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Thank you,
The Team at Orthosports

Time	Event	Who
07:30 – 08:00	Registration	
08:00	Welcome Message	Dr Doron Sher
	Lisfranc injury & Midfoot arthritis	Dr Todd Gothelf
	Achilles Tendinopathy	Dr George Konidaris
	Midfoot miscellany & lateral ligament repair	Dr John Negrine
	Panel Discussion	
	How I assess the SIJ	Dr Mel Cusi
	Pudendal nerve entrapment (PNE)	Dr Andreas Loefler
	Managing gluteal weakness and pain	Dr John Best
	Panel discussion	
10:05 – 10:45	**Morning Tea**	
	Thrower's shoulder	Dr Jerome Goldberg
	Posterior interosseous nerve compression syndrome	Dr Ivan Popoff
	Tendinopathies and overuse syndromes	Dr Kwan Yeoh
	Panel Discussion	
	Lower leg pain & chronic exertional compartment syndrome	Dr Paul Annett
	An update on ACL surgery	Dr Doron Sher
	Panel Discussion	
12:40	Close	

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Lisfranc Injury and Midfoot Arthritis

Midfoot arthritis involves degenerative changes to the metatarsocuneiform of the foot. The main causes of midfoot arthritis are: Previous Lisfranc injury, Primary osteoarthritis, and Inflammatory arthritis.

Lisfranc injuries are treatable to help prevent midfoot arthritis. As a result, its diagnosis and management is mentioned in detail.

Clinical evidence strongly suggests that Lisfranc injuries should be treated aggressively and surgically to restore alignment and stability. Restoring anatomic alignment resulted in 50 to 95% good to excellent outcomes, compared with 17% to 30% good to excellent results in patients where anatomic reduction was not achieved.

There should be a high index of suspicion for a Lisfranc injury in any ankle or foot injury. Patients may have a twisting injury, or a direct blow to the foot.

Physical examination will reveal tenderness at the 1-2 interspace at the base of the metatarsals. A pronation-abduction manouvre, placing stress on the midfoot, may reproduce pain at the base of the 2nd metatarsal.

Investigations:

Weightbearing Radiographs- A STANDING radiograph of the affected AND unaffected side is crucial to diagnose an unstable Lisfranc injury. Widening at the 1-2 interpace and lateral shift of the 2nd metatarsal on the middle cuneiform even of 1mm will confirm a Lisfranc injury (seen below on the right).

MRI - helpful to demonstrate injury to the Lisfranc ligaments. Being a non-weight bearing study, an MRI will not help to demonstrate instability and the need for surgery.

CT scan- may help to show fractures, but may also fail to demonstrate a Lisfranc injury as it is a NON weight bearing study.

Treatment:

Type I - No widening or instability demonstrated but injury to the lisfrance ligament complex. These can be treated in a boot, non-weight bearing for four weeks, followed by rehabilitation. I usually repeat a weight bearing radiograph in two weeks to confirm stability.

Type II- Dynamic instability on WB radiograph. These are treated with open reduction internal fixation to restore anatomy. Non-weight bearing is continued for six weeks, followed by boot weight bearing for four weeks. Sport-related activities are not allowed for six months.

Type III- Gross instability, seen even on non-weight bearing radiographs. These are all treated with surgery as in Type II.

Risk of arthritis- All patients with Lisfranc injuries have a risk of developing midfoot arthritis. The risk of arthritis is reduced in those treated with anatomic reduction. In addition, treatment of arthritis with fusion is far easier when the anatomy is restored as desciribed below.

Midfoot Arthritis

History- Midfoot arthritis usually causes pain in the arch of the foot with weight bearing. Pain is usually worse with activities and walking barefoot.

Physical Examination- Alignment of the feet is assessed and is usually normal. Some patients may have a flattened arch or forefoot abduction with collapse of the joints. Pain is present when the tarsometatasal joints are stressed. The most commonly painful joints are the 2nd and 3rd metatarsocuneiform joints.

Investigations-

Weightbearing radiographs should always be obtained to assess alignment of the foot. Advanced arthritis can be identified on radiographs, but moderate arthritis can be missed.

