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Original Article

Chiropractic Management of a Patient with Chronic Post-surgical Neck Pain: A Case Report

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Abstract

Introduction: This paper presents a case report of chiropractic management of a patient with myofascial cervicalgia as a sequela to carotid endarterectomy.

Case Presentation: An 83 year old male presented with a chief complaint of chronic right anterior neck pain and an associated tender mass. His surgical history includes a right carotid endarterectomy performed 32 months prior to initial chiropractic consult.

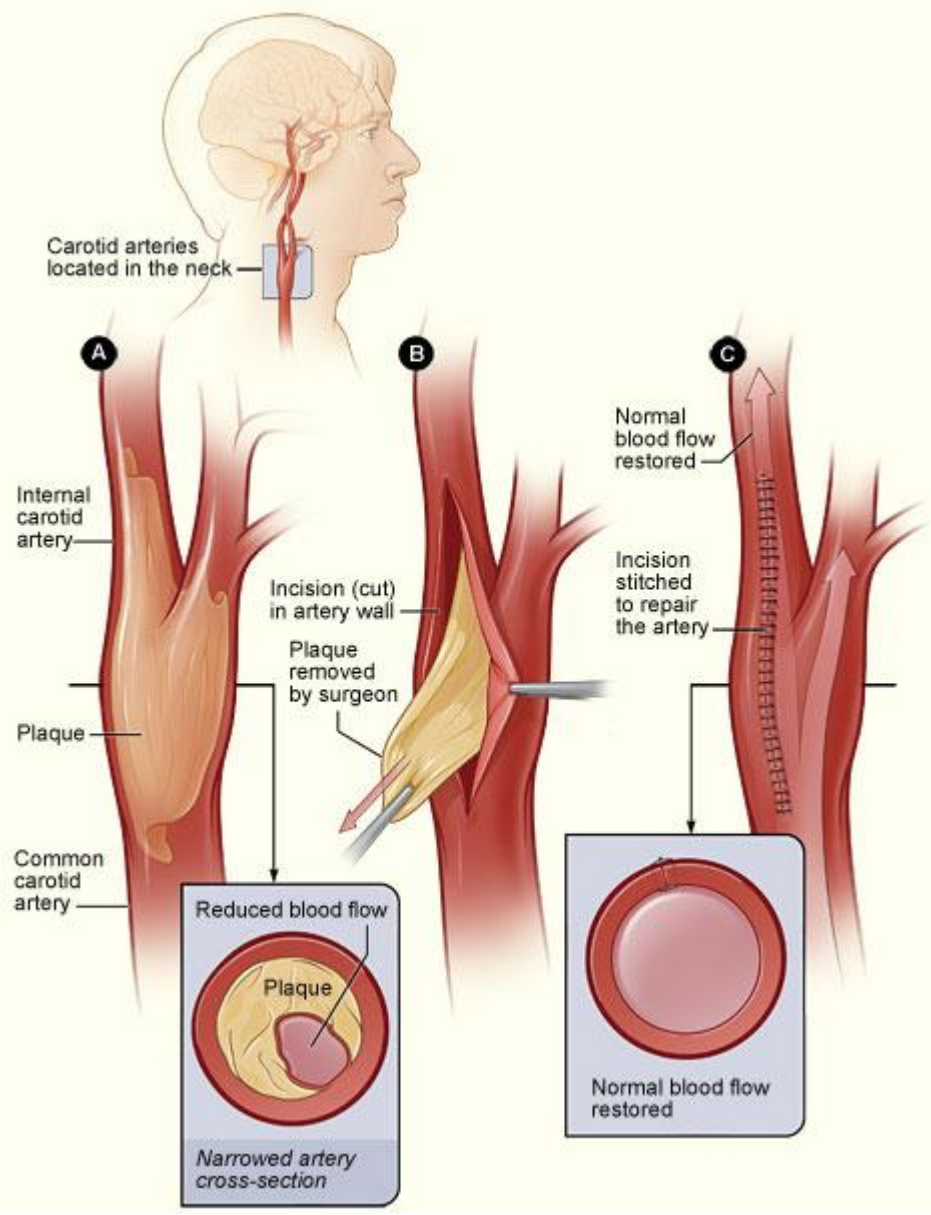
Management and Outcome: The patient was treated weekly with Instrument Assisted Soft Tissue Mobilization (IASTM) of the right cervical spine musculature and instrument assisted manipulation of the right first costovertebral joint. The patient's pain resolved after five visits without sustained soreness or other side effects following treatment.

Discussion: Post-surgical pain is a common problem with a high degree of morbidity and a high overall cost effect. Myofascial adhesions are a well-documented cause of postsurgical pain. IASTM was effective and safe in treatment of pain and adhesion in a patient with chronic pain following carotid endarterectomy.

Keywords: Fascia; Therapy, Soft Tissue; Chiropractic; Endarterectomy, Carotid; Chronic Pain

Background

More than 140,000 individuals die from stroke every year, making it the third leading cause of death in the United States, behind heart disease and cancer [1]. Patients with carotid artery disease may undergo a preventative surgery known as carotid endarterectomy (CEA) during which a surgeon will make a 5-10 cm incision on the carotid artery and remove accumulations of atherosclerotic plaque [Figures A-C]. Another common alternative treatment known as carotid angioplasty stenting (CAS) utilizes an inflatable balloon to displace the plaque and a stent to lower the risk of future blockage [2]. It is estimated that 100,000 CAE procedures occurred in the United States in 2010 [3].



The illustration shows the process of carotid endarterectomy. Figure A shows a carotid artery with plaque buildup. The inset image shows a cross-section of the narrowed carotid artery. Figure B shows how the carotid artery is cut and how the plaque is

removed. Figure C shows the artery stitched up and normal blood flow restored. The inset image shows a cross-section of the artery with plaque removed and normal blood flow restored.

The utilization of CEA declined between 1997 to 2010 as the use of CAS increased [3] despite studies suggesting that CEA is the preferred procedure in symptomatic patients due to decreased postsurgical risk of stroke when compared to CAS [4]. CEA has its own risks, specifically with regard to health related quality of life measures such as difficulty swallowing and persistent neck pain [5, 6]. The more invasive nature of the CEA increases the risk for and intensity of postsurgical pain. As with other open surgeries, myofascial pain with adhesion is a common postsurgical complication [7, 8, 9].

Instrument assisted soft tissue mobilization (IASTM) is an emerging treatment for conditions with myofascial components. Evidence indicates that soft tissue mobilization promotes healing by increasing fibroblast production [10] and instrument assisted cross fiber massage has been shown to accelerate early tissue level healing as well as the orientation and formation of collagen fibers in ligament injuries [11].

