

Musical Rehabilitation

James LUK

Antonius Stradiuarius Cremonensis
Faciebat Anno 1702



Case

- Mr. Yik, 75 year-old
- Living with wife, no children
- University level of education
- Ex second violinist of the HK Orchestra
- Worked as a violin teacher in Bonham Road
- His wife is a piano teacher
- ADL and IADL independent
- Still earning his own living

Past History

- Hypertension
- Haemorrhagic stroke with intracerebral haemorrhage
- Good recovery.

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Presentation

- Admitted to QMH because of
 - Drooling of saliva
 - Slurring of speech
 - Left side weakness
 - Unable to walk

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Physical examination in QMH :

- Left side limb power: upper limb: 1/5; lower limb: 2/5. Upper motor neuron signs on left.
- Right side limb power 5/5
- Sensation normal
- No cerebellar sign
- Mouth deviation compatible with lower motor neuron VII nerve palsy
- Dysarthria (Bulbal type)
- Dysphagia

Progress

- CT unremarkable except calcified basilar artery
- Diagnosis = brainstem stroke
- Patient was transferred to FYK for rehabilitation

Progress

- Ryle's tube was inserted for feeding.
- VFSS was arranged by speech therapist.
- Oral feeding was tried later after VFSS and he tolerated well
- RT was off completely

Progress

- Developed retention of urine during rehabilitation.
- Foley was inserted. Urine culture grew MSSA.
- Zinnat was given. AXR showed fecal loaded bowel. Daily bowel opening was maintained by laxatives. Foley was then successfully weaned off.

- Power of limbs gradually improved to 4/5 on left upper and lower limbs with weakness more over the distal extremities

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Progress

- Bulbar symptoms including dysarthria, dysphagia improved
- Still drooling of saliva
- ADL needed assistance
- Walked with assistance

Patient's 2 wishes – first wish

- Patient has strong wish to play violin again so that he can continue to teach violin
 - His right UL power normal – no problem in holding bow
 - Left hand (the string hand) finger was weak and dexterity impaired – unable to play strings
 - Unable to stand independently to play violin
 - Severe drooling of saliva – might damage his expensive violin (the cheapest one more than HK\$ 300,000!)

Patient's 2 wishes – second wish

- He wanted to go home instead of going to institution
 - Problems:
 - BADL needed assistance – toileting, bathing, dressing etc
 - Wife still teaching piano at home. Too busy to take care of him. Previously he cooked and did daily chores at home
 - He did not want to disturb his wife teaching

Plan made with the patient

- Step by step approach
 - Train standing and walking balance
 - Train left hand power and dexterity
 - Start violin training after the above 2 achieved (targeted training)

Placement

- A conference between patient and his wife was arranged.
- Patient agreed placement at a private old age home
- Continue rehabilitation at GDH after discharge

TWH GDH

- After training in TWH GDH for 2 months, he could walk and stand independently
- His left hand power improved to 5-/5 and dexterity better
- The concept of home exercise was taught to the patient and he started training himself in OAH

Musicians occupational disorders and related therapies

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Characteristics Ergonomic factors

