Arthroscopic Suture Anchor Capsulorrhaphy for Anterior shoulder Stabilization

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the most important factors for achieving success in shoulder reconstruction procedures are to
both recognize and correct the responsible pathology

Responsible pathology of instability lesion

1. Failure at the glenoid : (73%, Wolf)
   a. Classic Bankar
   b. ALPSA lesion(Anterior Labral Ligamentous Periosteal Sleeve Avulsion - T.Neviaser)
   c. Bony Bankar
   d. Perthe's lesio
2. Failure within the capsule : (17%, Wolf)
   a. Visible tear
   b. Insubstance laxity
3. Failure at the humerus : (9%, Wolf)
   HAGL lesion(Humeral Avulsion of Glenohumeral Ligaments)

Ideal surgical technique

1. Repair or the Bankart lesion by anatomic reattachment of the labrum and capsule to the glenoid
2. Use of strong permanent braided suture material
3. Ability to plicate or "tuck" the capsule if necessary
4. Employ miniature suture holding anchors(preferably retrievable) to obviate the need for drilling through the articular surface of across the glenoid from front to back
5. Avoids iatrogenic injury to normal tissues during the surgical exposure
6. Ability to treat the pathology such as rotator cuff tear, biceps tendon lesion and SLAP lesion

Indication of suture anchors

most traumatic anterior instabilities with failure at glenoid

: Classic Bankart
ALPSA lesion
Bony Bankart

Type of anchors

Bioabsorbable	Biotak
	Suretac(Acufex)
Nonabsorbable	Mitek G Ⅱ(Mitek)
	Fastac(Arthrex)
	Statak(Zimmer)

Suture materials(Barber FA)

: the most suitable selection for arthroscopic shoulder procedure are PDS or nonabsorbable sutures

IN VIVO SUTURE STRENGTH

Monocryl(Pologlecaprone 25) :	55% at 1 week, 20% 2 at weeks, 0% at 3 weeks
Vicryl(Polyglactin-910) :	60% at 2 weeks, 〈 10% at 3 weeks
Dexon(Polyglycolic acid) :	60% at weeks, 〈 10, at 3 weeks
Chromic :	58 at 2 weeks, 39% at 3 weeks, 28 at 4 weeks, 5% at 5 weeks
Maxon(Polydioxanone) :	80% at 3 weeks, 9% at 6 weeks
PDS(Polydioxanone) :	80% at 3 weeks, 40% at 6 weeks, 〈 5% at 9 weeks
LTS(Polycaprolactone) :	97% at 3 weeks.... 95% at 18 week

Mode of failure

(Canine model if Bankart repair) : McEleney ET, 1995

one-suture	suture breakage	46%
	soft-tissue-failure	54%
two-suture	soft-tissue failure	92%

Pullout strength of anchors in pound(Barber FA)

"Mini" Anchors ("Mini" Hole or minor diameter 〈 2.2mm)

	diameter	Diaphysis	Metaphysis	Cancellous
miniHarpoon	2.0	57	50	39
miniMitek	1.8	47	15	20
BioAnchor	2.1	33	49	29
Statak 1.5	0.8	13	13	21
Statak 2.5	1.7	32	37	65
SB 2	2.0	89		
PeBA 3	1.8	72	34	
miniRevo	1.8	74	62	67
Fastak A2	1.7	74	91	72
Questus 2.5	1.8	57		35
AME 2.5	2.1	101	101	48

60p. result of suture anchors

Advise for using anchors

A) For optimal anchor insertion site: glenoid margin
- too medial on glenoid neck, anatomy is not restored
- too far into articular surface may be esthetically less satisfying

for corner placement

1) direct visualization of glenoid rim and anterior glenoid neck
   - use viewing portal on same side of joint as anchor insertion site
   - use a 70 degree arthroscope if you must view from opposite side of joint
2) use a drill guide to seat drill on rim
3) if drill guide not feasible;
   - make a starter hole with a small ball tip burr or with an awl
   - spin drill prior to setting it down onto the rim

B) Adequate access to Low and High glenoid anchor insertion sites

for low and high glenoid insertion

accessory portals

low - anterior inferior & posterior inferior portals - E. Wolf M.D.

