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Keukenhof

Keukenhof – Lisse, The Netherlands

Keukenhof, also known as the Garden of Europe, is the world's largest flower garden. It is situated near Lisse, the Netherlands. According to the official website for the Keukenhof Park, approximately 7,000,000 flower bulbs are planted annually in the park, which covers an area of 32 hectares.

Original Manuscript

The Value of Board Specialty and Recertification: Implications for Chiropractic Orthopedists

James J. Lehman, DC, MBA, FACO

Introduction

While chiropractic clinical training lags behind that of the medical profession,[i] health care reform calls for the integration of properly trained and credentialed chiropractic specialists into coordinated care teams.[ii] In spite of the current demand for board certified chiropractic specialists, few resident training programs exist within the chiropractic profession in the United States.[iii] It appears that chiropractic colleges underappreciate the value of graduate clinical education as demonstrated by the scarcity of chiropractic resident training programs. Yet,
I suspect an inability to fund resident training attributes to the dearth of resident training programs for chiropractic graduates.[iv]

University of Bridgeport

Recently, the University of Bridgeport through the Health Sciences Postgraduate Education Department and the College of Chiropractic launched a three-year "Chiropractic Orthopedic Residency Pilot Initiative with a Subspecialty in Neuromusculoskeletal Medicine." The program emphasizes the provision of chiropractic medicine services within a world-class primary health care system, the Community Health Center Inc. of Middletown, Connecticut. This health care system is a Federally Qualified Health Center and a Patient-Centered Medical Home, which is committed to caring for special populations and focused on improving health outcomes as well as building healthy communities.

Another postgraduate course in chiropractic orthopedics and neuromusculoskeletal medicine is offered to practicing chiropractic physicians, which presents 100 hours of onsite seminar education, 400 hours of online/distance learning and an optional 500 hours of experiential training. Doctors interested in the experiential training must complete the Orthopedic Diplomate program prior to completion of the subspecialty in Neuromusculoskeletal Medicine. The experiential training will feature hospital, primary care, spine, and pain management rotations.[v]

Veterans Administration

The Veterans Administration has developed a "Chiropractic Care Residency Pilot Initiative for Academic Year 2014-2015." Although the program does not lead to a board certified specialty, it does appreciate the value of integration into a health care system and collaboration with primary care teams.

> *Applications for new chiropractic physician residency training programs in Integrated Clinical Practice will be considered. These programs will emphasize the provision of chiropractic care within an integrated health care system, in collaboration with primary care Patient Aligned Care Teams (PACTs), specialty care, and other medical and associated health providers and trainees.*[vi]

Maintenance of Credentials (MOC)

It is obvious that the Academy of Chiropractic Orthopedists members appreciate the value of graduate medical education as demonstrated by the opportunity costs invested in their clinical training. The Academy currently offers a voluntary recertification process. The recertification of Fellows is defined as the process of maintenances of credentials by documentation of orthopedic specialty continuing education as required by the Academy on an ongoing three year cycle. Since members have completed post-doctoral education in orthopedics, passed a specialty examination to become board certified chiropractic orthopedists, earned Diplomate and Fellow status within the chiropractic profession, members should also realize the value of maintenance of credentials (MOC). In order to illustrate the value of

chiropractic specialty certification and recertification, I am offering information promulgated by the American Board of Medical Specialties for your perusal.

According to the American Board of Medical Specialties: [vii]

> *Medical specialty certification in the United States is a voluntary process. While medical licensure sets the minimum competency requirements to diagnose and treat patients, it is not specialty specific. Board certification—and the Gold Star—demonstrate a physician's exceptional expertise in a particular specialty and/or subspecialty of medical practice.*
>
> *The Gold Star signals a board certified physician's commitment and expertise in consistently achieving superior clinical outcomes in a responsive, patient-focused setting. Patients, physicians, healthcare providers, insurers and quality organizations look for the Gold Star as the best measure of a physician's knowledge, experience and skills to provide quality healthcare within a given specialty.*

The American Board of Medical Specialties explains the values and benefits of Maintenance of Credentials (MOC):

