# ORTHOSPORTS 🗮

# LATEST ORTHOPAEDIC UPDATES LECTURE 2010

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Time	Event	Who
07:30 - 08:00	Registration	
08:00 - 08:10	Welcome Message	Dr Doron Sher
08:10 - 08:25	The Unstable Shoulder	Dr John Trantalis
08:25 - 08:40	Shoulder Rehabilitation	Dr Jerome Goldberg
08:40 - 08:55	Shoulder Osteoarthritis	Dr Ivan Popoff
09:00 - 09:15	Panel Discussion	Todd Gothelf, John Trantalis, Jerome Goldberg, Ivan Popoff
09:20 – 09:35	Red Herrings around the Spine	Dr Andreas Loefler
09:35 - 09:50	SI Joint Dysfunction	Dr Mel Cusi
09:50 – 10:05	Lateral Epicondylar Pain	Dr John Best
10:05 – 10:15	Panel discussion	Andreas Loefler, Mel Cusi, John Best
10:15 – 10:45	Morning Tea	
10:50 – 11:05	Achilles Tendon Disorders	Dr Todd Gothelf
11:05 – 11:20	Ankle Arthritis	Dr John Negrine
11:20 – 11:30	Panel Discussion	Todd Gothelf, John Negrine
11:35 – 11:50	Sport after Total Hip Replacement	Prof Warwick Bruce
11:50 – 12:05	Pain after Knee Ligament Surgery	Dr Peter Walker
12:05 – 12:20	Patella Instability and MPFL Reconstruction	Dr Doron Sher
12:20 – 12:35	Panel Discussion	Doron Sher, Peter Walker, Ivan Popoff, Warwick Bruce, Andreas Loefler
12:40	Close	

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Whilst you're there we would love your feedback – what you like about our Lecture and also how you think we can improve next year.

The link to a **5 minute survey** is on our homepage or you can go directly to <u>http://www.surveymonkey.com/s/T8HDT5H</u>

> Thank you, The Team at Orthosports



## PRESENTATIONS AND HANDOUTS



#### MANAGEMENT OF COMPLEX TRAUMATIC ANTERIOR SHOULDER INSTABILITY

#### Natural History of a First Time Adult Dislocator

- 60% chance of recurrence
- 5% with surgery
  - Chronic Instability associated with:
    - Increasing risk of Osteoarthritis
      - Increasing bone loss from ball and socket
      - Lower chance of Successful Surgery

#### Non-Op Management of the First Time Dislocator

- Physiotherapy
  - Helps to regain Range of Motion
  - Doesn't decrease risk of recurrent instability.
- ER Splinting

- Recurrence rate 30 to 40%. This was recently presented by Itoi, the "godfather" of ER splint at the 2010 ICSES in Edinburgh. This is a relatively high rate of recurrence and some believe that it is most likely related to non-compliance with the strict protocol of wearing an ER brace.

#### The "Older Patient" After a Shoulder Dislocation: EXCLUDE MASSIVE CUFF TEAR

If you are seeing an older patient a couple of weeks after a shoulder dislocation and they have lost active forward elevation, then they must have a MASSIVE ROTATOR CUFF TEAR excluded with an MRI. The success of repair if this tear is very dependent on operating as early as possible before irreversible changes of fatty change in muscle and tendon shortening occur. Having treated massive cuff tears picked up both early and late, I feel very strongly about getting these patients treated as early as possible and have even begun admitting them to hospital emergently for imaging and surgery.

If you have a patient with such a suspected massive cuff tear it's best not to wait - I'd be happy to be contacted either through my rooms or my email address (<u>drjohn@shoulderandelbow.com.au</u>) and I will expedite management of this semi-urgent problem.

#### The Concavity-Compression Concept of Shoulder Stability

This is a concept, which relies on 3 anatomical components:

- 1. Ball and Socket
- 2. Ligaments
- 3. Muscle

All these components contribute to shoulder stability. By having an intact concavity (socket), the static (ligaments) and dynamic (muscles) restraints compress the ball into the socket. It has been demonstrated that with an intact ball and socket, increasing the joint compression force correlates with increasing joint stability.



**The Most Common Lesion: "Bankart Lesion" – Torn Anteroinferior labrum:** This lesion compromises the socket. The labrum almost doubles the depth of the glenoid when repaired.



#### Arthroscopic versus Open Shoulder Stabilisation Surgery

In the absence of a significant structural bony lesion, current techniques for arthroscopic shoulder stabilizations have equal outcomes to open surgery. The disadvantage of open surgery with a subscapularis takedown is that studies have demonstrated irreversible fatty degeneration in the subscapularis muscle belly. The clinical significance of this is yet to be determined.

#### **Complex Lesions in Traumatic Anterior Shoulder Instability: Bone Loss**

One of the disadvantages of repeated shoulder dislocations is increasing bone loss from the glenoid and/or humeral head. With significant bone loss, a simple labral repair will often not suffice, and different surgery may be required. For example:

#### Glenoid Bone Loss: Laterjet Procedure (Coracoid bone graft to glenoid)

Not only does this procedure recreate the arc of curvature of the socket, but it also positions a tendon in front of the humeral head when the shoulder is in the ABER position that helps to stabilize the humeral head.



#### Humeral Head Bone Loss:

*Infraspinatus tenodesis (Remplissage Procedure):* This is an arthroscopic procedure which fills the Hill-Sachs lesion with the infraspinatus tendon. This then most likely acts as a mechanical block to allowing the humeral head defect from causing instability. Patients usually lose some external rotation in abduction.



*Prosthesis:* Filling the defect with metal is an option. Due to the variability in size and shape of Hill-Sachs lesions, the prosthesis is usually not a perfect match, however it does usually add to stability by extending the articular arc.

*Allograft humeral head:* Not available in Australia, and associated with high rates of resorption. *Mosaicplasty:* Osteochondral autografts: Technically an imperfect solution.

