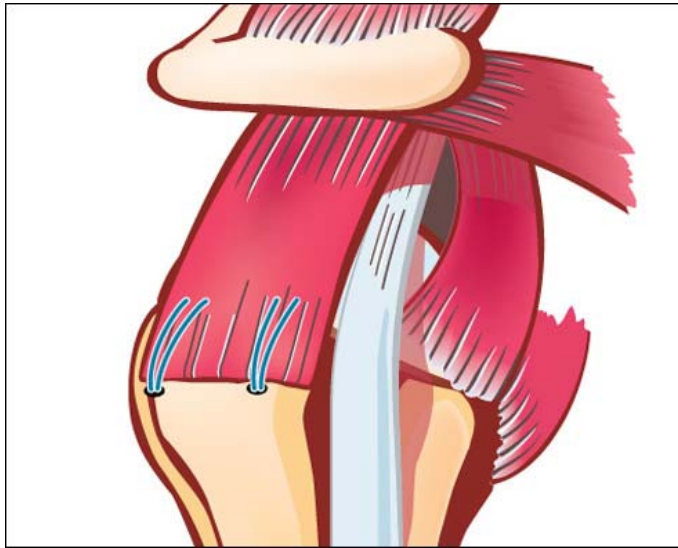


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Southern
Orthopaedics

Dr Mark
Haber



PATIENT INFORMATION ON ARTHROSCOPIC ROTATOR CUFF REPAIRS

This information brochure has been written specifically for patients of Dr Mark Haber who have undergone a rotator cuff repair.

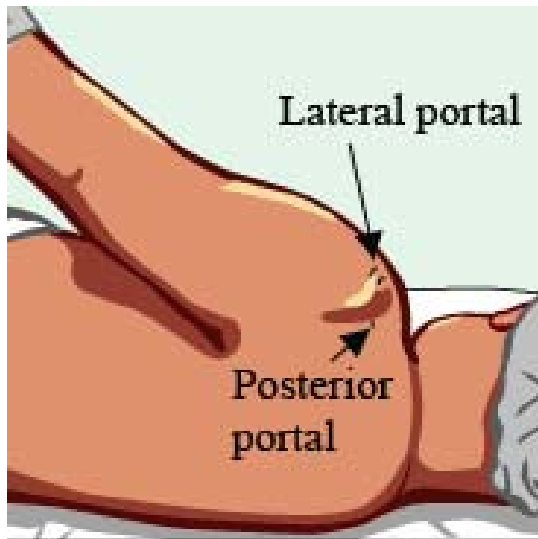
PATIENT INFORMATION ON PERFORMING AN ARTHROSCOPIC ROTATOR CUFF REPAIR
USING THE OPUS® AUTOCUFF® SYSTEM

DR MARK HABER

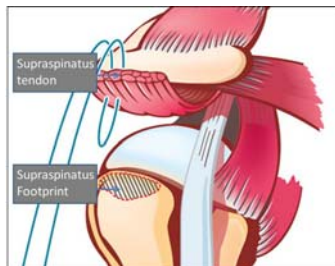
The tendons of the rotator cuff can be repaired either as an “open” technique or an arthroscopic technique, often referred to as “key-hole” surgery.

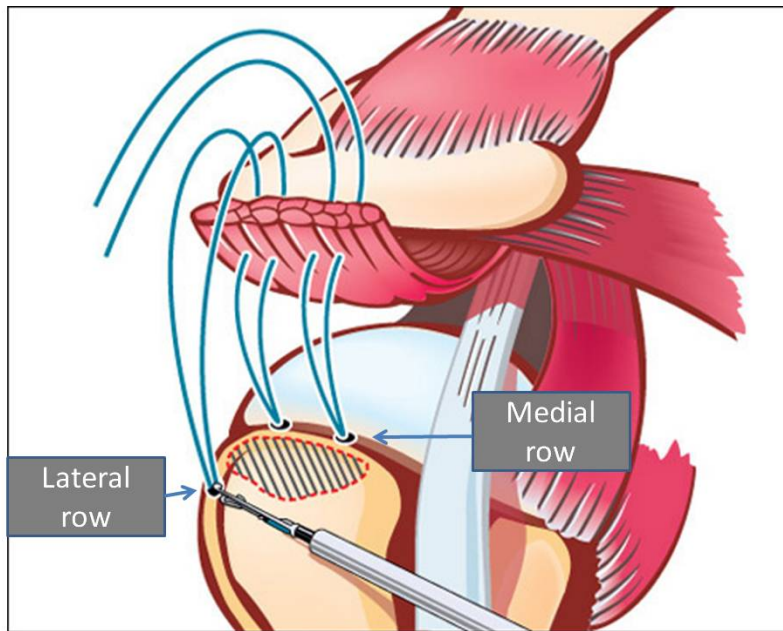
With this technique, the entire procedure is performed through 3 incisions of 6mm to 8mm, referred to as portals.

