Musculo-skeletal Conditions Affecting the Musician

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Abstract

Musicians are often compared to athletes. Although some similarities exist, musicians are in many respects very different. They start their careers much earlier and end at a much older age, train many more hours, do many more repetitive movements, require of their musculo-skeletal system to endure long periods of sustained contraction and most important of all, have to perform maximally and perfectly with every performance. These demands may result in various injuries of the hands and upper extremities related to the playing of the musical instrument.

A preventative approach is suggested through a balanced lifestyle and diet, physical exercise and the maintenance of a balanced posture. The management of these injuries needs a holistic approach, based on a comprehensive history to identify contributing factors, and a detailed physical examination that includes postural factors.

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Introduction

Since the dawn of mankind, music has been an integral part of human culture. Music has been used for various purposes, such as pleasure, entertainment, worship and communication.

Two important factors have influenced these purposes of music making. First is the discovery that music has a definite enhancing influence on the mental and cognitive development of children, which takes place even in utero. Secondly, competition has become an integral part of social activities, education and training in the modern world. This is transferred to young children who grow up with the constant pressure to perform.

If the budding musician looses the enjoyment of music making it eventually may become a burden. When the effort to achieve becomes greater than the reward of having achieved, loss of interest is guaranteed and a basis for ailments becomes established. Once pressures, demands and stresses become the overriding driving force behind the child's playing of music, all sorts of psychosomatic symptoms and signs may develop.

Musicians are often compared to athletes. Although athletes may start at an early age, their full potential is only known once they reach puberty. The next stage is extensive training under scientific supervision with the necessary backup from teachers, trainers, and a range of health related professionals. This period usually lasts about 10 to 15 years at the very most.

Musicians on the other hand usually start even before school age. Their talent is recognised very early and is gradually promoted in the way of training and encouragement. It is expected of them to perform at each concert maximally without any mistake. Musicians are also expected to adapt to their instruments and their surroundings. Often they live a lonely life and their support system consists only of close relatives and friends. Even from their colleagues one may find severe criticism, jealousy and even outright negative feelings. Furthermore, the musician practices many more hours than the average athlete, usually does not take a break over weekends or holidays and often performs right up into an old age. Even with the normal handicaps of everyday living such as arthritis, injuries and other ailments, the musician often battles to overcome these handicaps usually by him or herself.

The incidence of medical conditions in musicians is unclear but some reports claim that up to 90% of musicians may suffer some ailment during their career[1]. The aim of this article is to review the medical and surgical conditions affecting the musician, as result of music making, and to provide a practical approach for their management. This management approach has been developed through personal experience with over 300 musicians suffering from various ailments of the arm and hand.

1. Lifestyle and diet

The old dictum "practice makes perfect" is very applicable to the musician, therefore very long lonely hours are spent to master the pieces. These music students therefore often miss out on normal child's play, sport, socials and other activities. Parents and teachers should understand that a balanced lifestyle would promote a balanced and healthy child.

Some foods are heavy on the stomach and may interfere with the student's concentration. Drinks with gas and stimulants like caffeine should best be avoided. It is important to re-hydrate the musician before any performance just as an athlete re-hydrates before an event. This keeps the tissues soft, pliable and promotes lubrication between tissues planes and structures. The level of dexterity required from top musicians[2] can only be achieved if the tissues are well lubricated to allow gliding and the muscles, which move these tissues, have enough energy (carbohydrates and lipids) and building blocks (proteins).

2. Musculo-skeletal system

Best performance can be achieved from the mid-position of a muscle, i.e. the resting or balanced position of the muscle. This will allow excursion of the muscle, either side of this resting position, and also enhances the amount of muscle power generated. Athletes are well aware of this important physiological principle, and use stretching exercises to improve the excursion either side of the mid-line. This should also apply to musicians.

Another indispensable preparation for any performance is warm-up exercises. This will prevent micro- and macro injuries to the muscle fibres, tendons, ligaments, sliding tissue planes, and all the various receptors and nerve endings responsible for sensory input (such as two-point discrimination, proprioception, vibration sense, temperature changes, light and deep pressure and stereognosis).