> *ABMS MOC® acknowledges the growth and complexity of medical science, clinical care and the importance of the physician's relationship with the patient in delivering quality clinical outcomes. It also requires proof that a physician has the practice-related knowledge to provide quality care in a particular specialty.*
>
> *MOC is also a professional response to the need for public accountability and transparency. Through MOC, physicians demonstrate that they can assess the quality of care they provide compared to peers and national benchmarks and then apply the best evidence or consensus recommendations to improve that care.*
>
> *Through a program of lifelong learning and on-going self-assessment, board certified physicians demonstrate their rigorous commitment to achieving quality clinical outcomes for patients in a responsive, patient-focused setting.*
>
> *Physicians benefit from participating in MOC because they receive focused learning based on individual practice needs, increase efficiency and reduce malpractice premiums as well as the need for duplicate assessments of credentials, among other benefits.*
>
> *Patients experience fewer medical errors, better communication and quality clinical outcomes when they choose a board certified physician. Medical specialists who participate in MOC use the most current evidence-based guidelines and standards in their specialty and are widely recognized as leaders in the national movement for healthcare quality.*
>
> *In fact, MOC is recognized as an important quality marker by insurers, hospitals, quality and credentialing organizations as well as the federal government. Through the MOC program, board certified physicians advance the standard of specialty medical care nationwide. Higher standards mean better care.*

The American Board of Medical Specialties claims that the MOC process builds six core competencies for quality patient care.

- ***Professionalism****—Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to diverse patient populations.*
- ***Patient Care and Procedural Skills****—Provide care that is compassionate,*

appropriate and effective treatment for health problems and to promote health.

- ***Medical Knowledge**—Demonstrate knowledge about established and evolving biomedical, clinical and cognate sciences and their application in patient care.*

- ***Practice-based Learning and Improvement**—Able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence and improve their practice of medicine.*

- ***Interpersonal and Communication Skills**—Demonstrate skills that result in effective information exchange and teaming with patients, their families and professional associates (e.g. fostering a therapeutic relationship that is ethically sound, uses effective listening skills with non-verbal and verbal communication; working as both a team member and at times as a leader).*

- ***Systems-based Practice**—Demonstrate awareness of and responsibility to larger context and systems of healthcare. Be able to call on system resources to provide optimal care (e.g. coordinating care across sites or serving as the primary case manager when care involves multiple specialties, professions or sites).*

Academy Maintenance of and Recertification

The University of Bridgeport through the Health Science Postgraduate Education Department has agreed with the Academy of Chiropractic Orthopedists to offer an online/distance learning program, which will meet the recertification needs of chiropractic orthopedists.

The program consists of three distinct learning activities:

1. eLearning Episodes
2. Diagnostic Drills
3. Communication Drills

The eLearning Episodes consist of real patient cases via streaming video in a documentary format with embedded learning. Each eLearning Episode is a one **(2) hour learning activity**, consisting of:

- Minute multimedia video
- Downloadable PDF worksheet
- Online Assessment quiz
- Featured journal articles and recommended reading
- Self-directed learning component

The University of Bridgeport recognizes that learning in a clinical environment does not generally occur in a linear way, but rather is the product of diverse patient presentations that build knowledge and experience in increments over time. For this reason, each e-learning episode is based upon real case presentations.

In the near future, the Academy will offer this innovative learning program to its members.

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[iii] Wyatt LH. Perle SP, Murphy DR, and Hyde TE. The Necessary Future of Chiropractic Education: A North American Perspective. Chiropractic & Osteopathy (Volume 13, Article 10, July 7, 2005).

[iv] Morgan W. Cultural Authority and the Funding of Chiropractic Education. ACANews. Available from: http://www.acatoday.org/content_css.cfm?CID=2222.

[v] University of Bridgeport, Health Sciences Postgraduate Education Department. Advanced Clinical Training in Orthopedics and Neuromusculoskeletal Medicine. Available from: Bridgeport/nmsm.

[vi] DEPARTMENT OF VETERANS AFFAIRS. Chiropractic Care Residency Pilot Initiative New Chiropractic Care Residency Programs for Academic Year 2014-2015 Available from: http://www.va.gov/oaa/archive/20130723_ChiropracticResidency_RFP.PDF.

[vii] American Board of Medical Specialties. Higher standards and better care. Maintenance of Certification. Available from: http://www.abms.org/Maintenance_of_Certification/value_of_MOC.aspx.

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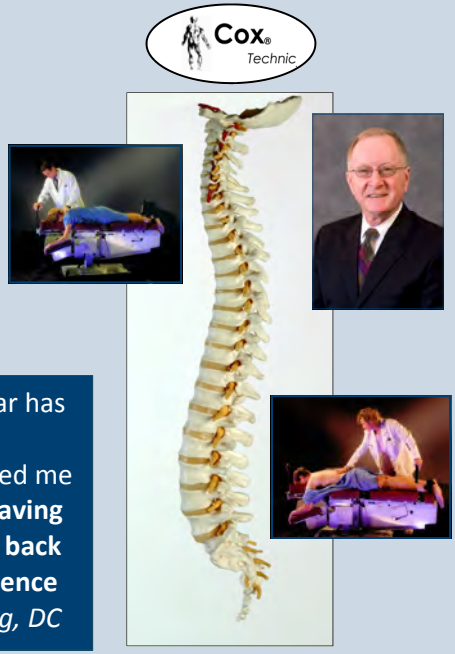