Case Presentation

The patient is an 83 year old caucasian male with right anterior neck pain and an associated soft, tender, mobile mass measuring approximately 2 cm by 3 cm in size. His surgical history includes a right carotid endarterectomy 32 months prior to initial chiropractic consult. He reported that the pain began a year and a half ago without inciting event or injury. He described the quality of pain as a soreness which he rated at a 2-3 out of 10 on the Numeric Pain Rating Scale (NPRS) where 0 equals no pain and 10 equals the most intense pain imaginable. The patient reported some pain relief from prescription acetaminophen (325 mg tablet, two per os every 6 hours as needed for pain). The patient's medical history includes right carpal tunnel release, right hip replacement, left quadriceps tendon repair, left forearm osteomyelitis surgery, and a bone marrow surgery. Two months prior, a computed tomography study showed signs of cervical degeneration. The patient also reports a history of transient ischemic attacks prior to, as well as several following the carotid endarterectomy. Patient consult was sent from an otolaryngologist who was seeing the patient for the neck discomfort and dysphagia as well as otitis externa and impacted cerumen.

Physical examination yielded mild to moderate palpatory tenderness at the right anterior cervical region as well as the right supraclavicular fossa. Palpation also revealed moderate to severe hypertonicity of the anterior cervical musculature including the right sternocleidomastoid (SCM) and anterior and middle scalenes. Cervical range of motion was normal in flexion, but decreased in extension, left rotation, right rotation, left lateral flexion, and right lateral flexion. Active cervical right rotation, left lateral flexion, and right lateral flexion were provocative for right anterior neck pain. Static and motion palpation revealed a tender superior prominence of the right first rib as well as a decrease in superior to inferior fluid motion of the right first costovertebral joint.

Management and Outcome

Following the consult evaluation, the patient's costovertebral joint was adjusted by a chiropractor with an Impulse® Adjusting Instrument (NeuroMechanical Innovations, Chandler,

AZ) with a superior to inferior and lateral to medial line of correction. Additionally, IASTM was performed utilizing a FAKTR® Instrument F4 and emollient (FAKTR-PM, Inc., Asheville, NC) on the right, hypertonic anterior cervical musculature. Following initial treatment the patient rated his pain at 0 out of 10 on the NPRS and noted on a subsequent visit that he remained without pain for three days.

The patient completed a short course of conservative care at a frequency of 1 visit per week for 4 weeks, during which he underwent the same intervention of instrument adjusting and IASTM as needed. Adjustment of the right first costovertebral joint was accomplished on visits 1-4 only. IASTM treatment progressed from visit to visit as follows: neutral cervical position; passive right and left rotation; active patient cervical motion of combined flexion and right lateral flexion and right rotation into combined extension left lateral flexion and left rotation; resisted cervical motion from combined flexion and right lateral flexion and right rotation into combined extension, left lateral flexion and left rotation. Patient pain presentation on the third visit was decreased to 1-2 out of 10 on the NPRS and 0 out of 10 on the penultimate visit. Patient reported feeling better following the first and second visit, and the patient stated that he had no pain or soreness following the care of the 3rd, 4th, and 5th visits.

During of the fifth and final visit of initial course of care, the patient presented with a pain intensity of 0 out of 10 on the NPRS and reported only three exacerbations since the fourth visit which he rated at 2 out of 10 in terms of pain intensity. Following active treatment on the fifth visit, a home exercise program was described, demonstrated, and observed with instructions regarding frequency provided to the patient for stretching of the anterior neck musculature, specifically the SCM. The patient was asymptomatic at the conclusion of the fifth visit and was discharged with self-care recommendations and the option to return to clinic on a symptomatic basis.

Discussion

Fascia becomes important clinically when it loses stiffness, becomes too stiff or has decreased shearing ability [12]. A surgical operation can cause adhesions that, regardless of the surgical procedure adopted, are traceable in the underlying layers, with fascial tissue failing to differentiate the adjacent structures effectively leading to entrapments [13, 14]. Fibrous adhesions are known to be painful, prevent normal muscle mechanics and decrease soft-tissue extensibility [15]. This case presented the use of a minimally invasive treatment for chronic post-CEA neck pain of myofascial etiology and yielded a good outcome over 5 weeks, without negative side effect.

The mean follow-up cost for CAE for one year is over $1,000 [16] and in 2012, the United States alone had an estimated 100,000 inpatient CEA procedures [3]. This creates a cost burden that is substantial and post-operative adhesions are associated with substantial morbidity and present a risk over time that can run into decades [17]. Due to the nature of many operations, fascial layers are often disturbed during surgery, but more often than not, little to no attention is given to the remodeling to this anatomy.

When providing care directly to an area of increased and delicate vasculature, especially with complications such as stroke, precautions such as a thorough history and physical examination are of a paramount importance. Although the results from one case cannot be generalized, further study is indicated to determine if this procedure could benefit other patients for whom chronic postsurgical pain is a problem.

Limitations

The authors recognize limitations of this case study. Generalization of the diagnostic findings and outcomes represented in this case may not necessarily apply to other patients.

Consent

Written consent for publication was obtained from the patient.

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Competing Interests

The authors declare that they have no competing interests.

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Original Article

Leg Length Inequality as a Cause of Functional Scoliosis in a Patient Following a Total Hip Replacement

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ABSTRACT

Introduction: Leg Length Inequality (LLI) has been identified as a mechanism that can lead to scoliosis. LLI is a relatively common outcome of total hip replacement (THR) surgery; however, few studies illustrate the potential for THR to result in scoliosis. The current report discusses a scoliosis that may have resulted from LLI following a THR.

Clinical Features: A 65-year-old woman sought care at a hospital based chiropractic clinic for an acquired scoliosis following a THR surgery. This was not present in plain film imaging taken prior to her THR surgery. Post-surgical leg length analysis revealed a significant LLI and subsequently, the rapid progression of a scoliosis.

Interventions and Outcomes: Post THR surgery radiographs of the hips illustrated significant asymmetrical leg lengths and progressing scoliosis.

Conclusion: A significant number of patients develop LLI following THR surgery. Non-surgical LLI have been found to cause or contribute to scoliosis; this case identifies a potential link between an iatrogenic LLI and the onset of scoliosis. The presenting case illustrates a patient that may present with back pain to the general chiropractic office.

Introduction

Acquired scoliosis following total hip replacement (THR) surgery is not well documented within the literature. Our paper describes a mature patient who presented post-THR who subsequently developed a

40-degree scoliosis. Total hip replacement surgery is an effective intervention for reducing hip dysfunction and decreasing pain; however, a substantial number of patients report poor outcomes related to Leg Length Inequality (LLI), nerve palsies, low back pain, and gait abnormalities (1, 2). Over 70% of post-THR patients are left with some LLI (3), and 23-56% of THR surgeries result in LLI of greater than 1 cm (4, 5, 6); subsequently, the Joint Commission has listed LLI as one of the 19 major events deserving additional focus and attention in healthcare safety (7). A search was conducted through Pubmed, Google Scholar, and 17 other databases within OVID using the terms leg length inequality, scoliosis, iatrogenic scoliosis, total hip replacement, and total hip arthroplasty. Scoliosis is defined as a lateral spinal deformity in a skeletally mature adult with a Cobb angle greater than 10 degrees. There are four type of scoliosis. Type 1 is termed primary degenerative scoliosis and is a result of disc degeneration and/or facet joint arthritis. Type 2 is known as idiopathic adolescent scoliosis, which progresses into adult life. Type 3a is termed functional scoliosis and results from pelvic obliquity due to LLI, hip pathology, or as secondary curves. Type 3b is development of the lateral curvature as a result of metabolic pathology (8).