#### HAGL: Humeral Avulsion of Glenohumeral Ligaments

This is an unusual variant of anterior shoulder instability where the ligaments tear off ball rather than socket. It is best repaired via open techniques due to the risk of damage of neurovascular structures with current arthroscopic techniques.

#### THE IMPORTANCE OF THE SCAPULA IN SHOULDER REHABILITATION AND CAPULA DYSKINESIS

#### **The Kinetic Chain**

Series of links & segments Activated sequentially Coordinated fashion To generate & transmit forces to accomplish a specific function

#### Throwing/serving in kinetic chain

Legs & trunk 51% of energy 54% of force

Scapula & GH joint Link in chain Segment in chain Increasing kinetic energy & force Conduit to transmit forces to hand

#### Pushing up from seated position in kinetic chain

Increase in intraabdominal pressure Knee & lumbopelvic activation Periscapular & shoulder muscles position scapula optimally RC positions humeral head in glenoid Hand is positioned Forearm and hand muscles push body upwards

#### Importance of Scapula

Provides anatomic & kinematic connection between torso & UL Anatomical classification of muscles Axioscapular Scapulohumeral

Axiohumeral

#### Axioscapular muscles

Attach scapula to thorax Serratus anterior Trapezius Rhomboids Levator scapula P. Minor

Position scapula optimally for humeral head

#### Scapulohumeral muscles

Fine tune HH movements keeping HH centred in glenoid throughout UL motion

Supraspinatus Infraspinatus T minor Subscapularis Deltoid T major

#### **Axiohumeral muscles**

Power muscles P Major Latissimus Dorsi M.B., B.S., F.R.A.C.S., F.A. Ortho. A. *Shoulder Surgery* 



Plus

Biceps Triceps

#### Scapulothoracic rhythm

Requires synchronous and coordinated movement of 4 joints

Scapulothoracic Glenohumeral Acromioclavicular Sternoclavicular

#### Scapula function

Difficult job Keep glenoid opposed to humeral head while arm and thorax move

#### Scapula movement

3 rotations (along 3 orthogonal axes

- 2 translations
- protraction
- retraction

#### **Scapula rotations**

6 degrees of motion 3 rotations (along 3 orthogonal axes

#### Scapula translations

Translations occur around the rib cage

Protraction Anterior translation Anterior tilt Upwards rotation

#### Retraction

Posterior translation Posterior tilt Downwards rotation

#### Normal scapula movement

Movements are Upwards rotation External rotation Posterior tilting protraction

Require coordinated patterns of muscle activation

Initially upper trapezius & S.Ant.

Upwards rotation External rotation Followed by lower trapezius Stabilise scapula Posterior tilting

The RC can then activate off a stable base

#### Scapula dyskinesis

3 common patterns

Inferior border prominence Entire medial border prominence Superior medial border prominence



#### Pathology behind dyskinesis

Caused by loss of dynamic control of Scapular retraction (especially)

E.R.

When this control is lost, gravity, forward arm motion & muscle activation cause Scapular protraction I.R.

around the rib cage

Importance of posture This cannot be emphasised enough

#### Classification

PROXIMALLY DERIVED SCAPULA DYSKINESIS (PDSD) Occurs proximally to GH joint Frequently due to postural dysfunction (esp lumbo pelvic weakness) Nerve lesions to S.A. or trapezius

NB optimum RC function only occurs when scapula is optimally positioned for stability

DISTALLY DERIVED SCAPULA DYSKINESIS (DDSD)

Occurs at GH joint or distally Most common Occurs with GH, labral, RC pathology Pain & altered biomechanics cause inhibition of S.A. & trapezius Vicious cycle commences

#### Treatment

PDSD

Always non operative Never surgery

#### DDSD

If nonop rehabilitation fails Consider surgery to restore integrity of kinetic chain Principles of Treatment

Core based functional rehabilitation

Core stabilisation – Pilates Postural alignment Kinetic chain – ??proximal stability must be regained before distal stability

#### **Principles of Treatment**

Posture/posture/posture Scapular positioning Proper retraction/depression very important "find scapula" early Biofeedback to inhibit upper Trap & L.D. & activate lower Trap Bracing/taping helpful to provide biofeedback but do not hold scapula in position

#### **Principles of Treatment**

Range of Motion – gentle stretches Reduce pain – NSAIDs & H/C injections

#### Strengthening

Closed chain - increased joint compression with decreased shear, translational & distractive forces on GH joint & RC

Initially should be eccentric - allow muscle fibres to lengthen

Open chain - these concentric exercises should be done late and only after tissue healing

QUALITY BETTER THAN QUANTITY

#### Dr Jerome Goldberg

M.B., B.S., F.R.A.C.S., F.A. Ortho. A. *Shoulder Surgery* 



#### Principles of Treatment if surgery required

RC Repair – no open chain exercised for ? 12 months Labral repair – no open chain exercises for 6 months

#### MUST RELY ON SURGEON'S INSTRUCTIONS

Each operation is different Poor RC quality post RC repair may require slower program with less emphasis on strengthening for 6 months Capsular plication may require no stretches for up to 6 months Biceps tenodesis may require weight restriction for many months

#### Summary

Core based functional rehabilitation

Proximal stability & core strengthening before distal mobility

- Postural alignment ++++++
- Correcting ST restrictions early
- Teaching patient to isolate muscles
- Training muscle groups in coordinated & synchronous fashion
- Re establish proprioception & functional patterns
- Progress from closed to open chain exercises

AIM – RESTORE DYNAMIC STABILITY & NORMAL KINEMATICS



To view Dr Ivan Popoff's presentation and handout please refer to the Teaching Section of our website www.orthosports.com.au



#### RED HERRINGS IN THE SPINE

What are red herrings? By their very nature, red herrings stand out of the crowd, diverting attention from items of significance. They divert our focus from the truly guilty party. When assessing patients with back pain or sciatica our attention is not infrequently drawn to abnormalities, which may be obvious, but may not be the cause of pain.

