

THE GYM JUNKIE'S PAINFUL SHOULDER

AN IMBALANCED 'HOUSE' THAT NEEDS A FULL RENOVATION!

The shoulder is of course the most muscular of all the body parts, and therefore very susceptible to imbalance. Allied health professionals, corrective exercise specialists and personal trainers need become more adept at understanding, highlighting and holding up the gold standard against "hypertrophy at the price of good biomechanics", or quantity over quality.

This article attempts to give a new level of understanding of not just shoulder anatomy, but poor shoulder biomechanics due to muscular imbalance. We will suggest some new concepts for thinking about the inner workings of the ball and socket joint, discuss the classic muscular imbalances, highlight the muscles that need focus and lastly suggest a unique and radical (we think) option for how these imbalances can be prevented and overcome.

I THE EXTREMES OF IMBALANCE

Even the average gym client can spot the more severe rounded shoulders, or ape-like morphology of your steroid-fuelled body-builder. Collapsed chest, massive anterior deltoids and 'no-neck' characterize these committed athletes who pump iron night and day, insisting on extremely heavy loads and immediate respect. Arms and shoulders loaded with heavy muscle hang internally rotated at their groins...

Perhaps we are being a bit harsh in only crucifying the obsessive minority of body builders – in reality they have just taken the same journey that so many fit people in gyms take, and yet perhaps taken it to the ridiculous, level. Are they therefore, simply extreme versions of the average muscular physique?

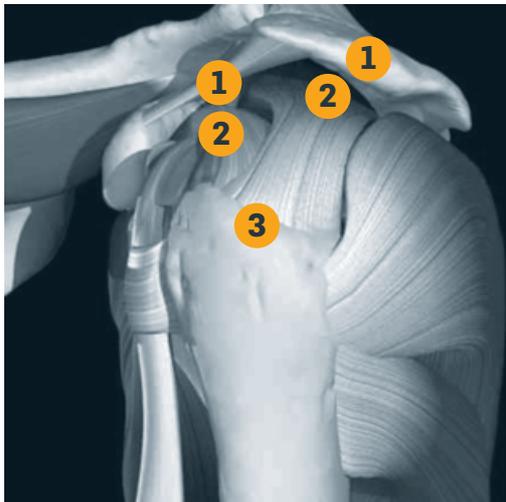
With respect to shoulder muscle imbalance, then, is it only the few extreme ones that deserve our critical inspection? Put an eye that has been trained in the clinical and exercise science of assessing patho-mechanics onto the gym floor, and suddenly very few shoulders look OK. One is left wondering whether it is the sealed fate of every man or woman doing upper body weights to get a thoracic kyphosis with moderately winged scapulae (albeit often hidden behind the layers of muscle) and over-developed upper traps and rhomboids.

Most quality fitness professionals would probably agree with me when I say that it is nearly impossible to find muscular shoulders in the gym that don't have an imbalanced (rounded) look and function about them. Any of us if, we have invested a lot of time and energy into our physique, will be a little in denial about this. It's natural, but the sooner we 'fess up, the sooner we can slow the process of degenerative change happening to the very fragile non-muscular structures of the shoulder. If it only smarts and pains in the shoulder when lifting a bar with 100kg of iron, does that really mean you can ignore it (as many do)? Let's really examine what's happening biomechanically, rather than burying our heads in the sand.

Many, such as extremely fit "Lachlan" who works as a PT in a boutique gym near our clinic in Brisbane, had given up seeing even good quality Physios as nothing was working for his painful left shoulder. Scans showed some degenerative changes in his rotator cuff, and while his shoulder was pain-free with all normal life activities, the usual rotator cuff exercises just weren't helping fix the shoulder impingement pain he was getting with heavy pressing exercises. Sometimes he felt as though he was getting worse with his rehab! He had been strengthening his external rotators and squeezing his scapula back for many weeks, but to no avail. And I have heard this report of stubborn and irritating shoulder pain during weights sessions countless times from PT's ... the answers lie in understanding at a deeper level the biomechanics of shoulder muscle imbalance.

Let's unpack the anatomy enough to gain a fresh understanding of what's going on here.