The portal in the back of the shoulder is used to visualize the shoulder joint structures, the rotator cuff tear and to visualize the subacromial bursa. Two side (lateral) portals are used to insert stitches to pair the torn rotator cuff tendons.

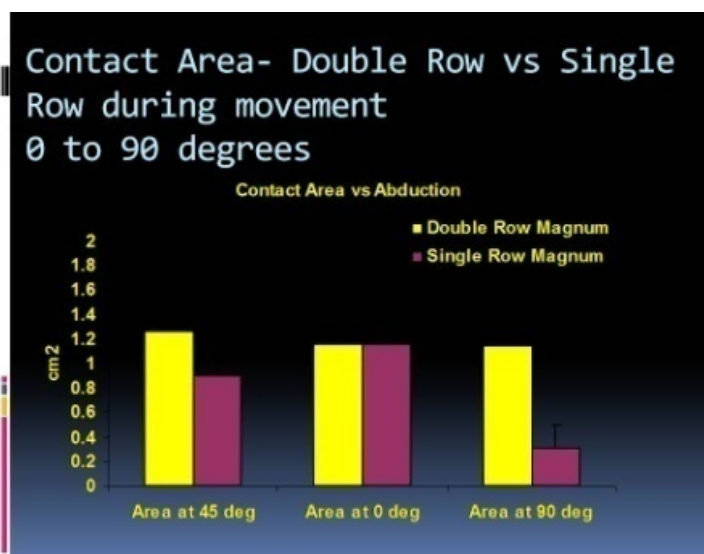


The arthroscopic repair can be performed by two different techniques, single and double layer repairs. Recent studies (and it is also my view) the single layer repair does not adequately fix the tendon onto the bone. The attachment site of the supraspinatus tendon is very broad (shaded area). To reproduce this large area of contact between tendon and bone I believe you need to fix the tendon at both sides, the inside (medial) and the outside (lateral). It is likened to fixing a load such as a container onto a semitrailer. You fix one side of the load, and then ratchet down the other side.





We hypothesised when performing an arthroscopic rotator cuff repair, if your fixation is only with a single layer repair on the most outside (lateral) aspect of the tendon, the more you lift the arm away from your body, the more you reduce the contact of the rotator cuff tendons, to its footprint on the bone. This will compromise healing. We demonstrated, with a single row repair, when you keep you arm against your body (0°), there was no difference in the contact area or pressure. A small difference was noted at 45°. A very significant difference was noted at 90°. A single layer repair had very poor contact of the tendon onto the bone. Significantly, contact area and pressure was independent of movement when a double row fixation was performed. That is, the tendon is held firmly onto the bone, and this will help it heal.



