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Promoting health and wellbeing in young dancers and musicians

Joint Hypermobility in Musicians

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Summary

Joint hypermobility (a larger than average range of movement at a joint), which can be inherited or acquired through training, is often found in musicians, who are essentially athletes of the arms. As in dancers, where it can be an asset or liability, it probably endows certain advantages to the performer. Since it is often localized to the hands and wrists which are not weight bearing joints, and perhaps because many musical instruments provide some stability, it does not normally lead to injury.

It can however, produce some chronic problems. This article tries to explain why and how so that teachers can modify technique whenever necessary and so that young performers can better understand the causes with any anxiety allayed.

Introduction

This is one of two articles discussing joint hypermobility; the other is applied to dance. "Joint Hypermobility" is here used to mean a joint with a larger than average range of movement. It does not refer to the frequency or rapidity with which a joint is used.

The range of movement that can be achieved at a joint is relevant to the playing of many instruments both in determining digital dexterity, where it can be both an asset or liability, but also at joints further distanced from the instrument, in determining posture and optimum playing position.

Causes of Hypermobility

The range of movement at any single joint varies throughout the population according to several factors which vary from individual to individual. Some are hereditary and others acquired.

Everybody's joints are naturally flexible to allow for ease of movement. However bone shape varies between individuals which may give greater flexibility depending on the person. For example at a ball and socket joint such as the shoulder, a joint endowed with a shallow socket will have a wider range of potential movement than one with a deep socket. This is unlikely to be altered by training.

Stability is mainly achieved by the strength of the collagen, or strengthening protein in the joint capsule, the elasticity of which varies between individuals according to its chemical structure which is inherited, but which can be stretched by some 10% by training.

Further stability is procured by strengthening the muscles that act around a given joint through appropriate athletic training just as techniques to relax or stretch muscles will restore the range of movement.

It is also probable the subconscious nerve control to the joints is altered in subtle ways in hypermobile individuals. There is increasing evidence, for example, of slight impairment in proprioception, that is the ability of the brain to recognise the exact position of the joint at any one time, which is obviously a desirable feature especially in both musicians and dancers.

Clearly a detailed assessment of the extent to which some or all of these factors contribute in any one individual is of value to the elite performer and informs on future management of the condition.

Quantification of Joint Laxity

A five point questionnaire (Table 1) has been validated as a very simple first screen when there is suspicion of hypermobility. Its high sensitivity and specificity confirm it is extremely reliable in detecting hypermobility.

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Table 1: A five point questionnaire for the detection of hypermobility

Do you have Hypermobility?

Here is a 5-part questionnaire to identify hypermobility. If you answer yes to at least 2 of the 5 questions then there is an 80-90% chance you are hypermobile.

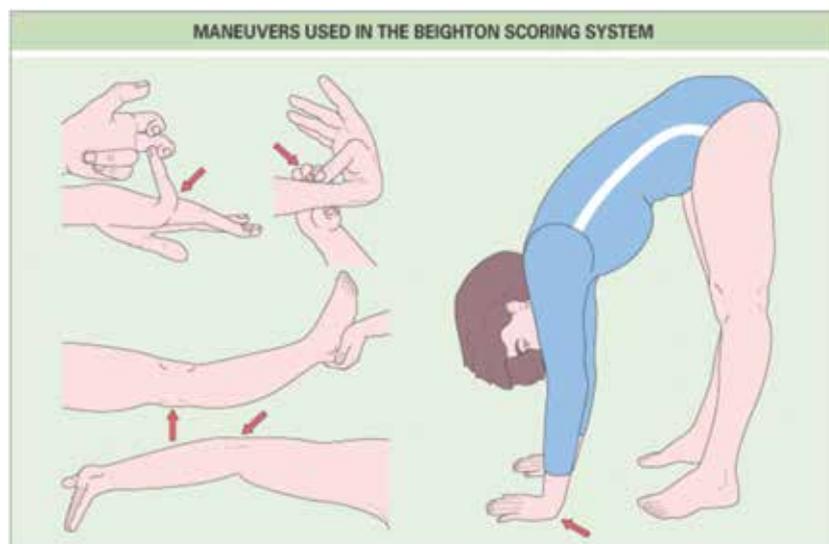
- >> 1. Can you now (or could you ever) place your hands flat on the floor without bending your knees?
- >> 2. Can you now (or could you ever) bend your thumb back to touch your forearm?
- >> 3. As a child did you amuse your friends by contorting your body into strange shapes or could you do the splits?
- >> 4. As a child or teenager did your shoulder or knee cap dislocate on more than one occasion?
- >> 5. Do you consider yourself to be double-jointed?

