

Disorders of the musicians' hand

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ABSTRACT

The upper limb of musicians is the primarily involved in occupational diseases, often with unpleasant consequences. Musicians are forced from time to time to visit several physicians to treat upper limb disorders. During the last 15 years several epidemiological studies, performed in specialized centers, analyzed the upper limb disorders in musicians and validated the results of treatment. The purpose of this article is to present 3 major epidemiological studies related to this subject and to compare their results to those of the general population. Overuse syndromes are more often in pianists and violinists, followed by nerve entrapment syndromes and dystonia. In the general population, overuse syndromes are 50% less often than in musicians, nerve compression syndromes are found in equal frequency, focal dystoniae are 20 times less often, and hand injuries are more often. Conservative treatment should be considered for most cases of musicians' hands disorders.

Key words: *Musicians; hand disorders.*

INTRODUCTION

Perfect, unhampered function of the upper limb is important to several professionals such as the musicians. A musician has to practice for many hours; more than 10.000 hours of practice are needed before a musician would be

able to give his first concert¹¹. The spectrum of hand and upper extremity disorders in musicians is wide; more than one medical specialties including Orthopaedics surgeons, Neurologists, Upper extremity and Hand Surgeons and Physical therapists are usually necessary for treatment of these disorders.

Musicians may experience pain in many organs and systems such as the ears in the members of an orchestra, the cervix and the temporomandibular joint in violinists, the lungs, the lips and the teeth in trompetists, etc. The most misused part of the body is the hand, because many musicians are forced to practice intensively, day by day, playing approximately 25 notes per second. Playing of a musical instrument implicates about 500 composite movements. A violinist who plays one Bachs' sonata for solo violin may perform more than 1200 movements per minute. The cause of hand injuries is the significant amount of repeated movements per minute (chronic overuse and mechanical overload) and the continuous pressure on certain parts of the body from specific music instruments such as the violin and the trumpet. There are also certain factors that deteriorate or occasionally provoke several disorders, as is the weight of the instrument, the posture, the abrupt increase of study hours, the change of the instrument, and anatomic variations of the musician.

Famous musicians like Robert Schumann and Garry Graffman suffered for many years from upper extremity and hand disorders without being able to find cure. Except from diagnosis, the most important part is that even today many musicians are forced by their disease to discontinue for a long time or permanently the art of music.

In Greece there are no specialized centers nor there have been medical studies on the disorders of the musician's hand. We designed this study to evaluate the most common disorders of the musicians hand and to present the current literature.

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DISORDERS OF THE MUSICIANS HAND

Today the high competition between high level musicians is responsible for the increased occurrence of hand disorders. The most common and important disorders of the musicians' hand are overuse syndromes^{5,7,9}, peripheral nerve compression syndromes^{5,11,13}, arthritis (most common of the carpometacarpal joint of the thumb), functional dystoniae or cramps^{2-4,6,10}, and other less common conditions such as ganglia, tenosynovitis deQuervain, hand injuries, and neuromas of the finger tufts.

Overuse syndromes are the most common occurring disorders and the most common cause of involuntary absence from their occupation^{5,7,9}. Many authors consider overuse syndromes related to tendinitis, while others claim that tendinitis is a disorder of the whole tendon and its sheath. However, in overuse syndromes the whole musculotendinous unit is affected. According to the later authors, tendinitis is distinguished in true tendonitis and pseudotendonitis, which are commonly perceived as overuse syndromes. True overuse syndromes are more common in women. Both overuse syndromes and tendinitis may coexist, or they may be stages of a same disorder. Absence from music practice, change of posture and technique during practicing, and gradual return is the most common treatment of overuse syndromes. Surgical treatment is rarely effective and should be avoided^{5,7,9}.

Nerve compression syndromes in the upper extremity of musicians display the same features as in the general population^{1,5,11,13}. Usually, they occur when music practicing is performed in certain posture such as thoracic outlet syndrome when the arm is abducted and the violin bow is horizontal. Ulnar tunnel syndrome of the hand may also occur in the left hand of violinists when the elbow is flexed excessively. Ulnar nerve compression at the elbow usually resolves with change of elbow flexion angle during playing, and with the application of night splints that keep the elbow in 140 degrees of extension and rarely using neurolysis or transfer of the ulnar nerve. Carpal tunnel syndrome very often occur in pianists and in stringed instrument musicians who use to play with their wrists in excessive flexion. According to the literature^{1,5,13}, it is concluded that rarely all of the above mentioned syndromes need surgical treatment, unless these are neglected or cause severe symptoms.

