

JACO

**Journal of the Academy of
Chiropractic Orthopedists**

2014



Volume 11

Issue 2

June, 2014



JACO

Journal of the Academy of Chiropractic Orthopedists

The Open Access, Peer-Reviewed and Indexed Publication of
the Academy of Chiropractic Orthopedists

June 2014 – Volume 11, Issue 2

Editorial Board

Editor-In-Chief

Bruce Gundersen, DC, FACO

Editor

Stanley N. Bacso, DC, FACO, FCCO(C)

Associate Editors

James Demetrious, DC, FACO

David Swensen, DC, FACO

Alicia Marie Yochum, R.N, D.C.

Current Events Editor

James R. Brandt, DC, MPS, FACO

Editorial Advisory Board

James R. Brandt, DC, MPS, FACO

Ronald C Evans, DC, FACO

James Demetrious, DC, FACO

Michael Henrie, DO

Reed Phillips, DC, PhD

Robert Morrow, MD

Editorial Review Board

Scott D. Banks, DC, MS	Gregory C. Priest, DC, FACO
Ward Beecher, D.C., FACO	Joni Owen, DC, FACO
Thomas F. Bergmann, DC	Deanna O'Dwyer, DC, FACO
Gary Carver, DC, FACO	Joyce Miller, DC, FACO
Jeffrey R. Cates, DC, FACO	Loren C. Miller DC, FACO
Rick Corbett, DC, DACBR, FCCO(C)	Raymond S Nanko, DC, MD, DAAPM, FACO
Anthony Vincent D'Antoni, MS, DC, PhD	J Chris Romney, DC, FACO
Donald S. Corenman, MD, DC, FACO	Roger Russel, DC, MS, FACO
James Demetrious, DC, FACO	Stephen M. Savoie, DC, FACO
Neil L. Erickson, DC, DABCO, CCSP	David Swensen, DC, FACO
Simon John Forster, DC, DABCO	Larry L. Swank, DC, FACO
Jaroslav P. Grod, DC, FCCS(C)	Cliff Tao, DC, DACBR
Tony Hamm, DC, FACO	John M Ventura, DC, FACO
Dale Huntington, DC, FACO	Michelle A Wessely BSc, DC, DACBR
Keith Kamrath DC, FACO	Michael R. Wiles, DC, MEd, MS
Charmaine Korporaal, M.Tech: Chiropractic, CCFC, CCSP, ICSSD	James A. Wyllie, DC DABCO
Ralph Kruse, DC, FACO	Steve Yeomans, DC, FACO
Clark Labrum, DC, FACO	Alicia Marie Yochum, R.N, D.C.

Journal of the Academy of Chiropractic Orthopedists

June 2014 – Volume 11, Issue 2

Image and Art Gallery

- ❖ Crooked Forest – Poland. JACO 2014, 11 (2): 1.

Abstracts and Literature Review

- ❖ Asplund, C and Best, T: **Achilles Tendon Disorders** Reviewed by Erickson, N. JACO 2014, 11 (2): 3-5.
- ❖ Paik,R. Douglas A Pepple, Mark R Hutchison **Chronic exertional compartment syndrome** Reviewed by Corbett, R: JACO 2014, 11 (2): 7-9.
- ❖ Pieter Bas de Witte, Jochem Nagels, Ewoud RA van Arkel, Cornelis PJH Visser, Rob GHH Nelissen and Jurriaan H de Groot **Study protocol subacromial impingement syndrome: the identification of pathophysiologic mechanisms (SISTIM)** Reviewed by Labrum, C: JACO 2014, 11 (2): 11-14.
- ❖ Han-Sung Lee, Ho Youn Park, MD, Jun O Yoon, MD, Jin Sam Kim, MD, Jae Myeung Chun, MD, Iman W. Aminata, MD, Won-Joon Cho, MD, In-Ho Jeon, MD **Musicians' medicine: musculoskeletal problems in string players** Reviewed Wiles,M: JACO 2014, 11 (2): 15-17.

Radiology Corner

- ❖ Yochum, A. M.: **Spondylolysis: Active- Inactive- Pending?.** JACO 2014, 11(2): 18-23.

Announcements

- ❖ September Diplomate Examination. JACO 2014, 11 (2): 24.
- ❖ University of Bridgeport Program

Crooked Forest - Poland



The **Crooked Forest** (Polish: *Krzywy Las*), is a grove of oddly-shaped pine trees located outside Nowe Czarnowo, West Pomerania, Poland. This grove of approximately 400 pines was planted around 1930, when its location was still within the German province of Pomerania. It is generally believed that some form of human tool or technique was used to make the trees grow this way, but the method and motive are not currently known. It has been speculated that the trees may have been deformed to create naturally curved timber for use in furniture or boat building.

CHIROPRACTIC FOCUSED ■ LEADER IN MALPRACTICE ■ EXPERT DEFENSE



NCMIC

We Take Care of Our Own®

NCMIC Stands Out Among the Rest

[Click here](#) to learn more
about NCMIC offerings.

Malpractice Insurance Plan is offered through NCMIC Insurance Company.
Policy terms may vary by state law.

www.ncmic.com/3120

Abstracts & Literature Review

Achilles Tendon Disorders

Chad A. Asplund, Thomas M. Best

Clinical Review- March 16, 2013; Volume 346.

JACO Editorial Reviewer: Neil L. Erickson, DC, DABCO, CCSP

Published:

Journal of the Academy of Chiropractic Orthopedists

June 2014, Volume 11, Issue 2

© 2014 Erickson and the Academy of Chiropractic Orthopedists. This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Authors' Abstract:

Disorders of the Achilles tendon are common in active people—competitive and recreational athletes alike—but they can occur in less active people as well. As the largest tendon in the body, the Achilles experiences repetitive strain from running, jumping, and sudden acceleration or deceleration, so is susceptible to rupture and degenerative changes. This review aims to describe the anatomy and diagnostic evaluation of the Achilles tendon, and to discuss the best available evidence to help in the management of Achilles tendon disorders.

Background

The authors begin with a brief anatomical review of the Achilles tendon including the paratenon "...a sheath of flexible connective tissue that allows for a gliding action." An epidemiological discussion follows relative to the stresses placed on the tendon and the mechanisms for its breakdown. A useful

algorithm for the treatment of Achilles tendon disorders is included in their article.