A further aspect is the clear understanding that peak performance and endurance of fingers and the hand can only be achieved if the supporting foundation also has the necessary strength and endurance. These foundations include the elbow, shoulder, neck, back and the whole torso. Most musicians have severely neglected this aspect of their training. They should get into a habit of regularly performing physical exercises, such as non-contact sport or workout at home or in a gym.

3. Posture

Musicians and their teachers unfortunately often underestimate the importance of a balanced posture. Most music instruments are of a poor ergonomic design. Teachers should also be sensitive to normal anatomical variations in people. Some students have difficulty in full pronation of their forearms which make piano playing rather difficult. Others may have connections between their tendons, which would make individual finger playing difficult or impossible. Many other examples exist. It is of no use to force the child to do certain movements, if it is physically not possible or very difficult. A full neurovascular examination could exclude annoying anatomical variations, which in some cases could easily be rectified.

Musical instruments are not holy and should be considered for adaptation or change if musicians have difficulty in reaching certain keys. Extensions and modifications could easily be fitted to instruments to allow for a more balanced hand and relaxed posture. For example, a violin may be too short or too long, twisting the upper part of the body into an awkward position, which will eventually lead, to muscle spasms and pain. Professional help in this regard could be gained from occupational therapists knowledgeable about the physical and psychological demands of the performing arts.

4. Exercise and training

John Williams the guitar player maintains that for every half-hour he practices he would rest for one half-hour. During the half-hour rest, he would do stretching exercises as well as moving exercises. This is a very important physiological concept, which needs to be understood by all musicians. Movement encourages blood flow and therefore function. Function refers not only to muscle power, but also to all the various sensory modalities referred to earlier. These exercises could be either isometric or isotonic muscle contractions.

Isometric muscle contraction is responsible for stable fixed joint positions, i.e. no movement takes place, but the muscles stabilising the joints are co-contracted, whereas isotonic muscle contraction is responsible for active movement of joints. This contraction shortens and lengthens the muscle with resultant movements, such as the fingers. Stretching of muscles and nerves is an integral part of exercise which "resets" the full excursion of muscle and nerve movement. All soft tissue structures need to glide, to prevent stiffness. This is particularly true for nerves as well[3]. Nerves need to glide and be stretched.

However, prolonged continuous stretching and compression for example around corners at joints such

as at the elbow, causes ischaemia as result of the reduced blood flow. Short-term ischaemia causes pins and needles (paraesthesias), numbness and a burning pain, whereas longer-term ischaemia causes external and internal scar tissue formation and fibrosis with permanent symptoms and signs of nerve compression. It is therefore important to any performer that whenever he or she has a chance to relax between performances or pieces, soft tissues should be stretched, relaxed and exercised to stimulate blood flow. Active relaxation exercises are a technique which physiotherapists could teach to reduce muscle spasms, fatigue and improve blood flow. Relaxation exercises can be attained by a number of methods, which include the Alexander technique[4], the Feldenkrais method[5] and yoga.

Approach to Specific Problems[6,7,8,9,10,11]

One should emphasise the holistic team approach to the management of specific health problems in musicians. Those most intimately involved with the musician, such as parents and teachers, should be sensitive to pick up any problems and concerns. The musician should have the boldness and the courage to approach the teacher and the parents with any problem that she or he may face before serious conditions could evolve. I had a young, very talented musician as patient, complaining of severe aches, pains and spasms in both her arms, which would only improve on rest. Physical examination did not reveal any abnormalities. However, her history indicated that she would develop these symptoms only after two hours of uninterrupted high performance playing. This was demanded by her teacher to improve muscle power and endurance. This kind of illogical approach, unsympathetic behaviour with an unfounded scientific basis should be strongly discouraged.