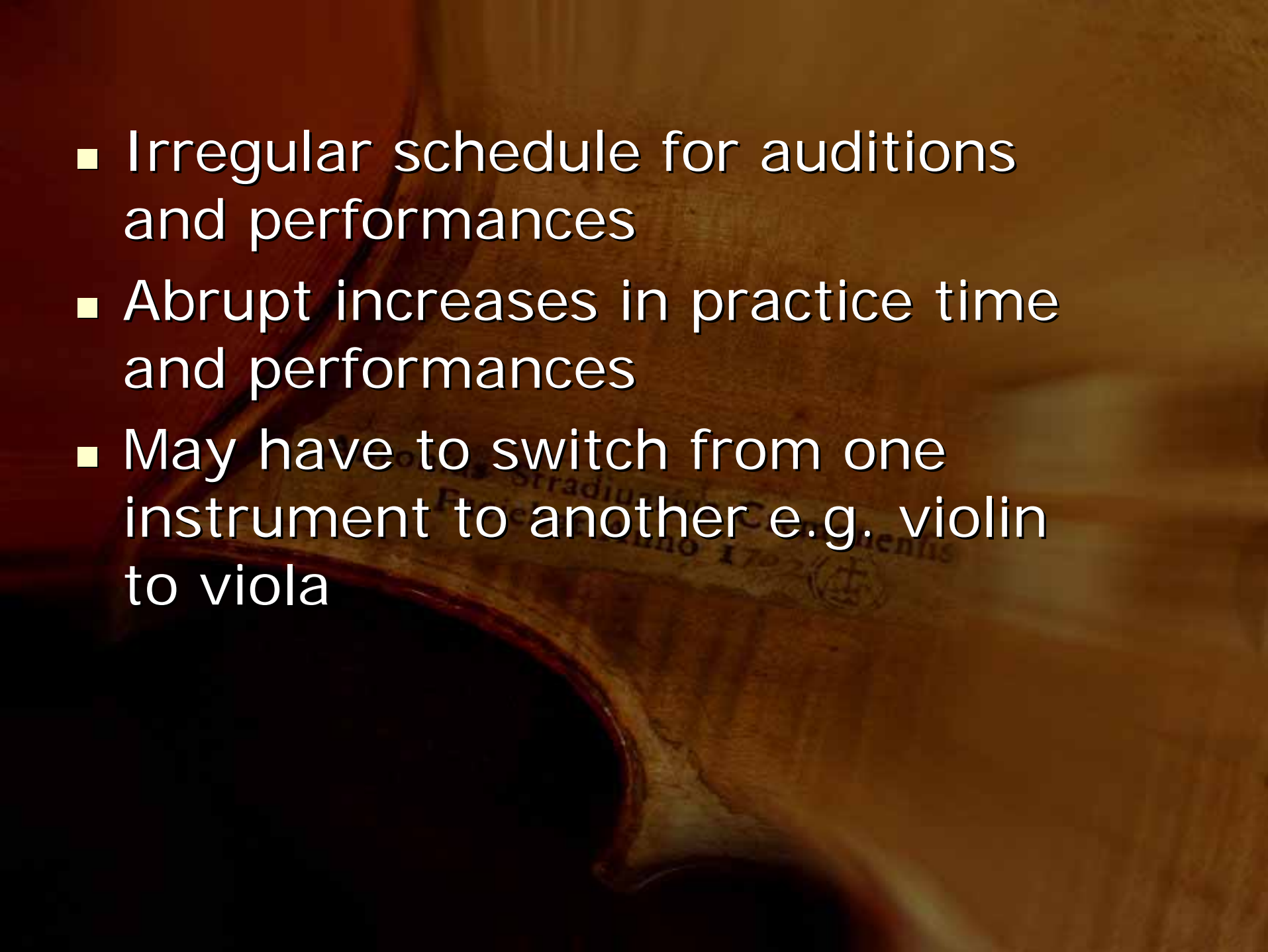
- Early start on the instrument
 - Majority of musicians start playing long before final growth has occurred in their musculoskeletal system
 - Highly competitive environment and a limited number of secure job
 - Lack of enthusiasm in seeking medical help
- *Bejjani FJ, Kaye GM, Benham M: Musculoskeletal and neuromuscular conditions of instrumental musicians. Arch Phys Med Rehabil 1996;77:406-413*

- Musicians often spend many hours a day holding a musical instrument and/or performing repetitive motions.
- The body's anatomical structures are simply not designed for the repetitive actions required by musicians in practice and performance.

- *Sataloff RT, Brandfonbrener AG, Lederman RJ (eds): Textbook of Performing Arts Medicine. New York, Raven Press, 1991, p 1*

The causes of these injuries vary such as:

- lack of warm-ups,
- excess tension in the upper extremities while practicing,
- improper musical techniques,
- faulty ergonomics (i.e., the wrong size instrument for a particular musician).

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- Irregular schedule for auditions and performances
 - Abrupt increases in practice time and performances
 - May have to switch from one instrument to another e.g. violin to viola

Most technically demanding piece

- Playing very difficult pieces beyond their ability

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Psychology

- Psychological stress – anxiety and nervousness
- This may lead to a lot of psychiatric problems amongst musicians
- *It's an open secret that at least half are taking beta blockers to slow down racing pulses and calm nerves.*

Playing through pain

- Some musicians – tendency to play via pain
- This would make their art better
- Some string players have been known to practice passages over and over until their fingers bleed

Evidence suggested that musculoskeletal changes are adaptive

- Compared with control:
 - Decreased internal rotation of left shoulder in 9% of violinist
 - Violinist left shoulder is higher than the right
 - Violinist right upper extremity longer than the left