Methods

This paper is a review article extracted from a search of 70 references, 57 of which met the author's inclusion criteria. Their paper addresses two categories of Achilles tendon disorders, each divided into two sub-groups. Tendinopathy is considered at the insertion of the calcaneus and in the midsubstance of the calf. Rupture is considered as complete and incomplete.

Results

The onset of both tendinopathy and rupture are characterized by a feeling of sharp sudden pain. "Most Achilles disorders are diagnoses clinically." Imaging in the form of MRI or ultrasound can be useful. The differential diagnosis of posterior heel pain from other causes is discussed. A surgical consultation is recommended for complete tendon rupture. References addressing

eccentric calf exercises were found most frequently and had the best outcomes. Other treatments included counseling patients to avoid the offending activity, weight bear as tolerated and use a heel lift to shorten the Achilles tendon. Acetaminophen is used as needed for pain. Other references suggest that low energy shock wave and low level laser therapy when added to eccentric exercises is beneficial. Lastly, glyceryl trinitrate in the form of a transdermal patch directly over a painful site is recommended.

Conclusions

Most patients will respond favorably with conservative care. Surgery is reserved for those who do not respond as expected. Although the recovery time can be lengthy, good outcomes are seen following both conservative and surgical interventions. One of their references indicates that 85% of patients were asymptomatic after eight years.

Clinical Relevance

The clinical relevance for the chiropractic orthopedist is anchored to the notion that conservative care is just as effective for this condition as surgical management. Furthermore, the rehabilitation of the post-surgical case mustn't be forgotten.

JACO Editorial Summary

On the whole this is a well-written article. The summary points listed at the bottom of the 1st page could easily be used as my 5

bullet points of interest. Additional items that I found of interest are as follows

1. The Achilles tendon is surrounded by a paratenon- a flexible connective tissue sheath.
2. A positive family history raises the risk of Achilles tendinopathy - almost 5 times.
3. Other associated medical factors include hypertension, hyperlipidemia and diabetes.
4. Treatment outcomes can be similar for conservative or surgical management.
5. Surgery for tendinopathy is reserved for patients who do not respond after 6 months of conservative measures.

The authors post "Areas for future research". One addition to this list might be a consideration of the cause of tendon degeneration.

Summary

The reader is left confused as to the presence of inflammation in this disease process. The authors site an equal number of references contending that this condition is associated with inflammation when compared to those where inflammation is absent. The authors did not address the ramifications to the musculoskeletal system when fitting the patient with a unilateral heel lift. The treatment choice of acetaminophen for pain control rather than nonsteroidal anti-inflammatories for both pain and inflammation control is noted. The absence of treatment recommendations relative to

cryotherapy or heat therapy is also noted. A caution to readers that applying any transdermal patch (glyceryl trinitrate) to the same area can result in skin irritation was not found in the paper. The wisdom of applying any transdermal patch below the

elbow or knee is questionable. The degenerative processes leading to tendon pathology are not identified by the authors; perhaps because these processes are unknown.



Cox[®] Seminars, Webinars, Workshops

share
evidence-based protocols and outcomes for spinal pain treatment

Cervical Spine—Thoracic Spine — Lumbar Spine

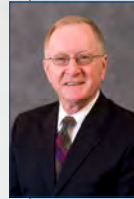
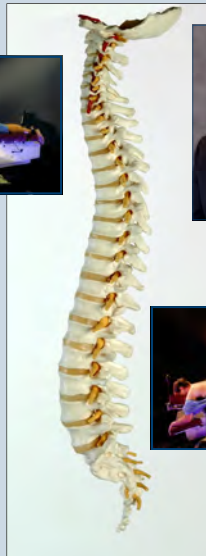
Research Outcomes

- Federally Funded HRSA Projects
 - Better for Radiculopathy Relief
 - Better for Chronic Moderate/Severe LBP
 - Better for Chronic Mild LBP
 - Better for Recurrent Mild LBP
 - Fewer Doctor Visits 1 year later
 - IVD Pressure Drop to **-39 to -192 mm Hg**
 - 28% increase in intervertebral foramen**
 - Better for LBP relief 1 year later
 - NEW! Cervical Spine IVD Pressure DROPS!**

"...taking the Cox courses over this year has really revived my enthusiasm for the profession and the practice, and opened me up to the power of what we can do. **Having the EVIDENCE and the PROTOCOL for back and neck pain has made a huge difference for me.**"

Keith Olding, DC

Get ACO Recertification
Credits with Cox[®]
Courses!



Designed by Dr. James Cox, founder of Cox[®] Technic Flexion-Distraction and Decompression, Cox[®] Certification Courses offer **evidence-based application and support** to chiropractic physicians who invite the tough cases — **the disc herniation and stenosis cases** — as enthusiastically as other more common spine pain patients.

Hands-on practice at Part I is introductory and at Part II is more intense and available...**with an objective transducer to measure your pressure application.**

Cervical Spine Cox[®] Technic is introduced at Part I and built on with more hands-on at Part II.

Dr. Cox makes Clinical Practice Reality come to life at Part III which is open to everyone to see **how Cox[®] Technic affects patients and clinical practice!**

www.coxtechnic.com/events.aspx

1-800-441-5571

LIVE WEBINARS

January 16, 2014—12:30pm EST
Diagnostic Imaging: Beyond the Disc Pathology

February 20, 2014—12:30pm EST
Short Leg & Scoliosis; Diagnosis, Foot Examination, Orthotics

RECORDED WEBINARS

On Demand—On Your Time—
29 topics and growing—**CE Credits**
available in certain states.

HANDS-ON WORKSHOPS

February 15, 2014—**Minster, OH**
February 22, 2014—**Wildomar, CA** (CE for CA)
March 15, 2014—**Mayetta, NJ**
April 5, 2014—**Vancouver, Canada** (CE)
May 3, 2014—**Atlanta, GA**
May 16, 2014—**Chicago, IL**
June 7, 2014—**Wildomar, CA** (CE for CA)
TBA—**Herndon, VA**
TBA—**Halifax, Canada** (CE)

More dates/locations on the website.