We have more and more sophisticated investigations. MRIs show great details of anatomy and pathology of both bone and soft tissue. Bone scans are now linked to CT scans and can accurately localize abnormal activity. Blood tests are more and more specific, but there is no test, which will show pain.

Pain is complex and has components, which are physical and psychological, social, behavioural, and cultural. Pain is the main reason why patients seek our advice. When assessing patients we should be aware of red herrings in the crowd. As clinicians we face the challenge of assessing the importance of symptoms, signs and investigations, as we try to understand and treat our patients.

It has been estimated that perhaps 80% of patients, who present with back pain, will not get a definitive diagnosis. Leg pain or sciatica may be caused by a number of conditions other than nerve root compression. Some of the more common clinical and radiological findings will be discussed.

#### Sources of back pain:

bones, muscles, fascia, dura mater, epidural plexus, ligaments, facet joints, sacro-iliac joints

#### Causes of back pain:

traumatic, inflammatory, neoplastic, infective, referred, psycho-somatic, secondary gains

#### Syndromes of pain:

activity related, sport or occupational, postural, neurogenic, vascular, systemic illness, litigation related

#### Symptoms:

back pain, pelvic or buttock pain, thigh and leg pain, stiffness, deformity, weakness, abnormal sensation or numbness, bladder and bowel dysfunction, sexual dysfunction

#### Clinical Red Herrings:

Scoliosis is rarely the cause of pain, but is often the result.

Weakness may be neurogenic or due to pain, muscular injury or fracture, hip or knee pathology.

Wasting often pre-existing due to dominance or previous injury. It may be due to disuse or nerve root dysfunction

#### Spasm: is it cause of effect

Tenderness: local trauma, spasm, hyperaesthesia. Trochanteric bursitis. Meralgia paresthetica.

Absent reflex: anxiety and technique, pre-existing



#### Radiological Red Herrings:

Disc Pathology: bulge, protrusion, herniation, sequestration

The Black Disc: disc degeneration, which leads to desiccation or drying of the disc, is common and present in perhaps 25% of asymptomatic individuals.

Modic Changes are related to disc degeneration, but may not be associated with pain.

Haemangiomas are common benign findings on CT and MRI. Rarely cause pain, but may fracture or expand.

Schmorl's nodes and Scheuermann's are radiological features, which are common and rarely the cause of pain.

Spondylolysis/Spondylolisthesis: pars defects are present in approximately 5% of the population and are mostly asymptomatic. Most patients with spondylolisthesis lead active lives without significant back pain

Facet Joint Arthritis is very common, but most elderly patients manage perfectly well. Pain usually settles, but the arthritic joints remain.

**Dr Mel Cusi** MBBS, FACSP, FFSEM (UK) **Sport & Exercise Medicine Physician** 



#### SIJ DYSFUNCTION | DEVELOPMENTS IN DIAGNOSTIC IMAGING

Transmission of mechanical load has been identified as an important function of the sacro-iliac joint. Clinical tests have been designed to detect mechanical changes in such load transmission, with specific patterns of muscle recruitment (active SLR, stork tests), as well as pain provocation tests (painful palpation of the long dorsal sacro-iliac ligament and posterior pain provocation test). In addition, they have been proved to be reliable. Imaging studies have not been found to match clinical developments thus far. The lack of imaging correlation to specific clinical findings based on history and clinical examination has frustrated clinicians and researchers alike for many years.

Generally, inflammatory processes, fractures (acute and overuse), and degenerative changes have been identified with sound use of the available imaging modalities.

The combination of Single Photon Emission Tomography and CT scan (SPECT-CT) offers exciting possibilities. SPECT-CT of the sacro-iliac joint can provide a specific set of images that matches the clinical diagnosis of failure of load transfer (formerly called "instability"). Those changes include increased uptake in the ligamentous (posterior) portion of the joint, with a distinct pattern quite different to the images typical degenerative changes or inflammatory disease of the sacro-iliac joint.

#### Study

We studied a population of 100 consecutive patients. It included 72 females and 28 males with an average age of 43 years (range: 21-78, Median: 40). All patients fulfilled the clinical criteria for a diagnosis of SIJ dysfunction (at least 3/4 positive clinical tests) The main clinical symptom was low back or buttock pain of at least 3 months duration. A control group of 30 cases was scanned for staging of prostate carcinoma (10 cases with no hip or low back pain) or suspected hip pathology and presented with lateral hip or groin pain (n=20). There were 17 females and 13 males. The average age was 44 years (range: 16-71), median: 49).

The 100 patients were clinically assessed by two experienced Sport Medicine Physicians with a battery of tests (Active SLR, Posterior pain provocation test, Stork test and palpation of the long dorsal sacroiliac ligament). A failure of load transfer across the SIJ was defined as having three or more of these four tests positive. The control group patients were examined to ensure that none of the tests were positive prior to inclusion in the study.

The specific information obtained from each SPECT/ CT study was as follows.

1. Sacroiliac joint uptake, posterior soft-tissue uptake, ligamentous uptake at insertion into the ilium

2. CT grading of sclerosis/ erosive disease in the upper SIJ as normal, mild, medium or marked

3. Uptake around the pubic symphysis or at the adductor insertions and the CT appearances of these sites

4. Evidence of lumbar zygapophysial joint uptake or uptake around the disc spaces with comment on CT appearance of the joints and intervertebral discs

5. Comments on any abnormal uptake and CT appearances of the hips.

#### Results

Population. The age demographics of the patients and the control group were assessed by the Mann-Whitney rank sum test due to the disparity in sample size. This yielded a Mann-Whitney U Statistic = 2765.00, indicating a non-significant difference between the two populations (p=0.54).