Functional scoliosis is related to LLI (8), but only one article has illustrated a possible connection between THR and progression of lateral spinal curvature. Moreno et al evaluated the effects of leg length discrepancy following THR using a 3D motion capture system in standing subjects and found a 1 cm difference caused significant alterations in posture and gait. They also noted that limb length inequality can result in pelvic obliquity, asymmetric loading patterns, and progressive dysfunction; therefore, the intent of their study was to analyze the effects of heel lifts on LLI. Group I was fitted with a heel lift equal to the LLI, group II was fitted with a heel lift not equal to LLI, and group III was not fitted with a heel lift. After 3 months, the groups were re-evaluated. Group III had progressive pelvic obliquity, more back pain, and noted spinal deformity, while group II had some who improved and others whose obliquity and spinal deformity increased. Group I had full resolution of the symptoms and a stable pelvic posture as defined by this study's authors (9). Leg length inequality can lead to scoliosis (8), and total hip replacement surgery can create leg length inequality (1, 2). However, little information is available regarding LLI secondary to THR and resulting in scoliosis. There are those who believe that LLI post-THR does not result in pain or alteration in gait(10); however, in addition to Moreno et all (8), Betsch et al illustrated that LLI greater than 20mm resulted in significant biomechanical alterations related to pelvic rotation and lateral deviation (11). Others have noted that LLI less than 2 mm is a static disorder and correction of the LLI will eliminate the scoliosis (12). We identified a patient who, after undergoing a THR, developed a LLI of 27mm and subsequent scoliosis of 40 degrees over 4 years.

Figure 1

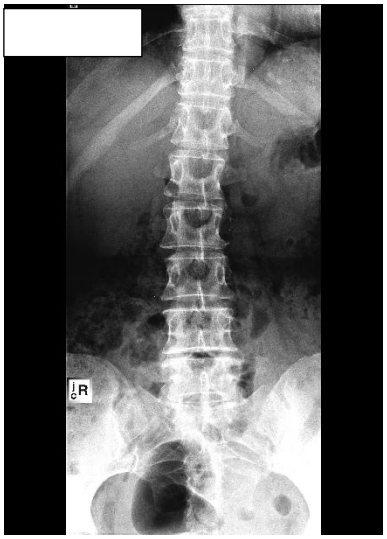
Case Report

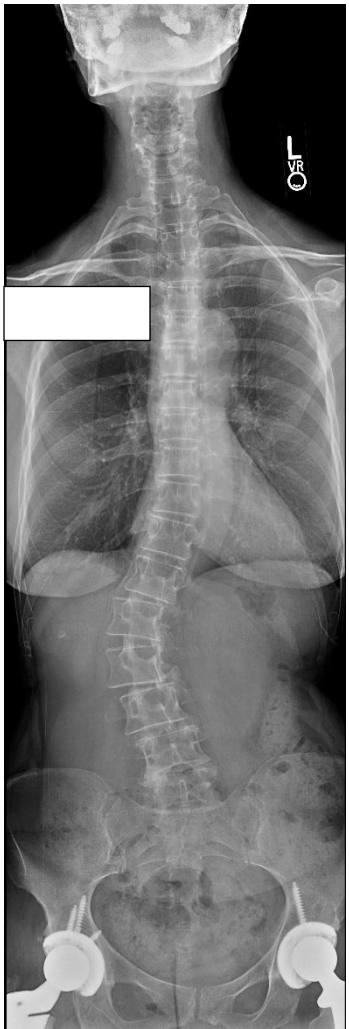
A 65-year old female patient presented initially to the hospital-based chiropractic clinic on 4/18/2008 with a mild backache for one visit before having a left THR on 4/29/2008. Plain film radiographs illustrated severe degenerative joint disease in the left hip that had resulted in prolonged pain and dysfunction. Her personal history was negative for inflammatory arthropathies, obesity, surgeries, or other systemic diseases; however, lumbar spine osteopenia was noted from a bone density examination.

Following the surgery, the patient's back pain increased. During a post-operative follow-up visit on 9/19/2008 with the orthopedic surgeon, a CT scanogram was taken and revealed a LLI of 27mm (figure 1).

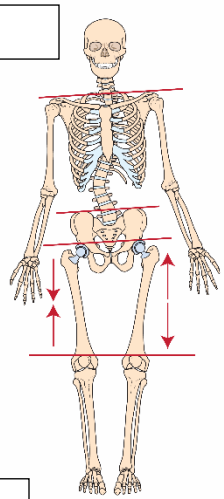
A lumbar spine radiograph was also taken on this date and revealed a 15 degree dextroscoliosis using a Cobb angle (figure 2). The patient did have a previous lumbar spine radiograph dated 3/10/2005, which was used for comparison, and that radiograph illustrated no significant lateral curvature (figure 3). The patient returned to the hospital based chiropractic clinic for two additional visits on 11/21/2008 and 12/10/2008 with subjective complaints of severe low back pain. The patient's treatment plan consisted of continuous passive motion using a flexion distraction table with light posterior-anterior joint manipulation in addition to instruction for core bracing. The patient's pain persisted, prompting the writer to obtain a right hip radiograph which revealed degenerative joint disease. The combination of degeneration and LLI resulted in the patient and the orthopedic surgeon choosing to proceed with a right THR on 7/17/2009. Three months following the right hip replacement, another lumbar radiograph was taken that demonstrated a progression of her scoliosis to 33 degrees (figure 4). The extent of the rotatory progression was especially noteworthy. Symptoms persisted and a scoliogram was performed on 1/29/2010 and revealed progression of the lateral curvature to 35 degrees.

Figure 2

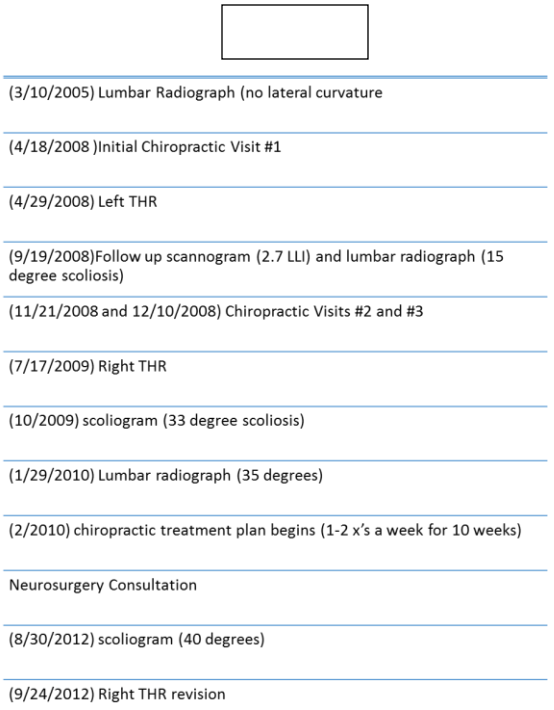




On 2/24/2010, the patient returned to the hospital-based chiropractic clinic with pain rated 3/10 on an 11-point scale that began 18 months prior, at the time the initial lumbar spine radiograph was taken (figure 2). The pain was rated as high as 5/10 within the last 24 hours, and 8/10 within the last 30 days. Subjectively, standing was listed as provocative while massage therapy and physical therapy provided some degree of relief She also noted a large "hump" on her back that she hadn't noticed prior to the either THR. She was seen at a frequency of 2 visits per week for 10 weeks with treatment consisting of core stability exercises, lateral bend stretching over a bolster,