Answer in the affirmative to two or more questions suggests hypermobility with sensitivity 80-85% and specificity 80-90%

Source: Prof Rodney Grahame & Dr Alan Hakim Department of Rheumatology, University College Hospitals, London

The conventional simple medical screen for the detection of joint laxity, developed for rapid use in rural African populations is known as the Beighton 1973 scoring system (Table 2 and Figure 1). One point is allocated for the ability to perform each of nine simple manoeuvres though the threshold for defining hypermobility, usually 4 or 5 out of 9, is somewhat arbitrary and is influenced by gender, race and especially by age.

Fig 1: Beighton diagrams



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Table 2: The 9-point Beighton Scoring System for Joint Hypermobility Scale

Scoring 1 point on each side
>> Passive dorsiflexion of the fifth metacarpophalangeal joint to 90°
>> Apposition of the thumb to the flexor aspect of the forearm
>> Hyperextension of the elbow beyond 10°
>> Hyperextension of the knee beyond 10°
Scoring 1 point
>> Forward trunk flexion placing hands flat on floor with knees extended
Maximum score = 9
<i>(Adapted from Beighton et al.)</i>

Several alternative scoring systems exist. The Brighton 1998 scoring system incorporates the Beighton score but also considers symptoms both at the joints and at other parts of the body leading to the concept of Hypermobility Syndrome. The majority of features of Hypermobility Syndrome probably reflect collagen structure, though its value in musicians has not been studied. The Bulbena score concentrates on the joints but in greater depth.

Clearly none of these methods were designed specifically to assess and inform musicians or dancers or their teachers and there is now an urgent need for new scales for use in these specialized professions. For dance, an adaption of existing scales of laxity might suffice though an assessment of potential flexibility and injury risk for ballet might differ considerably from that for contemporary dance. An evaluation of musicians might also incorporate the use of mechanical devices to measure finger laxity which would be of especial importance.

Instruments

For musicians, the particular instrument played also needs to be considered. For keyboards, the ideal flexibility might be equal in both hands and uniform across all ten fingers. For woodwinds, in general less finger flexibility is required across the nine fingers used to play than with keyboards and the thumb, which supports some woodwind instruments, benefits from stability. Although small the flute is especially complex and often awkward to hold. With brass, a large chest is desirable and for the trombone strength and laxity of the shoulders is important. The strings require quite different functions between the two arms, players benefiting from laxity at the right shoulder and laxity of the fingers in the left arm. The greatest difference between the two hands is perhaps found in the classical guitar.

Crucially, and unlike clothes or shoes, all instruments tend to be a single uniform size, the player, whatever their size or shape, having to adapt as best they can for long periods of practice.

Manual Dexterity

For some instruments, especially the piano and strings, the requirements made upon the hands by the various composers vary considerably. The difficulty of the violin works of Paganini and the piano works of Rachmaninov, both themselves performers, have been attributed to the hyperlaxity of the hands that they undoubtedly both possessed. The

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keyboard works of Bach often prove difficult for large hands. The wide variety of techniques required for the piano etudes of Chopin attest to the various combinations of strength, endurance and flexibility that were considered desirable at the time. The stretch required in the left hand of a classical guitarist is considerable.

In general, where additional finger laxity is felt to be desirable, scales and technique studies probably provide the best and safest way of increasing finger stretch. For some instruments, for example the flute, a variety of devices are available to give stability to hyperflexible fingers.

Body Posture

With the larger instruments positioning of the upper arms, shoulders and especially the spine becomes important. Here, hyperlaxity may be more of a liability, leading to slouching positions that cause discomfort. Hyperlaxity of the shoulders will need strengthening of the muscles that act about that joint though the spine may also need spinal strengthening exercises and careful attention to posture since in string players the shoulder and spine act together when playing. The Alexander technique is invariably helpful though the gentler types of Pilates and the strengthening types of Yoga both have their advocates.