It is important to explain to musician patients the basic anatomy and working of their body, and how things may go wrong. This will diminish fear, uncertainty and anxiousness. It will also help to improve communication and co-operation. When suffering from a musculo-skeletal condition, they should be impressed of the need for a combined effort between doctor and patient to solve the problem.

The musculo-skeletal conditions affecting musicians are grouped into three sections:

1. Ordinary everyday life ailments such as injuries, arthritis, rheumatic condition and nerve compressions.
2. Overuse (too much of a normal activity), abuse (wilfully causing damage) or disuse (incorrect activity or position), these are seen in poor postures, imbalances, over training.
3. Stress related ailments such as musicians' cramps, spasms, and distonia.

In order to arrive at a diagnosis and a plan of management a thorough history and examination is mandatory:

1. **History:** Table I lists some of the pertinent points that need to be clarified in order to put the patient and his/her problem into proper perspective.

***Table I:* History**

- Gender
- Age
- Musical History
- Symptoms - cramps / pain / weakness / sensory defecit (pins & needles, dead feeling, burning sensation)
- Signs - sweating / heart rate increase / dry mouth / palpitations
- Cognitive signs - forgetting / fright / fear
- Behavioral signs - drugs / medicine / tablets / pills / alcohol / cancelling performances
- Social activities - friends / parents / teachers
- Sporting activities - regular exercises / relaxation exercises
- Hobbies
- Financial
- Career stresses - competition / job security / conductor / fellow musicians / parents
- Triggering factors - over use / type of instrument ("interface")

2. Examination: (Table II)

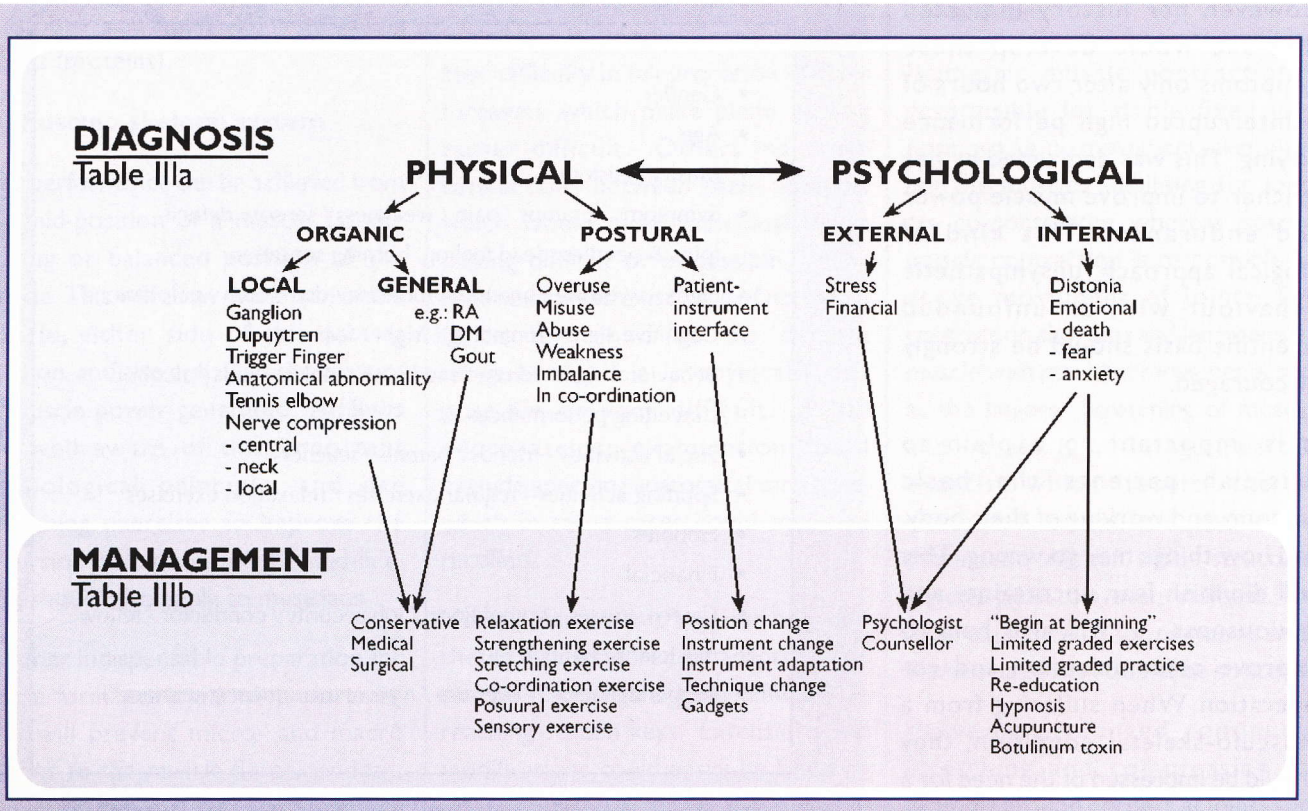
- A generalised clinical examination which includes sensory, motor and vascular examination, always comparing with the contra-lateral normal side.
- Demonstration with the instrument is often essential to highlight the problem.
- This is then followed by the specific examination of the involved part.
- Specialised investigations, e.g. nerve conduction, X-rays, technetium MDP bone scans, blood tests (to exclude conditions such as gout, rheumatoid arthritis, diabetes), biopsy from nerve, muscle or synovium should be requested if relevant.
- Diagnostic therapy, e.g. local anaesthetic with or without steroid injections may be indicated to exclude or confirm certain painful conditions
- Consultations with the other team members or experts for second opinions is often helpful before a final diagnosis is made.

