

# PREVENTING INJURIES IN GUITARISTS

ERGONOMICS, STRENGTHENING AND SURGERY

By Katherine Butler of London Hand Therapy

## MUSCULAR TENSION AND STRETCHING EXERCISES

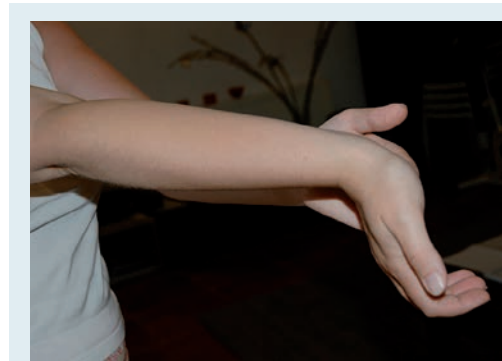
Muscular tension in a guitarist may be due to over activity of a muscle, and this can result in distinct referral patterns of pain. Treatments for muscular tension can include soft tissue massage, trigger point therapy, stretching, icing, acupuncture, home acupressure and activity modification (eg altering the way we carry items and sleeping and playing positions).

Stretches can be useful self treatment for most musicians. However if the individual is hypermobile in their elbows and wrists they must not go into their hypermobile range, but rather keep the elbow slightly flexed when performing the exercise. In Fig. 1 there are two examples of forearm stretches<sup>1</sup> that may be useful as a warm up and cool down before and after playing. These exercises are done away from the instrument, and can be a great way of preventing build up of muscular tension.

## STRENGTHENING AND STABILITY EXERCISES

The small muscles of the hand and the muscles in the forearm are frequently stressed while playing the guitar and can also be stressed in an attempt to compensate for joint instability.<sup>2</sup> Strengthening exercises utilizing therapeutic putty can be a useful technique when treating patients who use their hands to perform extremely rapid and repetitive movements. These exercises can also assist patients with hypermobile hands by increasing muscular strength, which in turn increases joint stability.

Treatment for hypermobile



**Fig. 1 (A) Forearm flexor stretch.**

With the elbow straight, and palm facing upwards, gently take your wrist backwards using your own muscle strength, until you feel a stretch. Then, with the other hand gently pull the wrist further backwards by placing light pressure in the palm. Hold this stretch for 10 seconds.



**Fig. 1 (B) Forearm extensor stretch.**

With the elbow straight and palm facing downwards, gently bring the wrist and fingers in towards yourself using your own muscle strength until you feel a stretch. Then with the other hand, lightly push on the back of your wrist, bringing it further towards yourself. Hold this stretch for 10 seconds.

patients must focus on increasing stability and strength. They need to be aware of where their joints are when they are playing and performing daily living tasks (proprioception). Patients may benefit from the use of temporary splints or supports to assist in retraining positioning or limiting movement. Education regarding good practice habits and healthy joint use is also important.<sup>3</sup>

Exercises must only start when the patient's pain is 'under control'. They should continue until enough muscle strength has been gained and a straight or neutral joint position can be maintained when playing their instrument and performing other functional activities.

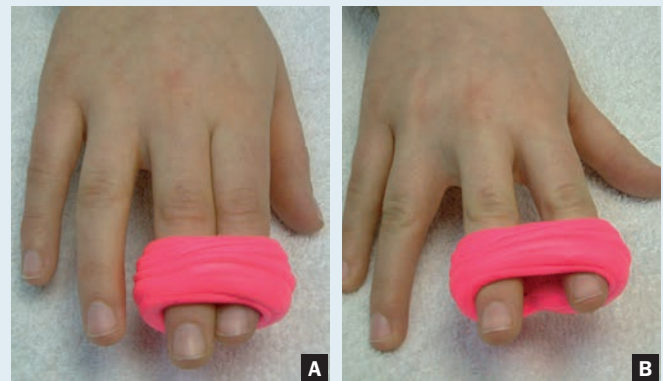
It is important that the guitarist knows which muscles are weak and therefore which ones require strengthening. At London Hand Therapy manual muscle testing techniques are used in order to grade different muscles, set short and long term goals and map improvements. Particular

exercises using therapeutic putty can be very useful in increasing strength in specific muscles. There are many therapeutic putty exercises and Figure 2 shows an example of an exercise that can assist in increasing strength of one particular group of muscles that are within the hand.