THE ROOF, THE FLOOR AND THE FURNITURE OF THE SHOULDER



To appreciate the deep and under-lying biomechanics of the shoulder, let's start by introducing the image of the house:

- 1** "Roof" – acromion process, coraco-acromial ligament and the coracoid process
- 2** "Living space" (sub-acromial bursa not shown); "Furniture" includes SSpin/ISpin/Long head biceps
- 3** "Floor " – bony head of the humerus

Roof of the shoulder: combined anatomy of the acromion process, coraco-acromial ligament and coracoid process

Floor of the shoulder: the head of humerus (the "ball" in the socket)

The living room: the sub-acromial space

The furniture: includes the supraspinatus, infraspinatus and (less so) teres minor tendons, the sub-acromial bursa, the labrum (posterior, superior through to anterior portions). We could loosely include the long head of biceps and subscapularis tendons as furniture that can get inflamed under the coraco-acromial ligament in the anterior shoulder, in a true anterior impingement – though this is relatively rare for the 'gym junkie'.

I THE POOR BIOMECHANICS OF A BAD HOUSE

The majority of “niggling” impingement problems in the gym, if they can be caught early enough, will not have too much actual damage to the furniture of the shoulder such that anything needs to be done to fix or actually treat the furniture per se. What will urgently need to be “renovated” are the problems with the roof caving in, or the unstable floor! Here’s what’s probably going on:

The roof caving in due muscular imbalance around the scapula

A repetitive and perpetual downward force of the acromion process onto the ball is the most common destructive force that active shoulders must be wary of. The roof of the shoulder is literally crushing down onto the furniture! This movement is specifically called “downwards rotation” or “anterior tilt” of the scapula, and is primarily created by pec minor, levator scapulae, the rhomboids. These muscles will dominate over the critical serratus anterior muscle, resulting in scapular winging, and poor control of protraction and retraction during the movement. Therefore, any simple push-pull exercise has the potential to include too much downward force of the roof into the living space, and the most common “furniture” that gets damaged is the supraspinatus tendon. Tearing, rubbing, and scuffing of this tendon accounts for most shoulder pain in the gym.

As a part of this situation, the pec major and lat dorsi will often become tight and will further progress the imbalance by rounding the shoulder, though they are not actually acting directly on the scapula. In addition, the posterior deltoid and gleno-humeral external rotators (infraspinatus and teres minor) may also contribute to the imbalance by becoming overactive and pinching together the scapula and humerus at the posterior aspect of the shoulder.

Another extremely common scapular imbalance that will exert its negative effect is the dominance of rhomboids/levator scapulae over lower trapezius: the elevators dominate over the depressors of the scapula. While this can also contribute to rotator cuff pathology, it will also play havoc with thoracic and cervical pain syndromes (including chronic headaches).

Note that the latest thinking is that Upper Trapezius might not tend to get tight and dominate like we have previously thought: rehab specialists around Australia have long argued that upper traps can easily get weak and hence contribute to shoulder dysfunction.

The Scapular Renovator Muscles that normally need to be called in for a scapular renovation to take place (such that the roof stops caving in onto the living space) are:

1. Serratus Anterior, and
2. Lower Trapezius

(Upper Trapezius has a role too but more for over-head movement, and this is less important here).

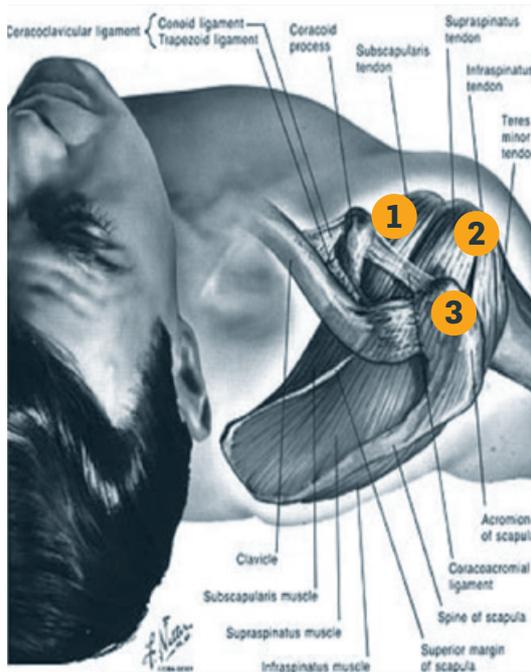
In combination, these two shoulder renovators mainly produce upward rotation (and posterior tilt) of the scapula. By itself serratus anterior produces scapular protraction during the pushing movement, and lower trapezius produces posterior tilt and depression during the pulling movement. Together they are the perfect antidote to the dominance of pec minor, rhomboids and levator scapulae. *Without activation and strength of these muscles no true and lasting improvement of shoulder pain is possible.*

Their roles cannot be overstated, and generally are very poorly isolated and integrated by health professionals into rehab programmes, so there is much room for development of new drills in the gym to target these scapular muscles (see later in this article and future article on the “Shoulder Renovators”).