SEMINARS

January 25-26, 2014
San Francisco—Part I with Dr. Greenwood
March 22-23, 2014
Orlando, FL—Part III with Dr. Cox
April 24-27, 2014
July 17-20, 2014
November 6-9, 2014
Fort Wayne, IN—Parts I/II with Cox[®] Team
October 11-12, 2014
Baltimore, MD—Part III with Dr. Cox

32 hours CE

Chronic Exertional Compartment Syndrome

Ronald S Paik, Douglas A Pepple, Mark R Hutchison

British Medical Journal 2013;346:f33

JACO Editorial Reviewer: Richard P. Corbett DC, FCCR(C), FCCO(C)

Published:

Journal of the Academy of Chiropractic Orthopedists

June 2014, Volume 11, Issue 2

The original article copyright belongs to the original publisher. This review is available from: <http://www.dcorthoacademy.com>

© 2014 Corbett and the Academy of Chiropractic Orthopedists. This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Authors' Abstract:

presence of chronic exertional compartment syndrome.

Study Design: The study is a practice update case presentation.

Objective: Chronic exertional compartment syndrome (CECS) may be an easily missed diagnosis, and should be considered in the differential diagnosis in exercise active patients and athletes presenting with exercise-induced leg pain.

Summary of Background Data: 31 year old female runner with exercise-induced bilateral lower leg pain.

Methods: Consultation, observation, examination, and dynamic intracompartmental pressure measurements.

Results: Elevated post-exertional dynamic intracompartmental pressure measurements confirmed the diagnosis.

Conclusion: Clinicians who manage exercise-induced lower extremity pain in exercise active patients and athletes should have a higher index of suspicion for the

Background

CECS is an ischemic condition that occurs when a fascial compartment is unable to accommodate the increase in volume associated with muscle contraction and swelling. CECS is most common in the lower leg but has been described in the thigh, forearm and foot. Symptoms are dependent on the affected compartment and the nerve or other structures within the compartment.

Clinical Features: History is important. While the patient is typically symptom free at rest, exertion causes a dull achy pain and tightness, which gradually increase in severity, forcing the patient to stop the activity. The symptoms subside within a few minutes of activity cessation.

Physical Findings: When the symptoms are present, the compartment may be palpably tense like a drum. When the anterior compartment is affected, ankle dorsiflexion may be weak. When the lateral compartment is affected, ankle eversion may be weak.

When the deep compartment is affected, toe flexion may be weak with numbness of the plantar foot.

Differential: Athletes with stress fracture and medial tibial stress syndrome have pain at rest and with first impact, but no delay in onset.

Patient Data: The case study was of a 31 year old woman with no medical history of note. She presented with no pain at rest, but experienced the gradual onset of bilateral lower leg pain following running the 1st km which resolved shortly after cessation of running. She managed the pain by stopping running for several weeks, but the pain returned when she began running again.

Differential Diagnoses: Differential diagnoses included muscle strain, medial tibia stress syndrome, stress fracture, CECS, and popliteal artery entrapment syndrome. The diagnosis of CECS is often missed because patients are asymptomatic at rest with minimal findings on physical exam. It may be confused with claudication. It may co-occur with stress fractures, or medial tibial stress syndrome. The diagnosis may be missed due the overuse of the non-specific label of “shin splints.”

Methods

Investigations: Elevated post-exertional dynamic intracompartmental pressure measurements are used to confirm the diagnosis. Pre-exertion and post-exertion intracompartmental pressure testing with large bore needle insertion, is the gold standard for confirming the diagnosis.

The following criteria results in a less than 5% incidence of false positives: resting pressures greater than or equal to 15 mm Hg, plus a one minute post-exercise pressure

greater than or equal to 30 mm Hg, or a 5 minute post-exercise pressure greater than or equal to 20 mm Hg.

In Great Britain, a post-exercise pressure greater than 35 mm HG has a sensitivity of 77% and a specificity of 83%.

Alternative diagnostic methods consist of infrared spectroscopy measuring tissue oxygen saturation and MRI evidence of T2 signal intensity changes at rest and after exertion.

Tissue oxygenation less than 50% on infrared spectroscopy has a sensitivity of 78% and specificity of 67% for CECS. MRI has had poor results for investigating CECS compared with both intracompartmental measurements, and near infrared spectroscopy.

Acute compartment syndrome is a surgical emergency that if untreated can result in permanent impairment, muscle loss, paralysis, or limb loss.

Management: Conservative treatment is ineffective in most patients with CECS confirmed by pressure measurements as they eventually require surgery. Most surgeons insist on a positive pressure test before proceeding with surgery for CECS. Surgery usually entails subcutaneous fasciotomy via one or two small incisions offering good to excellent results in 80-90%. The success rate decreases to 73% in cases of revision.

Results

Elevated post-exertional dynamic intracompartmental pressure measurements confirmed the diagnosis.

Conclusions

Chiropractors who manage exercise-induced lower extremity pain in exercise active patients and athletes, need to be aware of this condition, and should include it in their differential diagnosis, when appropriate.

Clinical Relevance

This paper reminds all of us that clinicians need to make specific and anatomic diagnoses that leads to targeted treatment.

JACO Editorial Summary:

- Runners and endurance athletes have a higher risk than sedentary populations for developing CECS.
- Elevated post-exertional dynamic intracompartmental pressure

measurements confirm the diagnosis of CECS.

- The article was written by authors from the Sports Medicine Service, University of Chicago.
- The purpose of the study was to demonstrate an example of an easily missed condition: chronic exertional compartment syndrome.

Summary

- This case study should raise the index of suspicion of chronic exertional compartment syndrome for clinicians who manage exercise active patients and athletes presenting with exercise-induced leg pain.



Inside:

Spenco® TOTALSUPPORT™
Insoles when you wear shoes.



Out:

Spenco® TOTALSUPPORT™
Footwear when you don't.

1-800-877-3626
www.spenco.com



We Make the Internet User-Friendly

*Your Web site is important.
And so is your time.*

Let ResidentTECH manage
your site, so you can manage
your business.