continuous passive motion flexion distraction with light posterior to anterior prone spinal manipulation. The patient was also fitted with a 9 mm heel lift on the right. The size of the heel lift was chosen because it was the largest lift that the clinic had, it reduced the LLI to under 20 mm, and the patient reported relief with this lift when trialed in clinic. Following the third appointment, the patient reported pain severity at 1/10 which persisted until discharge on 7/23/2010. The proposed frequency was 3 visits per week; however, the patient lived four hours away and preferred to coordinate her appointments with semi-weekly family visits. Regular exercise like walking was suggested and neurosurgery was consulted due to the severity of the curvature. Neurosurgery suggested multisegmental spinal fusion as an option to correct the scoliosis; however, the patient chose to forgo the suggested intervention at that time. On 8/30/2012, another scoliogram was performed and revealed a 40-degree curvature with right lateral subluxation of L1 relative to L2 (figure 5). The continued pain prompted a right THR revision on 9/24/2012. Pain, altered spinal contours (figure 6), and altered gait persisted post-revision. To date, her symptoms and imaging have progressed. She has continued to be followed by neurosurgery and has remained undecided regarding multisegmental spinal stabilization. A timeline has been included as a summary for the points above (Figure 7).



Discussion

The report presents a compelling link between an iatrogenic leg length discrepancy and the onset of scoliosis in an otherwise mature spine. LLI is common amongst the THR population. Following placement of the implant, if the surgeon feels that the implant is too loose, a larger implant will be placed to prevent dislocation, which adds length to that lower extremity (1). While no literature exists to date correlating post-THR LLI to scoliosis, the European Spine Journal released a review of adult scoliosis, which identified LLI and pelvic obliquity as one of the 4 major possible causes of scoliosis (8). In addition, Giles et al have provided evidence that LLI and pelvic torsion result in asymmetry of lumbosacral facet joint angles, postural scoliosis, concavities in the vertebral body end-plates, wedging of the fifth lumbar vertebra, and traction spurs (13,14). One reason this correlation may not be apparent in the literature is the inherent difficulty in quantifying LLI. Full spine standing A-P radiographs are commonly used to initially assess LLI; however, the CT scanogram is the most reliable and accurate technique because of its ability to take into account soft tissue contractures (15). If physicians suspect that their patient has a LLI, especially post-surgically, the CT scanogram would be the most appropriate method for quantification. Historically, most of the studies examining this topic were performed before the CT scanogram was identified as the method of choice for evaluating LLI; therefore, the amount of LLI may be over or underestimated. Within the timeline, the patient had only reported to the chiropractic clinic for one visit prior to the initial lumbar radiograph and lateral curvature measurement of 15-degrees. In addition, the patient was only seen two more times before another radiograph illustrated a 35-degree lateral curvature. The lateral curvature is much more likely to have been a result of LLI (8) or degenerative changes (8) as there is no evidence to suggest that manipulation is a cause of scoliosis. As for other treatments, the progression was rapid and earlier post-surgical follow up with the orthopedist

may have resulted in prompter recognition of the LLI. Early recognition could have resulted in early intervention including corrective orthoses. It is worth noting that the literature does support initial treatment with a heel lift half of the size of the measured LLI (16). It is possible that the combination of early detection and correction may have slowed progression of the scoliosis.

Our case demonstrates a relationship between LLI following THR surgery and progression of scoliosis using acceptable standards of measurement (11, 13). We acknowledge that causes other than surgery may explain this particular acquired scoliosis. It is our opinion that the pain and dysfunction of degenerative hips, psoas inhibition or hypertonicity, unrecognized organic disease, or several other causes could potentially cause or contribute to this condition. It should be noted that the limitations related to this case include a lack of scoliogram or lumbar radiograph immediately prior to the initial THR, so it is unclear whether the LLI existed and, if so, to what degree, prior to the THR.

Conclusion

Leg length inequality can contribute to scoliosis (8) and total hip replacement frequently results in leg length inequality (1). It is our opinion that this case demonstrates the potential for hip replacement surgery to inadvertently cause or worsen a functional scoliosis. This case contributes to the body of evidence regarding post-surgical structural changes and is directed toward healthcare professionals who may treat musculoskeletal spinal disorders post-THR.

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Abstracts & Literature Review

Incidence of Neuralgic Amyotrophy (Parsonage Turner Syndrome) in a Primary Care Setting - A Prospective Cohort Study

Nens van Alfen, Jeroen J. J. van Eijk, Tessa Ennik, Sean O. Flynn, Inge E. G. Nobacht, Jan T. Groothuis, Sigrid Pillen, Floris A. van de Laar
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Authors' Abstract:

Objective: Neuralgic amyotrophy is considered a rare peripheral nervous system disorder but in practice seems grossly under recognized, which negatively affects care for these patients. In this study we prospectively counted the one-year incidence rate of classic neuralgic amyotrophy in a primary care setting.

Methods: In a prospective cohort study during the year 2012 we registered all new cases of neck, shoulder, or arm complaints from two large primary care centers serving a population of 14,118. Prior to study, general practitioners received a short training on how to diagnose classic neuralgic amyotrophy. Neuralgic amyotrophy was defined according to published criteria irrespective of family history. Only patients with a classic phenotype were counted as definite cases. After inclusion, patients with suspected neuralgic amyotrophy who had not yet seen a neurologist were offered neurologic evaluation for diagnostic confirmation.

Results: Of the 492 patients identified with new onset neck, shoulder or arm complaints, 34 were suspected of having neuralgic amyotrophy. After neurologic evaluation the diagnosis was confirmed in 14 patients. This amounts to a one-year incidence rate for classic neuralgic amyotrophy of 1 per 1000.

Conclusions: Our findings suggest that neuralgic amyotrophy is 30-50 times more common than previously thought. Unawareness of the disorder and its clinical presentation seems the most likely explanation for this difference. An incidence rate of 1 per 1000 and the long-term sequelae

many patients suffer warrant more vigilance in diagnosing the disorder, to pave the way for timely treatment and prevent complications.

Clinical Relevance

This study suggests that neuralgic amyotrophy is much more common than that previously thought/reported and should be considered when patients present with radiating neck pain to the upper extremity.