The unstable floor moving due to muscular imbalance around the gleno-humeral joint

This phenomenon is perhaps less understood but will explain why simply prescribing external rotator cuff strengthening exercises can make a shoulder worse. The prevalent imbalance here is between the internal and external rotators of the rotator cuff. To be specific then, the external rotators of the cuff (infraspinatus and teres minor) gradually dominate over the lone internal rotator (subscapularis), creating destructive anterior shearing and superior movement forces.

This is akin to the furniture riding up into the ceiling as the floor lifts and sways out of control during gym movements such as push-pull exercises.



- 1 **Subscapularis** here plays a critical role as a shoulder renovator by preventing anterior shear and elevation of the ball in the socket
- 2 During chest press the gleno-humeral joint may 'lurch' anteriorly...
- 3 while the scapula moves into downward rotation / anterior tilt – a deadly combination for the supraspinatus tendon and other fragile shoulder furniture.

This is also described functionally by some educators as an imbalance between the humeral depressors and the humeral elevators - the elevators (deltoids and external rotators) dominating. In this situation gleno-humeral imbalance can gradually lead to mild to moderate instability in the gleno-humeral joint given enough force and load and time.

What creates this imbalance? External rotator cuff muscle overload. This happens in numerous positions and movements such as:

- 1. Poor technique in push-pull exercise where the hand is allowed to fall forward of the elbow under load (especially watch chest press and shoulder press from side-on view);
- 2. Consider that the downwardly rotated scapula by its very position requires this overload simply to carry weights in the arm: the scapula is thrown repeatedly forwards and down towards the humerus creating shortening and therefore dominance of the posterior cuff; and
- 3. Over-prescribed external rotator strengthening or dumbbell drills in side-lying will perpetuate the imbalance and not solve the actual shoulder problem (this mis-understanding is surprisingly common, and stems from the fact that the practitioner prescribing the exercises has believed that the rotator cuff pain is due to weakness of the cuff in general).

How to know if you have it? If you are finding it gradually harder to reach into the small of your back and up towards your thoracic, and if it looks like the ball is starting to protrude forward in your socket when your arms are relaxed by your side (look side-on in a mirror).

The Gleno-humeral Renovator Muscle that normally needs to be called in for a renovation of the gleno-humeral joint (such that the floor stops moving excessively and riding up into living space) is subscapularis. The more recent physiotherapeutic research into gleno-humeral dysfunction and injury is prolific in the focus on subscapularis as the main muscle that needs activation and retraining for effective rehab of rotator cuff dysfunction.

How does the subscapularis muscle act to counteract gleno-humeral imbalances?

- Firstly, it is the perfect humeral depressor and posterior glider. It counter-balances the external rotator force of infraspinatus, teres minor and to some degree supraspinatus, thereby preventing anterior shearing and elevation into the sub-acromial space.
- Secondly, it acts in a reverse-origin insertion manner to re-align the scapula such that muscle imbalances there are less able to cave the roof of the shoulder down into the sub-acromial space.

I TIGHTNESS AND MUSCULAR IMBALANCE

Anyone who has embarked on an upper body strength acquisition / muscle building process will soon tell you this kind of story: how nearly impossible it is to prevent tightness...tightness of the chest, lats, upper back, and lateral shoulders. For example, the lateral shoulders may scream with tightness and fatigue during certain exercises like lateral raises or shoulder press – but this may not be the lateral deltoids fatiguing, rather external rotator cuff overload due to poor biomechanics! Try and stretch out pec minor or rhomboids/ levator scapula and see if you then can pump out another few sets.