Contact us for your **FREE**
Web site evaluation!
Toll Free: **866.993.2228**
www.residenttech.com

To order the newly designed

Academy of Chiropractic Orthopedists'

Patient Education Brochure, purchase is now available at:

<http://www.dcorthoacademy.com/store-pamphlet.php>



Study protocol subacromial impingement syndrome: the identification of pathophysiologic mechanisms (SISTIM)

Pieter Bas de Witte, Jochem Nagels, Ewoud RA van Arkel, Cornelis PJH Visser, Rob GHH Nelissen and Jurriaan H de Groot

BMC Musculoskeletal Disorders 2011, 12:282

JACO Editorial Reviewer: Clark Labrum DC, DABCO

Published:

Journal of the Academy of Chiropractic Orthopedists

June 2014, Volume 11, Issue 2

The original article copyright belongs to the original publisher. This review is available from: <http://www.dcorthoacademy.com>

© 2014 Labrum and the Academy of Chiropractic Orthopedists. This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Authors' Abstract:

The Subacromial impingement Syndrome (SIS) is the most common diagnosed disorder of the shoulder in primary health care, but its etiology is unclear. Conservative treatment regimes focus at reduction of subacromial inflammatory reactions or pathologic scapulohumeral motion patterns. Long-lasting symptoms are often treated with surgery, which is focused at enlarging the subacromial space by resection of the anterior part of the acromion. Despite that acromionplasty is in the top-10 of orthopedic surgical procedures, there is no consensus on its indications and reported results are variable. The hypothesis of the proposed study is that SIS is multi-factorial. It is believed that patients should be treated according to their predominant etiological mechanism(s).

Study Design: In this multicenter observational study, patients clinically diagnosed with subacromial impingement syndrome in either one of 3 participating

hospitals will be included for analyses, selected by 1 of 3 orthopedic surgeons. A total group size of 100 patients diagnosed with SIS based on patient history, physical examination, radiographs and MRI arthrography will be selected

Objective: The objective of the study is to identify and discriminate etiological mechanisms occurring in SIS patients, in order to develop tailored diagnostic and therapeutic strategies.

Summary of Background Data:

Although SIS has been typically assumed to be the result of rotator cuff injury, the subacromial space is a complex anatomical environment, containing several structures that can be a source of pain. Even several pathologies that have a similar patients' history, pain patterns and findings with physical examination, can be mistakenly diagnosed as SIS. In a recent study done at this institution, 14 of 80 patients (17.5%) clinically diagnosed with SIS, had to be excluded following MRI arthrography because of alternative

shoulder pathology. By relating anatomic properties, kinematics and muscle dynamics to subacromial volume, the expectation is to be able to identify one or more predominant pathophysiological mechanisms in every SIS patient. These differences in underlying mechanisms are a reflection of the variations in symptoms, clinical scores and outcomes reported in the literature. More insight in these mechanisms is necessary in order to optimize future diagnostic and treatment strategies for patients with SIS symptoms.

Methods: In this cross-sectional descriptive study, applied clinical and experimental methods to identify intrinsic and extrinsic etiologic mechanisms comprise: MRI-arthrography; 3D-motion tracking; EMG and dynamometry instrumented shoulder radiographs during arm tasks; Clinical phenotyping.

Background

The Subacromial Impingement Syndrome (SIS) can be defined as symptomatic irritation of the rotator cuff and subacromial bursa in the limited subacromial space. Clinical characteristics are pain with arm abduction (painful arc), decreased active range of motion and loss of arm force and function. It is the most frequently diagnosed shoulder disorder in primary health care, accounting for 44-65% of all shoulder complaints. Symptoms can persist for months or years and the majority of patients are between 40 and 50 years old. Consequently, SIS has a significant socioeconomic impact.

Despite its reported prevalence, the diagnostic criteria and etiology of SIS are debatable. Two main etiologic theories have been described. First is Neer's widely accepted impingement theory which focuses

on the *extrinsic* mechanism: symptoms resulting from compressive forces on the rotator cuff, caused by biomechanical or structural anatomic abnormalities. The mechanisms leading to this assumed compression remain unclear. Some studies have correlated scapula dyskinesia, others associated the present of a hooked acromion. Others conclude there is no relation between acromial shape and SIS. Despite this confusion, the extrinsic mechanism forms the rationale for one of the most frequently performed orthopedic surgical procedures: acromioplasty.

The second theory is based on a degenerative *intrinsic* mechanism: SIS can be caused by ischemia, which is enhanced by microtrauma or overuse, tensile overload on degenerating rotator cuff tendons, a subacromial inflammatory reaction or insufficient cuff function leading to an imbalance between glenohumeral mobility and joint stability.

Thirdly, SIS can be the consequence of adjoining pathologies or joint hyperlaxity. Concluding, the ongoing debate on the etiology of SIS, its varying clinical presentations, the diagnostic difficulties and the highly variable treatment outcomes of SIS suggest there might be multiple pathophysiologic mechanisms leading to complaints clinically diagnosed as SIS that need specific approaches in clinical practice.

Methods

Patients will be selected if one of more of the following usual care criteria are present, next to a positive Neer impingement test and a positive Hawkins test:

- Patient history:
 - Diffuse unilateral shoulder pain for > 3 months

- Pain during activities with abduction, retroflexion and/or internal rotation
- Pain at night or the patient being incapable of lying on the shoulder
- Physical Examination:
 - Positive Yocum test
 - Painful arc
 - Diffuse pain on palpation of the greater tuberosity
 - Disturbed scapulohumeral rhythm
 - No signs of pathologies or symptoms on the contralateral shoulder
 - Capable of 90 degrees of passive abduction and 90 degrees of external rotation

After the first clinical inclusion round, eligible patients are further investigated with the use of standard shoulder radiographs and an MRI-arthrography of the shoulder.

Results

As this is a proposed study, there are no actual results at this time. However, all patient data, including patient characteristics, physical examination, interview, radiological findings, questionnaires, psychological scores, biomechanical measurements and MRI findings will be entered in a database.

Conclusions

There is a wide variety of views with respect to etiology, diagnosis and treatment of SIS that exists presently. Instead of studying the outcomes of various treatment modalities in patients with SIS symptoms, first a detailed analysis of possible underlying pathophysiologic mechanisms is needed.

Clinical Relevance

Because of the ongoing debate on the etiology of SIS, its varying clinical presentations, the diagnostic difficulties and the highly variable treatment outcomes of SIS, suggest there might be multiple pathophysiologic mechanisms leading to complaints clinically diagnosed as SIS that need specific approaches in clinical practice. A more specific identification of the cause will lead to a more appropriate treatment regimen.

JACO Editorial Summary:

- SIS is the most common diagnosed disorder of the shoulder, but its etiology is unclear
- The purpose of the proposed study is to specifically identify etiological mechanisms occurring in SIS patients, in order to develop tailored diagnostic and therapeutic strategies
- SIS has a significant socioeconomic impact: from the impact of the workforce to the associated medical costs
- The extrinsic pathophysiologic mechanism is only valid for a subgroup of SIS patients, and consequently acromioplasty is the wrong treatment for at least a part of SIS patients
- The ultimate goal of this study is to be able to design clinically applicable methods for differentiating between patients that might benefit from a specific treatment modality

Summary

The results of this proposed study should raise awareness in assisting the orthopedic

surgeons as well as the treating non-surgical team, including therapists, chiropractic physicians or orthopedic specialists to better identify the causality of Shoulder

Impingement Syndrome. This should reduce the incidence of one of the most performed orthopedic surgeries (acromioplasty) that often provides variable and mediocre results.