JACO Editorial Summary

- This article was written by authors primarily from the Netherlands (where the study took place) with one author from Ireland.
- Neuralgic amyotrophy or NA (a.k.a. Parsonage Turner syndrome or brachial plexus neuritis) is a distinct type of peripheral neuropathy, with one or more episodes of acute, severe pain in the upper extremity which is quickly followed by multifocal paresis with a slow 1-2 year recovery time of which a large subset become disabled (estimated at 25% of NA cases in this study).
- Diagnostic difficulty is common (about 30% of the cases) due to the high variance in clinical presentations such as painless episodes and lower brachial plexus, or other peripheral nerve involvement.
- In about 70%, the "classic presentation" is: acute shoulder region pain followed by scapular winging, weakness in shoulder abduction, external rotation, grip/pinch strength, and forearm pronation.
- The cause is thought to be autoimmune but difficulty proving this has occurred most commonly due to delay in diagnosis (median time: 11 weeks) and hence, difficulty randomizing subjects to corticosteroids or IV gammaglobuline groups.
    - A reference listed in the study identifies "idiopathic" and a "hereditary form." (https://www.radboudumc.nl/Informatiefolders/7130-Neuralgic_Amyotrophy__id-i.pdf)
- This study changes the prior incidence rate estimate from 1-3/100,000 per year to 1 in 1000 (30-50 times more frequent for the "classic presentation."
- History criteria: 1) New / subacute onset of uni- or bilateral shoulder pain; 2) NRS pain score of ≥7/10; 3) History of weakness with abnormal shoulder ROM (abduction, ER, FFL); 4) When ≥3 weeks post-onset: Paresis of the long thoracic, suprascapular, and anterior interosseous nerves; 5) Slow recovery.
- Physical exam criteria: 1) Scapular winging/dyskinesia; 2) Signs of muscle atrophy; 3) Weakness of shoulder abduction, external rotation, serratus anterior, forearm pronation and/or pinch strength.
- Probable reasons for "missing" this diagnosis: 1) Diagnostic unfamiliarity (many physicians simply do not know about it); 2) Given it's rarity, it's simply not considered as a differential diagnosis; 3) Many physicians don't look at scapular stability, don't perform a detailed neurological exam of all the upper extremity muscles, and/or don't "tie" the findings of NA together.

- The ratio of classic NA to that of other disorders in this study was 3% or, 1 in every 33 patients with a new onset of neck, shoulder, or arm complaints in a primary care setting will have NA (this compares to 47% or 1 in 2 patients that were diagnosed with shoulder pathology; 15x more common).
- An incidence rate of 1 per 1000 per year suggests NA is NOT "rare" which is defined as 1 per 2000 per year. This equates to 17,000 new cases per year in the Netherlands.
- Table 4: Points that lead to a correct diagnosis
    - Any patient with 1) acute onset, 2) severe pain (≥7/10), 3) Analgesic resistant shoulder &/or upper arm pain
    - Pain worse at night and still severe at rest
    - Multifocal motor/sensory losses that can be bilateral but asymmetrical
    - PE: Remove clothing – inspect/palpate shoulder/arms for scapular asymmetry and muscle atrophy
    - Look for scapular motion dyskinesia during slow abduction, FFL (video clips available)
    - Test/compare bilaterally the strength of the serratus anterior, shoulder external rotation, long thumb and index finger flexors (pinch), forearm pronation: Any weakness found in combination is suspect for NA and rare in other disorders with similar presentations
- Periscapular weakness and a pain score of ≥7/10 are needed as "minimums."
- Training of primary care physicians (PCP's) in two, 1-hour teaching sessions followed by a simple diagnostic protocol led to a 3-fold increase of identifying NA (confirmed by an experienced neurologist).
- Limitations in the study include: 1) All PCP's involved were aware of the study goal (which can lead to bias); 2) They did not systematically refer every patient with suspected NA for neurological examination &/or ancillary tests (EMG, cervical MRI)
    - There is no "gold standard" test to confirm NA; the diagnosis is made by adhering to clinical criteria (history/examination).
- Recommendation: Every PCP be given a short educational program on NA, confirm suspected cases with a neurologist, in order to pave the way for acute phase immunomodulating therapy trials to prevent long-term complications

Summary

The results of this investigation should raise awareness of all health care providers that treat neuromusculoskeletal disorders that: 1) NA is not rare; 2) Diagnosis is clinical, NOT reliant on expensive diagnostic tests; 3) A prompt diagnosis can help to avoid the common (25% incidence) long-term disability associated with NA, i.e., to improve clinical outcomes.

Carpal Tunnel Syndrome: Hand Surgeons, Hand Therapists, and Physical Medicine and Rehabilitation Physicians Agree on a Multidisciplinary Treatment Guideline – Results: From the European HANDGUIDE Study

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JACO Editorial Reviewer Dale G. Huntington, D.C., F.A.C.O.

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Author's Abstract

Objective: To achieve consensus on a multidisciplinary treatment guideline for carpal tunnel syndrome (CTS).

Design: Delphi consensus strategy.

Setting: Systematic reviews reporting on the effectiveness of surgical and nonsurgical interventions were conducted and used as an evidence based starting point for a European Delphi consensus strategy.

Participants: In total, 35 experts (hand surgeons selected from the Federation of European Societies for Surgery of the Hand, hand therapists selected from the European Federation of Societies for Hand Therapy, physical medicine and rehabilitation physicians) participated in the Delphi consensus strategy.

Interventions: Not applicable.

Main Outcome Measures: Each Delphi round consisted of a questionnaire, analysis, and feedback report.

Results: After 3 Delphi rounds, consensus was achieved on the description, symptoms, and diagnosis of CTS. The experts agreed that patients with CTS should always be instructed, and instructions combined with splinting, corticosteroid injection, corticosteroid injections plus splinting, and surgery are suitable treatments for CTS. Relevant details for the use of instructions, splinting, corticosteroid injections, and surgery were described. Main factors for selecting one of the aforementioned treatment options were identified as follows: severity and duration of the disorder and previous treatments received. A relation between the severity/duration and choice of therapy was found by the experts and reported in the guideline.

Conclusions: This multidisciplinary treatment guideline may help physicians and allied health care professionals to provide patients with CTS with the most effective and efficient treatment available.

Comment

The complex movements and tactile sensation of the hand are essential for completing everyday tasks. Consequently, hand disorders affecting these qualities have a significant impact on activities of daily living. Of those with chronic non-traumatic complaints of the arm, neck and/or shoulder, 29% reported complaints in the wrist/hand area. The most prevalent non-traumatic hand disorder is carpal tunnel syndrome (CTS).

Although the exact causative mechanism of CTS is unknown, it is safe to state that CTS is related to an increased pressure within the carpal tunnel, resulting in mechanical compression and local ischemia – mediated damage to the median nerve. The occurrence of CTS can be associated with work-related factors. The prevalence of CTS is reported to be 0.6% in men and 5.8% in women in the general population and 1 in 5 in symptomatic subjects.