SPECT/ CT. Scan criteria of increased uptake in the SIJ, increased posterior soft-tissue uptake and increased uptake at the site of sacroiliac ligament insertions on the ilium together with SIJ sclerosis on CT were found in 95 patients. By site, 53% were on the left, 36% on the right and 11% were bilateral. In the incorrect group, 1 patient was called on the contralateral asymptomatic side, 2 called bilateral and 2 normal. One case in the control group was called abnormal on the basis of uptake in the upper sacroiliac joint, without a significant difference in the posterior soft-tissue region of interest analysis. This was called normal in the second reading, but registered as a false positive case. Sensitivity was therefore 95% and specificity 97%. Positive predictive value was 99% and negative predictive value 91%.

Data for the analysis of regions of interest in the soft-tissues posterior to the SIJs passed the test of normality (0.090) and equal variance (0.209). Analysis of the counts on the abnormal versus the normal side by the t test yielded a mean difference in counts of 52 (95% confidence interval 12 to 91 counts) which was significant (p=0.011). The t test score was 2.60.

Additional findings on SPECT/ CT included 31 patients with increased uptake at the site of adductor tendon insertion around the pubic symphysis. Eight patients had increased bilateral uptake. Degenerative disease of the hips was evident in 19 patients and was graded as mild or moderate. The scintigraphic scan pattern of acetabular labral tears<sup>1</sup> and hip impingement<sup>2</sup> was evident in 6 and 4 patients respectively and was clinically not suspected. Gluteus medius tendon insertion enthesopathy was evident in 2 patients.

Inter/ intra-observer variability for reporting the SPECT/ CT studies was good with kappa scores of 0.85 (0.75 and above being the 'Excellent' range).

#### Discussion

The utility of SPECT/ CT for the diagnosis of SIJ dysfunction and more specifically the failure of load transmission across the joint is confirmed in the current study. There is clearly selection bias in this study as the vast majority of patients referred for scanning had already fulfilled the clinical criteria for the diagnosis. Nevertheless, the scan criteria that have been defined and have good inter and intraobserver reproducibility. The pattern of scintigraphic uptake and the CT scan changes reflect the pathology of the condition, where there is a primary abnormality of the supporting ligaments in the posterior aspect of the joint that fail to support the joint, leading to abnormal motion at the level of the joint itself, hence the increased uptake, sclerosis and occasional osteophyte formation as well as uptake in the damaged ligaments and the insertion on the ilium due to the altered mechanics. More complex changes such as alterations in muscle recruitment and failure of the normal sequence of muscle activation to compress the joint may also contribute to these primary abnormalities.

The combination of Single Photon Emission Tomography and CT scan (SPECT/ CT) offers exciting possibilities for early diagnosis. The current study suggests that SPECT/ CT of the SIJ can provide specific imaging criteria that match the clinical diagnosis of failure of load transfer (formerly called "instability"). Those changes include increased uptake in the ligamentous (posterior) portion of the joint, with a distinct pattern quite different to the images typical degenerative changes or inflammatory disease of the SIJ. Evaluation in a larger trial in which all comers with low back and buttock pain are assessed is important to test the robust nature of the described imaging criteria.



#### LATERAL EPICONDYLALGIA OF THE ELBOW

The results of non-operative and operative treatments for lateral epicondylalgia are inconsistent. Deciding on the appropriate treatment pathway is dependent on both the causation and nature of the pathology.

The paradigm below will be outlined during the presentation.



#### **Recommended reading:**

- 1. A new integrative model of lateral epicondylalgia. Coombes et al; *Br J Sports Med* 2009;43:252-258
- 2. Current concepts in the management of tendon disorders. Rees et al; *Rheumatology 2006 45:* 508-521
- 3. Clinical Application of Bioactive Factors in Sports Medicine. Angel et al; *Sports Med Arthros Rev* 2006; 14;3, 138-145



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#### ACHILLES TENDON DISORDERS

The Achilles tendon is the largest tendon in the body. When healthy, it can usually withstand tremendous force from running or jumping. Ruptures and Tendinoses develop in a tendon that is degenerate from overuse.

#### Anatomy

The Achilles tendon is formed from two main muscle groups, the gastrocnemius and soleus muscles. The tendons from these two muscles twist around each other about 6 cm above the insertion on the calcaneus. This twisting of the fibres is thought to make the tendon vulnerable to injury.

While other tendons in the body have tenosynovia that wrap around the tendons and feed blood vessels, the Achilles has a paratenon in its place. The paratenon is vascular, but contributes little in terms of blood supply to the tendon. Blood supply feeds from distally (calcaneus) and proximally (muscle), leaving the area 2-6 cm from the insertion relatively avascular.

#### Pathology

Lack of blood supply makes it difficult for the Achilles tendon to develop an inflammatory response to injury. Stress to the tendon can cause micro tears. If the body cannot heal these tears, the tendon is vulnerable to degeneration in the avascular area, leading to a tendinosis. Histological studies reveal mucoid degeneration, decreased cellularity, and fibrillation of collagen fibres. It is more precisely termed a tendinosis, rather than a tendinitis, as there is a lack of inflammation at the site of injury.

Causes of Achilles tendinosis include hyperpronation of the foot, running on hard surfaces or slanted surfaces, and training errors, or a sudden in crease in duration.

#### Classification

Tendon pathology has been classified as acute if symptoms are less than 2 weeks, subacute with symptoms between 3 and six weeks, and chronic if greater than 6 weeks.

There are several different diagnoses of Achilles disorders. Each entity has a different origin and behaviour, and therefore needs to be treated differently. The diagnoses can mostly be differentiated by location around the heel. Broadly, they can be classified into insertional and non-insertional conditions.

The insertional conditions include Retrocalcaneal Bursitis, and Insertional Tendinitis. The Noninsertional conditions include Paratenonitis, Paratenonitis with Tendinosis, and Tendinosis.

Paratenonitis is an inflammatory condition of the paratenon. The inflammation causes a thickening around the tendon, but this generally does not affect the tendon itself. Pain is present over the Achilles tendon that does not move with dorsiflexion or plantarflexion of the foot. It is common in runners and in patients younger than 40.