Musicians' medicine: musculoskeletal problems in string players

Han-Sung Lee, Ho Youn Park, MD, Jun O Yoon, MD, Jin Sam Kim, MD, Jae Myeung Chun, MD, Iman W. Aminata, MD, Won-Joon Cho, MD, In-Ho Jeon, MD

Clinics in Orthopedic Surgery 2013; 5:155-160.

JACO Editorial Reviewer: Michael R. Wiles, DC, MEd, MS

Published:

Journal of the Academy of Chiropractic Orthopedists

June 2014, Volume 11, Issue 2

The original article copyright belongs to the original publisher. This review is available from: <http://www.dcortheoacademy.com> © 2014 Wiles and the Academy of Chiropractic Orthopedists. This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Authors' Abstract:

There is increasing attention to medical problems of musicians. Many studies find a high prevalence of work-related musculoskeletal disorders in musicians, ranging from 73.4% to 87.7%, and string players have the highest prevalence of musculoskeletal problems. This paper examines the various positions and movements of the upper extremities in string players: 1) basic postures for holding instruments, 2) movements of the left upper extremity: fingering, forearm posture, high position and vibrato, 3) movements of right upper extremity: bowing, bow angles, pizzicato and other bowing techniques. These isotonic and isometric movements can lead to musculoskeletal problems in musicians. We reviewed orthopedic disorders that are specific to string players: overuse syndrome, muscle-tendon syndrome, focal dystonia, hypermobility syndrome, and compressive neuropathy. Symptoms, interrelationships with musical instruments, diagnosis and treatment of these problems were then discussed.

Background

The authors describe the fact that there is a growing interest in “musicians’ medicine” or performance arts medicine, and at the same time a growing recognition of specific musculoskeletal complaints related to instrumental musicians. In fact, as stated in the abstract, around 80% of musicians suffer from work-related musculoskeletal disorders. As a result of the growing interest in this field, specialized medical associations and societies are being organized as well as clinics specializing in this area.

Methods

This paper is a review article, that is, it does not represent an empirical study, but rather a general overview of the field of musculoskeletal problems related to string players (i.e. violin, viola, cello, contrabass). The review first describes the biomechanics of the playing of stringed instruments, and then describes the major categories of disorders resulting from this playing. These

categories are overuse syndrome, muscle-tendon syndrome, focal dystonia, hypermobility syndrome, and compressive neuropathy.

Results

Though this is a relatively short review paper, the authors manage to cover a lot of ground within their five pages of text. Their work covers an excellent short overview of musicians' medicine (one page); biomechanics of playing string instruments (2 pages) and disorders of string players (2 pages). Among the five disorders described, overuse syndrome is considered synonymous with repetitive strain injury or cumulative trauma disorder. They go on to define this as subjective symptoms in the absence of any objective lesion – with the prescription of rest as the key treatment approach. “Muscle-tendon syndrome” is described as a constellation of disorders related to these tissues including tendinitis and tenosynovitis. Focal dystonia is considered the “most serious and difficult medical condition to cure (...among the medical problems of musicians)” (page 159). It is characterized by “abnormal involuntary muscle contractions in a single body part and is task-specific” (pg. 159). Only 1% of musicians suffer from this condition, but only 38% of these can continue playing despite treatment. In most cases, loss of control and involuntary movements (such as of the left fingers) result in lasting or permanent disability. Physical therapy, Botox injections and various pharmacological approaches are proposed. Hypermobility is described as being more frequent in female musicians (35% incidence) than male musicians (17% incidence) and a common manifestation is chronic unidentified wrist pain (CUWP). Finally, compressive neuropathy is “one of the musicians' hand and arm problems that

often requires surgery” (pg. 159). Carpal tunnel syndrome and cubital tunnel syndrome are briefly described, with the traditional orthopedic surgery approach to treatment – NSAIDs, steroid injections, and surgical decompression.

Conclusions

As this is a review paper, there is no specific summary, other than stated in the abstract, “We reviewed orthopedic disorders that are specific to string players: overuse syndrome, muscle-tendon syndrome, focal dystonia, hypermobility syndrome, and compressive neuropathy” (pg. 155).

Clinical Relevance

Given the incidence of musculoskeletal injuries and syndromes in musicians, chiropractors would be well advised to become more familiar with these conditions. This is also a specific area of healthcare specialization that may be of interest to chiropractic doctors. Up to 47% of musicians suffer from performance anxiety¹, and many of these may use anti-anxiety medications when performing. To the extent that conservative therapeutics may reduce the need for medication for musculoskeletal conditions, chiropractors have a significant role to play in the field of performance arts medicine. The conditions described are all within the scope of expertise of the chiropractor and amenable to conservative methods of treatment. Of particular interest is the area of posture as it relates to musicians; both in general and as applied to performance posture.

JACO Editorial Summary:

- This article was written by members of the Department of Orthopedic Surgery at the University Of Ulsan College Of

Medicine, Seoul, Korea; accordingly, the musculoskeletal conditions described were viewed from the orthopedic surgery lens: that is, most are “non-organic” and lack objective findings, and surgery is indicated for cases of compressive neuropathy.

- Chiropractic doctors may contest this view and assert that the lack of objective findings is most likely due to the lack of an appropriate examination; further, that specialized and conservative approaches are well suited to these types of posture and mechanical related problems.
- There is a very high incidence of musculoskeletal injuries among musicians (about 80%), and the highest incidence is among string players; this begs further research and investigation into appropriate conservative approaches to both treatment and prevention.

Summary

Considerable interest has been expressed in sports injuries and rehabilitation within the chiropractic field, but there appears to be a paucity of information describing conservative approaches to musicians’ injuries within the chiropractic literature. Given the incidence of problems and the large population of musicians, ranging from amateurs, to high school and college students, to professional musicians, this is an area of great importance to chiropractic orthopedists who can offer a specialized approach to these patients. The author of

this review had a large number of musicians in his former practice and found this to be a fascinating area to pursue as an informal practice specialty. Time will tell if the interest in this field grows to the level resulting in formal training programs and professional interest groups.