Another way of strengthening the muscles of the forearm and in turn increasing stability of

the elbow, wrist and fingers, is by exercising against resistance. Isometric exercises as outlined in the box above, are frequently taught to guitarists and other instrumentalists to not only increase strength of the forearm and stability of the wrist but also to increase proprioceptive levels.

These isometric exercises are done away from the instrument and are to be done in a pain



**Figure 2.** Therapeutic putty exercises. Exercising the small muscles within the hand, different finger pairs can be used to increase strength in the hand. The putty is looped around two fingers (A) and then the fingers are actively spread apart in a side to side ways movement (B).

## STABILITY EXERCISES FOR THE WRIST AND FOREARM

These exercises do not involve any movement but are static and resisted. You must support the length of your forearm on a table or flat surface. You should feel resistance rather than pain, and only use 30% of your maximal effort initially, and as tolerated increase this gently and in a graded manner, up to a maximum of 50%. Hold each position for 5-10 seconds and in time as tolerated gently increase the time that the position is held so that a 30 second hold is achieved.



### Forward bending

With the palm of your hand facing down and your hand forming a light fist, push your forearm into the table and feel the resistance right up into your upper arm.

Repeat \_\_ times \_\_ per day



### Backward bending

With your affected wrist in a neutral plane and whilst forming a light fist, place your unaffected hand over the back of the wrist and resist the backwards movement.

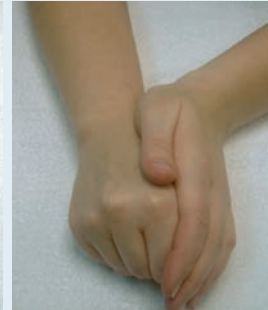
Repeat \_\_ times \_\_ per day



### Side to side

Rest your hand and forearm with the little finger in contact with the table. Make a light fist and push the side of your forearm into the table.

Repeat \_\_ times \_\_ per day



### Turning

Rest your hand and forearm with the little finger in contact with the table, resist against your affected side using your other hand. Place your unaffected hand over the base of your wrist. Imagine you are turning your palm down towards the table and resist this movement without moving the wrist.

Repeat \_\_ times \_\_ per day

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free range. Proprioception and retraining exercises can be graded and weight bearing in a neutral position first with the eyes open and then with the eyes closed can be another way to increase the difficulty of these exercises.

When treating musicians the musical instrument is used as a rehabilitative tool when possible. In the later stages of rehabilitation these isometric exercises can be progressed so they are more challenging and the musical instrument can be used as resistance. For example, the patient is asked to maintain a neutral joint position while holding the string down on a guitar.<sup>3</sup>

After months of performing strengthening exercises symptoms can improve and it is not uncommon to detect an improvement in ligament tautness with joint translation testing, which is very encouraging to both the patient and the treating therapist.

### SPLINTS

Temporary supports to maintain joint(s) in a straight (neutral) position are useful in assisting a patient to grade their return to play. Supports can include light plastic splints, neoprene

wraps, wrist braces, lycra finger sleeves, or Coban™ wrap (See Figure 3). It may take many months for stability and strength to improve and splints or wraps may need to be worn for some time. They should be weaned as strength increases and symptoms decrease.

### MUSICAL INSTRUMENT MODIFICATIONS

The shape of a guitar can at times present the player with difficulties. The right forearm may press on the body of the guitar and cause pain in the forearm and hand, and the left wrist may feel it needs to bend

### “EXERCISES MUST ONLY START WHEN THE PATIENT’S PAIN IS ‘UNDER CONTROL’”

forwards in order to access some of the strings.