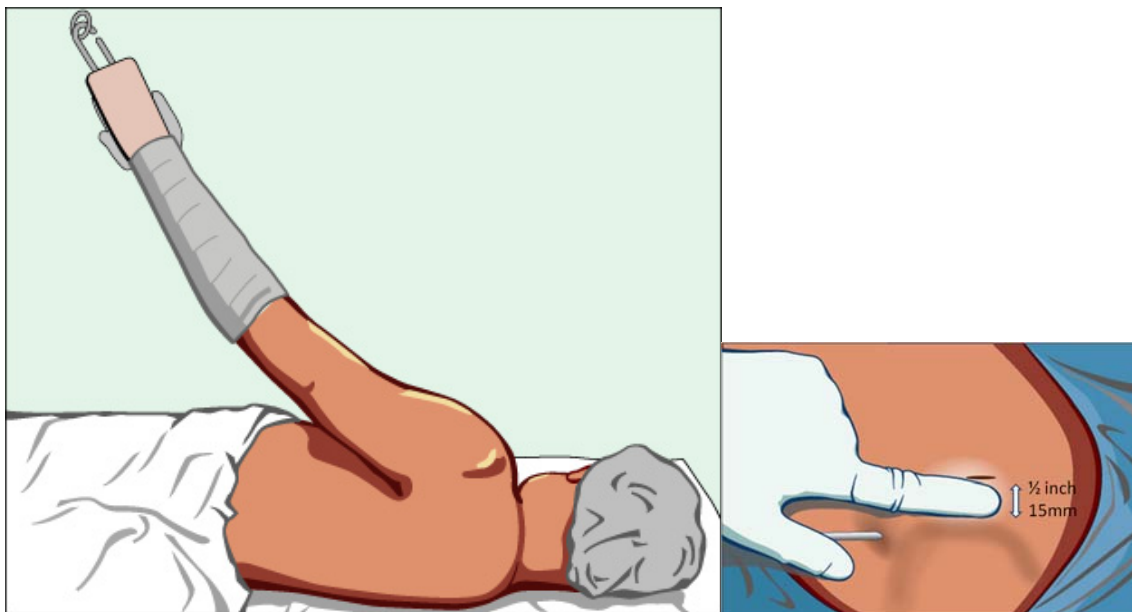
It is therefore very important to adjust the rehabilitation during the early period after surgery based on whether a single or double row repair has been performed.

Surgical technique

Patient preparation and positioning

The patient is placed on their side and is supported by a bean bag to stabilize their body. The anesthetist will frequently make sure they are comfortable in this position before being anaesthetized (put to sleep).

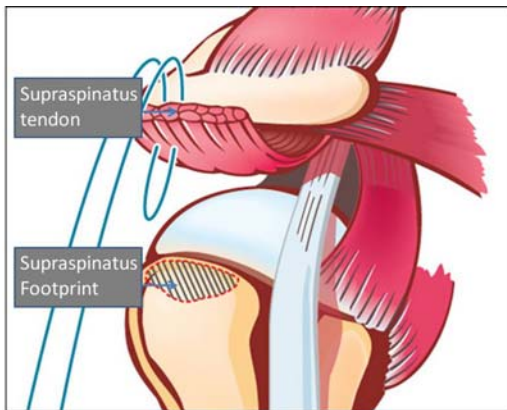
An examination and possible manipulation under anesthetic is performed to eliminate any stiffness in the shoulder prior to the procedure.



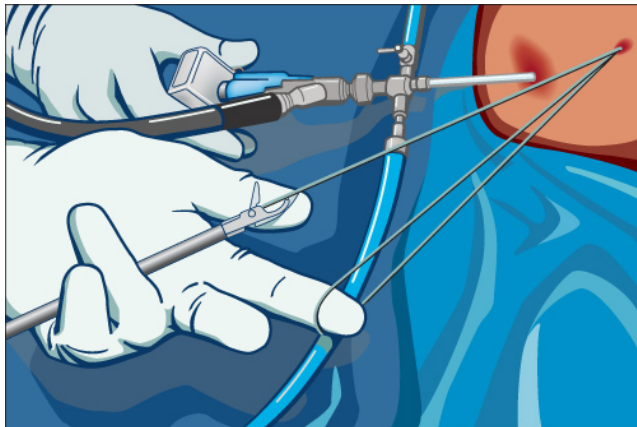
The shoulder region is then prepared with an antiseptic and sterile drapes applied.

Inserting stitches into the tendon

With the use of specialized instruments we are able to pass sutures through the tendon via an incision less than a centimetre long. The stitches are inserted using the SmartStitch® which contains a suture cartridge. The jaw at the end of this instrument closes on the torn end of the tendon by pulling the silver handle holding the tendon gently in place. The gold handle is then pulled and this passes a needle thru the tendon and pulls the suture through, much like a sewing machine.