Interventions used to treat CTS vary from splinting to exercise therapy and from ultrasound to all kinds of surgical interventions. Ideally, a treatment guideline for CTS is based on systematic reviews describing the long-term effects of all aspects relevant for the diagnosis and treatment of the disorder. However, systematic reviews on the treatment of CTS mainly describe short-term and mid-term effects and focus on the global picture of a treatment (eg, splinting, corticosteroid injections, open surgery), without taking into account relevant details (eg, type of splint; when to wear it; type of corticosteroid; number of injections; types of anesthesia, incision, and stitches). Because such details can have significant consequences, a Delphi consensus strategy was conducted to develop a treatment guideline for CTS. Development of evidence-based protocols and treatment guidelines can aid in optimizing care for hand disorders. Therefore, in Europe, the HANDGUIDE study was initiated with the goal to create multidisciplinary consensus on treatment guidelines for non-traumatic hand disorders: trigger finger, De Quervain disease, Dupuytren disease, CTS, and Guyon canal syndrome. In a Delphi consensus strategy, a series of

sequential questionnaires (or rounds) are presented to a panel of experts, interspersed with controlled feedback, with the aim to achieve consensus of opinion among these experts. This article reports on the results for CTS.

Methods:

Steering committee and advisory team: A steering committee consisting of a hand surgeon (with a PhD), physical medicine and rehabilitation (PM&R) physician (with a PhD), and physiotherapist (with a PhD) was composed to initiate and guide the HANDGUIDE Study. All 3 members of the steering committee have a clinical and scientific and/or epidemiologic background. They designed the questionnaires, analyzed the responses, and formulated the feedback reports. Further, an advisory team (consisting of 2 professors of hand surgery, 1 professor of PM&R, and 1 hand therapist with a PhD) was formed that received regular updates on the progress of the HANDGUIDE Study. This team could be consulted by the steering committee if necessary and could give the steering committee their opinions and advice as they saw fit.

Preparation of the study:

Evidence for effectiveness of interventions of CTS to establish an evidence-based starting point for this study, systematic reviews were conducted reporting on the evidence for the effectiveness of nonsurgical, surgical, and postsurgical interventions to treat CTS.

Selection of experts:

The Federation of European Societies for Surgery of the Hand (FESSH) and European Federation of Societies for Hand Therapy (EFSHT) endorsed this study. The national member associations of the FESSH and EFSHT selected the experts in their respective field. Each national member association was invited to select a maximum of 3 representative experts per Delphi consensus strategy. In addition, some European PM&R physicians who specialize in hand rehabilitation were invited to participate in this study.

Delphi consensus strategy on CTS:

Description, symptoms, and diagnosis of CTS First-round questionnaire: In the first round, literature-based concepts for a short description of CTS, its symptoms, its diagnosis, and its nonsurgical and surgical treatment were presented to the experts. Subsequently, the experts were asked whether they agreed (yes/no/no opinion) with the aforementioned concepts followed by the request to explain their answer (please explain your answer). This allowed the experts at any time to object or suggest alterations to any of this steering committee’s suggestions regarding the aforementioned items.

Results

Expert panel: A total of 112 experts (52 hand surgeons, 47 hand therapists, 13 PM&R physicians) from 17 European countries were selected to participate in 1 of the 3 Delphi consensus strategies of the HANDGUIDE Study, which was performed between June 2009 and December 2012.

For the Delphi consensus strategy on CTS, 36 experts were selected (18 hand surgeons, 13 hand therapists, 5 PM&R physicians). Of these, 1 expert did not finish any of the questionnaires. Response rates of the remaining 35 experts for rounds 1 to 3 were 89%, 94%, and 89%, respectively.

Conclusions

European experts (hand surgeons, hand therapists, PM&R physicians) achieved multidisciplinary consensus on a treatment guideline for CTS. This guideline may help and guide physicians and allied health care professionals to provide patients suffering from CTS with the most effective and efficient treatment available.

JACO Editorial Summary:

- This clinical research article was written by the authors; Bionka M. Huisstede, PhD, Jan Friden, MD, PhD, J. Henk Coert, MD, PhD, Peter Hoogvliet, MD PhD, of the "European Handguide Study".
- The purpose of this 2.5 years, 17 country study was to determine the most effective ways of treating CTS via nonsurgical, surgical, and postsurgical interventions which is an evidence based starting point for the first European Delphi consensus strategy.
- This was a comprehensive study that was closely monitored to obtain the most reliable results by the hand experts to assimilate the documentation from all the Delphi groups to determine multidisciplinary results in the 3 separate interventions.
- The diagnosis of CTS is primarily based on the clinical picture. The sensitivity of special tests such as, (Phalen test and Tinel sign) are reported to be 34% to 59% and 51% to 93% and 25% to 41% and 66% to 91% respectively. These tests are of limited value which brings to point the importance of electro - diagnostic testing. There are reports of results that do not clearly demonstrate whether the origin is at the wrist, cervical spine radiculopathy or a mixed result.
- Of those who reported non-traumatic neck and upper extremity pain 29% of the complaints were in the wrist/hand area. The most prevalent non-traumatic hand disorder was carpal tunnel. In addition the study revealed the prevalence of CTS reported to be 0.6% in men and 5.8% in women. This mere fact could be a study of its own.
- The use of the cold laser has been utilized with some degree of effectiveness in North America over the past 10 plus years as a primary or adjunctive therapy procedure in the fields of the interventions that have been discussed in this clinical research model. To my knowledge there has not been a controlled clinical study performed or an article written in an indexed medical journal on that topic.

Summary:

The authors of this study are to be commended for their efforts in this comprehensive clinical investigation that spanned over a period of two and one half years, seventeen countries, and 112 experts guiding this multidisciplinary study to a consensus of opinion. It is hoped that this will launch other studies of its kind in the future.

Abstracts & Literature Review

Radial Tunnel Syndrome, Diagnostic and Treatment Dilemma

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JACO Editorial Reviewer J. Chris Romney DC FACO

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Author's Abstract

Background: It is evident that radial tunnel syndrome should be considered in the diagnosis of lateral elbow and dorsal forearm pain that may radiate to the wrist and dorsum of fingers. Clinical examination of the elbow has been found to be the best method for the diagnosis of radial tunnel syndrome. The paraclincal study options such as, electrodiagnostics, imaging studies, or diagnostic ultrasound are utilized to rule out other pathologies to differentiate the several conditions of lateral elbow pain. The most valuable examination is at the direct site of pain and can be best identified by rule of nine test and detecting weakness of the third finger and wrist extension. Treatment of radial tunnel syndrome should utilize various conservative non-surgical efforts before undergoing surgical intervention.

Methods: The study identifies the prevalence of compression of the superficial radial nerve is at 0.003%, in comparison to carpal tunnel syndrome which has an annual incidence between 0.1% and 0.35%. The entrapment of the radial nerve and its deep branch has been found to occur at five different sites within the radial tunnel. The study by Bolster reported 5 out of 12 patients with the diagnosis of RTS had previous surgical intervention on the ipsilateral upper extremity such as, trigger finger, CTS, and shoulder instability. Studies also indicate that patients with RTS disease is more prevalent in women age 30-50 years, significantly right hand dominant with bilateral involvement being rare.

Results: RTS is relatively uncommon but has distinct signs and symptoms that include localized tenderness over the radial nerve 5cm distal to the lateral epicondyle. Patients report

aggravated pain at night that disturbs sleep and can become more severe when increased traction is applied to the nerve by extending, flexing, or pronating the elbow. There are two accepted clinical tests to confirm the diagnosis. although X-ray, MRI, and EMG have not been found to play a key role in RTS diagnosis.