Goal setting in musicians

- Many musicians and composers set goals that they could not meet easily
- This is especially so among pianists and violinist

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Psychological stressors in 67 musicians, measured with Millon Beh Health Inventory

Psychological stressors	Mean score (total %)
Considerable self imposed pressure	58
Considerable exogenous pressure	38.6
Premorbid pessimism	28.6
Hopelessness	34
Social alienation	32.8
Hypochondriasis	36
Psychological participation in pain	45

Nature and prevalence of injuries

- In a study of 71 musicians (violin, viola, cello, bass, piano, harp, and guitar)
 - 77.5% prevalence of upper extremity disorders serious enough to impair performance
 - 62% back disorders
 - 24% neck disorders

Types of problems according to possible etiology in musicians

- Overuse syndrome, myofascial pain and inflammatory disorders
- Entrapment neuropathies
- Focal motor dystonias
- Joint hypermobility

■ *Lockwood AH. Medical problems of musicians. NEJM 1989;320:221-227*

Overuse syndrome, myofascial pain and inflammatory disorders

- Due to overuse and repetitive movements of playing
- Prolonged muscular effort to bear the weight of the instrument
- *Lederman RJ et al. Overuse syndromes in instrumentalists. Med Probl Perform Art 1986; 1:7-11*

Overuse syndrome

- Defined by Fry as a painful condition brought about by long hard use of a limb that is excessive for the individual affected, taking the tissues beyond their anatomical and physiological limits.
- *Fry HJH. Overuse syndromes in instrumental musicians Semin Neurol 1989;9:135-145*

Overuse syndrome

- Muscle is primary affected, followed by ligaments and joints.
- The predominant symptom is pain, swelling

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Treatment

- Complete rest until pain and tenderness subsided.
- Follow by gentle physical therapy to restore tone and then follow by short playing sessions

Entrapment neuropathy

- Compression by hypertrophied muscles in forearm compartments
- Anoxia due to venous congestion caused by pressure
- Traction on neural tissue from an awkward position
- Friction trauma from repetitive motion



- Lederman reported 13% entrapment neuropathy in 226 musicians

- *Lederman RJ et al. Nerve entrapment syndromes in instrumental musicians. Med Probl perform Art 1986;1:45-48*

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Median nerve entrapment syndrome

- CTS
- Pronator syndrome
- Anterior interosseous compression
- Median digital nerve compression- may occur on the radial side of left index finger of flute players

Ulnar nerve entrapment

- Repeated flexion and extension of the elbow may damage the nerve as it passes via the 2 heads of the Flexor Carpi Ulnaris in the cubital tunnel (e.g. bowing arm of the string player)
- Flute player – Guyon canal