The cello can cause particular problems if there is a slight twist in the spine. It is also important that the chin rest for the violin or viola provides an exact fit.

Pain

It is not certain why a small proportion of people with hypermobile joints experience pain. There may be several reasons for this that are discussed in more detail elsewhere (see references). The principal theory is that this represents an overuse syndrome of the sort that is fashionable in athletes. Simplistically, the hypermobile joint requires exertion of the muscles around it to stabilize it in a firm position before it is moved to play the instrument. With a stiffer joint, already held in the correct place prior to playing, this extra exertion is not required. It is also possible that hypermobile joints develop a small effusion or collection of fluid in the joint when under stress, the pressure effect of which causes stiffness, possibly pain.

There is reasonable evidence that joint hypermobility acts as one of the predisposing factors for "Work Related Upper Limb Disorder", previously termed "repetitive strain injury" or RSI, probably through the element of inherent overuse described above.

Growth

Young musicians are still likely to be growing. There is evidence that symptoms attributable to joint hypermobility are more frequent at some times than others.

In males the successive growth spurts seem to cause episodic exacerbation of symptoms for a few months after each spurt, probably through the physical stretching of tendons and ligaments as the bones lengthen.

In females growth spurts can also aggravate but the onset of menstruation is more normally incriminated, probably as a result of hormonal changes, since the female sex hormone progesterone has a relaxant effect on collagen. Sometimes this results in more pain at lax joints around the time of menstruation and since this can also be associated with a little clumsiness, may in part be mediated through proprioception as well.

Sometimes the introduction of a hormonal preparation containing a progestogen (an artificial progesterone), can aggravate symptoms too.

Proprioception

The possible link between hypermobility and impairment of proprioception has not yet been studied in depth in musicians but seems likely and if confirmed might prove a further undesirable association of hypermobility. Appropriate apparatus is now available (Figures 2/3). Other clues such as delay in walking and balancing as a child or excessive clumsiness or awkward gait might

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arguably point to those at particular risk. This would be important since specialist proprioceptive training is available and might be required especial for those playing instruments where proprioception was important.

Fig 2: Proprioptometer

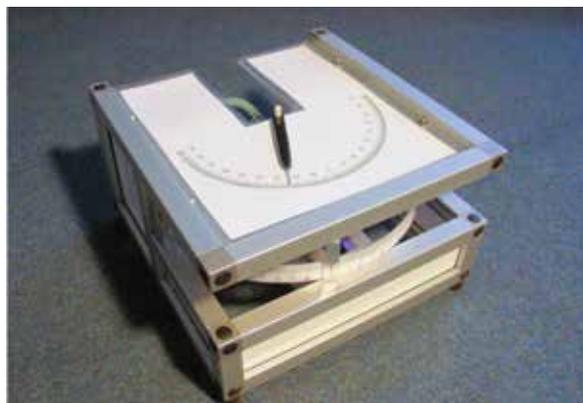


Fig 3: Proprioptometer



Warm-up

A formal warm-up of up to 20 minutes including cardiovascular exercise and stretching, of the sort recommended for dancers even before their class, is probably not appropriate for musicians. Better is a few minutes of less specific exercise in a warm room before starting with scales and warm-up exercises on the instrument, keeping the most challenging composers towards the ends of the practice session. All this makes good physiological sense as well as for technique.

Appliances

Although splinting alone can restrict performance even with the risk of disuse atrophy, a variety of safer ingenious aids are available. Figures 4-6 show a selection of those used by flautists.

Fig 4: Aids for flautists



Fig 5: Aids for flautists



Fig 6: Aids for flautists



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Management

Until such time as a medical assessment becomes part of the curriculum for the elite musician in training, and/or assessment/improvement clinics become commonplace, precise guidelines are perhaps beyond the scope of this article. With variability present amongst individual musicians (both through nature and nurture), between instruments and between the requirements of the composers, tailored advice becomes a highly specialized area.

Perhaps better that the teacher and performer should both be well informed and therefore able to approach and solve each problem as it arises.

Not all composers will suit particular performers, which can be remedied, nor all instruments suit anyone body shape and size, which may be more problematic. Hypermobility of the hands and fingers, as in the case of more widespread hypermobility in dancers, can be an undoubted asset and is not necessarily a liability but may at times need some care and attention as well as common sense.

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