Rehabilitation after Sub-Acromial Decompression and Biceps Tenodesis

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The primary aims of any rehabilitation protocol for biceps tendon tenodesis are firstly, to get the tendon healed, and secondly, to maintain shoulder motion and rotator cuff strength. If these two aims are fully achieved, then shoulder function should slowly come back to normal, or near normal, with strength improving over a few months. Unlike the situation following rotator cuff repair where shoulder movement can damage the repair; when only the biceps has been repaired, the shoulder can be moved straight away and yet still leave the biceps tendon protected.

Changing the biceps tendon anatomy. The biceps tendon normally crosses the shoulder joint to attach to the top of the glenoid (socket). As such, it passes up the humerus inside a sheath and then crosses through the shoulder joint itself to reach its final attachment. At the top of the sheath, just before it enters into the joint space, it lies on the very front of the supraspinatus tendon. As this is the point at which the supraspinatus first starts to rub on the acromion in impingement syndrome, one can imagine that this can also affect the biceps tendon or the top of its sheath, or both. As such therefore, impingement of this area is probably the commonest cause of biceps pain: this being pain down the biceps muscle, or anywhere along its length, including in the front of the elbow joint where it attaches to the neck of the radius (a forearm bone). The tendon can just be a bit swollen from being rubbed on, it can be frayed, or it can even be completely torn. It can also start to fall out of its sheath at the top when the sheath itself is damaged. This can lead to not only pain, but in some people, a clicking as the tendon moves in and out of its groove (subluxes) when the
SLAP tears, which are generally an injury that occurs in labrum. Hence the term SLAP.

The attached anterior (front) and posterior (back) tendon gets pulled off the glenoid, and with it comes buffer that attaches to the rim of the glenoid. This upper glenoid (shoulder socket) labrum (a soft tissue is a tear of the biceps tendon from its origin on the humerus, or it can be done further down below the pectoralis major insertion. Their are pros and cons of both these approaches. Most usually however, it is attached at the top of the groove.

If the tendon is totally ruptured, it is usually left where it is without repair. This leaves a small cosmetic deformity, being a muscle lump above the elbow (a so-called ‘Popeye Muscle’), but very little if any functional loss. Accordingly, given how difficult it may be to find the end of the ruptured tendon in the mid-arm region, a repair, with all that entails to achieve healing, is generally not usually worthwhile. Exceptions are for those with on-going biceps pain which has not settled with time, and for those for whom cosmesis is paramount. This includes body builders etc.

A further reason to tenodese the biceps tendon is a SLAP (Superior Labrum Anterior & Posterior) tear. This is a tear of the biceps tendon from its origin on the upper glenoid (shoulder socket) labrum (a soft tissue buffer that attaches to the rim of the glenoid). This tendon gets pulled off the glenoid, and with it comes the attached anterior (front) and posterior (back) labrum. Hence the term SLAP.

SLAP tears, which are generally an injury that occurs in throwing athletes, can be repaired and, 20 or so years ago when the technology to do this was developed, there was much enthusiasm for this. Unfortunately however, these repairs have not done all that well in over time. For most therefore, tenodesis is now known to be a better option being both quicker to heal, and more reliable. In addition, the functional deficit is minimal even in most athletes. The one group in whom this may not be the case are the baseball pitchers. In this special case, where extreme arm angles need to be achieved, tenodesis seems to be slightly inferior to repair. It remains however, a less reliable alternative.

**Sub-Acromial Decompression**

Whilst not always required when there has been an acute injury, is almost always necessary in the chronic situation where impingement is involved in the causation of the problem. This procedure widens the sub-acromial space so that the tendons are no longer impinged upon. Hence, in most instances, it not only removes the cause of the problem, but it also provides some protection to the remaining rotator cuff tendons which may be at risk of further damage. Of course, if the rotator cuff tendons are already torn, they may need repair themselves. This however is a different scenario which requires different post-operative rehabilitation (and is covered elsewhere).