Tendinosis is a degenerative disorder that affects the substance of the Achilles tendon. The tendon becomes nodular and thickened due to the mucoid degeneration and fibrillation of collagen fibers. This can be distinguished from paratenonitis on physical exam by demonstrating tenderness over the nodular portion that moves proximally and distally as the tendon moves with ankle plantarflexion and dorsiflexion (the painful arc sign). This condition occurs more commonly in the older population (>45).



Retrocalcaneal Bursitis is a true inflammatory process of the retrocalcaneal bursa as it moves between the Achilles tendon and superior angle of the calcaneus. A prominent superior angle, known as a Haglund's deformity is often present. Pressure can occur due to pressing of the shoe backing against this prominence, or from uphill running. A bursitis can be detected by squeezing the fingers just anterior to the Achilles insertion. A painful response to the two-finger squeeze test is positive for retrocalcaneal bursitis. Bursitis without tendon degeneration occurs commonly in runners and the younger population (<40).

Insertional Tendinitis is a condition that affects the insertion of the Achilles onto the calcaneus. This inflammatory condition causes direct tenderness over the back of the calcaneus. In longstanding insertional tendinitis, degeneration and calcification of the insertion can occur, resulting in spur formation. This condition is commonly seen in the older population (>50).

#### **Clinical Presentation**

All of these conditions are from overuse syndromes. Pain occurs without trauma in most cases. Pain is usually worse first in the morning and with increased activity. While rupture of the tendon is uncommon with these chronic disorders, symptoms will usually persist if left untreated.

#### Investigations

The diagnosis for Achilles tendon disorders can be made with history and physical examination in most cases. Radiographs can be helpful to look for spurs in insertional tendinitis, or Haglund's deformity in Retrocalcaneal bursitis. MRI is the gold standard to assess the quality of the tendon and extent of degeneration, and can be helpful for pre-operative planning. Ultrasound can also be used to demonstrate pathology.

#### Treatment

All Achilles tendon disorders should be initially treated with non-operative management, as 50-70% of patients can improve with proper treatment. Non-operative management has traditionally involved rest, activity modification, NSAIDS, Ice, stretching, and heel lifts. Other treatments that have recently received interest include eccentric strengthening, extracorpeal shock wave treatment (ESWT), and Platelet Rich Plasma (PRP) injections.

Recent prospective randomized studies have shown that traditional methods and the "wait and see" philosophy have been significantly less successful than Eccentric strengthening and ESWT. A study looking at MRIs after eccentric strengthening revealed a reduction in volume of the thickened tendon and decreased degeneration signal, and this correlated with pain relief. PRP injections have gained recent interest but there is little literature proving its effectiveness.

Steroid injections have been shown to increase the risk of rupture around the tendon. While some feel that it is safe to injection into the retrocalcaneal bursa, I feel this is risky as well and do not recommend any cortisone injections to my patients with Achilles tendon disorders.

Surgery is considered when patients have failed non-operative management after six months. Surgery is tailored to the specific diagnosis and pathology. The success of surgery is 70%.

#### Achilles Tendon Ruptures

Achilles tendon ruptures usually occur from an indirect load to the tendon. There is a sharp dorsiflexion of the foot combined with a contraction of the triceps surae muscle. A sharp severe pain in the back of the heel is felt, usually described as if someone has kicked them in the back of the leg. This commonly occurs during sports such as soccer, basketball, and volleyball.



Studies have shown that tendons that have acutely ruptured usually have intrinsic degeneration. Biopsies from ruptured tendons have shown mucoid degeneration, disruption of collagen fibers and tendinous calcification. It is interesting that in most cases of acute Achilles tendon ruptures, no prior pain or warning is felt. Contrary, Achilles tendinosis is painful and patients with painful tendinosis usually do not rupture, perhaps because they decrease their activity level to accommodate the pain.

The diagnosis of an acute Achilles rupture can be made clinically in almost all cases. A defect can be palpated at the site of rupture. With the patient prone and the knees flexed, the affected side will have a more dorsiflexed foot. The Thompson test will be positive -- with squeezing of the calf, the foot fails to plantarflex. If all three of these signs are present, there is a 99% chance of a complete Achilles rupture.

Ultrasound is not helpful, as it can be inaccurate and does not add to clinical decision-making. A radiograph can help in distal ruptures to look for bony avulsions, as this will help with surgical fixation planning.

Treatment of acute Achilles rupture non-operatively or operatively remains controversial. Operative treatment has been advocated as it can reliably restore tension to the tendon. Rupture rates after operative repair are about 5%, compared to 13-35% for patients treated in plaster.

A recent study in the Journal of American Academy of Orthopaedic Surgery critically reviewed the literature on Achilles tendon ruptures and treatment. There is strong evidence in the literature that early protected weight bearing in patients with surgical repair resulted in better scores with physical function.



#### ANKLE ARTHRITIS

#### Why replace an ankle?

- Pain
- Progressive deformity

#### Symptoms of ankle arthritis

- Pain
- Stiffness
- Swelling
- Limitation of function
- Progressive deformity

#### Causes of ankle arthritis

- Osteoarthritis secondary to trauma &/or abnormal ankle biomechanics (primary osteoarthritis is exceedingly rare)

- Inflammatory arthropathies
- Haemochromatosis
- Infection
- Neuropathic arthropathy
- Tumour

#### NB: Ankle sprains generally do not cause ankle arthritis

#### Incidence

- 0.75% general population (compared with knee 6%)

- Average 14% risk post-trauma, however lesser or greater depending on severity & location of original fracture

#### Non-operative management

- Analgesics
- NSAIDs
- Walking aids
  - Activity modification:
  - Work
  - Social / sport
- Weight-loss
- Intra-articular corticosteroid injection
  - Orthotics:
    - Modified footwear Lace-up ankle support Rocker bottom sole with solid ankle cushion Polypropylene AFO