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Radial nerve entrapment

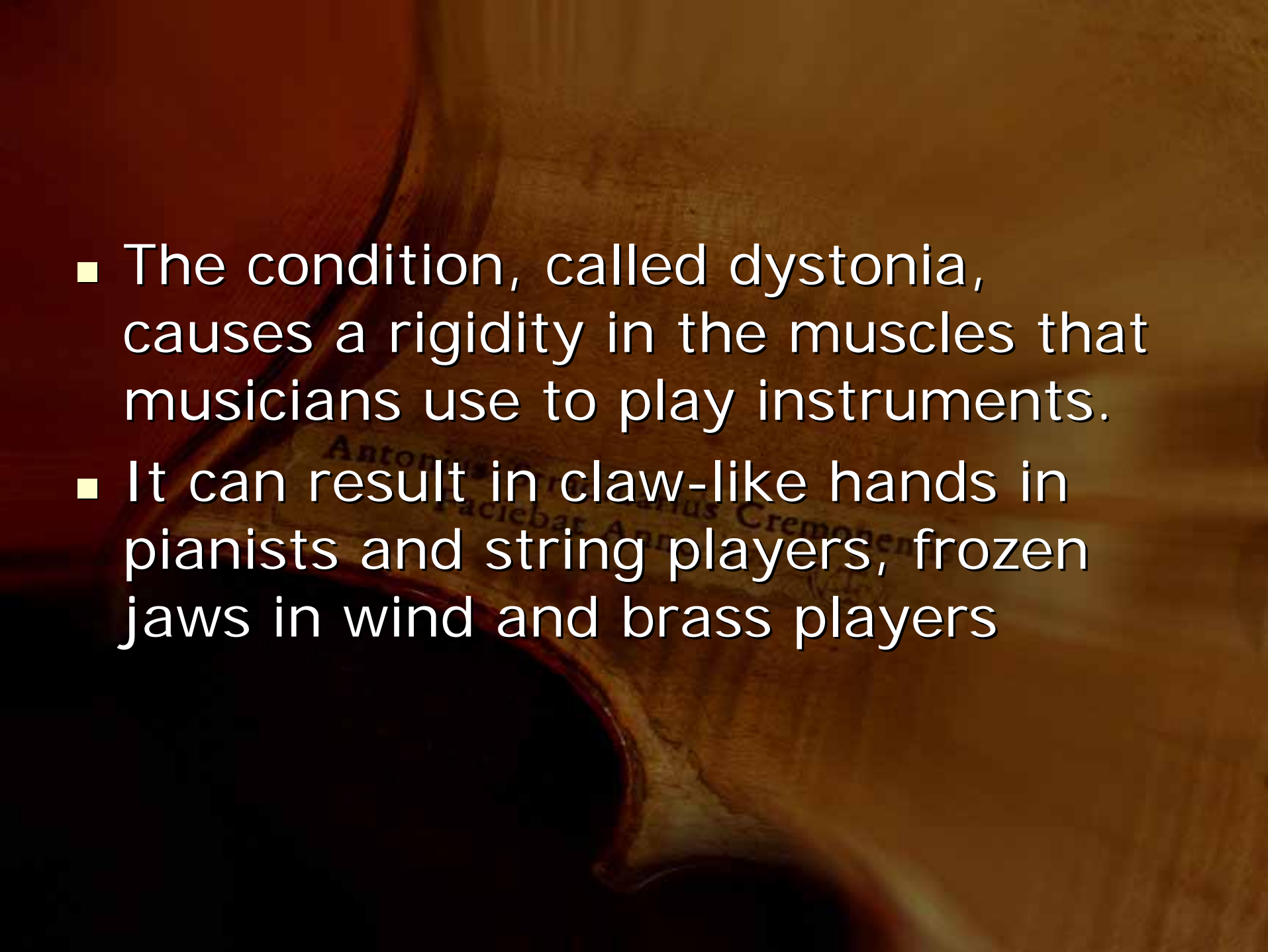
- Less common
- Involvement of the posterior cutaneous branch can occur as a result of elbow extension in drummers

Focal Motor Dystonia

- Abnormal muscle spasms or posturing of isolated muscle groups.
- The signs of involuntary muscular contraction only apparent during playing.
- Hochberg et al reported a prevalence of 1.4%
- Pathogenesis is unknown
- *Lederman RJ: Focal dystonia in instrumentalists: clinical features. Med Probl Perform Art 1991;6: 110-115*

Clive Hobday (violinist)

- "It started in 1998. My right arm suddenly collapsed and my violin bow felt like a dead weight in my hand. I could see the notes on the page and my brain knew what it had to do, but my arm wouldn't react. My fingers were like a claw around the bow....."

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- The condition, called dystonia, causes a rigidity in the muscles that musicians use to play instruments.
 - It can result in claw-like hands in pianists and string players, frozen jaws in wind and brass players

Treatment

- No definite successful treatment
- Rest, psychotherapy, steroids, injections, tricyclics, bromocriptine, etc have been tried without success
- Most promising – botox injection
- (estimated one in ten professional musician used botox as it produces swift result)

Problems of botox

- Not long lasting
- If a muscle governs three fingers but only one is affected by dystonia, it will affect the good fingers as well as the bad.
- May end up with patients who cannot play before the injection, and cannot play after

Joint hypermobility

- Most common in the MCP, IP and wrist joints
- Capsular laxity can lead to joint subluxation and affect performance

Treatment

- Increasing muscle tone with a carefully designed ex program
- Customised dynamic splinting to prevent articular instability
- Surgical reconstruction sometimes needed

Orofacial problems in musicians

- Yeo DK et al School of Dentistry, The University of Queensland, Brisbane
- Patients who play musical instruments (especially wind and stringed instruments) are prone to Orthodontic problems, soft tissue trauma, focal dystonia, denture retention, herpes labialis, dry mouth and temporomandibular joint (TMJ) disorders were identified as orofacial problems of career musicians.