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May 16, 2014—**Chicago, IL**
June 7, 2014—**Wildomar, CA** ***(CE for CA)***
TBA—**Herndon, VA**
TBA—**Halifax,** ***Canada (CE)***

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July 17-20, 2014
November 6-9, 2014
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October 11-12, 2014
Baltimore, MD—Part III with Dr. Cox

Abstracts & Literature Review

Stemming the Degeneration: IVD Stem Cells and Stem Cell Regenerative Therapy for Degenerative Disc Disease

V Sivakamasundari and Thomas Lufkin

NIH Public Access
Author Manuscript

JACO Editorial Reviewer: *Anthony W. Hamm, DC, FACO, DABFP*

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Authors' Abstract:

The intervertebral disc (IVD) is immensely important for the integrity of vertebral column function. The highly specialized IVD functions to confer flexibility and tensile strength to the spine and endures various types of biomechanical force. Degenerative disc disease (DDD) is a prevalent musculoskeletal disorder and is the major cause of low back pain and includes the more severe degenerative lumbar scoliosis, disc herniation and spinal stenosis. DDD is a multifactorial disorder whereby an imbalance of anabolic and catabolic factors, or alterations to cellular composition, or biophysical stimuli and genetic background can all play a role in its genesis. However, our comprehension of IVD formation and the etiology of disc degeneration (DD) are far from being complete, hampering efforts to formulate appropriate therapies to tackle DD. Knowledge of the stem cells and various techniques to manipulate and direct them to particular fates have been promising in adopting a stem-cell based regenerative approach to DD. Moreover, new evidence on the residence of stem/progenitor cells within particular IVD niches has emerged holding promise for future therapeutic applications. Existing issues pertaining to current therapeutic approaches are also covered in this review.

Objective

The objective of this manuscript is to share new and emerging evidence on the role of stem cell therapy for the management of intervertebral disc degeneration.

Summary of Background Data

Degenerative disc disease (DDD), often associated with low back pain, affects about 70% of the population at some point in their lives. DDD is a progressive disorder and, when symptomatic, compels one to seek medical attention. However, a significant proportion of DDD cases are asymptomatic, thus preventing timely intervention. Such unrecognized disc degeneration worsens with age and can eventually lead to permanent disabilities.

Current therapies involve symptomatic pain relief through various medications and physiotherapy including manual therapies. Surgical intervention neither arrests the progression of DDD nor restores the original state of the IVD.

The avascular and aneural nature of the disc exposes the nucleus pulposus (NP) to low oxygen and nutritional environments, resulting in poor regenerative capacity. The unique biochemical

composition of the NP, annulus fibrosis (AF) and end plates function collectively to provide even distribution of load forces.

Radiographic and magnetic resonance imaging (MRI) -based imaging are the most common modes of assessment of disc degeneration. Typical findings include reduction of disc height or collapse, lack of distinction of boundaries between AF and NP as well as loss of signal on T2 weighted images. Annular rupture, end plate sclerosis, Schmorl`s nodes and calcifications are also associated with DDD.

DDD progresses with alteration of the biochemical and cellular composition of the IVD. A decrease in large proteoglycans and a marked increase in Collagen I and small proteoglycans are hallmarks in NP aging and degeneration. Aberrant biochemical factors in DDD include:

1. Imbalance of anabolic and catabolic factors
2. Embryonic cellular composition of the NP
3. Impaired nutrient supply
4. Inappropriate biomechanical stressors
5. Genetic influence

Knowledge of pathological alterations to the cellular composition and biochemical changes to the NP can be utilized for its resolution. Appropriate therapeutic intervention should be based on the level of degeneration. Ideal therapy should be minimally invasive involving manual therapy/physiotherapy, NSAIDs, pain medications, muscle relaxers and tricyclic antidepressants.

Protein injections (gene therapy) rely on the fact that remaining healthy endogenous cells can be stimulated to proliferative matrix homeostasis, thereby restoring NP and AF tissues. Embryonic stem cells and mesenchymal stem cells possess the ability to self-renew as well as differentiate into specific cell lineages. Recently, numerous studies have successfully isolated cells with stem cell markers from the intervertebral disc.