#### **Operative management**

- Arthroscopy
- Osteotomy
- Arthrodesis
- Arthroplasty

#### Arthroscopic removal of osteophyte

- Debridement of impinging osteophytes, chondral defects, & removal of loose bodies



- Contraindications

Advanced arthritis Joint-space narrowing Marked fibrosis Deformity

#### Osteotomy

- Realignment of a deformed joint
- Tibial
- Calcaneal

#### Arthrodesis

- Debilitating post-traumatic arthritis
- Pain & deformity secondary to previous infection
- Osteochondral defects
- Osteonecrosis of the talus
- Osteoarthritis
- Inflammatory arthropathies
- Rheumatoid arthritis
- Neuropathic ankle arthropathy
- Salvage of failed arthropathy

#### **Technique**

- Approach anteriorly or laterally or arthroscopically
- Removal of remaining articular cartilage
- Preparation of joint surfaces
- Correction of deformity
- Rigid internal fixation
- Long period of non-weightbearing

#### **Results of arthrodesis**

- 90% good to excellent
- Gait efficiency decreased by 10% with 3% increased energy expenditure

#### Gait analysis of patients with a fused ankle has shown

- Decreased knee flexion before heel strike
- Less time in single-limb stance
- Reduced sagittal ground-reaction force, which is important only with barefoot walking

#### **Complications of arthrodesis**

- Non-union 5 10% incidence
- Factors associated with non-union include infection, smoking (4x greater risk), impaired vascularity, neuropathy, osteonecrosis of the talus, malalignment, poor technique, & post-operative non-compliance
- Mal-union
- Pseudoarthrosis
- Neurovascular injury
- Stress fracture of the tibia
- Infection
- Subsequent arthritis development in joints of hind- & midfoot



#### Longterm follow-up of arthrodesis

- Saltzmann et al. JBJS 83A: 219, 2001.
- 23 patients followed for a mean of 22 years
- 100% developed arthritis in the surrounding joints
- More pain, disability and limitation of movement than contralateral limb
- ??were surrounding joints injured in the first place??

#### **Total ankle replacement**

- Began in the 1970's
- Mostly disastrous...
- Failure because of poor techniques, poor implants, poor patient selection
- Largely abandoned for 25 years by most surgeons

#### Improvements in ankle replacement

- Better pre-op investigations
- Cementless designs
- Better instrumentation/ three component designs
- Less bone resection
- Better surgical techniques

#### **Contraindications to ankle replacement**

- Active or recent infection
- Neuropathic joint disease (Charcot arthropathy)
- Osteonecrosis of the talus
- Severe malalignment
- Vascular impairment
- Compromised soft-tissue envelope
- Severe joint laxity
- Neurological dysfunction of the lower limb

#### **Complications of ankle replacement**

- Loosening of the implant
- Delayed wound-healing
- Skin necrosis
- Deep infection
- Damage to nerve blood vessel or tendon
- DVT

#### Salvage of failed ankle replacement

- Revision arthroplasty (depending on bone stock)
- Arthrodesis
- Below-knee amputation

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#### ATHLETIC ACTIVITY AFTER TOTAL JOINT ARTHROPLASTY

- Increasing numbers of arthroplasties
- Increasing demands
- Younger patients

Hip and Knee replacement by Age and Gender. Australian Orthopaedic Association National Joint Replacement Registry. Annual Report Adelaide: AOA; 2009

#### The operation of the century: total hip replacement -The Lancet

Relieves pain Improves function Economical

Projections for rise in numbers over next 20 years:

Hips 150% Knees 600%

#### **Changing indications and expectations**

- "Baby boomers"
- Ageing population
- Incidence of arthritis
- Trauma
- Success of joint arthroplasty

Pain relief

Improved function

#### Do patient increase their post operative activity levels?

#### Athletic activity before and after joint arthroplasty

- Hugh. 600 joint replacements participation in sport
  - Hips 36 to 52%
  - Knees 42 to 34%
- Precaution (47%), pain elsewhere in the body (27.5%), and pain at the site of the replaced joint (12.7%)

#### Athletic activity before and after joint arthroplasty

- Bradbury. 208 TKR's
  - TKR 49 to 34% at 5 years
  - Of those that partook preop 77% continued

#### High demand sports

Mont. 31 patients in high-demand sports (singles tennis, jogging, downhill skiing, racquetball, squash, and basketball) 4 X per week for a mean of 3.5 hours / week following TKR impact of high-level

??? Activity on implant survival, and it is not clear that patients should participate in high-demand athletic activity ???



#### Unicompartmental Knee Replacement

- Naal. 83 patients 18 months fixed bearing UKR
  - 77 (93%) had engaged in an average of 5.0 sports activities
  - 73 (88%) participated in an average 3.1 athletic activities
- Fisher. 76 patients at 18 months after mobile-bearing medial UKR.
  - 42 (55%) participated in sports
  - 39 (51%) participated in sports activities after it.

#### **Return to Sport**

- UK 2085 patients
  - 30% got back to sports (most commonly swimming, walking and golf)
  - 61% of the respondents who were active in sports in the 3 years prior to replacement
- 160 Australian patients (208 knees)
- TKR recipients were more likely to return to low-impact activities such as bowls (29 of 32, or 91%) than to high-impact activities such as tennis (6 of 30, or 20% returned).
  - 43 / 56 patients (77%) who had participated in regular exercise in the year before surgery returned to sports

#### Tennis

- Mont. 58 competitive tennis players 8 years after joint replacement
  - Patients reported improved court mobility, pain relief and decreased speed
  - National tennis ratings 4.25 to 4.15
- No outcomes reported relating to implant longevity

#### Skiing

- Mont. 33 High impact sport only 3 were regular downhill skiers
  - Experience
  - Type of sking
  - Wear and fracture

#### **Expert opinion**

- Surveys show consultants and residents had similar recommendations (Mayo Clinic)
- Low impact encouraged
  - bowling, cycling, golf, sailing, scuba, diving, and swimming
- High impact discouraged
  - baseball, basketball, football, handball, hockey, karate, running, soccer, and water skiing

#### Overview

- Function is important to patients
- Trend to recommend higher activity to patients
- Implant longevity
- Implant materials and design
- No level I or II evidence
- Patient advice and education

- This handout was written in association with Dr Nick Hancock FRCS



#### PAIN AFTER KNEE SURGERY

Pain can occur for many reasons. Being subjective pain is difficult to interpret and the art of being a good surgeon or physio is to try and sort out if this pain is expected or if there is something that can be fixed either non operatively or with surgery.