The tightness is evidence of deterioration in muscle synergy. Force couples are ceasing to work as effectively as they used to – equal and opposite is fast becoming unequal and dominated! Agonist / antagonist balance is being lost. Neuro-muscular programming for movements is slowly being altered such that certain muscles (eg rhomboids) and movements (eg retraction-elevation-downward rotation in a seated row exercise) become more dominant over others (eg lower traps executing pure retraction-depression in seated row). The brain begins to forget certain movements (because let's remember it thinks in terms of movements not muscles) because they feel hard to do (and it probably is intrinsically seeking the easiest route). It feels easier to use stronger muscles and gradually the movements they generate DOMINATE.

ISO-INTEGRATION: THE SPECIFIC USE OF THERA-TUBING DURING A MOVEMENT TO OVERCOME MUSCLE IMBALANCE

This pioneering work is at the cutting edge of muscle activation work to improve biomechanics and prevent / rehab injuries across the spectrum of all the body areas, not just the shoulder. It has no formal research as yet to validate it, only the countless hours of experimentation and successful application to imbalanced shoulders and injuries, which is the nature of anecdotal evidence. We will apply the concept to overcome the common muscle imbalances that could apply to the shoulder in two exercises: one arm dumbbell row and chest press.

ONE-ARM DUMBBELL ROW

Classic patho-mechanics: imbalanced rowing action from the scapular retractors, demonstrating excessive elevation during the main movement (dominant rhomboids and levator scapula over lower trapezius) and possibly even downward rotation at the late stage of the movement (dominant pec minor, posterior deltoid, and external rotators).



Tubing used here requires the arm to sustain internal rotation during the one-arm dumbbell row movement, thereby indirectly improving lower trapezius function.

FEEL the difference on yourself. Note the pronated hand position.

Tubing integrated to restore balance: hold tubing on tension from in front (the more muscular a client the more tension will be required) during the movement. Dumbbell and tubing are held together in the hand, as the movement is performed.

The direct effect of the tubing is to activate the gleno-humeral internal rotator subscapularis, but by reverse-origin insertion it will pull the scapula away from an elevated and downwardly rotated position towards a more pure retraction movement, thereby indirectly activating lower trapezius. Most commonly the client will feel an improved contraction of this muscle, and hence improved lat dorsi action. The net effect is a significant improvement in joint biomechanics and muscle balance during the movement.

In terms of muscle biomechanics the middle-lower trapezius will grow at the same rate as the upper trapezius/ rhomboids and levator scapula.

Trigger points and pain in the neck (even headaches) will be reduced.

DUMBBELL CHEST PRESS

Classic patho-mechanics: during the lowering phase of chest press the scapula prematurely ceases to retract; instead the scapula lurches into downward rotation / anterior tilt, and the gleno-humeral joint shears anteriorly, possibly into external rotation and excessive horizontal extension. Effectively the roof is caving in and the floor is shifting at the same time! This movement is the reason that bench press remains one of the most damaging movements in the gym for the fragile supraspinatus and other furniture under the shoulder roof.



Tubing used here during bench press will directly activate the subscapularis, thereby improving muscle balance and preventing injury to the supraspinatus tendon under the roof of the shoulder.

Tubing integrated to restore balance: tubing is held in the hand during dumbbell chest press with the tension directed overhead.

- The direct effect of the tubing is to activate the gleno-humeral internal rotator subscapularis, which will pull the gleno-humeral joint posteriorly and inferiorly away from the acromion process. It will neutralize any external rotation and horizontal extension patho-mechanics, and activate serratus anterior to function eccentrically during the lowering phase. Consequently it prevents downward rotation and anterior tilt of the scapula.
- In terms of muscle biomechanics the pec minor is prevented from dominating over pec major, so this becomes an extremely useful tool in the optimization of muscle development around the chest.
- Very importantly if there is any pain at all during chest press, the tubing needs to be applied in an attempt to reduce the pain, hence its value then as a rehab drill for the retraining of subscapularis and serratus anterior.

In summary, everything must be done by the discerning personal trainer / corrective exercise specialist to prevent the spiral into muscle imbalance and degenerative change in the fragile furniture of the shoulder. Prevention is much better than cure, especially since it is also guaranteeing your client actually builds their musculature the way they are hoping to – flexibility of the dominant power muscles and activation of the deeper stability muscles will ensure the equilibrium is maintained.

It is recommended that massage and Iso-integration is used regularly during work-outs to prevent this.

Red rubber tubing can easily be purchased off "The Rehab Shop" and applied to your exercise.

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