3. Diagnosis: It may not always be easy to arrive at a diagnosis. Table IIIa indicates the interrelationship between physical and psychological conditions; e.g. a tennis elbow could lead to poor posture which in turn presents as a distonia.

4. Management: This depends on the diagnosis and may be multi-pronged as depicted in Table IIIb.

Table II: Examination

- General medical examination
- Neurological examination - motor / sensation
- Vascular examination - swelling / blood supply / sweating / temperature
- Physical examination - pinpoint tenderness / posture / muscle co-ordination / power
- Perform - with instrument / simulate
- Specific examination of affected part
- Special investigations - X-rays / bone scans / nerve conduction / MRI
  - Blood test (RA, DM, Gout, Muscle enzymes, FBC, ESR, LFT)
- Diagnostic measures - local anaesthesia ± steriods
- Consultations



Once a diagnosis is made the management from the hand surgeon's point of view is relatively straightforward. An anatomical variation may be corrected, a tumour may be removed, a web space may be deepened or widened and arthritic joints may be dealt with in various ways. Special consideration should of course be given when dealing with the musician's hand, such as placing the surgical scar in a position which would not interfere with the performance of the musician's hands and fingers. An arthroplasty (artificial joint) for an arthritic joint may be more appropriate than an arthrodesis (fusing the joint) in the musician whereas the reverse may be true in a manual labourer. The range of excursion of finger joints need to be considered when reconstructive surgery is done and may differ depending on the type of instrument played.

During the medical examination the emphasis should be on evaluating balance and co-ordination, and not only strength and endurance. Sometimes one sees an unbalanced posture or non-physiological position, which distorts the whole body resulting in a strained back, twisted neck, elevated shoulders, bent elbows and flexed wrists. Aches, pains and spasms will surely follow; and need to be addressed by restoring balance, prescribing appropriate exercises and attending to the musician-instrument interface.

Hyper laxity of ligaments and therefore joints may be a severe handicap to musicians. This laxity may be generalised, involving joints and/or tendons and ligaments; or localised, involving sets of joints, ligaments or tendons or only one joint, ligament or a tendon.