Guitars have been designed with part of the body of the instrument recessed to permit the use of a more neutral wrist and more optimal ergonomic position when playing.<sup>4</sup> The resultant decrease in left wrist flexion can help avoid the high pressures associated with CTS and minimize friction

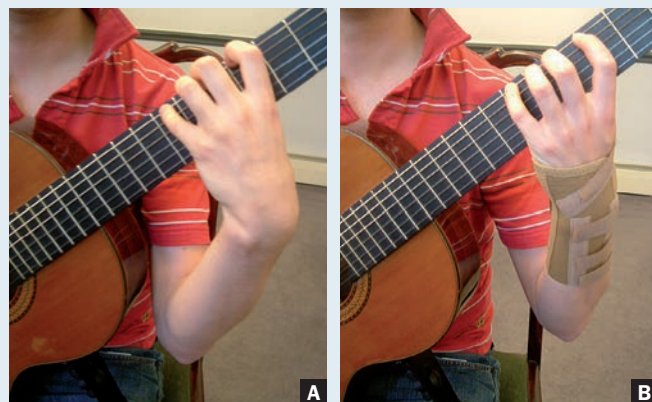
of the flexor tendons against the transverse carpal ligament. Some electric guitars avoid this problem altogether by virtually eliminating the body of the instrument.

The lower “bout” of the acoustic guitar (the part where the right forearm crosses the instrument) also can present a physical obstacle<sup>4</sup> resulting in either excessive right wrist flexion or protraction of the right shoulder for the right hand to access the strings. The larger the body size of the guitar or the smaller the player, the bigger the problem. Laskin<sup>5</sup> has developed a small beveled edge for the classical guitar where the right forearm crosses the instrument. Norris<sup>4</sup> further developed this idea to a more radical bevel, improving right-hand access to the strings with minimal distortion of right shoulder and wrist position.

### ADAPTIVE EQUIPMENT FOR THE PHYSICALLY DISABLED

Musical instruments can be modified or adapted to increase the ease of playing for individuals with a physical or mental disability. Metal picks can be fixed to the end of a prosthesis to allow guitar playing.

For quadriplegics and people with severe neurological



**Fig. 3A.** Flexed wrist position utilized by some guitarists to access the lower strings; **Fig. 3B.** Retraining the wrist position using a wrist brace to limit wrist flexion and encourage more elbow and shoulder range of motion.

“NON-SURGICAL TREATMENT SHOULD ALWAYS BE TRIED FIRST...[TO] SOLVE THE PROBLEM RATHER THAN SURGERY”

impairments, sip and puff controls can be adapted to the computer and used in conjunction with one of a number of musical software packages to allow composition and playback.

Guitarists with left hand or shoulder problems can place a capo on the third fret, thus decreasing the amount of combined wrist, forearm and shoulder rotation when playing on the first three frets. Because the distance between the frets decreases as one goes higher up the neck, the finger spread required for chords or intervals is also decreased.<sup>6</sup>

**SURGERY**

Surgery on musicians must be entered into cautiously. Winspur<sup>7</sup> reports that of the musicians presenting with recognisable orthopaedic or rheumatologic conditions in the upper limb 4-6% will be candidates for surgery. Non-surgical treatment should always be tried first and it should not be forgotten that in some situations adjustment or modification of the instrument or playing technique (the interface) may solve the problem rather than surgery.

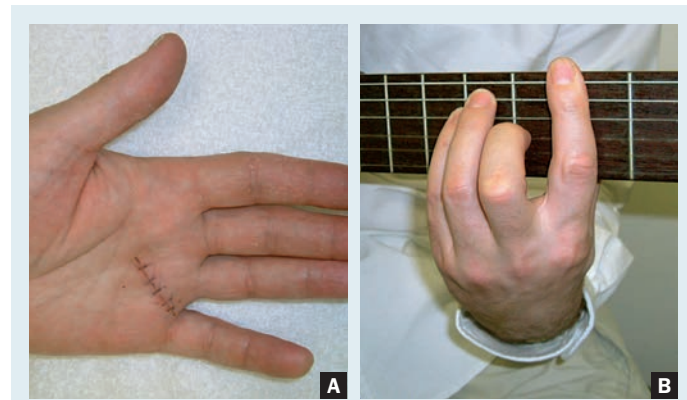
The implications of surgery are great for a musician, whose hands are their livelihood. Thus respect for their hand and career must be paramount. Accurate diagnosis,

analysis of need and disability, and precision in planning are needed to ensure optimal outcome of surgery. In the area of acute trauma, techniques that will permit early return to function (such as rigid fixation of fractures and early rehabilitation) are often advantageous. Electrodiagnostically documented carpal/cubital tunnel syndrome and ligamentous injuries leading to instability that have not responded to activity modification or nonoperative therapy can be considered appropriate surgical conditions in the musician's hand.<sup>8</sup>

Winspur<sup>9</sup> states that there are four areas that must be identified and specifically addressed when planning surgery on a musician's hand.