Conclusions

Mesenchymal stem cell differentiation towards NP cell type has not proven effective, however mesenchymal cell differentiation towards AF cell type may be more promising for rectifying or sealing annular tears. Other concerns include survival of the injected cells, rejection by host immune system and adverse effects of the carrier used for transplantation. Human trials are underway.

According to the authors, stimulating stem/progenitor cells holds promise for the future management of intervertebral disc degeneration.

Clinical Relevance

Clinical relevance is yet to be determined.

Summary

Intervertebral disc disease is a common source of both acute and chronic low back pain which accounts for > $30 billion in costs annually in the US. It is progressive and can lead to both physical and mental disability. While there are several current concepts in the management of degenerative disc disease, none have been proven to arrest or reverse the degenerative process.

IVD stem cells and stem cell regenerative therapy is currently being investigated in both animal and human trials.

As spine care experts, chiropractic physicians should be aware of all current and emerging treatment modalities for DDD and concomitant low back pain.

Abstracts & Literature Review

Difficulty of Diagnosing the Origin of Lower Leg Pain in Patients With Both Lumbar Spinal Stenosis and Hip Joint Osteoarthritis

Junya Saito , MD, Seiji Ohtori , MD, PhD, Shunji Kishida , MD, PhD, Junichi Nakamura , MD, PhD, Munenori Takeshita , MD, Tomonori Shigemura , MD, Makoto Takazawa , MD, Yawara Eguchi , MD, PhD, Gen Inoue , MD, PhD, Sumihisa Orita , MD, PhD, Masashi Takaso , MD, PhD, Nobuyasu Ochiai , MD, PhD, Kazuki Kuniyoshi , MD, PhD, Yasuchika Aoki , MD, PhD, Tetsuhiro Ishikawa , MD, Gen Arai , MD, Masayuki Miyagi , MD, Hiroto Kamoda , MD, Miyako Suzuki , MD, Yoshihiro Sakuma , MD, Yasuhiro Oikawa , MD, Gou Kubota , MD, Kazuhide Inage , MD, Takeshi Sainoh , MD, Kazuyo Yamauchi , MD, PhD, Tomoaki Toyone , MD, PhD, and Kazuhisa Takahashi , MD, PhD

SPINE Volume 37, Number 25, pp 2089–2093

JACO Editorial Reviewer: Jeffrey R. Cates, DC, MS, FACO, DABCC

Published:
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Authors' Abstract:

Study Design: Case series.

Objective: To present the difficulty of diagnosing the origin of lower leg pain in patients with lumbar spinal stenosis and hip joint arthritis.

Summary of Background Data: Pain arising from a degenerated hip joint is sometimes localized to the lower leg. Patients with lumbar spinal disease may also show radicular pain corresponding to the lower leg area. If patients present with both conditions and only pain at the lower leg, it is difficult to determine the origin of the pain.

Methods: We reviewed 420 patients who had leg pain with lumbar spinal stenosis diagnosed by myelography, computed tomography (CT) after myelography, or magnetic resonance imaging (MRI). Pain only at the ipsilateral lateral aspect of the lower leg but slight low back pain or pain around the hip joint was shown in 4 patients who had lumbar spinal stenosis and hip osteoarthritis. The symptoms resolved after L5 spinal nerve block, but remained after lidocaine infiltration into the hip joint. We performed decompression and posterolateral fusion surgery for these 4 patients.

Results: Leg pain did not resolve after lumbar surgery in all patients. Conservative treatment was not effective from 6 to 12 months, so ultimately we performed ipsilateral total hip replacement for all patients and they became symptom-free.

Background

Pain patterns are often used to establish differential diagnoses. One problem with that is the fact that pain referral patterns often overlap, which can lead to confusion as to where the pain generator is located. This paper reviews patients with both lumbar spinal stenosis and hip joint osteoarthritis (OA) with associated lower leg pain. The authors report the results of orthopedic tests, neurologic tests, imaging findings, plus pain blocks to attempt

to differentially diagnose and predict whether surgery to the spine or hip might be most effective. The authors also provide a brief narrative review of the neurology of referred pain and current diagnostic strategies.

Methods

420 patients were reviewed with leg pain and spinal stenosis; 4 of which also had osteoarthritis of the hip. These patients were examined by 8 spine surgeons and 5 hip surgeons. Additional diagnostic procedures included x-ray, MRI, CT and myelography. The 4 patients with both OA of the hip and lumbar spinal stenosis were singled out for additional evaluation and procedures including L5 transformational epidural infiltration of lidocaine and lidocaine infiltration into the hip. All 4 patients had marked reduction in their visual analog pain scales (VAS) following the L5 nerve block, however minimal reduction in VAS scores were seen in those receiving lidocaine infiltration of the hip. Conservative treatment methods were not effective.