Once the suture is passed through the tendon, the sutures are retrieved out of the portals.

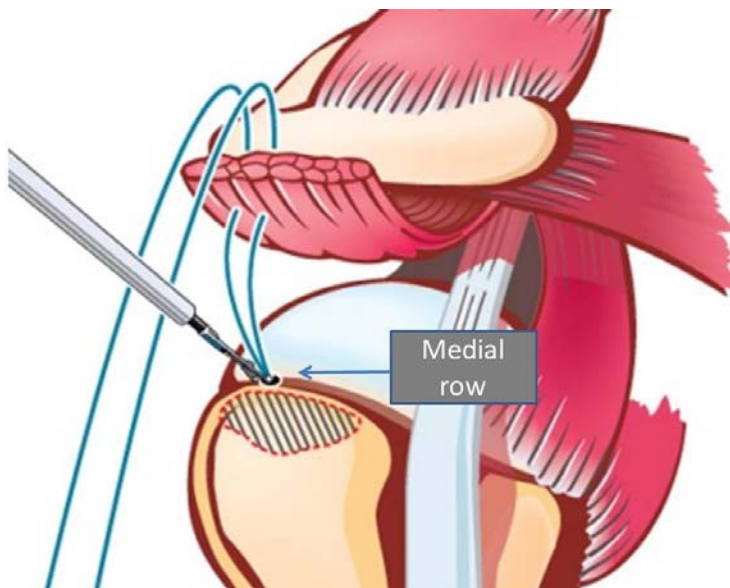


Fixing the Stiches to the Bone Using Anchors

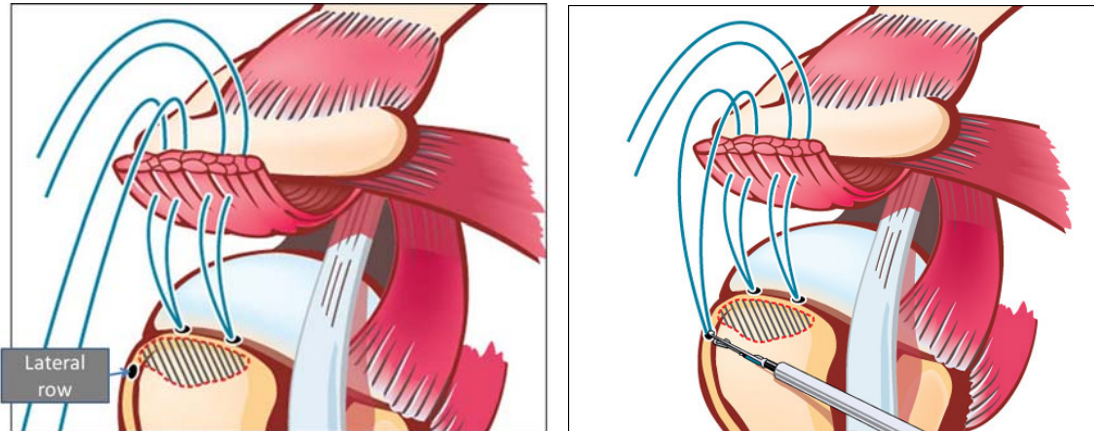
The suture can then be attached to an anchor. A drill hole is placed in the bone. The anchor with its attached suture is placed in the bone and locked into position by pulling on the black handle of the introducer. This fixes the suture to the bone.