¹Marchanthaycox SE, Wilson GD.
Personality and stress in performing artists.
Personality and Individual Differences
1992; 13: 1061-1068

Radiology Corner

Spondylolysis: Active-Inactive-Pending?

Alicia M. Yochum RN, DC

Diagnostic Imaging Resident, Logan University
alicia.yochum@gmail.edu

Published:
Journal of the Academy of Chiropractic Orthopedists
June 2014, Volume 11, Issue 2

This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The article copyright belongs to the author and the Academy of Chiropractic Orthopedists and is available at: <http://www.dcorthoacademy.com>.

© 2014 Yochum and the Academy of Chiropractic Orthopedists.

HISTORY: 16 year old cheerleader

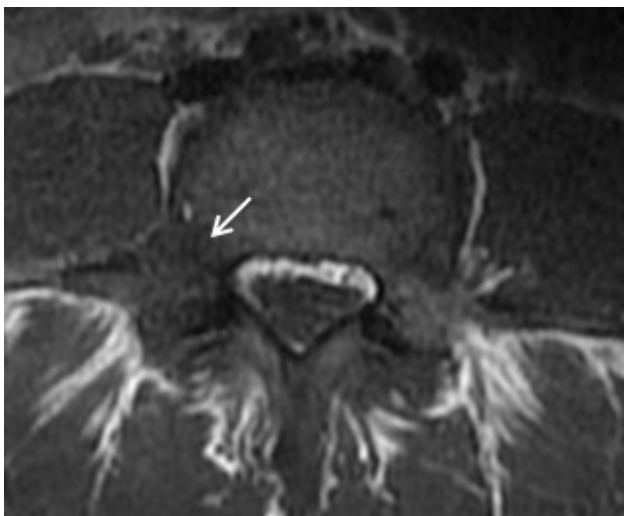


Figure 1: Axial T1 weighted MRI of L5 demonstrates low signal in the area of the right pars interarticularis (arrow).

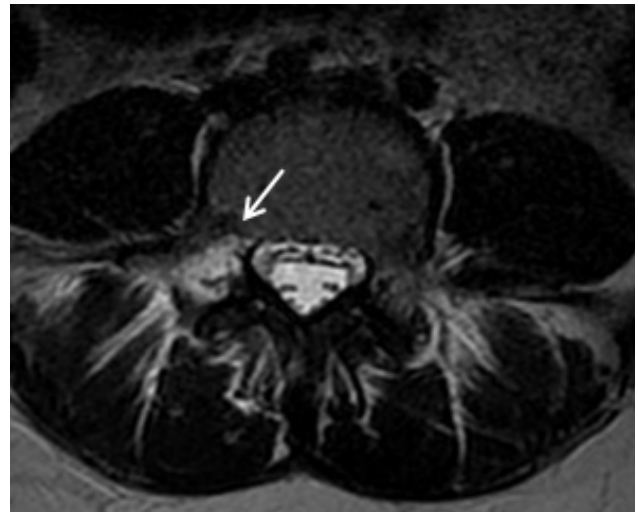


Figure 2: Axial T2 weighted MRI of L5 demonstrates high signal (arrow) in the corresponding area.



Figure 3: The right parasagittal T2 weighted MRI displays increased signal within the pedical facet junction (arrow). There is no evidence of pars defects on any of the figures 1-3 which classifies this as a *pending*.

Technical Comment

Understanding the signal intensities evident on MRI is important when attempting to interpret the meaning of the findings. Water is dark (black/low signal) on T1 weighted images and bright (white/high signal) on T2 weighted images. Fat is bright on T1 weighted images and dark signal on T2 weighted images. It is important to confirm signal intensities on all imaging sequences to aid in determining the nature of the process. The signal intensities present in this case indicate that bone marrow edema (fluid in the form of blood) is present within the pars interarticularis.

Historical Pearl

Historically spondylolysis has been referred to as a congenital anomaly.¹ Extensive studies have shown that they do not occur in fetal spines as the pars interarticularis is fully ossified at birth and there is no growth center in that area to undergo closure. There is however a congenital predisposition to acquiring a spondylolysis when the pars is thin. This may be related to genetic factors and explain why the incidence in certain families or ethnic groups (Alaskan Eskimos or Native American Indians) is higher.¹

General Characteristics

Spondylolysis is defined as a defect in the pars interarticularis either unilaterally or bilaterally and is present in 5-7% of the general Caucasian population.¹ If this defect allows anterior translation of the vertebral body, the term spondylolisthesis (isthmic variety) is employed and the amount of displacement can be measured utilizing the percentage method. Use of the old Meyerding classification is discouraged. Spondylolysis in the lumbar spine is the most common location for stress fracture in the human skeleton (90% occur at L5).¹

There are two types of stress fractures, insufficiency and fatigue. An insufficiency stress fracture occurs when normal loads are applied to weakened bone which leads to fracture. This would occur in the setting of osteoporosis. A fatigue fracture occurs when abnormal loads are placed on normal bone which leads it to stress fracture. Spondylolysis is an example of a fatigue stress fracture induced by repetitive mechanical load in hyperextension.^{1, 2} Continued hyperextension activity eventually creates microfractures within the bone and an edematous response develops

within the trabecular bone. If mechanical load in hyperextension continues, this edematous weakened bone will eventually fail and a stress fracture (pars defect) will occur.¹

Clinical Features and Mechanism of Injury

Patients who have lumbar spondylolysis may be asymptomatic or present with activity related low back pain, particularly in extension. The key to diagnosis is determining if the source of their low back pain is related to the spondylolysis (active/new) or unrelated to their chief complaint and represents an old (inactive) pars defect.