Results

Based on the examination findings, all 4 patients underwent spinal decompression surgery. The symptoms did not resolve in any of the 4 subjects. All 4 patients did become pain free following total hip replacement surgery.

Conclusions

Identification of the pain generator is difficult in light the neurological complexity associated with referred pain. In this case review, most of the clinical and diagnostic data suggested that the 4 patients' pain was the result of spinal stenosis; however, the post-surgical clinical outcomes, would suggest that the pain was generated by the hip OA. The authors suspect that the difficulty in differentiating these referred pain pattern is due to the dichotomized sensory neurons from the dorsal root ganglia, with one sensory fiber serving the pain generator and the other sensory fibers passing to the sensory tissues in the referred pain area. In this instance the hip joint pain was thought to pass to the lower leg via the L5 nerve root or dorsal root ganglia. The neurological interaction and complexity of these linked sensory nerves are thought to lead to the diagnostic difficulties described.

Clinical Relevance

This paper is a case series and as such it limits the generalizability of its findings. It does, however, provide us with a reminder that all the tests we do are subject to error. Consideration of test sensitivity and specificity, along with knowledge of neurological and referred pain pattern can assist with identification of a pain generator.

JACO Editorial Summary:

- This study was done at the Department of Orthopaedic Surgery, Graduate School of Medicine, Chiba University, Chiba, Japan.
- The purpose of the study was to document the difficulty of diagnosing the origin of lower leg pain in patients with spinal stenosis.
- Dichotomous neurological complexity may cause referred pain in patterns that impede pain generator identification.
- Diagnostic tests, including nerve blocks, are not always helpful in determining the pain generator.

Summary

The results of this study should remind all doctors that diagnosis is a science and an art. Part of the art is knowing that, on occasion, the apparent facts can be misleading. The study also points out the need for additional study in the realm of referred pain.

Abstracts & Literature Review

Role of Inflammation in the Pathogenesis of Osteoarthritis:

Latest Findings and Interpretations

Jeremy Sokolove MD and Christin M. Lepus MD, PhD Candidate

Ther Adv Musculoskel Dis J. 2013 5(2) 77–94

JACO Editorial Reviewer: *Keith R. Kamrath, DC, FACO*

Published:
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March 2014, Volume 11, Issue 1

Authors' Abstract:

Study Design: Literature review

Objective: To understand the role of inflammation, synovitis, and the immune response in the development of osteoarthritis (OA).

Summary of Background Data: OA is associated with multiple risk factors, most notably age, joint trauma, altered biomechanics, and obesity. OA should not be thought of as a single disease, but rather as the clinical endpoint of numerous disorders leading to the eventual failure of one or more joints of the body.

Methods: Literature review and research by authors

Results: Perhaps the first step in understanding OA as an inflammatory disease is to acknowledge that inflammation is not exclusive to rheumatoid arthritis (RA) and the other classical inflammatory arthritides. These paradigm-changing studies have freed OA from its reputation as a non-inflammatory, 'wear and tear' arthritis, likely transforming the ways in which researchers and clinicians think about and treat the disease. Using modern tools and techniques, our group has further characterized inflammatory mediators in OA and RA synovial fluid as well as OA, RA, and normal serum. To date, no agent has been shown to have disease-modifying effects on the structural progression of OA.

Malalignment and mechanical derangement, although perhaps not the effectors of inflammation, are clearly the harbingers of both development of inflammation and propagation of OA pathology.

Conclusion: The increasing appreciation of clinical risk factors for the development of OA as well as the advent of highly sensitive imaging modalities capable of visualizing early synovitis and cartilage change holds great promise for the identification of the at-risk population most suitable for very early anti-inflammatory interventions.

Background

Osteoarthritis (OA) has long been considered to be an isolated, non-inflammatory, wear-and-tear degenerative type of joint disorder. OA can affect

any joint, but is most commonly found in weight-bearing joints such as the spine, hips, and knees. Inflammatory or immune-mediated types of arthritis, such as rheumatoid arthritis, have been thought to be separate disease entities with inflammatory changes being a hallmark. However, OA may also be associated with systemic inflammatory markers such as C-Reactive Protein. This paper explores the early inflammatory and immune reactions that may set up a chronic inflammatory response, leading to the characteristic degenerative changes associated with OA.

Methods

This review included a wide range of studies that evaluated synovial inflammation, innate immunity, cartilage degeneration, and the common causes of OA. The usefulness of contrast-enhanced magnetic resonance imaging (MRI) and Power Doppler Ultrasound in early detection of inflammatory changes were discussed.