When a sub-acromial decompression is performed, the underside of the acromion is burred back to widen the space for the tendons. This means that the bone will have its smooth outer covering removed exposing a raw bleeding bony surface. This of course will go on to heal and become smooth again but, early on, this exposed surface wants to heal onto any nearby surfaces which include the underlying rotator cuff and, perhaps more critically, the repaired upper end of the biceps tendon. Hence, it becomes important in the post-operative period to begin moving the shoulder immediately, thus preventing these two surfaces from healing to each other. Unlike after a rotator cuff repair where movement of the shoulder can damage the repair, in a biceps tenodesis the repair can be protected by a sling (or collar and cuff) which keeps the elbow bent to 90°. Provided that this is used, and provided that the sling (or the opposite arm) takes all the force that holds the elbow thus, the shoulder can be safely moved through a near full range of motion.

**The Repair**

There are many ways of repairing the tendon to the bone. All that has to be done is to roughen up the bone a bit to make it bleed, and then to attach the tendon to the freshened up area so that it heals in the same way as a new wound. There are special screws made for this but all of these need a moderate size hole in the humerus to work. The screw goes into that hole with the tendon alongside, which it then wedges into the side of the hole. Easy though these are to use, the hole that has to be made for them can lead to an area of weakness in the bone which, in turn, can result.
in a small fall leading to a fracture through that area of weakness. There also seems to be an occasional failure of the repair with this technique which is thought to be due to the tendon being pulled over a sharp edge of bone as it goes into the tunnel to which it is fixed.

For all of the above reasons, and because of the lower failure rate, use of a small diameter anchor in the bone to which the tendon can be stitched, seems to be a better method. It is perhaps slightly less secure initially, relying on stitches into the tendon rather than the firmer initial fixation of a screw, but the failure rate is lower, and the result more assured. In addition, pain at the anchor site seems to be less with this method.

**Moving and using the elbow**

**Weeks 1 & 2.** Like all wounds, healing of the tendon does not really commence until about 10 days post surgery, and strengthening of the repair will keep occurring for many months. By about 2 weeks however, the tendon should be starting to heal, and hence, can be subjected to small degrees of stress. In the first 2 weeks, the elbow can be extended (straightened) once or twice, for a few seconds, 2 or 3 times a day, but protected by the other arm. After 2 weeks however, it can be gently lowered and raised without the use of the other arm.

It is also important to recognise that the main function of the biceps tendon is not flexion of the elbow but supination (turning the hand up to face the ceiling) of the forearm. As this also stresses the biceps tendon, this activity should be limited in the first few weeks.

**Early Elbow Stretching**

The arm is then lowered a few times until full straightening has occurred.

**The Main Biceps Function**

Not to be done with any force after tenodesis because this stresses the insertion point at the upper arm.

**The sling after Biceps tenodesis**

The sling (or collar and cuff) provides support for the forearm leaving the elbow bent. Hence, the biceps is not under stress.

**Tenodesed Biceps Tendon**

The tendon has been detached from the glenoid and anchored into the groove.
By 3 - 4 weeks most people can wean out of the sling altogether. The elbow can now be fully straightened, and fully bent up, but without excessive force, and without carrying anything. Full elbow motion should be restored by the end of that time frame. The limitation on use (carrying) from then on is from the tendon repair.

Moving the shoulder

For the first 2 weeks - the arm should be left in the sling full time but, whilst it is in the sling, the shoulder can be taken through a full range of motion. It is important that the elbow is not held bent by the biceps as this will stress the repair. Hence, the sling should take the weight of the forearm whilst the shoulder is being moved.

The aim is to try and achieve a full range of shoulder motion in the first week or so, and earlier if possible. Once the arm is above shoulder height (horizontal) the forearm will fall towards the shoulder. The biceps therefore, no longer being under any stress, will not need the support of the other arm. In this position (shoulder height) and above, the triceps muscle will control the forearm, thus maintaining its position.

As the shoulder improves, it will become easier to move this by itself (actively), rather than with the help of the other arm (passively). This is perfectly safe providing that the sling (or collar and cuff) is protecting the biceps repair.