The perception of pain varies widely amongst individuals. One extreme is someone with terrible arthritis who says they have no pain. The other extreme is the patient who is in severe pain with no identifiable pathology.

Arthroscopies are simple to do but have varying results. As a surgeon we never expect to cure all our patients. Arthroscopies are not uncommonly performed to improve pain. It is disappointing when they don't but there are patients in whom this is not totally unexpected eg an arthritic patient with a meniscal tear. The success of an arthroscopy reduces with the degree of articular cartilage damage. Not uncommonly MRIs don't pick this up and you can get nasty surprises. On the flip side a young person with a simple meniscal tear should get better.

So what do you do if someone has pain after an arthroscopy. Firstly find out who the surgeon is and secondly try and get hold of the operation report. If a patient has unexpected pain or is unhappy ask them to seek a second opinion but wait at least a few months.

What about pain after ligament surgery. Pain can again be due to intrarticular pathology or it can be secondary to hardware problems. Screws can be prominent under the skin, other devices can also protrude or move over time. At times this is obvious but an x-ray or MRI is often needed. It is amazing how helpful a simple x-ray can be. After ACLR it is very common to get anterior knee pain, more so with patella tendon grafts. This can take 6-12 months to settle down. Longstanding hamstring pain is rare but early on is quite common. Ongoing instability or failure of the graft is not really a cause for pain.

Pain after MCL injuries is rare and if does occur in the absence of instability is difficult to treat surgically. MCL instability is a cause of pain both on the medial side due to the valgus thrust but also on the lateral side as more weight is placed on this side. If this occurs a reconstruction or an osteotomy may be required.

Pain after meniscal repairs is usually due to a retear or the tear never healing. Success of repair is dependent on numerous factors but success is probably around 70%. It is more successful in the younger patient and in those who have an ACLR at the same time.

What about knee replacements. Unless you treat a lot of these it is probably hard to know what to expect. Most people are in reasonable pain for 4-6 weeks. As a physio you need to be a counsellor and therapist. You can do no harm to the prosthesis. The main aim in the first 6 weeks is to get full extension and as much flexion as possible. After 6 weeks it is hard to get extra motion.

It can take 6-12 months to be as good as they are going to be. Certainly a strengthening programme will help. Hydrotherapy is also of great benefit. Some people have ongoing pain the reason for which is often unexplained. There are however a number of knee replacements poorly done so if you have someone who you believe is genuine it is reasonable to send them for a second opinion.

Causes of pain include malposition of components, ligament laxity, patella pain due to arthritis if not replaced, loosening of the implants, loose bodies eg cement, patella baha, under or oversizing components. Some of these conditions are easy to pick up but some are quite subtle such as midflexion instability and really need an arthroplasty surgeon to pick up.

In summary not everyone who has an operation is going to be happy. The first question I ask someone who has had surgery is who did it as it is important. If someone has ongoing pain which you believe is genuine and not explained by their operation then tell the patient they should think about seeking a second opinion. That being said remember not everyone can be made happy.

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#### PATELLA INSTABILITY AND MPFL RECONSTRUCTION

The history is very important when assessing a patient with patella instability. The most valuable information to establish is whether it is Acute or Chronic. It can also be traumatic or non traumatic and unilateral or bilateral. The patient with true patellar instability reports that the patella either dislocated (requiring a reduction) or shifted laterally (partial dislocation with spontaneous reduction).

The passive elements are the most important for patella stability. The trochlear constrains the patella; and the capsular ligamentous structures (such as the MPFL) tether it in place. Patella alta is important because it means the patella engages into the trochlear later in flexion and is left unstable for longer.

Trochlear dysplasia is a common cause for chronic or episodic patellar dislocation. The lateral trochlear sits more anterior than its usual position. Combined with the fact that it is relatively flat, it creates less of a 'hill' for the patella to ride over, which leads to lateral movement of the patella. Lateral offset of the tibial tuberosity relative to the trochlear (or a 'high Q angle') makes the lack of lateral constraint worse, increasing the tendency of the patella to dislocate. (When the tibial tubercle is lateral to the long axis of the femur and the quadriceps, the patella is subjected to laterally directed forces). Dynamic constraints have little effect on constraining the patella if the passive elements are inadequate.

The location of contact for the patella and femur vary with different degrees of flexion and joint load. At 0°, no contact occurs; in early flexion, the distal patella contacts the proximal trochlea; at 90° of flexion, the superior aspect of the patella contacts the femur; when flexion is greater than 90°, the contact area returns to the centre of the patella; and when the knee is fully flexed, the inner border of the medial femoral condyle is in contact with the small vertical ridge of the medial facet.

#### Examination

An acutely dislocated patella is quite obvious. The patella is observed as a prominent bulge on the lateral margin of the knee. The medial condyle is uncovered and may be mistaken for the displaced patella (Medial dislocation is extremely uncommon and is usually a complication of surgery for recurrent dislocation). The knee is swollen and neither active nor passive movement is possible. The knee is usually in a flexed position when the patient presents for acute treatment.

A chronically dislocated patella may not be painful and the patient may have almost normal motion of the knee. The bony findings are similar to an acute dislocation.

