

Optimal Arthroscopic Knots

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Arthroscopic Knot = Initial slip Knot + Additional locking half-hitches

Principals of Arthroscopic Knot-Tying

- Post
- Half-Hitch Loop
- Sliding Knot
 - Duncan loop, Tennessee slider
 - SMC knot, Over-hand loop
- Non-sliding knot
 - Revo knot, Square knot
 - Alternating half-hitch
- Past Pointing
- Alternating Posts
- Reversed Half-Hitches
- Push
- Pull

Optimal knot security

A key factor for successful arthroscopic repair

Tensile failure of Suture: Caused by poorly tied knot rather than suture breakage
Poorly tied knot

- Surgeons technical error
- Inherent low strength of knot
- Complex knot configuration leading to poor slip

Tissue fixation security = Knot security + Loop security

Loop Security

Failure of Arthroscopic Slip Knot

Looseness of initial slip knot before additional locking half-hitches

Loop Security Enhancement

- Cramping with hemostat in open tying
- Maintenance of tension of post strand
- Cannulated double-diameter knot pusher (Burkhart, SS)
- Internal locking mechanism: locking mechanism in the initial slip knot (Kim, S-H)

Internal Locking Mechanism

Pulling the loop strand flips the post

Convert the loop strand into a new post

= Switched-post effect

locking in situ (internal locking within initial slip knot)

before additional locking half-hitches (external locking outside of initial slip knot)

SMC Knot: Arthroscopic slip knot with internal locking mechanism

- Good loop security
- Good knot security
- Good tissue fixation security

- Inherent high strength
- Simple knot configuration: Good sliding
- Self-locking mechanism: No slippage
- Low profile: Less chance of impingement in the joint and subacromial space

(Kim S-H, *Arthroscopy* 2000)

REFERENCES

1. Kim, S-H, Ha K-I. SMC knot: A new arthroscopic knot with locking mechanism. *Arthroscopy* 2000;16:563-565.
2. Snyder SJ. Technical manual for the Revo screw and knot. Largo FL, Linvatec Corp, 1994.
3. Loutzenheiser TD, Harryman DT II, Yung SW, France MP, Sidles JA. Optimizing arthroscopic knots. *Arthroscopy* 1995;11:199-206.
4. Loutzenheiser TD, Harryman DT II, Ziegler DW, Yung SW. Optimizing arthroscopic knots using braided or monofilament suture. *Arthroscopy* 1998;14:57-65.
5. Burkhart SS, Wirth MA, Simonick M, Salem D, Lanctot D, Athanasiou K. Loop security as a determinant of tissue fixation security. *Arthroscopy* 1998;14:773-776.
6. Tera H, Aberg C. Tensile strengths of twelve types of knot employed in surgery, using different suture materials. *Acta Chir Scand* 1976;142:1-7.