1. The exact location of incisions avoiding critical tactile areas (Fig 4A)
2. Anatomic repair and reconstruction
3. Adjustment of any anticipated anatomic compromise to the musician's specific musical needs
4. The need for an early return to limited playing. (Fig. 4B).

A large series of professional musicians operated on by a single surgeon are presented by Butler and Winspur.<sup>11</sup> Of the total number of musicians undergoing



**Fig. 4A.** Because of the need to retain full control of the tip of the digit when in complete flexion, rather than dividing the A1 pulley which has been shown to have detrimental effects in guitarists with trigger finger, the ulnar slip of FDS was removed to allow more space under A1 pulley of left ring finger, without sacrificing the pulley.<sup>10</sup>; **Fig. 4B.** Guitarist playing 4 days after surgery for triggering affecting the left ring finger.

hand surgery 12.3% were guitarists, this is a lot lower than piano/organ players (35.7%) and string players (34.6%), however, the frequency of piano and string players represents the popularity of these instruments rather than a vulnerability of the players. Of the 130 patients, 127 (97.7%) returned to full time professional work or were able to complete their final year music college examinations. The period of 'time off the instrument' following surgery is kept to a minimum and then there is a graded return to play programme that is initiated as soon as possible.

**SUMMARY**

The musician's hand is intricate and beautiful. What a guitarist is required to do with their

whole body is complex, and it is paramount that the musician, music teacher, educational facilities, health professionals and instrument makers all work together to prevent and decrease the possibility of injuries developing. Simple warm up, cool down and strengthening exercises, a careful analysis of the playing position and an ergonomic approach to the instrument can assist the musician in decreasing the possibility of an acquired injury and facilitate a more enjoyable performance experience.

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**References**

1. Simmons, DG, Travell, JG and Simons, LS. Myofascial Pain and Dysfunction. The Trigger Point Manual Volume 1. Upper Half of Body, 2nd Ed. 1999, Lippincott Williams and Wilkins.
2. Brandfonbrener, A. The epidemiology and prevention of hand and wrist injuries in performing artists. *Hand Clinics*, 1990; 6(3): 365-77.
3. Warrington J. Hand Therapy for the musician: instrument-focused rehabilitation. In: Winspur I & Tubiana R (ed). *Hand Clinics, The Musician's Hand*. Philadelphia, Pennsylvania: W.B.Saunders Company 2003 (19:2), 287-301.
4. Norris RN, Dommerholt J: Applied ergonomics, *Orthop Phys Ther Clin North Am* 6:159, 1997.

5. Laskin W: Classical guitar "arm rest," *Guitarmaker* 14:36, 1992.
6. Butler, K & Norris, R. Chapter 142 Assessment and treatment principles for the upper extremities of instrumental musicians. In: Skirven TM, Osterman AI, Fedorczyk J, Amadio PC, ed. *Rehabilitation of the Hand and Upper Extremity*, 6th ed. Mosby Elsevier; 2011: 1855-1877.
7. Winspur I. Surgical indications, planning and technique. In: Winspur I & Wynn Parry CB (ed). *The Musician's Hand a Clinical Guide*. Abingdon, Oxon: Martin Dunitz, 1998: 41- 52.
8. Amadio PC. The Role of Surgery. In: Tubiana R & Amadio (ed). *Medical Problems of the Instrumentalist Musician*. London: Martin Dunitz, 2000: 421- 431.

9. Winspur I. Special operative considerations in musicians. In: Winspur I & Tubiana R (ed). *Hand clinics, The Musician's Hand*. Philadelphia, Pennsylvania: W.B.Saunders Company, 2003 (19:2), 247-258.
10. Ragoowansi R and Winspur I. Solutions to two difficult surgical problems in musicians. *Medical Problems of Performing Artists*, 2008; 23: 16-19.
11. Butler K, Winspur I 'Retrospective case review of time taken for 130 professional musicians to fully return to playing their instruments following hand surgery' *Hand Therapy*, 2009, 14: 69-74.