Compression syndromes of the digital nerves may lead to neuroma formation; these are more often in the thumb and index digits of wind and string instrument musicians. Arthritis usually occur at the carpometacarpal joint of the thumb and may lead to instability.

Focal dystoniae or occupational cramps^{2-4,6,7,10} have been described centuries ago. During the last 20 years the pathogenesis has been clarified, and diagnosis and treatment have been defined. Focal or functional dystoniae are painless, stereotypic, localized movements encountered in some professional groups of patients that perform many times per minute the same tasks. They are more often in males. Around the 1950's, the prevailing theories were divided into

three groups. Currently, the neurological theory, as formulated by Marsden, Sheechey and Tubiana replaced the former psychiatric pathogenetic theory of dystoniae^{2-4,6,7,10}.

Dystoniae are painless, reflexes are preserved and EMG is normal. Dystoniae share the same pathophysiologic mechanism with "writers' spasms". They may be divided into three types including involuntary flexion of the 4th and 5th finger in pianists (occasionally associated with ulnar neuritis at the elbow), involuntary flexion of the 3rd and 4th finger in guitarists (sometimes combined with 5th finger abduction), and involuntary extension of the 3rd finger in clarinetists⁸. A common finding is instability of the carpometacarpal joint of the thumb.

Dystoniae may be treated with rest, break from music, physical therapy, night splinting, administration of muscle relaxants or antidepressant agents, muscle strengthening, and combined treatments. Botulinum toxin A injections into the neighboring non affected muscles have also been used for the treatment of dystoniae²⁻⁴.

EPIDEMIOLOGICAL STUDIES

There are few studies reporting on the type and the incidence of hand and upper extremity disorders in musicians^{1,5,12,13}. In 1993, Tubiana and Chamagne^{12,15} presented their study on 243 pianists and 98 violinists. Of the 243 pianists, 88 suffered from focal dystoniae, 73 from overuse syndromes and 48 from hand injuries and compression nerve syndromes of the upper extremity; surgical treatment was performed in only 43 (17.7%) of them. Of the 98 violinists, 33 had focal dystoniae, 36 had overuse syndromes, and 19 had injuries and compression nerve syndromes of the upper extremity; surgical treatment was done in 10 of them (10%).

Amadio and Russoti¹ evaluated a series of 100 musicians (86 professionals) of a mean age of 29 years; there were 29 women and 11 men; 6 were performing more than 2 different music instruments. Most of the musicians have been practicing from 10 to 40 years, for 4 to 6 hours daily. The mean duration of clinical symptoms in their series was 20 months. Results have been evaluated regarding the music instrument, the diagnosis, the cause, the treatment and outcome. Most patients were pianists (56.5%), followed by violinists (13%), guitarists (8.7%), tympani players (6.5%), and string instrument musicians (2%). The commonest diagnosis was overuse syndromes-tendinitis (31%), compression nerve syndromes of the upper extremity (22.5%; mostly carpal tunnel syndrome in 13%, and pronator teres syndrome in 3.5%), focal dystoniae (9%), trigger finger and thumb (4.4%), hand joints instability (7%), injuries and associated complications (12%), and hand and wrist ganglia (7%). Conservative treatment was applied in most of the patients (84%); 85% of the patients returned fully to their previous activities and music status.

In their study⁵, Ignatiadis and Dumontier presented the results of evaluation 67 musicians with upper extremity and



Figure 1. The hand of a pianist is usually affected by overuse syndromes and focal dystonia.



Figure 2. The hand of a violinist. For a Bach sonata, more than 1000 movements per minute are performed.

hand disorders from 1995 to 1997 at Institute de la Main. All patients were professional or semiprofessional musicians, or music students, and have been practicing intensively for many hours per day, many of them since childhood. In these patients, hand and upper extremity disorders have been diagnosed in one or both hands.