- anterior-inferior 5 o'clock (trans-subscapularis) portal
  - P. Davidson and J. Tibone M.D.

high - anterior & posterior para-acromial portals
  - Neviaser portal (trans-supraspinatus muscle)
  - trans-supraspinatus tendon portal (small punctures)

C) variety of anchor insertion and soft tissue fixation sequences and technique

I) insert anchor (and suture) into bone first, pass suture through soft tissue second
- can be used with both screw-in and push-in type anchors
  : avoid suture twists betwwen anchor and soft tissue

II) pass suture (without anchor loaded) through soft tissue first, insert anchor second
- only possible with push-in type anchors
  : 1) frequently a bit easier to pass suture this way
  2) must slide anchor down the "inside limb" of suture

III) pass anchor (loaded with suture) through soft tissue and into bone, then pull one limb of suture back out of soft tissue
- probably best done with smaller profile anchors to minimize size of passage hole through soft tissue
  : 1) hold soft tissue in reduced position with traction suture or tissue clamp while passing anchor through issue and into bone
  2) beware of anchors with profile which may easily become caught in soft tissue and disengage from insertor

SMC preferred method of anterior shoulder stablization (Arthroscopic mini-Revo screw technique)

Set-up

1. Patient position : lateral decubitus with the torso tilted posteriorly approximately 30 degrees supported with the vacupak beanbag (Vac-Pac, Olympic Medical)
2. Arm support : long foam traction sleeve (STaR Sleeve, Arthrex)
3. Traction apparatus : 2-point traction (Arthrex shoulder holder) "Gross" position

Draping

shoulder drape pack(Baxter)

body drape

upper U-shaped plastic end with built-1n fluid collection pouch

Anchor

mini-Revo screw(Zimmer) with

permanent nonabsorbable no. 0 braided polyester suture (Ethibond)

Suture hook loaded with Shuttle-Relay

Surgical procedures

1. Patient positioning after general anesthesia
2. Stability examination
   anterior posterior translation with the weight of arm allow to compress the joint and rotating the arm into internal and external ritation
3. Draping from finger to shoulder
4. Applicaion of traction apparatus, initially longitudinalt traction only(6-8 lbs)
5. Surface anatomy outline
   : around the corner of bone not on the most superficial subcutaneous bony prominence
6. 15-point anatomic review
   10 point from posterior portal
   5 point from anterior portal
7. Creation of anterior lateral migglenoid portal
   inside-out technique(usually)
   outside-in technique
   2cm inferior and 1cm lateral to the original anterior superior portal just lateral to coracoid process
8. Debride the fragmented soft tissue and synovium along the anterior glenoid neck with arthroscope visualizing from the anterior portal
9. Mobilization of anterior capsulolabral tissue from glenoid neck(use liberator)
10. Light decortication of glenoid neck using high speed 4mm burr and rasp

11. Smooth articular cartilage edges with suction punch
12. Creation of 3 suture anchor sites using pituitary forcep(starter holes)
    exactly at the corner of articular surface
    lowest : four-thirty to five O'clock(1cm above the inferior margin)
    top : just above the midglenoid notch
13. Creation of 3 anchor holes moni-Revo punch with or without guide(better than drill)
    45° angle to the face of glenoid be sure to locate exactly on the edge of glenoid cartilage
14. First Anchor implantation
    mini-Revo screw loaded with a no. 0 Ethibond suture into the most inferior hole
    pull the end of suture to ensure secure seating
15. Place the arthroscope in the posterior portal
16. Crochet hook is inserted through the anterior superior portal and deliver one limb of suture out of cannula
17. Suture hook loaded with shuttle Relay is passed through the inferior aspect of the anterior capsule and below the labrum
18. Grasping clamp is inserted and retrieves the shuttle Relay, cramp the end of shuttle
19. Pull back the suture hook, and cramp the other end of shuttle
20. One end of Ethibond suture within the anterior superior portal is inserted into the eyelet of the shuttle Relay and pulled retrogradely back out the anterior midglenoid cannula and cramped
21. Knot tie
    Revo knot with knot pusher
    Ensure that there are no twists in the suture
    5 knots preferably
    Cut two limbs within the 5mm from the knot
22. Additional two anchors are inserted following the same steps

Postoperative treatment

Sling immobilizer with a pillow-spacer(Ultrasling, DonJoy Inc.) for 3 weeks
prevent internal rotation contracture

air circulation to the axilla
Elbow, wrist and hand exercise during the op-day
At 2 weeks : gentle pendulum exercise
gentle external rotation
At 3 weeks : gentle interanal rotation strenghening "STK" (shoulder therapy kit)
At 6 weeks : progressive active and active-assisted ROM exercise
At 10 weeks : full exercise, except for external rotation strain in the abducted position
At 6 months : full activity including throwing and contact sports