Skin diseases

- The skin is important in the positioning and playing of a musical instrument.
- During practicing and performing there is a permanent more or less intense contact between the instrument and the musician's skin

- Callosities and "occupational marks" (e.g., "Garrod's pads")
- Contact dermatitis
- Skin injuries may occur in musical instrumentalists
- Skin infections such as herpes labialis common skin problem in woodwind and brass instrumentalists.

- Fisher AA: *Dermatitis in a musician. Part II: Injuries to skin, soft tissue, and bone from musical instruments.* *Cutis* 1998;62:214-215

- Violinists and violists have "fiddler's neck," an area of hyperpigmentation and lichenification on the left side of the neck
- Hypersensitivity to the chin rest of a violin or viola can produce localized eczema

- *Haustein UF: Violin chin rest eczema due to east-indian rosewood (Dalbergia latifolia ROXB). Contact Dermatitis 1982;8:77-78*

Hausen BM: Chin rest allergy in a violinist. Contact Dermatitis 1985;12:178-180

Vocal fold polyp in a professional brass/wind instrumentalist

- Wind instrumentalists, especially brass players, and singers share common factors, including vocal tract shape, function and pressure, vocal fold opening and closure.....
- Hence vocal polyp common in brass/wind musicians

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Eye problems

- The playing of high-resistance wind and brass instruments such as the oboe, bassoon, French horn, and trumpet has been associated with increases in intraocular pressure and greater incidence of visual field loss.
- *Schuman JS, Massicotte EC, Connolly S, et al: Increased intraocular pressure and visual field defects in high resistance wind instrument players. Ophthalmology 2000; 107: 127-133*

Hearing loss

- Positioning within an orchestra may have an impact on hearing loss, since some studies have shown that violinists have greater hearing deficits in the left ear, which receives more orchestral noise than the right
- *Westmore GA: Noise-induced hearing loss and orchestral musicians. Arch Otolaryngol 1981; 107: 761-764*

Diagnosis

- Sometimes difficult in less well defined entities such as overuse syndrome or muscle tension, or rarer syndromes unique to this population
- Establishment of special clinic such as Music Clinics

Examination

- It is important to observe their performance
- Videotaping the performance can allow discrete portions of the performance to be reviewed in detail.

Biomechanical profiles

- A task and instrument specific musculoskeletal performance evaluation tool that attempts to establish normal ranges of motions and activities of joints and muscles involved in a well defined musical task