Conclusion: Because of the limited number of confirmatory diagnostic tests, RTS is diagnosed by exclusion and is dependent on clinical signs and symptoms. Common non surgical methods are recommended, however, the success rate is in doubt. Steven at al report shows only 4 out of 15 patients with the diagnosis of RTS had improvement with conservative treatment. Surgical treatment was found to result in 93% success rate. RTS is a disease that should be consider in the differential diagnosis of lateral elbow pain.

JACO Editorial Summary

Clinical Relevance: Lateral elbow pain is commonly diagnosed as lateral epicondylitis, when in some cases a closer look can identify the evidence of radial tunnel syndrome. This study includes an allopathic conservative care regimen with little success. The chiropractic physician can differentiate the diagnosis of lateral elbow pain by utilizing the proper historical and diagnostic techniques. Once the doctor has arrived at the diagnosis of RTS, the treatment plan might include the following: manipulation of the spinal segments of the cervical and thoracic spine, deep tissue massage , ultrasound modality, exercise rehabilitation, and manipulation of the radial head. If these efforts do not accomplish the preferred outcome then prolozone therapy or steroid injection may be a viable option prior to referral for surgical intervention.

Radiology Corner

Case Presentation: 64 year old female with right shoulder pain

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A 64 year old female presented for chiropractic care with anterior right shoulder pain. She is retired but continues to participate in shot put, javelin, and the hammer throw which exacerbates her pain. She had decreased range of motion with pain in abduction, internal rotation, and flexion. Orthopedic testing revealed pain with supraspinatus press test. Neurological and physical examination was negative.

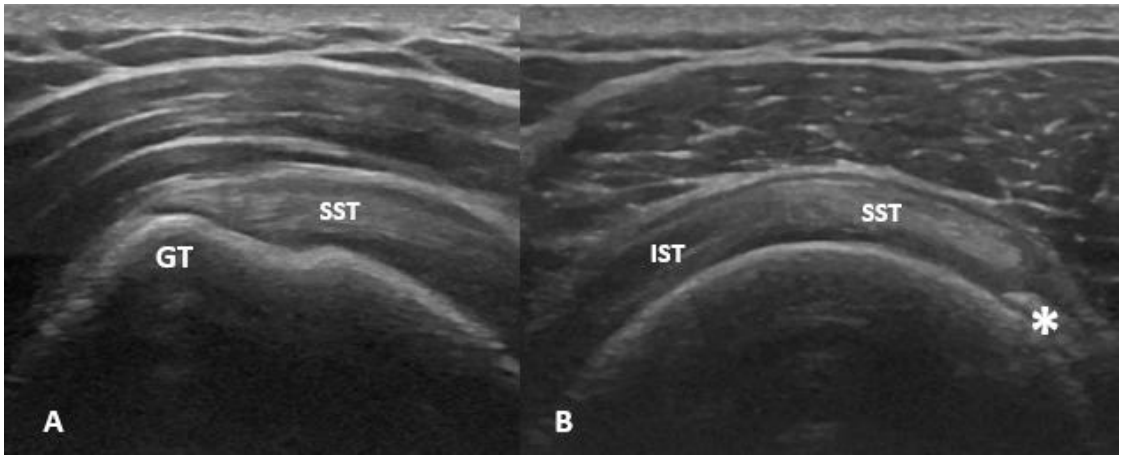

Fig 1: Normal diagnostic ultrasonography of the rotator cuff. A- Longitudinal view which compares to the coronal magnetic resonance imaging (MRI) perspective. B- Transverse view which compares to the sagittal MRI perspective.

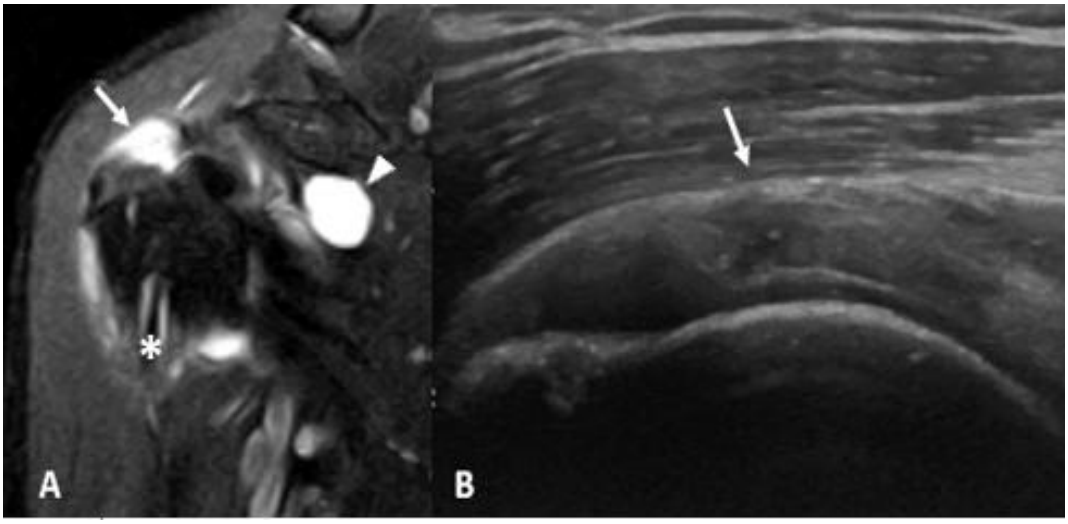

Fig 2: A- Coronal T2 fat saturated MRI depicting a full thickness tear of the supraspinatus (arrows). There is also evidence of a joint effusion (arrowhead). B- Longitudinal diagnostic ultrasound in the same patient showing the focal tear of the supraspinatus.

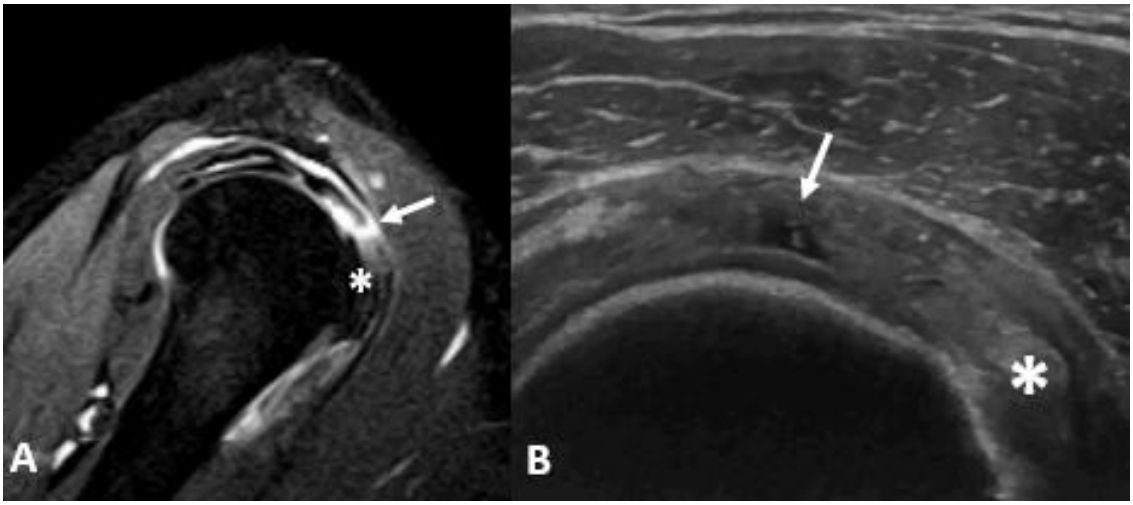

Fig 3: A- Sagittal T2 fat saturated MRI demonstrating a full thickness tear of the supraspinatus tendon with partial thickness tearing as well. B- Transverse diagnostic ultrasound in the same patient showing the focal tearing of the supraspinatus.