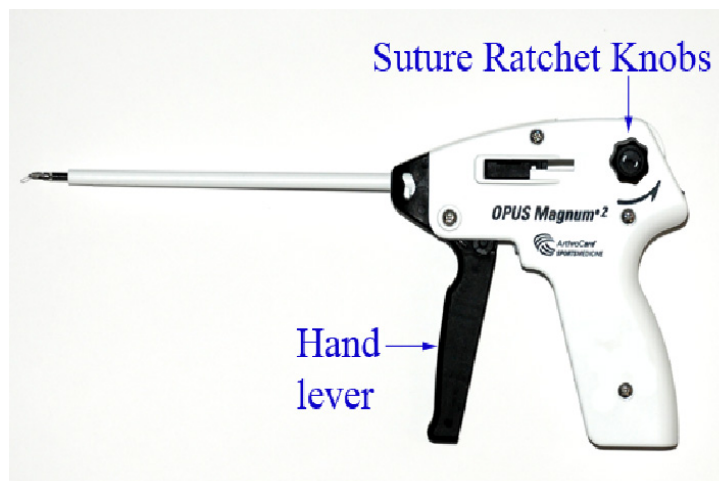
For double row repairs, initially the inside (medial side) of the tendon is repaired. A number of sutures are usually required.



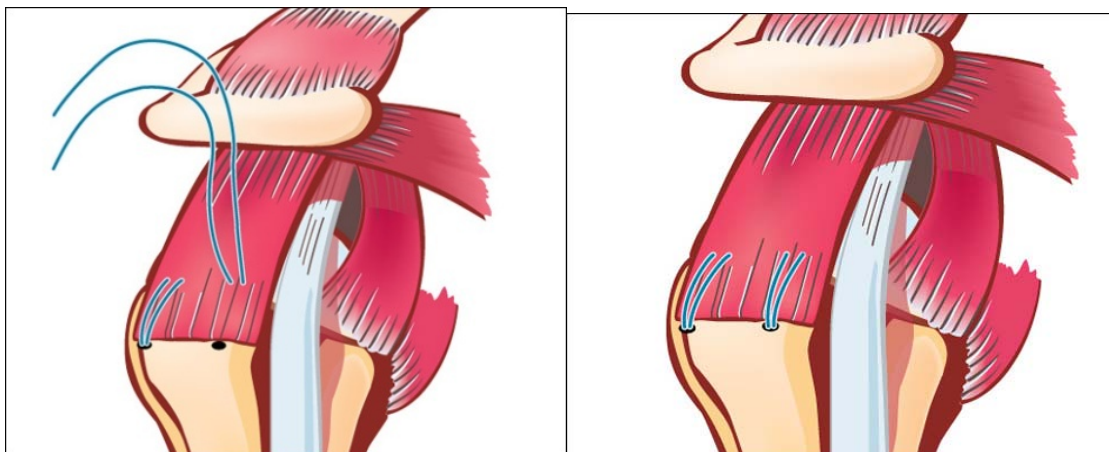
Once all the medial row sutures are fixed into position, the outer row (lateral row) of anchors can be inserted.



With these anchors in place, the sutures can be tightened as required by turning the Suture Ratchet Knob. When adequate compression of the tendon onto the bone has been achieved the suture can be locked in position by pulling the hand lever.



A number of loops can thus be inserted depending on the size of the tear.



Initial Rehabilitation

There are two important principles in the rehabilitation.

1. ***protecting the repair***
2. ***preventing stiffness***

Protecting the repair

The rotator cuff is repaired using stitches and plastic or metallic “anchors” which fix the torn tendon back on the bone. Initially, the success of the operation is dependent on these stitches. Over the subsequent six to twelve weeks the tendon will knit onto the bone. Protection of the repair during this early phase of healing is therefore extremely important.

Protect the repair by being careful not to use your shoulder *actively*, that is, do not lift your arm away from your side under its *own power*. Unless we tell you otherwise, you may use your hand for typing or writing as long as your arm is supported. The nursing staff will instruct you on how to change clothes and wash. You may rest with your arm supported on pillows for periods out of the sling to let your skin breathe. However, raising the arm *actively*, even a small amount places demands on your repair and should be avoided. We will tell you how long these restrictions need to be in effect. During this time you should leave your sling on and you *should not drive!*

Preventing stiffness due to scar formation

While your shoulder is healing, passive motion is necessary to prevent unwanted scar tissue formation. *Passive motion* means that the shoulder is moved, but *not under its own power*. Your operated shoulder is moved by your other hand while the muscles of the operated shoulder are completely relaxed.