Results

OA should be considered as the common endpoint of a number of disorders and not simply as a separate disease. OA commonly begins as a result of primary traumatic injury to a joint, but continued biomechanical dysfunction, obesity, or anatomic misalignment is usually needed to perpetuate the degenerative process. It is clear that inflammation is an early part of OA and is not exclusively the domain of inflammatory arthritides such as rheumatoid arthritis (RA). Early detection of these inflammatory changes may be the key to successful pharmaceutical treatment. Currently, medications prescribed for OA are palliative and there is no known medical treatment that significantly alters the degenerative course of the disease. MRI has been used extensively to identify early inflammatory changes at the bone-cartilage interface and the synovium. OA does not exhibit the impressive immune response seen in RA, but a more muted immune response plays a key role in establishing chronic inflammation in the affected joint. Once this cycle of inflammation-tissue damage-immune response is established, the patient is well on the way to loss of cartilage and joint space and permanent changes. The authors state that "malalignnent and mechanical derangement are clearly the harbingers of both development of inflammation and propagation of OA pathology."

Conclusions

Injury combined with continued biomechanical stress on a joint can lead down the pathway to OA. Chronic, sustained inflammation and immune response in the cartilage and synovium are the components that can ultimately lead to end-stage OA.

Clinical Relevance

The research outlined in this paper is highly relevant to chiropractic practice. The authors recognize that there are multiple factors beyond an initial injury that lead to the development of OA. It is these perpetuating factors, especially significant for chiropractors: "malalignment and mechanical derangement," that set up the cascade of chronic inflammation. If the initial joint injury is treated correctly at the outset, the likelihood of chronic joint misalignment or dysfunction is reduced or eliminated. Given the broad social and financial impact of OA morbidity, chiropractic has much to offer in treating and preventing the factors that lead to the progression of OA.

JACO Editorial Summary:

- The article was written by authors from VA Palo Alto Health Care System, Palo Alto, CA and Stanford University, Palo Alto, CA, USA.
- The purpose of this article is to review the current research regarding the role of inflammation and the immune system in the development of OA.
- OA has much more significant inflammatory and immune components than previously thought.
- OA is the final common pathway of a multitude of joint disorders and injuries.
- Activation of the innate immune system in response to tissue damage (inflammation) in the joint cartilage and synovium is an important factor in the development of OA.

- Chronic inflammation is a key factor in progressive loss of cartilage, loss of joint space, and changes in bony architecture.
- Unlike RA, there is no known pharmaceutical intervention that will significantly alter the course of osteoarthritis.
- Ongoing biomechanical stress affecting a joint is a key perpetuating factor that results in chronic inflammation.

Summary

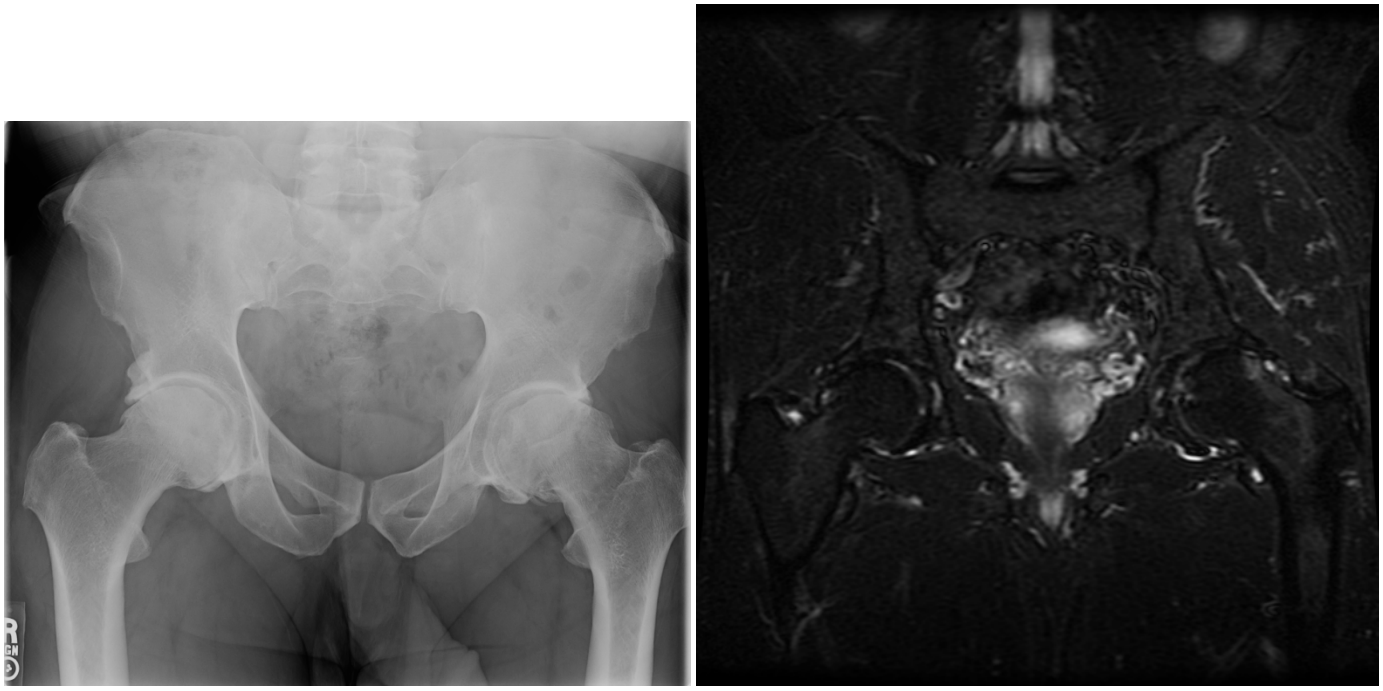
Chiropractors should understand and appreciate the benefit that proper chiropractic joint manipulation has on the long term outcome of joint injuries and malalignment. Ongoing, regular chiropractic manipulation may be effective to prevent or minimize advanced OA for patients with permanent joint instability or obesity.

