, and it is versatile in that the knot can be backed up with additional half-hitches if needed. Moreover, a biomechanical study showed that the West Point knot had a greater load to failure than the Roeder, Weston, or SMC knot. It also showed the smallest amount of displacement at failure compared with the other sliding-locking knots. Potential disadvantages of the West Point knot include the risk of premature locking if the non-post suture strand is pulled before adequate knot tension is obtained. In addition, it is a relatively bulky knot, especially when compared with alternatives such as alternating half-hitches. Despite these minor disadvantages, the West Point knot possesses all the characteristics of a good arthroscopic knot and is one of the most commonly used arthroscopic knots at our institutions.

Before the adoption of an arthroscopic knot, it is recommended that the surgeon proceed through multiple practice steps before using the knot in the operating room. The steps include (1) practicing the knot using a rope and a post, (2) practicing with various types of suture on a post, (3) incorporating a knot pusher and arthroscopic cannulas, (4) applying the technique in a cadaveric specimen, and (5) clinically using the knot. This Technical Note presents a sliding-locking arthroscopic knot that is easy to use and reproduce (Tables 1-3).

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### Table 2. Pearls and Pitfalls

| Pearls |
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| The surgeon should choose the suture strand farthest from the articular cartilage as the post to prevent the knot from lying on the cartilage. |
| An assistant should place his or her finger between the 2 suture strands and over the cannula to prevent the knot from advancing prematurely. |
| The surgeon should be sure to dress the knot before advancing it through the cannula, because this will help limit the bulk of the knot. |

| Pitfalls |
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| Failure to throw the inverted half-hitch after the 4 suture passes will prevent the knot from being able to lock. |
| When the surgeon is advancing the knot, prematurely pulling on the non-post strand will lock the knot and prevent further advancement. |

### Table 3. Advantages and Disadvantages

| Advantages |
| --- |
| Combination sliding and locking knot |
| Excellent knot security |
| Relatively easy to learn to tie |

| Disadvantages |
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| Risk of premature locking |
| Bulky knot |