You may be instructed to commence your passive motion with the assistance of a physiotherapist. Remain in the sling until your first visit. Please take this report with you to the physiotherapist on your first visit.

You can move your shoulder passively by standing up and bending over at the waist, allowing the operated arm to dangle down in a relaxed way. Your good, non-operated arm can lift the operated arm which is relaxing, allowing the good arm to take all the weight.

Do's

- **Do wear the sling as specified, usually full time for 4-6 weeks, up to 8 weeks if there is a large tear**
- **Do use your hand and forearm for eating, writing etc.**
- **Do perform your exercises as outlined**

Don't

- **Don't actively lift your arm for at least the first 4 weeks unless specified**
- **Don't leave your sling off unless performing exercises or showering for the first 4 weeks unless specified.**
- **Don't lift more than 5 kg above shoulder height for at least 3 to 6 months**

The rehabilitation following rotator cuff repair has traditionally been divided into four phases.

- Phase 1: Immediate postoperative period (weeks 0-6)
- Phase 2: Protection and active motion (weeks 6-12)
- Phase 3: Early strengthening (weeks 10-16)
- Phase 4: Advanced strengthening (weeks 16-22)

While we do construct the rehabilitation around these four phases, you can see there is some overlap. The timing of each phase needs to be flexible and depends on a number of factors which affect the healing rates.

These include:

1. Tear size
Tear size has been the most important factor in determining postoperative repair integrity.
2. Quality of the tendon and integrity of the repair
Poor quality tendons are often associated with chronic tears and tears in the elderly.
3. Chronic tear
Large, longstanding tendon tears are often associated with significant tendon retraction, and muscle wasting.
4. Cigarette smoking has been shown to significantly delay healing.
5. Age Older people heal slower.
6. Medications. Oral steroid medications significantly delay healing. chronic use of anti-inflammatory medications may have a small affect
7. Compliance. Failure to comply with the rehabilitation may result in stressing the repair before it is adequately healed. This may result in failure of the tendon to heal at all.

Other issues which need to be taken into account on the rehabilitation include are which tendons are involved in the repair.

With tears of subscapularis, avoid passive external rotation. You will be told after the surgery which tendons were repaired and which movements, if any, will need to be restricted.

Based on the arthroscopic findings, one can decide on the post op protocol and speculate when to proceed from Phase 1 to Phase 2.

With so many variables to the healing it is impossible to know its progress. I believe when we start active range of motion (AROM) exercises, we should let the patient determine the degree of resistance and never push beyond what the patient finds comfortable.

The scapula (shoulder blade) has an important role in shoulder function. Therefore during the “acute phase” following surgery one must begin muscle (re)education with postural and core strengthening, including lumbar spline and pelvic stabilization and scapular positioning (retraction and depression). Maintaining hand, wrist and elbow function is also very important.

should the shoulder show a tendency to worsening rather than improving pain stiffness, rather than try and push the shoulder harder, we sometimes need to “back off” the therapy till the pain and stiffness settles. Sometimes this is because the patient is doing too much rather than not

enough, and sometimes pain and stiffness can remain longer than anticipated. We do not know why this occurs and seems often to be unrelated to the surgery, the rehabilitation or the patient themselves.

Also, rather than have criterion to proceed from one phase to the next, we determine limits on active movement based on the expected heal time of the tear. This is based in the variables as discussed above, including age of the patient, the quality of the repair, etc.

We therefore divide the rehabilitation into “minimal tension repairs” and “repairs under tension”.

Shoulder stabilization, core strengthening, elbow and hand movements should be encouraged as soon as possible.

The rehabilitation is largely performed at home. Visits to the physiotherapist can be organized as required but it is certainly worth a visit as each phase of the rehabilitation changes. For the first few weeks after surgery, the exercises are kept very simple and can all be done at home. These will be explained both before and immediately after the surgery.

Tendon healing typically is divided into three phases.

The inflammatory phase

This phase occurs during the first 7 days. Even a small amount of bleeding occurs after the surgery. Platelets help form a clot and a fragile bond, which helps limit the bleeding. Messenger chemicals attract inflammatory cell such as white blood cells.