Repetitive strain injuries (RSI), sometimes referred to as "cumulative trauma disorders", is a very controversial topic that only enjoys wide acceptance in the USA. In South Africa we prefer to either make a definite diagnosis or regard the problem as disuse, overuse or abuse. Under normal circumstances, tissues can handle extensive exposure to repetitive movements over long periods without tissue damage, provided the general precautions have been taken, e.g. warming up, stretching and strengthening exercises, hydration, posture, etc. RSI is an artificial diagnosis seeking to place blame on some "other cause" and therefore compensation may be claimed.[13,14] To label a condition as "RSI" is dangerous and unsupportable.[15]

Gliding of tissues can be curtailed severely by swelling. The mucous lining or synovium, is an anatomical structure to enhance gliding. Once this gliding layer which is responsible for lubrication is inflicted by disease and swelling, movement will be severely effected. Stiff joints and fingers can often easily be treated with an anti-inflammatory drug to reduce the swelling and increase movement.

Sensory education and development has never been stressed when training musicians. One modality of sensation, namely proprioception (that is placing the hand and fingers in space) is such a fundamental function of all the joints of the body that without this modality no musical instrument could be played at all. Therapists should especially concentrate on proprioceptive acuity after an injury, surgery or in-patients with hyperlaxity.

During the rehabilitation phase, the measurement of improvement is a certain psychological boost, however it is important to set limited, graded goals for a slow build-up especially if the original problem was a result of overuse, misuse or disuse.

Occupational cramps, or to be more specific, musicians' cramps are also referred to as focal distonia. Fortunately they are much more rare than is generally believed. Provided physical conditions, postural imbalances and overuse injuries have been eliminated, one may consider a distonia. The management thereof should be very sensitive and with a great deal of empathy, understanding and patience. Stress situations such as overbearing parents or unreasonable teachers should be identified and dealt with circumspection. Assessments by occupational, physical and hand therapists as well as the psychologist prove to be helpful. Once the problem is unravelled, analysed and understood it is advisable to start right at the beginning and slowly build up to a level of performance, which would match the ability of the musician. Again, slow, graded, and attainable goals should be set.

Finally, since many conditions may be interrelated and may have an emotional or a psychological overlay, a combination of treatment options need to be considered. This includes drug therapy for stage fright, anxiety, excessive sweating and tremors. Musicians should not use sedative drugs such as the benzodiazepines, since they cloud judgement, cause sleepiness and depression and lead to addiction. Alcohol may "calm the nerves" and boost one's confidence, but also may cloud the judgement and suppresses reflex time. It may be wise to follow the general rule: "Don't drink and play".

Caffeine, which is contained in coffee, tea and cola, may cause tremor, anxiety and insomnia. Other drugs, such as beta-adrenergic receptor antagonists (e.g. propranolol) block the physical effects of adrenaline such as anxiety,

tremor, sweating and reduce the heartbeat. Generally, they are safe in healthy people, but should not be used in patients with asthma, heart problems and pulmonary obstructive disease. Side effects may however include slowing of finger movement and insomnia. These drugs do not enhance performance, but will allow a more optimal performance. When these are prescribed for the first time, the dose and timing should be tried on a non-important event. However, on a cautionary note, one should emphasise that these medicines should only be used as single doses for the exceptional occasion. If a drug is used regularly the musician may become psychologically dependent on this "crutch", so that performance without these drugs may become difficult or even impossible.

Conclusion

Very often factors such as job security and pressure from peer and support groups prevent the musician from making an issue of his or her specific ailment. Musicians should develop the confidence to approach their teachers, conductors, parents and peers should they have a problem. It is better to solve the problem earlier rather than later, as it will make rehabilitation and the earlier achievement of peak performance much easier. Musicians should also have the right to have "off days", make mistakes and be "out of synch" with their biological clockwork. Often insurmountable problems, as seen from the musician's perspective, may indeed be a simple medical problem that could easily be solved.

I would like to suggest that a panel of interested experts in their various fields who deal with music and musicians be established in South Africa. The names and addresses of these panel members should be freely available and a free communication should exist between these members for consultations and second opinions. Regular meetings could be held to co-ordinate the activities, improve understanding between the team members, introduce new team members and to make known the available expertise to the public at large. Interested persons can contact the author.

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