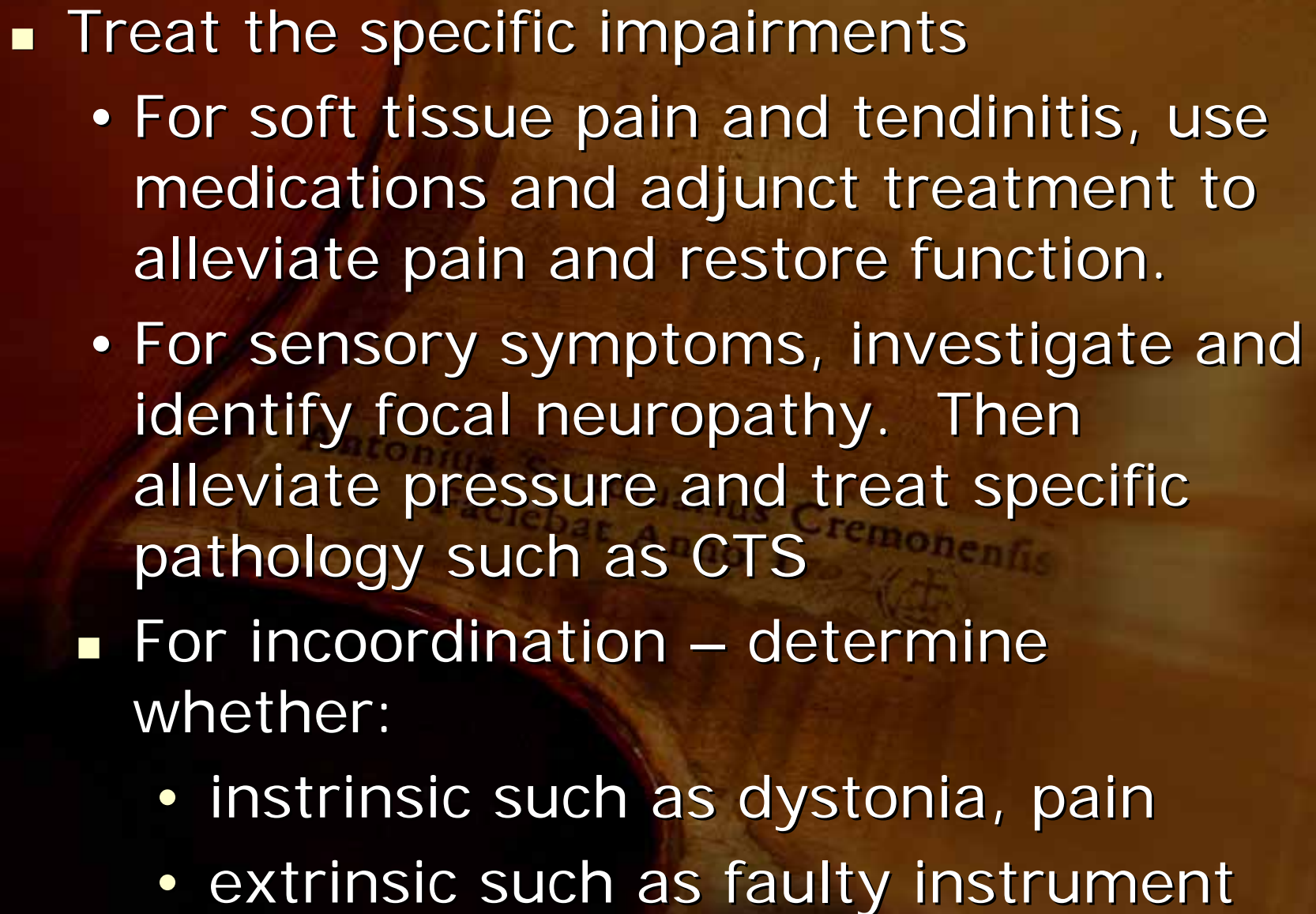
- Experienced professional musicians tested to establish the norms
- Biomechanical parameters obtained for a given musician with a musculoskeletal disorder can be compared to the norm established.
- This helps to assess musicians efficiency and appropriate use of his muscles, enhance performance and prevent injury