The proliferative (new cell formation) phase

The inflammatory phase gradually transforms into the proliferative phase, which occurs 2 to 3 weeks after surgery. New cells replace the inflammatory cells to produce scar tissue (collagen) and new blood vessels which replace the original clot. This scar tissue is the scaffold of the more permanent repair tissue. During the following week, this repair tissue grows stronger during the transition to the maturation phase

The maturation and remodelling phase

This begins around week 3 after ^{surgery} as tissue production slowly tapers and scar tissue (collagen) matures. Immature scar tissues are replaced by mature tissues. The collagen is continually remodelled until permanent repair tissue is formed.

Tendon healing takes at least 12 to 16 weeks, but may indeed take up to 26 weeks to reach its final strength.

Aggressive early movements following surgery, which overly stresses the repair and exceeds the mechanical strength of the repair construct, must be avoided

Healing during rehabilitation following rotator cuff surgery four phases – See appendix 1

Appendix 1

The Four Phases of Healing During Rehabilitation Following Rotator Cuff Surgery

Modified from "Rehabilitation of the Rotator Cuff: An Evaluation-Based Approach".

Peter J. Millett, MD, MSc, Reg B. Wilcox, III, PT, DPT, MS, James D. O'Holleran, MD and Jon J. P. Warner, MD
J Am Acad Orthop Surg, Vol 14, No 11, October 2006, 599-609

Phase 1: Immediate postoperative period (weeks 0-6)

Goals

- Maintain/protect integrity of repair
- Gradually increase PROM
- Diminish pain and inflammation
- Prevent muscular inhibition

Precautions

- Maintain arm in abduction sling/brace, remove only for exercise
- No shoulder AROM, lifting of objects, shoulder motion behind back, excessive stretching or sudden movements, supporting of any weight, lifting of body weight by hands
- Keep incision clean and dry for first few days

Exercises

- Common to groups, "minimal tension repairs" and "repairs under tension"
- Finger, wrist, and elbow AROM
- Begin scapula musculature isometrics/sets; cervical ROM
- Cryotherapy for pain and inflammation
- Begin PROM to tolerance, should be reasonably pain free
- May resume general conditioning program, i.e. walking, stationary bicycle, etc.
- Aquatherapy/pool therapy may begin 3-4 weeks postoperative
- Continue with full-time sling/brace until end of week 4
- Between weeks 4 and 6, use sling/brace for comfort only
- Discontinue sling/brace at end of week 6

MINIMAL TENSION REPAIR

Patient is immobilised in a sling with the arm at the side or abduction sling.

- Sling may be removed 3-5 times per day for exercises and while resting.
- Continue with full-time sling/brace until end of week 4

- Commence gentle passive elevation using the opposite hand to support the limb. Aim for full elevation of the arm by week 4.
- Gentle passive external and internal rotation aiming for 50% of range by week 4 and 100% by week 6.
- NO repetitive pendulum. Perform pendulums for washing your underarm, drying yourself etc.
- NO abduction or extension strengthening exercises

- Active elbow flexion/ extension strengthening exercises unless biceps surgery is performed which would be notified.

- May squeeze a soft ball.

CUFF REPAIR UNDER TENSION

Patient immobilised in an abduction pillow at about 45 degrees abduction.

Pillow must NOT be removed at any time in the first 3 weeks.

- Continue with full-time sling/brace until end of week 6
- Patient may commence gentle passive elevation of the operated limb above the level of the pillow, aiming for full arm elevation by the end of Week 6.
- May also undertake gentle passive external rotation.
- Active elbow flexion/ extension strengthening exercises unless biceps surgery is performed which would be notified.
- May squeeze a soft ball.