Another way of lifting the forearm above shoulder height is to bend forwards so that the arm hangs down (in its sling). If you bend forwards so that your back is near horizontal, then the arm will hang at nearly 90° to that (vertical). The good arm can then be used to help the affected arm swing up and down (forwards and backwards) - using gravity to help rather than having to fight it. Alternatively, with the arm protected in a sling, it can be moved under its own power. (see pictures on this page).

It is important to realise that the above activity is not an exercise as such, so it only needs to be done a few times in each session, just to break down any scar that may be forming between the repair and the acromion above. 3 - 4 such sessions a day is more than adequate.

Remember that the aim is to regain range of motion, not strength.

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of gentle passive abduction (moving the arm out to the side) of the shoulder. If the forearm is held in the sling, then this can be done actively just by lifting the elbow out from the side up to shoulder height (like flapping the wing). Alternatively, it can be done passively by allowing the arm to rest on a bench or table whilst sitting next to it, and whilst supporting the forearm with the other hand. Some, or all, of the weight of the arm should be taken by the bench, and it can then be gently slid along the bench away from the side of the body. Again, this just needs to be done for 2 or 3 repetitions, perhaps 2 or 3 times per day.

**Weeks 3 & 4** - During the third week the shoulder can be moved more actively without the help of the other arm, and the elbow can be straightened (but not stretched) more often. The arm can be used to help with eating but should not be used to carry anything of any significant weight. It is therefore better to use this arm for cutting (where the force is downwards) rather than for lifting food up to the mouth.

For most people, the sling can be removed all together by the end of week 3. The repair will still need protecting however, so lifting anything significant should still be avoided.

It is important to make sure that a full range of shoulder motion is now possible, and that it continues to be, because this is the long term limiting factor to full recovery, not the tendon repair.

**Weeks 6 - 12** - The tendon repair is now getting stronger. Moderate force can be used but formal strengthening should still be avoided.

**By 3 months**, the tendon repair should be quite strong. It still won’t tolerate really heavy loads but medium sized loads can be carried. From an exercise point of view however, lower loads with higher repetitions are preferred.

**Month 3 - 6** - The tendon is now quite strong and failure is unlikely. Moderate use is encouraged. Activities that involve hitting (golf, cricket, baseball, etc.) can be commenced in a limited and careful fashion being slowly built up to normal over this period. For instance, chipping and putting should be safe at 3 months, hitting with irons at 4 months, and full golf by 5 months.

Ultimately, the tendon should have normal strength, but this does take many months, and it does require a degree of use to build up that strength. No one knows exactly how long this might take, but maximal strength may take up to a year, even though, by 6 months, most normal activities and sports can be undertaken.

**Return to sport**

Time to return to any sport will be variable, and will necessarily be determined by the tendon strength (as determined by the factors described above), the nature of the sport, and the range of motion that has returned. For bowls, because of the weight of the bowl, some 4–5 months are required. For golf, 5 months. For weights, 6–12 months with limits being placed on the amount of weight being used. For combative sports, a full 9–12 months may be needed.

Getting into a pool can be done within 7–10 days as long as the wound is dry and not leaking. At this early stage, you will not be to swim, but you can walk around, let the arm float up, and so on. It must be done in a pool with steps and not a ladder, so that the arm does not need to be used to get out. Early gentle swimming can be done at about 8 weeks, moving towards full power swimming at 4 months.

**What if I re-tear my biceps tendon?**

The commonest time for failure of the biceps tendon repair is within the first couple of weeks. Sometimes this is due to failure of fixation, and sometimes it is because the tendon tears away from the fixation. Theoretically this is repairable, but sometimes, the tendon gets pulled right down the arm by the muscle belly which is attached to it. This means that either a new incision may have to be made, or the old one significantly extended, to find the tendon and reattach it. For this reason, and because in most people the loss of this tendon causes almost no residual loss of strength, it becomes predominantly a cosmetic problem.
being a muscle lump just above the elbow which is sometimes known as a 'Popeye Muscle'.

Late repair can be difficult, and hence, this would only be undertaken if there were residual symptoms that were bad enough to consider intervention.

More information can be found at:

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