Legend: Arrows all point to the area of tearing in the supraspinatus tendon
* - Biceps tendon (long head)
GT- Greater tuberosity
SST- Supraspinatus tendon
IST- Infraspinatus tendon

The shoulder is the most movable joint in the body and prone to dysfunction and injury. Rotator cuff tears are the most common cause of shoulder pain and dysfunction in adults. They are commonly related to overuse and degeneration within the tendon. In patients over 66 years old who present with a symptomatic rotator cuff tear, 50% of those patients will have an asymptomatic tear on the contralateral side as well.

Rotator cuff tears can be categorized into partial or complete (full thickness). A complete tear extends through the entire thickness of the tendon and creates a communication between the subacromial space and the glenohumeral joint. This will allow fluid to be visualized superficial to the cuff tendons at the greater tuberosity and can be helpful when determining if a tear is partial or full thickness. A complete tear may allow retraction of the tendon and could create a wavy appearance to the tendon called the "cuff wave sign." If this is present, it is associated with easier reattachment of the tissue on surgical repair [1].

Partial thickness tears are divided into articular sided, bursal sided or intrasubstance. They are twice as common as complete tears. Articular sided are adjacent to the humeral cartilage while bursal sides are adjacent to the subacromial bursa. Intrasubstance tears are within the center of the tendon. Bursal sided and intrasubstance tears may be hidden during arthroscopic examination therefore imaging evaluation is important for accurate diagnosis [1].

In this case presentation, the coronal MRI depicts fluid (high/white signal) filling the region of the anterior rotator cuff where tendon should be visualized (Fig 2a- arrow). The corresponding longitudinal ultrasound image depicts the fluid within the rotator cuff as black region known as hypoechogenicity (Fig 2b-arrow). The normal appearance of the rotator cuff is demonstrated in figure 1a without focal areas of hypoechogenicity to indicate tearing.

The sagittal MRI demonstrates fluid communicating between the glenohumeral joint and the subacromial space through a focal fluid filled rotator cuff tear within the supraspinatus tendon (Fig 3a). Note the proximity to the biceps tendon (*). The correlating transverse ultrasound image depicts the focal fluid collection as the focal hypoechogenicity within the tendon also near the biceps tendon (Fig 3b). A normal transverse ultrasound image is provided for comparison (Fig 1b).

The sensitivity of diagnostic ultrasound for full thickness rotator cuff tears is equal to MRI (>90%). The sensitivity of MRI and ultrasound for partial thickness tears is equivalent (67-68%) but an MRI arthrogram where contrast is injected into the joint is the most sensitive (83%). The specificity of MRI and ultrasound for full thickness and partial thickness tears is >93%. Musculoskeletal ultrasound allows the examiner to perform dynamic maneuvers such as orthopedic tests while imaging the anatomy which is very beneficial to help localize abnormalities [2].

Diagnostic musculoskeletal ultrasonography is a growing diagnostic tool that is cost effective and noninvasive. It is user dependent and requires significant training but can be very useful as an imaging modality when utilized appropriately.

Case courtesy of Logan University

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2. Roy J-S, et al.: **Diagnostic accuracy of ultrasonography, MRI and MR arthrography in the characterization of rotator cuff disorders: a systematic review and meta-analysis.** *British Journal of Sports Medicine*. 2015, **49**:1316-1328

Ortho Quiz

by Steven L. Kleinfield D.C.,F.A.C.O.

1) Avascular necrosis of the tarsal navicular is better known as:
    a. Kohler's disease
    b. Blount's disease
    c. Freiberg's disease
    d. Sinding-Larsen-Johansson's Disease
    e. Keinbock's disease

2) "A 4-year-old girl presented with intermittent right foot pain for 1 week. Pain had worsened the previous day after playing outside, and she was now refusing to bear weight on the right foot. On examination, she had pain and tenderness over her right dorsomedial midfoot with no local skin changes. She walked with an antalgic gait with weight bearing on the lateral side of the foot. Her right foot radiograph showed a collapsed, flat, and radiodense navicular bone".

    Your best working diagnosis would be:
    a. Kohler's disease
    b. Blount's disease
    c. Freiberg's disease
    d. Sinding-Larsen-Johansson's Disease
    e. Keinbock's disease

3) Which ligament listed below does not belong as being part of the conjoined Deltoid Ligament
    a. Posterior talofibular
    b. Tibiocalcaneal
    c. Tibionavicular
    d. Anterior tibiotalar
    e. Posterior tibiotalar

4) According to the work of Nachemson and his co-workers, he noted that different postures can affect the intra-discal pressure. Which position was found to be the most deleterious to the disc by having the highest increase in intra-discal pressure:
    a. Coughing or straining
    b. Small jumps
    c. Lifting a weight with the back and knees bent
    d. Rotation of the lumbar spine
    e. Lifting a weight with the back bent and the knees straight

5) A non-union of the secondary growth center of the inferior articular process of a vertebrae is better known as:
    a) Bertolotti's Syndrome
    b) Ossicle of Oppenheimer's
    c) Tropism
    d) Opisthion
    e) Lisfranc's Joint

Current Events

- Part I examination dates are now closed for 2016.

- The Academy of Chiropractic Orthopedists has set its Part II Diplomate examination at Northwestern Health Sciences University (NWHSU) in Bloomington, Minnesota. The date is October 1, 2016. Part I must be completed before the candidate is eligible to sit Part II. Contact the Academy's executive director Dr. Jerry Wildenauer to obtain the necessary information.

- The Academy of Chiropractic Orthopedists announces the on-line Part I examination dates will be May 19, 2017 and July 20, 2017.

  Information about sitting the Board is available from the Executive Director Dr. Jerry Wildenauer.

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Answers to Ortho Quiz

1. ***a. Kohler's disease***
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3298227/

2. ***a. Kohler's disease***
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3298227/

3. ***a. Posterior talofibular***
Orthopedic Physical Assessment 5th edition page 844 David J. Magee

4. ***e. Lifting a weight with the back bent and the knees straight***
Orthopedic Physical Assessment 5th edition page 514 David J. Magee

5. ***b. Ossicle of Oppenheimer's***
Clinical Imaging by Dennis Marchiori 2nd edition page 410