Phase 2: Protection and active motion (weeks 6-12)

Goals

- Allow healing of soft tissue
- Do not overstress healing tissue
- Gradually restore full PROM

Precautions

- No lifting from the shoulder
- No supporting body weight with hands and arms
- No sudden jerking motions
- No excessive behind the back movements

Exercises

- Initiate AAROM flexion in supine position
- Progressive PROM until approximately full
- Gentle scapular/glenohumeral joint mobilization as indicated to regain full PROM
- Initiate prone rowing to neutral arm position

- Continue cryotherapy as needed
- May use heat before ROM exercises
- Aquatherapy okay for light AROM exercises

MINIMAL TENSION REPAIR

- Patient may remove sling for increasing periods through the day as tolerated, and eventually discard it.
- Continue range of motion programme for elevation, external and internal rotation, beginning with gravity eliminated and progressing to work against gravity.
- Gentle abduction exercises only. Full abduction is not important at this stage.

CUFF REPAIR UNDER TENSION

- Abduction pillow is gradually removed for increasing periods during the day from about four weeks. Initially done with the patient supine and when the arm is comfortable at the side thane patient may sit or stand.
- Continue range of motion programme for elevation and external rotation.
- When arm is able to be left out of pillow then begin passive internal rotation.
- At about 8 weeks introduce active assisted movement in elevation and internal/external rotation
- NQ abduction exercises active or passive

Phase 3: Early strengthening (weeks 10-16)

Goals

- Continue stretching and PROM, as needed
- Full AROM (weeks 10-12)
- Maintain full PROM
- Dynamic shoulder stability
- Gradual restoration of shoulder strength, power, and endurance
- Optimize neuromuscular control
- Gradual return to functional activities

Precautions

- Sudden lifting or pushing activities, sudden jerking motions, overhead lifting

Exercises

- Dynamic stabilization exercises
- Initiate strengthening program
- ER and IR with exercise bands/sport cord/tubing etc

MINIMAL TENSION REPAIR

- Work towards full active range of elevation, external and internal rotation.
- Continue terminal stretching and introduce the full cuff stretching programme including posterior and inferior stretches gradually.
- Begin resistance strengthening

- Avoid repetitive overhead use of the arm
- Gentle active abduction but no resistance work in this arc. Full abduction is not important at this stage.

CUFF REPAIR UNDER TENSION

- Work toward a full range of active elevation, external and internal rotation.
- Continue terminal stretching and introduce the full cuff stretching programme including posterior and inferior stretches gradually.
- Begin resistance at strengthening using Theraband. (Yellow – Green – Black)
- Avoid repetitive overhead use of the arm
- Gentle active abduction but no resistance work in this arc. Full abduction is not important at this stage.

Phase 4: Advanced strengthening (weeks 16-22)

Goals

- Maintain full non-painful AROM
- Advanced conditioning exercises for enhanced functional use
- Improve muscular strength, power, and endurance
- Gradual return to full functional activities

Exercises

- Continue stretching if motion is tight
- Continue progression of strengthening
- Advance proprioceptive, neuromuscular activities
- Light sports (golf chipping/putting, tennis ground strokes) if doing well

AAROM = active-assisted range of motion, ADL = activity of daily living, AROM = active range of motion, ER = external rotation, IR = internal rotation, PROM = passive range of motion, ROM = range of motion

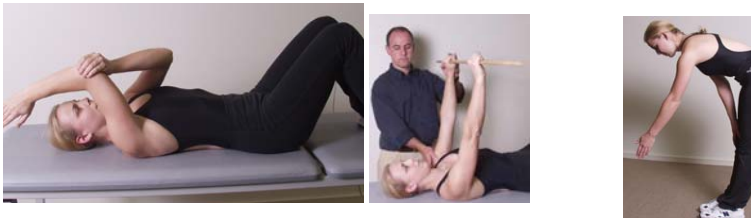
Appendix 2

Pendulums

You can move your shoulder passively by standing up and bending over at the waist, allowing the operated arm to dangle down in a relaxed way

Forward Elevation

Passive motion is also easily done while you are lying on your back. Grasp the arm of your operated shoulder with the opposite hand and slowly help the arm up to a vertical position and then over your head. On lowering it back down you will need to concentrate on keeping the operated shoulder completely relaxed.



Finger walking on a table are good alternative ways of passively elevating the arm.



External Rotation

A second exercise is performed while you are lying down with both your elbows bent to a right angle. Using a cane or dowel or yardstick, gently push the wrist of the operated shoulder out to the side while keeping your elbow at the side.