Spondylolytic stress fractures occur in two populations. It can occur shortly after a child begins to walk which places them in extension creating abnormal forces through normal bone. As they continue to walk, the pars interarticularis fractures.¹ For this reason, parents should be discouraged from encouraging their children to walk before the child is ready to do so. The other circumstance when spondylolysis occurs is in the adolescent or young adult athlete. Patients participating in sporting activities that place them in repetitive hyperextension such as football, wrestling, gymnastics, and power lifting induces increased biomechanical load through the pars interarticularis. With continued hyperextension, the patient develops microfractures and an edematous reaction within the trabecular bone that will eventually lead to fracture.^{1,3} In the latter situation, the patient would present with low back pain that is most commonly localized and worse upon extension.³ Pain that radiates into the buttock or posterior thigh can occur but would not be associated with neurologic deficits. A single-leg standing

hyperextension test (Stork test) can be performed on the patient by having them stand on one leg and hyperextend the lumbar spine.^{1,2} This would recreate the patient's low back pain and be indicative of active spondylolysis. Note that this position would also place stress on the facet structures and be positive in the situation of facet irritation.¹

A patient who develops spondylolysis as a child during walking may be asymptomatic or complain of low back pain that is unrelated to the spondylolysis. It is important to remember that if an older patient presents with low back pain and spondylolysis, it is most likely unrelated to the chief complaint as the patient does not fit the right demographic (young athlete in repetitive hyperextension activity).

Radiologic Features

Imaging is imperative to making the correct diagnosis in a patient with low back pain and spondylolysis. If the lysis is remote/inactive (developed in childhood when walking) it is not related to the chief complaint but, if the lysis is new/active, it could be the source of the patient's low back pain.

Radiography is the first imaging series usually obtained with oblique films that profile the pars interarticularis nicely. The typical "Scotty Dog" appearance should be visualized but, if a pars defect (fracture) is present there will be a collar on the neck of the "Scotty Dog." After the pars fracture has been identified, it is important to determine if the fracture is new or old. There is no way to distinguish the age of the fracture definitively on the radiograph. The typical rules for determining the age of a fracture such as visualization of well corticated

edges or jagged versus smooth margins is not reliable in this location.^{1,2}

In order to determine the age of the spondylolysis, physiologic imaging is required.^{1,2} Two modalities are available that show physiologic activity within bone. They are bone scan in the form of single photon emission computed tomography (SPECT) imaging or magnetic resonance imaging (MRI). Since adolescents and young adults (10-30 years old) are the usual population that develops symptomatic (active/new) spondylolysis, MRI is the appropriate study to perform so the skeletally immature patient does not receive a full body dose of radiation. MRI also provides more detailed information regarding the integrity of the disc, the spinal canal dimensions, and the exiting nerve roots.²

A computed tomography (CT) scan may be performed to better visualize the pars defect but CT fails to demonstrate physiologic activity. CT would not help the clinician in determining the age of the spondylolysis, it would merely help confirm the presence of the fracture. In order to determine the age of the lesion a MRI is indicated and a CT scan would not be beneficial.

Standard MRI sequencing includes both T1 and T2 imaging in the sagittal and axial planes. In order to better visualize the edema within the bone, short tau inversion recover (STIR) imaging can be added to the standard sequence with minimal effect to the length of the scan. The STIR sequence suppresses all signal from fat, making fat appear black so that fluid signal is white and becomes more conspicuous.⁴

A spondylolysis that is newly acquired would demonstrate bone marrow edema (fluid) adjacent to the pars fracture. This

would appear as dark signal on T1, bright signal on T2, and very bright signal on STIR since it is blood next to the fresh fracture.⁵ This patient would be experiencing low back pain typical of active spondylolysis. If the pars fracture is visualized but there is no fluid adjacent to it, then the signal intensity would follow normal bone marrow signal.⁵ In this situation the fracture is old and occurred when the patient was a young child. If this patient is complaining of low back pain, then other sources for the low back pain should be investigated since the fracture is old.

Pending Spondylolysis

If the radiograph is negative but the patient fits the clinical picture for hidden lumbar spondylolysis and is not responding to conservative management a *pending* spondylolysis may be present. The case presented demonstrates this entity as no pars defect is visualized. In this situation the edematous reaction from the micro fractures has begun but the fracture has not yet occurred. The MRI signal intensity would be the same as if a new fracture was present demonstrating low signal on T1 and high signal on T2 and STIR. This is a fracture that is about to occur or *pending* and is being imaged in the very early stages.^{6,7}

Management

Proper management of a patient with an active/new spondylolysis on MRI is important to achieve good outcomes for the patient. Treatment includes removing the patient from the activity that is placing them in hyperextension for approximately 2-3 months.³ It is appropriate to consider placing the patient in an anti-lordotic brace (Boston Overlap Brace) as it improves patient compliance and aids in reducing the patient's increased lordosis. Chiropractic

adjustments can be applied above or below the involved segment and stabilization exercises will help reduce postural imbalances in the lumbar spine. If a MRI was done following three months of rest and conservative management, it would show resolution of the previously noted edema as evidenced in this case. (Figures 3-6) At this point the patient is cleared to return to participation in activities and is released from the orthosis.³

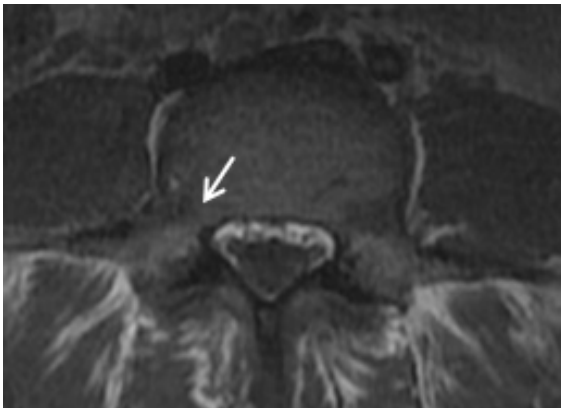


Figure 4: T1 weighted axial MRI image of the same patient 3 months after initial imaging demonstrates resolution of the previously noted low signal in the area of

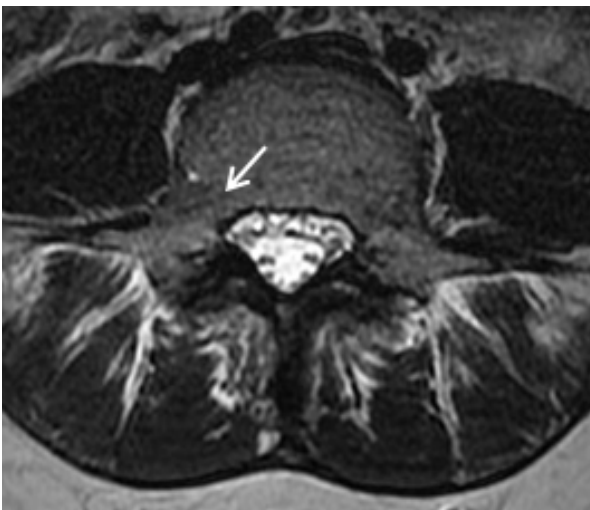


Figure 5: T2 weighted axial image 3 months after initial imaging demonstrating resolution of the edema (arrow) that was present in the initial MRI.