Radiology Corner

❖ Yochum, A. M.: **DEGENERATIVE JOINT DISEASE OF THE HIP.** JACO 2014, 11(1)

Degenerative Joint Disease of the Hip

HISTORY: 57 year old male with bilateral anterior hip pain and restricted range of motion.



Case courtesy of Logan University Health Centers

Figure 1: AP pelvis radiography demonstrates non-uniform loss of joint space with osteophytosis, subchondral sclerosis, cystic changes and buttressing. There is also superior migration of the femoral head with flattening of the superior surface.

Figure 2: This patient was suspected to have osteonecrosis of the femoral heads due to the flattening of the superior aspect noted on radiography which could indicate necrotic collapse. The magnetic resonance imaging (MRI) was performed and there were no signs of necrosis on the STIR weighted sequence (provided). The findings of osteoarthritis were confirmed on the MRI with the addition of a joint effusion on the left.

General Characteristics

Degenerative joint disease (DJD), traditionally known as osteoarthritis (OA), is the most common pathologic disease of a joint [1]. It has been classically described as a progressive non-inflammatory arthritis involving the articular cartilage and joint complex however there is a localized inflammatory component as well. DJD has been categorized into either primary (idiopathic) when there is no one cause attributable to the arthropathy or secondary when the arthropathy is resulting from a known factor such as trauma or repetitive stress. Any joint can be affected but it typically involves the larger weight bearing joints and the small joints of the hands particularly the distal interphalangeal joint, the proximal interphalangeal joint and the first metacarpal-trapezium joint [1, 2].

Clinical Features

There is a poor correlation between pain and the extent of radiologic findings noted in a patient with DJD [1]. A patient with severe degeneration of a

joint on radiography could be asymptomatic whereas a patient with mild changes may be symptomatic. The prevalence of symptomatic DJD is 9% in Caucasian populations and 4% in the hip specifically [2]. Typical symptoms include aching pain which is activity related, reduced function and movement, stiffness, swelling, crepitus, referred pain and joint instability. The patient may have deformity of the joint, bony enlargement or muscle atrophy in adjacent musculature. It is important to take into account psychological factors that may be contributing to the patient's pain such as anxiety or depression [1, 2].

Onset is typically insidious with episodes of exacerbation related to activity or environmental changes such as cold weather. There are no associated laboratory findings to suggest systemic involvement. Degenerative joint disease accounts for 90% of hip and knee replacements and contributes to the growing cost of arthritis related care which has reached $65 billion annually [2].

Pathologic Features

The pathologic process that occurs in the development of DJD begins locally and spreads to surrounding joint surfaces. It can be thought of as failed repair of cartilage damage that has been caused by excessive mechanical stress on tissues [3]. There are many causes of DJD so a common pathophysiologic pathway does not exist, but there are some commonalities such as abnormal joint mechanics or excessive load. Abnormal physical forces are thought to be the trigger for the development of DJD and cause interference with the function of the cartilage. The articular cartilage then undergoes fibrillation, fissuring, flaking, ulceration, and full thickness loss of the joint surface [1, 3]. When full thickness loss of joint surface occurs, this appears as loss of joint space on the radiograph and secondary changes begin to occur. One of these secondary changes is synovial hypertrophy and the release of prostaglandins, leukotrienes, proteinases, neuropeptides and cytokines causing synovitis which in turn results in more cartilage damage [2]. This may be a source of pain and is a local inflammatory reaction. Additional secondary changes are osteophytosis, subchondral sclerosis, subchondral cysts (geodes), articular deformity and subluxation.

