

관절경 술기의 효과적 향상 방법

Method of Improvement in Shoulder and
Elbow Arthroscopic Technique or Effective Ways to
Improve Shoulder and Elbow Arthroscopic Skills

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The topic of this presentation is difficult to clearly outline and summarize, also it is possibly that lecture materials might overlap with other subjects. Due to my personal experiences some topics are more focus to the shoulder arthroscopy than elbow arthroscopy. In the future, this topic might have been better illustrated from the masters in shoulder arthroscopy giving surgical tips.

Comments on shoulder arthroscopy

"I believe that sophisticated shoulder arthroscopy, like other complex orthopedic disciplines such as revision total joint surgery and complicated spinal instrumentation, is not something that should be practiced by every community orthopedic surgeons." (Snyder SJ)¹⁴⁾

Theory of two levels in shoulder arthroscopy by Stephen J. Snyder¹⁴⁾

"Each surgeon should determine in his or her experience and practice profile which one to embrace"

First level:

- Basic diagnostic arthroscopy,
- Simple joint debridement,
- Removal of loose bodies,
- Diagnostic bursoscopy,
- Calcium removal,
- Decompression with partial or complete resection of the distal clavicle

Second level:

- Instability reconstruction,
- Rotator cuff repair,
- Biceps stabilization,
- SLAP repair,
- Ganglion cyst resection

THERE ARE NO SHORTCUTS TO SECOND-LEVEL SKILLS!

“If you perform fewer than 20 to 30 shoulder procedures per year and are comfortable with open technique, I would not advise investing the time and effort required to do these few procedures arthroscopically.”

“... I spent 1 year making the transition... (transition from open to all arthroscopic rotator cuff repair)...” (Gartsman GM)⁵⁾

Some personal thoughts on shoulder arthroscopy

“Needs some helping hands, need a lot of expensive equipment, and needs a tremendous patients for first starters!”

“Most of all, needs a lot of time and effort to be comfortable with second-level surgeries”

Comments on elbow arthroscopy

“Arthroscopy of the elbow is difficult, however, because the joint is small and in close proximity to neurovascular structures” (Timmerman, LA)³⁾

“(Elbow arthroscopy)... is safe, effective, and reproducible but also is technically demanding. ... An understanding of the neurovascular anatomy and attention to detail is critical if complications are to be avoided.” (Ramsey, ML)¹³⁾

TOPIC OF STUDY

I. Non-surgeons factor

- i. Equipment
- ii. Anesthesia
- iii. Position
- iv. ...

II. Surgeons factor

- i. Practice and learning curve
- ii. Knowledge of anatomy
- iii. Appropriate portal placement
- iv. Knowledge of knot tying principle
- v. Know the surgical steps
- vi. Surgical tips from the masters
- vii. ...

Arthroscopic skills will improve as your knowledge increases!

I. NON-SURGEON'S FACTORS

i. Equipment

Shoulder

"The effectiveness of shoulder arthroscopy is augmented by the large variety of mechanical instrumentation available today." (Meehan JP)³⁾

- Knot pusher type:
 - Single-holed closed type knot pusher seems easier than ring open type
 - Double-diameter knot pusher had better loop security than single-hole knot pusher^{2, 10)}
- Penetrator or Birdbeak:
 - Useful in many procedures but it really helps save time and effort suturing the posterior aspect of the torn rotator cuff
- Suture hook (multiple direction):
 - The more the better!
 - Especially straight curved hook seems to be easier than left or right curved hook, however all type are needed for usage.
- Caspari punch and similar tool: Very effective in tissue purchase and holding.
- Stronger knot material (Ethibond(Fiberwire))
 - Suture loads to failure¹⁾
 - Panacryl no. 2
 - Fiberwire no. 5 >>> Ethibond no. 5 = Fiberwire no. 2 >> Ethibond no. 2
 - Fiberwire no. 2-0
- Electrocoagulation and cautery in a fluid medium is very important
 - especially in subacromial space. (Excessive bleeding in coracoacromial artery)

Elbow

- 4.5 mm scope can be used, however small joint scope should be available, also small joint instrument is a must (i.e., probe, small joint basket forceps...)

ii. Anesthesia

Shoulder

Since the tourniquet is not available in shoulder arthroscopy, it is crucial to have hypotensive anesthesia. If blood pressure can be kept 90/60 mmHg, than you will have a good surgical field throughout your operation, especially for subacromial shoulder arthroscopy.

Elbow

Some prefer general anesthesia, because one can check neurology

immediate postoperative period

iii. Position

Shoulder

Lateral vs. Beach-chair both have pros and cons, so choose the one they are most comfortable with, which is frequently the one they trained with

Elbow

Supine, prone, or lateral¹³⁾

However, prone position has gained more popularity¹⁵⁾

II. SURGEON'S FACTORS (=How to shorten the learning curve?)

"Practice makes perfect!"

i. Practice in workstations

Alex model/ Simulation model

CLASroom- SCOI office: unfortunately we don't have this.

Sammy: Virtual Reality Arthroscopy Simulator: we don't have this either
Cadaver workshop

Yonsei Un. under Prof. SJ Kim, ISAKOS approved

Triangulation, Knee scope?

ii. Know your anatomy

- First draw a bony landmark with a permanent skin marker: very important step making proper portal especially for beginners.
- Stay away from the neurovascular structures

Shoulder¹¹⁾

Maintain traction (in lat. decubitus position) less than 12 lb and 7 lb, longitudinal and vertical traction, respectively.