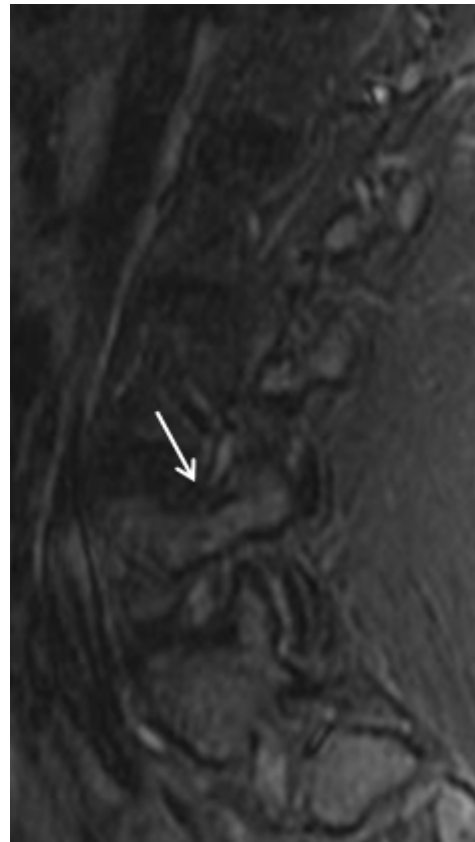


Figure 6: The right parasagittal T2 weighted image 3 months after the initial MRI confirms the absence of the previously reported edema within the right pars interarticularis (arrow).

Conclusion

The topic of spondylolysis has historically been a misunderstood entity within the Chiropractic and Medical professions for decades. With the advent of MRI and physiologic imaging, the confusion related to spondylolysis can be dissipated. Obtaining MR imaging in a patient who clinically fits the picture of lumbar spondylolysis to determine the age of the lesion is vital to accurate diagnosis and in turn appropriate management.

Acknowledgements: Case courtesy of Scott Thorpe DC, DACBR and Terry R. Yochum DC, DACBR

1. Yochum TR, Rowe LJ. *Yochum and Rowe's essentials of skeletal radiology*. 3rd ed. Philadelphia: Lippincott/Williams & Wilkins; 2005.
2. Leone A, Cianfoni A, Cerase A, Magarelli N, Bonomo L. Lumbar spondylolysis: a review. *Skeletal Radiol*. Jun 2011;40(6):683-700.
3. Blanda J, Bethem D, Moats W, Lew M. Defects of pars interarticularis in athletes: a protocol for nonoperative treatment. *J Spinal Disord*. Oct 1993;6(5):406-411.
4. Yochum T. Spondylolysis and/or spondylolisthesis: let's get it right and STIR things up. *The American Chiropractor*. June 2010.
5. Yochum T. et.al. Active or Inactive Spondylolysis and/or Spondylolisthesis: What's the Real Cause of Back Pain? . *Journal of the Neuromusculoskeletal System* 2002;10(2):1067-1082.
6. Yochum T, Yochum A. Pending Spondylolysis And/Or Spondylolisthesis: What's It All Mean? . *The American Chiropractor* February 2013.
7. Goda Y, Sakai T, Sakamaki T, Takata Y, Higashino K, Sairyo K. Analysis of MRI signal changes in the adjacent pedicle of adolescent patients with fresh lumbar spondylolysis. *Eur Spine J*. Feb 28 2014

❖ Announcements

The Academy of Chiropractic would like to announce our upcoming Diplomate examination on September 27, 2014. It will be held at Northwestern Health Sciences University. For further information, contact Dr. Jerry Wildenauer at the following e-mail address.

E-mail: aco@dcorthoacademy.com

The Academy of Chiropractic Orthopedists has received the following announcement.

Dr. James R. Brandt
President
Academy of Chiropractic Orthopedists
January 11, 2014

RE: University of Bridgeport

I am pleased to announce that last year on December 7 the members of the Florida Chiropractic Physician Association in Fort Lauderdale, Florida warmly received the first session of the “Advanced Clinical Training in Orthopedics and Neuromusculoskeletal Medicine Program”. The reviews by the 150 chiropractors attending the 10-hour presentation for continuing education credits were extremely positive and appreciative of the advanced learning experience. Twenty-three chiropractors enrolled in the course with the intention to complete the orthopedic training and become board certified as chiropractic specialists. The second session will take place in Orlando, Florida at the Florida Chiropractic Physician Association meeting (February 21-23, 2014) and 15 continuing education credits will be available for all attendees.

This post-doctoral program designed specifically for practicing chiropractors interested in becoming board certified chiropractic specialists in orthopedics and neuromusculoskeletal medicine includes a combination of onsite seminars, online learning and experiential training. Our new post-graduate program will put the chiropractor on the path to becoming a valuable member of the primary care team as the neuromusculoskeletal medicine specialist.

This innovative advanced clinical learning program requires only 100 hours of seminar training and 400 hours of online/distance learning to become eligible to sit for the Academy's Board certification examination. Doctors may seek advanced clinical training in hospitals, spine centers, primary and specialty care centers, community health centers and Federally Qualified Health Centers, and pursue a subspecialty in neuromusculoskeletal medicine. The 500-hour experiential training attempts to meet the needs of the individual doctor.

The University of Bridgeport will commence a second site of training on campus in Bridgeport, Connecticut on March 8-9, 2014. The seven (7) sessions are each independent of the other and offer 100 hours of seminar training per annum. If a doctor misses one session, the session will recur at another site or recur the following year. Attendees may attend the Florida and the Connecticut seminars to complete the seminar training. Please direct questions regarding the program to Dr. James J. Lehman, Director of the Health Sciences Postgraduate Education Department. jlehman@bridgeport.edu

Respectfully submitted,

James J. Lehman, DC, MBA, FACO



The Journal of the Academy of Chiropractic Orthopedists welcomes your comments on these and any other issues you wish to provide feedback on.

Please address your comments to the JACO Editors at:
ACO@dcorthoacademy.com

Editor-In-Chief

Bruce Gundersen, DC, FACO

Associate Editors

James Demetrious, DC, FACO

David Swensen, DC, FACO

Alicia M Yochum, RN, DC

Editor

Stanley N. Bacso, DC, FACO, FCCO(C)