

## How to Use Cuff Suture Instruments: The Concept of “Concave In and Concave Out”

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**Abstract:** Arthroscopic reconstructive surgery of the shoulder is extremely demanding. The advent of suture anchors and knot-tying instruments has greatly facilitated its development. Knowledge of the anatomy and surgical principles alone is not enough. Familiarity with specific instruments is also important. We describe our experience with the Elite Cuff Stitch Suture Relay (Smith & Nephew, London, U.K.). We describe a new concept on how to use this suture passer or similar instrument. We advocate this new concept of “concave in and concave out.” **Key Words:** Shoulder—Arthroscopy—Suture—Suture relay—Suture anchor—Elite Cuff Stitch Suture Relay.

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Shoulder reconstructive arthroscopy is a demanding procedure. Complications because of poor surgical techniques are well known.<sup>1</sup> Suture anchors have greatly expanded the application and role of arthroscopic repair. New instruments are continuing to be developed and being introduced into the market at great pace. To the average surgical consumer, the instruments often at first appear similar to existing models. Frequently, only after experience in an in vivo situation can a surgeon–instrument combination be judged, ie, “battle tested.”

Suture passers are commonly used instruments in shoulder arthroscopy surgery and many variations are available. Our experience is that they are all slightly

different, and different situations call for different suture passers. We recently acquired the Elite Cuff Stitch Suture Relay (Smith & Nephew, London, U.K.). To the experienced user, it has obvious advantages, but the accompanying documentation is sparse. We describe our initial experience and how best to maximize its potential use.

### CASE REPORT

A 45-year-old man developed acute left shoulder pain after a trivial injury. The clinical history and physical examination suggested a significant full-thickness acute rotator cuff tear. A magnetic resonance imaging arthrogram of the left shoulder confirmed the diagnosis and excluded any other pathology.

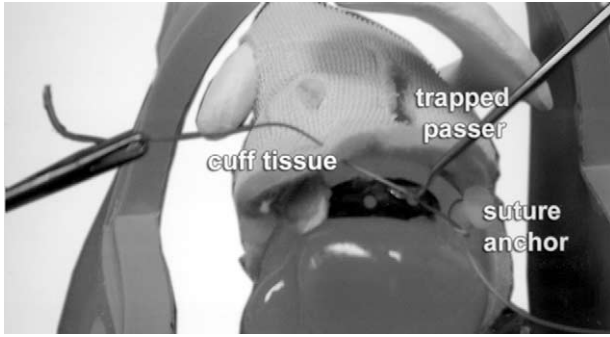
Arthroscopy examination and arthroscopic repair was performed in the lateral position. A standard technique was followed. The initial part of the procedure was uneventful. The first suture anchor was inserted into the greater tuberosity. Outside the portal, the free end of the suture was threaded through the Elite Cuff Stitch Suture Relay (Elite passer). The Elite passer was introduced into the portal cannula. A piece

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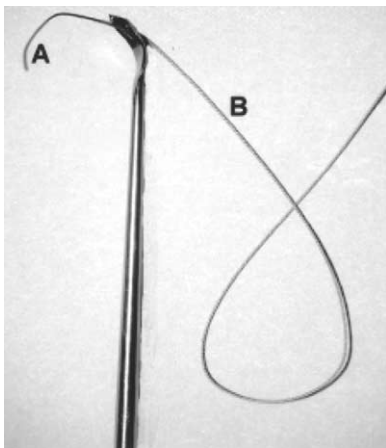


**FIGURE 1.** Shoulder surgery simulator: The suture passer is trapped between the anchor on the right and the cuff tissue on the left. This situation needs to be undone to proceed with the repair.

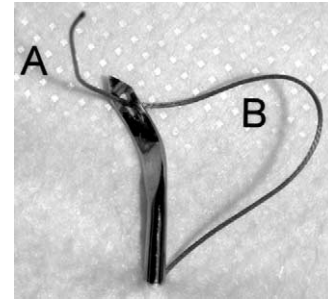
of the rotator cuff tissue was penetrated by the Elite passer, carrying the suture through the cuff tissue. The suture was grasped at the other end and the Elite passer was reversed back through the cuff of tissue. The Elite passer was now trapped, ie, threaded between the suture anchor at one end and the rotator cuff tissue at the other (Fig 1). To correct the problem, the suture was unravelled from the cuff tissue and the Elite passer intra-articularly and everything was brought out of the cannula.