Radiologic Features

There are eight crucial radiologic features associated with plain film manifestations of DJD. They include: asymmetric distribution, non-uniform loss of joint space, osteophytosis, subchondral sclerosis, subchondral cysts (geodes), intra-articular loose bodes, intra-articular deformity and joint subluxation [1]. These findings can be found in any joint that is afflicted with DJD.

In the hip, the femoral head most commonly migrates superiorly related to cartilage thinning of the lateral weight bearing surface. Osteophytes occur on the superolateral acetabular margin as well as the lateral and inferomedial surface of the femoral head forming a collar osteophyte. Within the osteophyte, trabecular pattern is continuous with the adjacent bone and a cartilage cap is present contributing to continuous growth. Subchondral sclerosis appears as increased radiopacity most commonly in the supra-acetabular region but is not as prominent in the femoral head. It is associated with an increase in the number of trabeculae present in response to altered stresses. When subchondral cystic changes occur they may be large and appear as a lucent region adjacent to the articular portion of the bone. These occur most commonly in the supra-acetabular region of the ilium and within the superior femoral head. They occur from cartilage thinning with underlying cortical microfractures allowing synovial fluid to escape into the bone. This fluid is eventually replaced by fibrous tissue resulting in the synovial cyst.

Femoral head cystic changes may be impossible to differentiate from avascular necrosis. Buttressing is a finding that is specific to the hip and includes thickening of the cortex of the medial femoral neck just superior to the lesser trochanter. This is a stress reaction from altered biomechanics [1]. Joint deformity may occur and be evidenced by flattening of the femoral head as well as the adjacent acetabular margin which is present in this case. This finding needs to be differentiated from osteonecrosis which can appear as collapse (alteration in shape and/or contour) of the femoral

head with fragmentation related to osseous necrosis [1]. While collapse of the femoral head is a sign of osteonecrosis it may not be evident in some cases. If necrosis is suspected, an MRI is indicated and would demonstrate various changes depending on the stage of osteonecrosis. The most classic finding is the double line sign which is a focal serpiginous low signal line with an inner line of high signal on T2 weighted imaging as well as bone marrow edema [1]. If degeneration progresses and becomes advanced then the term coxarthrosis and malum coxae senilis (old degenerated hip) may be used [1].

The radiographic findings associated with very early degenerative changes would not be visualized on plain film but may be evident on MRI [4]. They would consist of localized defects or thinning of the cartilage [4].

Differential Diagnosis

Diagnosis of DJD of the hip is usually straightforward. Differential diagnosis includes osteonecrosis which should be suspected in any case where there is flattening or alteration in shape and contour of the femoral head and MRI is indicated to rule out osteonecrosis. It also includes inflammatory arthritis (such as rheumatoid or psoriatic arthritis) where the joint space narrowing is typically symmetrical as opposed to superolateral narrowing. There are often erosions (rat bite erosions) that occur in inflammatory arthritis that are absent in DJD as well as a lack of productive changes such as osteophytes and subchondral sclerosis which occur in DJD. When joint space narrowing is symmetrical, infection must be excluded. As infection progresses, it would cause extensive bony destruction on either side of the joint therefore eliminating the possibility of degenerative or inflammatory arthritis as the diagnosis and support the diagnosis of septic arthritis [1].

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3. Brandt, K.D., P. Dieppe, and E. Radin, *Etiopathogenesis of osteoarthritis.* Med Clin North Am, 2009. **93**(1): p. 1-24, xv.
4. Chan, D.D. and C.P. Neu, *Probing articular cartilage damage and disease by quantitative magnetic resonance imaging.* J R Soc Interface, 2013. **10**(78): p. 20120608.

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

2014 American College of Chiropractic Orthopedists Annual Convention

When:

Thursday April 24, 2014 at 4:00 PM EDT
-to-
Saturday April 26, 2014 at 1:00 PM EDT

Where:

Lake Buena Vista Hilton Hotel
Orlando, Florida

1751 Hotel Plaza Boulevard
Lake Buena Vista
Orlando, FL 32830

For Further Information, Contact:

Deanna L. O'Dwyer, DC
American College of Chiropractic Orthopedists
Email: dosdc@aol.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