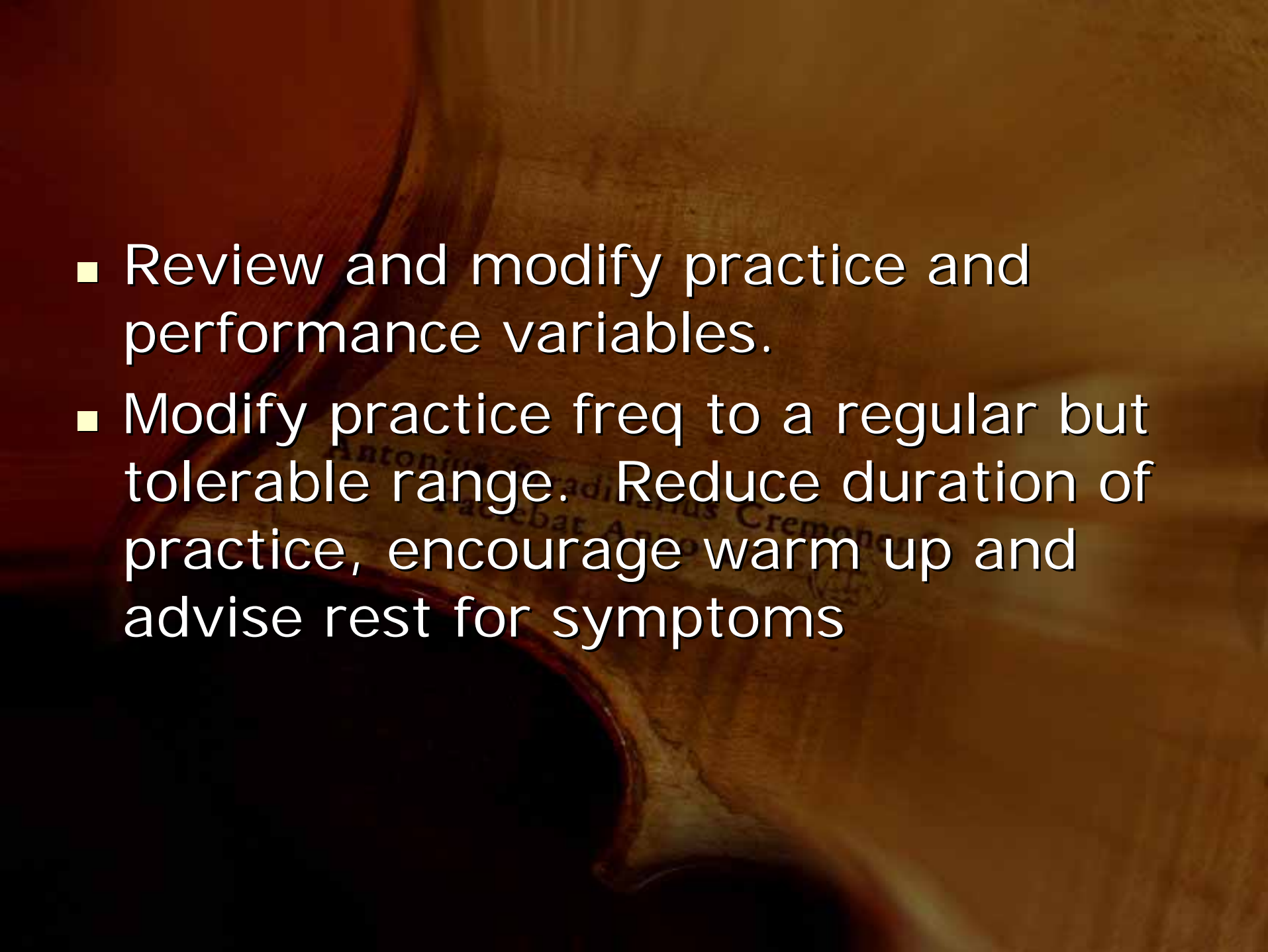
Treatment

- The type of injury, and the action leading to the injury will not only vary from instrument to instrument, but can also vary from individual to individual.
- Accordingly, this may alter the preventative measures and the treatment strategies

Steps to treat musicians

- Separate the symptoms of pain, numbness and incoordination
- Identify usual medical causes of these symptoms (ie tendinitis, CTS)
- *Potter JP et al. Medical problems affecting musicians Can Fam Phy 1995; 41:2121-2128*

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- Treat the specific impairments
 - For soft tissue pain and tendinitis, use medications and adjunct treatment to alleviate pain and restore function.
 - For sensory symptoms, investigate and identify focal neuropathy. Then alleviate pressure and treat specific pathology such as CTS
 - For incoordination – determine whether:
 - intrinsic such as dystonia, pain
 - extrinsic such as faulty instrument

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- Review and modify practice and performance variables.
 - Modify practice freq to a regular but tolerable range. Reduce duration of practice, encourage warm up and advise rest for symptoms

A close-up photograph of the body of a violin, showing the wood grain and the f-hole. A small, rectangular label is affixed to the body, containing the name 'Antonius Stradivarius Cremonensis' and the date 'Anno 1702'. The text on the label is partially obscured by the violin's body and the overlaid text.

Review playing technique – need
expert sometimes

Review and modify instruments –
expert is needed

Optimal work-rest schedule

- May be helpful for preventing and treating overuse disorders
- Flesch advised practice rule for violin:
 - 1 hour of general technique (e.g. scales)
 - 1.5 hours of applied technique
 - 1.5 hours of purely artistic playing
 - 15 min of rest every 2 hours

Alexander technique

- Using skilled hand contact a teacher observes and assesses changes in muscle activity, balance and co-ordination resulting from mental activity and provide immediate feedback
- Patients learn to recognize and adopt better thinking strategies for overall control of balance and movement

Alexander technique – whole body relaxation

- Keep the neck free
- Ensure symmetry and awareness of one's posture
- Perform relaxation and deep breathing, using both intercostal muscles and diaphragm

EMG biofeedback

- Using EMG biofeedback on the left arm extensors of string players, Morasky et al noted biofeedback facilitate significant decrease in EMG activity, improve coordination between agonists and antagonists

Visual feedback

- Visual biofeedback is used in cases which the patient performs awkward motions or sustained awkward positions
- E.g. play in front of a mirror can generate necessary feedback

Surgery

- Surgery indicated for:
- Nerve entrapment
- Trigger fingers
- Intractable rotator cuff tendinitis or tear

Severe CTS