If they are not acutely painful then start with the legs adequately exposed and watch the patient walk. Look for flat feet, rotational problems of the hips and for high or low patellae with or without lateral subluxation of the joint. With the patient sitting feel the patella as they take the knee through a range of motion. Feel for crepitus and check to see if the patella shifts laterally as the knee reaches full extension (J tracking). Look for a tight lateral retinaculum and to see if the patella can be subluxed or dislocated. This involves checking the integrity of the medial structures. As the knee flexes a patella that has been subluxable will usually become 'stable' as it engages in the trochlear groove. Always check the other knee because it is rarely normal if the patient has congenital problems. Apprehension sign. The knee is placed at 30° flexion, and lateral pressure is applied. The patient will complain of pain or the sensation that the patella is about to dislocate. Increased femoral anteversion: This increases the internal rotation of the femur and increases the lateral displacement force vector affecting the patella. This factor is additive when associated with concurrent genu valgum. Foot pronation contributes to the lateral forces on the patella and can be easily managed with orthotics. Lateral tibial tubercle and External tibial torsion: This moves the pull of the extensor mechanism laterally and thus increases laterally directed forces on the patella.



#### <u>Imaging</u>

Always start with plain x-rays of the knee:

Weight bearing AP, Lateral in 60<sup>°</sup> flexion, Lateral in full extension with quadriceps contracted, Merchant view and get bilateral views for comparison (one of the few times we do this).

It is important to evaluate the height of patella, the length of patella ligament and patella trochlear alignment. The articular surface of the patella is completely out of the trochlear with a patella alta when the knee is extended. The Blackburne-Peel index or the Insall-Salvati index can be used to check patella height. A hypoplastic trochlear can be identified on a true lateral radiograph. The crossing sign is present in most patients with patella instability and an avulsion fracture is often seen after an acute dislocation.

<u>CT scanning</u> is useful when planning surgery but is rarely used in the initial stages of diagnosis and treatment. MRI is very useful for looking at soft tissue and chondral injuries. Patellar tilt is measured with the knee in full extension: Start by drawing a line through the posterior femoral condyles as the reference line and the long axis of the patella as the measurement line. If it is greater than 11° the patient has a high likelihood of having anterior knee pain or instability but can be normal up to  $20^{\circ}$ . The TT-TG distance can be measured on CT or MRI. The tibial tubercle should lie <20 mm lateral to the midline of the femur at the proximal edge of the femoral condyles.

<u>MRI</u> The MRI helps to look at the medial retinaculum and the articular cartilage. It is useful to help determine whether acute surgery is required. It is less useful in recurrent dislocators. Since the PF ligament attaches to deep part of patella, the retinaculum tears from deep surface first. Avulsion fractures are often better seen on CT than MRI.

<u>Acute Traumatic Instability</u> If an otherwise "*normal knee*" suffers a patella dislocation; the medial structures tear but the passive elements remain intact. Examination reveals medial damage rather than lateral subluxation. Repair of the torn structures (proximal procedure) should prevent further instability.

If there are *congenital problems* then performing a proximal procedure alone will not work. The patella often sits laterally, sits high (alta), tracks poorly (J tracking) and there is ligamentous laxity. A combined lateral and distal re-alignment procedure is required for these (and rotational problems).

#### **Treatment**

#### Non surgical treatment

Strengthening of the quadriceps and VMO, stretching of the lateral retinaculum, hamstrings, quadriceps, Achilles tendon, and iliotibial band. Core stability and functional alignment of the lower extremity is important. Weight loss reduces patellofemoral loads. Patellar braces and taping helps some people, use of an orthotic device in the shoe when a patient has excessive foot pronation and use of NSAIDS.

#### Surgical Treatment.

This is broadly divided into proximal and distal procedures, although commonly a combination of both is required.

#### Proximal procedures

- Medial repair Plication of the medial patellar retinaculum or anatomic repair of the MPFL.
- Lateral release Dividing the capsule of the lateral retinaculum to allow medial motion of the patella into the trochlear groove and/or to level a patella with a large degree of lateral patella tilt. A lateral release should only be performed if it facilitates the recentering of the patella by other procedures or when it is specifically performed to address lateral patella tilt.



• Proximal realignment does not work well in patients with patellofemoral pain and should be reserved for patients who have sustained a dislocation and require stabilization.

#### Distal procedures

- Distal realignment is the preferred treatment if there is an abnormal trochlea or a high patella. It is accomplished by the transfer of the tibial tubercle distally to allow the patella to engage correctly in the trochlea. As a result, the Blackburne-Peel index is lowered to the normal range.
- Tibial tubercle transfers
  - Tibial tubercle transfer was first described by Hauser in 1938 with a medial and distal transplantation of the tibial tuberosity. It is meant to correct the Q angle by medializing the tibial tubercle and should be used only when the patella does not track in the central part of the trochlea.

#### **Combined procedures**

The patient may require a realignment procedure which is done distally, a release and repair which is done proximally or a combination of both. This can also correct patella alta, with distal movement of the tibial tubercle during the medial transfer.

#### Other surgical treatments

- Trochleoplasty, rotational osteotomy for excessive femoral anteversion / external tibial rotation and patellectomy may be performed in cases in which both conservative treatment and less extensive surgery have failed. These are big procedures with significant morbidity and are very rarely used these days.
- Arthroscopic debridement may provide some symptomatic relief but is very unpredictable.

In the 'normal knee' where a high level athlete tears their medial retinaculum as part of a dislocation one should consider surgery acutely. The Merchant view will be normal. This will be discussed in more detail during the lecture.

In the general population a more conservative approach is usually taken. Having excluded an intra-articular injury the leg is wrapped, iced and kept in extension for 3 weeks before commencing a ROM and strengthening programme. If they continue to dislocate they may require an open lateral release and proximal medial retinacular imbrication or a MPFL reconstruction.

#### Summary

Patella instability is common. Work out the cause of the instability and the choice of treatment usually becomes clear. Medial Patellofemoral Reconstruction works very well with careful patient selection.

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