Axillary n. injury - Inferior glenoid pouch esp. with thermal device

- Grossly misplaced posterior portal

- Subacromial anterolateral portals

- Accessory anteroinferior portal (combined with musculocutaneous n.)

Suprascapular n. - superior portal (Caspari-Neviaser portal)

Brachial plexus- any portal medial to coracoid

Elbow

AL, Prox. AL, Mid-AL portal: Radial n., lat. antebrachial cutaneous n.

AM, Prox. AM portal: medial antebrachial cutaneous n., Median n.

Prox. PL, distal PL portal: posterior antebrachial cutaneous nerve

- Posterior margin of the subacromial bursa (so called "posterior curtain")

lies somewhat anterior than expected, so the posterior insertion of the scope should drive into this bursa for visualization

· ...

iii. Understand the importance of appropriate portal placement

No such thing is “Proper Portal” rather “Most Suitable or Appropriate Portal”

It should be individualized and versatile, and also bear in mind that it can be subject to change depending on the lesion.⁹⁾

Some of the examples

- For posterior instability, MDI, and SLAP repair, more lateral portal than usual posterior portal is needed.
- Differential arthroscopic portal placement for rotator cuff repair⁷⁾
- For mainly subacromial space work use slight superior posterior portal (i.e. high portal)
- Tranarticular approach for elbow⁸⁾
- Posterior type SLAP II, use port of Wilmington
- Slight high portal is needed for anteroinferior portal in arthroscopic Bankart operation: This is to facilitate the anchor insertion with proper angle

· ...

MAKE A GOOD FRIEND WITH THE SPINAL NEEDLE FOR APPROPRIATE AND MOST USEFUL PORTALS!

iv. Know knot-tying principle

“It is recommended that the arthroscopist practice knot-tying techniques outside the operating room to master this skill.” (Cole BJ and Romeo AA)¹⁰⁾

- If you are not custom to arthroscopic knots do not operate beyond second-level surgeries
- If you don't understand the following principles, you should not operate beyond second-level surgeries until you do.
- Acquire proficiency of at least two sliding knots and one non-sliding knot. Author recommends: Revo knot¹²⁾, SMC knot⁶⁾, Field knot⁴⁾
- If a suture limb is placed within a cannula, that cannula should always be hold within the joint to prevent soft tissue entanglement.
- Only one pair of sutures at any time is inside an operative cannula for knot tying
- The cannula tip should be placed as close as possible to the area being tied

which can minimize soft tissue interposition and suture limb tangling. Soft tissue entrapment occurs commonly as water is pumped up to the operative cannula.

- Prevent knot twisting outside the cannula. This is done by tagging the post limb with a hemostat while tying the knot sequence.
- Maintain tension in the first loop. As many authors emphasized the importance of loop security²⁾ as well as knot security, it is crucial to maintain tension in the first loop to prevent reverse slippage.
- Knot pusher should always be passed down one “post” of the suture through the cannula to make sure the posts (or limbs) of the suture are not tangled and are free of tissue. This is done before placing your first knot.
- Never tie all loops of your knot around the same post. The best is alternating post with reversing throws with more than 3 additional half-hitches. This is true regardless of the type of suture material.
- Use a sliding knot whenever possible since they can be used in knots under tension. To improve sliding capability, proper suture anchor with good sliding capability must be used.
- As for anchor placement for proper knot: the anchor eyelet orientation must be properly place before knot tying, the screw hole made for anchor should be funnel shaped, and the anchor must be inserted not too deep and not too shallow.
- Finally, don't hurry, be patient, and be prepared for the worst.
- ...

v. Know the surgical steps

Textbooks

Snyder SJ: Shoulder Arthroscopy 2nd Edition 2003, LWW
Gartsman GM: Shoulder Arthroscopy 2003, Saunders
Miller.Cole: Textbook of Arthroscopy 2004, Saunders
Strobel MJ: Manual of Arthroscopic Surgery 2002, Springers

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Journals and Periodicals

The Journal of Arthroscopic & Related Surgery
The American Journal of Sports Medicine
JBJS
Journal of Shoulder and Elbow Surgery
Operative Techniques in Sports Medicine
Knee Surgery, Sports Traumatology, Arthroscopy

...

“Constantly learn and be open-minded to other techniques especially the J of

Arthroscopy technical note section.”

vi. Follow some surgical tips by masters...

“There might be some disagreements on these tips within these masters.”

General

- Always draw land marks
- Never inflate until you are in the joint
- Use outside-in technique for most of the portals
- ...

Glenohumeral joint

- When making the posterior portal make sure you are in the joint by checking the structure you see, if you are seeing more red than white, you are probably not in the joint. Only infuse water when you are sure that you are in the GH joint. This prevents early swelling of the shoulder
- Before anchor insertion- make a pilot marking.
- Camera should be always horizontal or vertical depending on the position one is working with
- For Bankart repair, the amount of capsular shift or suture should be at the level of glenoid.
- ...

Subacromial joint

- Switch the water pump for better infusion to anterior portal cannula
- Do not debride too much of the deltoid muscle sheath otherwise rapid swelling will obstruct the scope field
- Do not go too medial for bursectomy, or else there is going to be much bleeding.
- Separate small anchor portal is more useful, in terms of anchor insertion anchor and suture limb clarification.
- ...

Elbow joint

- Use the transarticular approach⁸⁾ for starters
- Do not debride with suction on, the nerves are close to capsule
- Only make skin incision with a blade and make a portal with blunt trocar.
- ...

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