The mean age of the patients was 34.6 years. There were 35 women and 32 men. Twenty patients were pianists, 15 were violinists, 11 were guitarists, 6 were tympani players, 6 were wind instrument musicians, 3 were contrabass players, 2 were violoncellists, and 3 musicians were practicing more than 2 music instruments. These patients have been practicing for 6 to 47 years with a mean daily practice duration of 4.5 hours⁵.

In this series⁵, most disorders occurred in pianists, violinists and guitarists. Most frequent diagnoses were overuse syndromes-tendinitides (21 patients), compression nerve syndromes (8 patients: 4 with carpal tunnel syndrome and 4 with thoracic outlet syndrome), degenerative joint disease (6 patients), focal dystoniae (8 patients), and hand injuries (18 patients). Six patients had both hands involved, and 15 patients had associated musculoskeletal diseases including low back pain, sciatica and neck pain. The mean duration of clinical symptoms was 29 months.

Duration of treatment ranged from 1 month to 1 year⁵. Surgical treatment was necessary in 9 patients. Nine patients had corticosteroid injections in addition to physical therapy, 43 patients had physical therapy and splinting, 4 patients had physical therapy and psychotherapy, 12 patients had only break from practice, and 14 patients had combined treatment. Fifty three patients had complete recovery or significant improvement; 2 patients had to discontinue music for 6-12 months, 5 patients had to decrease intensity and frequency of practicing, 1 patient with dystoniae had to change instrument of practicing, and 6 patients had to stop permanently practicing music. All patients with upper extremity compression nerve syndromes had mild symptoms and have been managed with conservative measures; only

1 patient with carpal tunnel syndromes had to be treated surgically⁵. Most patients with dystoniae were refractory to treatment; 4 of them had to discontinue music permanently and 1 had to change instrument of practicing.

In their study⁵, the most important factors related to musicians' hand disorders were the type and the weight of the instrument, the intensity and frequently of practicing, the long period of practicing before diagnosis, the posture and hand positioning, hand and upper extremity injuries, anxiety and emotional disorders, stiffness or instability of joints, weak body type, hearing and visual impairment, stressful activities besides music, and age of the musician⁵.

In all series^{1,5,11,13}, the most vulnerable group of musicians were the pianists, followed by the violinists and guitarists; the most frequent disorders were overuse injuries and tendinitides, focal dystoniae, and compression nerve syndromes, most usually carpal tunnel syndrome. Regarding treatment, there is agreement that the majority of musicians should be treated non-operatively^{1,5,12,13}.

DISCUSSION

Every music instrument may cause upper limb and hand disorders. The hands of pianists and violinists are most frequently affected. Most common associated disorders are overuse injuries, tendinitides and focal dystoniae. In contrary, guitarists most usually develop overuse injuries and tendinitides that may coexist with compression nerve syndromes because of non functional posture and positioning of the upper extremities during long-term practice and performance.

The management of patients with focal dystoniae is challenging. Probably, a psychological factor occurring prior to or following the presentation of dystonia may be implicated, deteriorating the prognosis^{1-6,10-13}. Compared to the general population of Greece, compression nerve syndromes of the upper extremity occur with the same frequency with musicians; however, surgical treatment is more usually applied, tendinitides are more rare (approximately 50%),

and dystoniae are very rare. In contrary, injuries of the hand and upper extremity are rarer in musicians compared to the general population⁵.

Currently, musicians of all performance status are required to decrease practicing or discontinue music for a long period, and rarely to stop music permanently. The major problem is ignorance or inability to diagnose the disorder, evaluate the cause and risk factors, and determine the most appropriate treatment for early return to music practicing. Many musicians accept pain as a result of their work, while others avoid presenting their symptoms fearing of the consequences to their career.

General Orthopaedic surgeons should be aware that hand and upper extremity disorders of the musicians should not be treated surgically. Recognition and management of hand and upper extremity disorders should include knowledge of the music-specific disorders, prevention, consultation regarding posture and technique of practice and performance, proper warm-up and regular breaks, and "cooling" just like the athletes after practice, psychological support, and cessation of music even for long periods if necessary. Developed countries have already created specialized institutions for the management of the disorders that occur in musicians, and have established the field of "Musicians' Medicine".

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