**THE CORRECT METHOD**

Thread the free end “A” (Fig 2) of the suture through the Elite passer with the suture entering the eyelet from the concave of the instrument (Fig 2). Enter the joint through the cannula and pass through the cuff tissue (Fig 3), as with any penetrator. Using a



**FIGURE 2.** Thread the eyelet from the concave side of the passer—“concave in.”

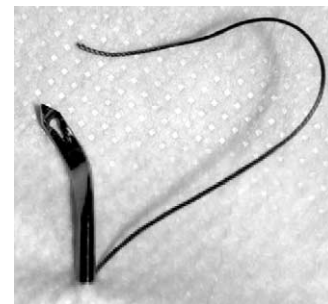


**FIGURE 3.** After piercing the cuff tissue: rotate the passer to make the concave side thread more accessible (B). Grasp the suture on the concave side (B) of the eyelet and begin unthreading the eyelet—“concave out.”

suture grasper instrument, pick up the suture from the concave side “B” (Fig 3) of the eyelet of the Elite passer. This will unthread the suture from the eyelet, freeing the Elite passer (Fig 4), which can then be removed from the cuff tissue and exited through the cannula. The free end of the suture can now be retrieved through the cannula and the whole process repeated to get the suture through another flap of cuff tissue to approximate the repair to the bone anchor.

**DISCUSSION**

Although the development of these suture passers has been an important milestone in arthroscopic surgery, these instruments merely mimic the function of a needle–thread and needle-holder combination of traditional surgical instruments. In effect, they are merely a miniaturization of traditional instruments so that they can be used arthroscopically and in very tight corners. The use of an arthroscopic suture grasper is akin to a forceps in open surgery. In addition, these “arthroscopic instruments” also can be very useful for open surgery in which the exposures are getting



**FIGURE 4.** Unthreaded suture. Maintain a grip on the suture end and the passer can be withdrawn from the cuff tissue.

smaller and smaller, eg, split subscapularis approach method for open Bankart repair.

We have had experience with many brands of suture passers or penetrators, all of which have in common a tip mechanism that can open and capture suture material. To accommodate the jaw mechanics, the dimensions of the tips of these penetrators are bigger. This can cause tissue damage, especially in awkward corners, and after several attempts to get a "better bite of tissue." The tips of the Elite and Spectrum systems (Spectrum Tissue Repair system; Linvatec, Largo, FL) are simpler, smaller, and therefore less traumatic.

The tips of these "new penetrators" have several choices of angles. Having an angled tip is very important and allows the arthroscopist to reach adjacent areas of tissue that are not "in the line of fire." This feature distinguishes the old and newer passers. In fact, the angle in some systems can be more complex in the form of a corkscrew tip. Whatever the shape, whether it be a simple angle, curve, or corkscrew, there is in effect always a concave side to the tip of the penetrator.

Our experience has taught us that it is important for the surgeon to remember from which side of the eyelet the suture was loaded. Only by unloading (or grasping) the suture from the same side as it was loaded can the passer be free from the suture. With experience, we feel it is easier to grab the suture from the concave side and therefore advocate the concept of "concave in and concave out," hence avoiding any miscommunication between the surgeon and assistant working at the operating table.

Our experience with the Elite system has shown that the loading or threading of sutures through the eyelet tip is quicker than other systems. The Spectrum system relies on a thumb-roller system based on the original Caspari suture punch. This means that when unloading the suture, one also has to use the thumb roller, which is slow and tricky and can sometimes accidentally pull the suture out of the intended cuff tissue.

On the one hand, it seems to make sense that the technique was simply "to thread and pass the Elite passer through cuff tissue." We learned through experience that this was not the case. There are many alternative techniques to passing sutures through tissue arthroscopically. We could have used suture relay or the loop transporter technique.<sup>2</sup> In the future, there will be newer and better arthroscopic equipment on the market. Some will have a sound advantage over others, whereas others will simply be "preferred" by some surgeons. The surgeon is ultimately responsible for which surgical equipment he chooses to use. However, it is in the best interest of everyone that an elective surgical procedure goes according to plan, and it is for this reason that we want to share this experience.

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