MRI is very helpful to assess the midfoot joints for arthritic changes, especially when radiographs are normal. MRI can demonstrate cystic changes, bone oedema and cartilage wear.

CT Spect Scan can also demonstrate arthritic changes in the midfoot, but is less specific than MRI.

Treatment

Non-operative treatment should be attempted prior to considering surgery. A soft or rigid custom-molded orthosis can provide support to the longitudinal arch. A rocker-bottom sole may help to reduce stress on the arch and improve ambulation. Judicious cortisone injections may help to temporarily reduce pain.

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Surgery:

Surgical treatment is indicated when non-operative treatment fails to adequately reduce symptoms. Surgery consists of an arthrodesis of the involved midfoot joints. The most common joints involved are the second and third tarsometatarsal joints. After surgery the foot is immobilized in a boot for six weeks non-weight bearing, following by walking in a boot for six more weeks. Successful surgery usually follows a successful fusion, and occurs about 85 to 90% of the time.

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Achilles Tendinopathy

Introduction:

Previously known as "Achilles tendonitis", it is now recognised that the inflammatory process is absent in most patients, and that this is a degenerative and overuse condition with attempted repair. "Achilles tendonopathy" is used to describe the clinical syndrome of pain, swelling and impaired performance in the Achilles tendon, and "tendinosis" for histopathological findings. The two do not always co-exist.

Anatomy:

The TA fibres have a spiral arrangement. In the upper part of the leg, the soleus fibres are anterior to the gastrocnemius fibres. Lower down, the tendon has rotated so that the soleus fibres lie medial to those of the gastrocnemius. Recently there has been interest in the role of the plantaris tendon in Achilles tendon pain. The differential movement of the tendons may create abrasion and adhesions in the plantaris tendon, which tend to be found in the painful mid-portion zone of the Achilles tendon. When comparing the material properties of Achilles and plantaris tendons and found plantaris to be stiffer and stronger, suggesting it could tether the Achilles.

Pathology:

Puddu classified the pathological features into:

- peritendonitis, with inflammation of the paratenon only
- peritendonitis with tendinosis, with inflammation of the paratenon and abnormalities of the tendon
- tendinosis, with abnormality of the tendon only
- rupture

Histopathology of Achilles tendonopathy:

The histology generally is noninflammatory, showing decreased cellularity and fibrillation of collagen fibers within the tendon. Along with the collagen fiber disorganization, there is scattered vascular ingrowth and occasional areas of necrosis and rare calcification. Injury or abnormal stress on the tendon may lead to altered matrix metabolism, neovascularisation and painful nerve ingrowth. There are no significant numbers of inflammatory cells - this is a degenerative condition with attempts at repair. The current consensus is that there is a zone of hypovascularisation from 2-6cm above the insertion. This is the zone in which most tendonopathy and rupture occur, and it has been suggested that ischaemia is involved in the causation of tendonopathy, which might fit with increased lactate levels seen. The neovascularisation, associated with pain-mediating nerve endings, may be partly prompted by chronic or intermittent ischaemia.

Insertional tendonopathy:

As well as the degenerative changes in the tendon itself, insertional tendonopathy also shows:

- Bone spurs arising from the posteroinferior insertion
- Splits in the tendon, mostly longitudinal
- Degeneration of the fibrocartilage that lies on the deep surface of the tendon next to the retrocalcaneal bursa

Epidemiology:

Seen in – mid & long distance runners, track & field, tennis, badminton, volleyball, soccer
7-9% of top level runners
In those athletes with tendinopathy - 66% non-insertional and 23% insertional
There are associations with: quinolone antibiotics, oral steroids, HRT, OCP, obesity, HT, diabetes.

Lower limb malalignment is seen in 60% of patients with Achilles tendinopathy. 14% of patients are overpronators and 27% have cavovarus feet. No study has looked at the distribution of foot shape in a large population with Achilles tendonopathy and compared with a control group.

Management – Non operative

Combined **cryotherapy** and **compression** may be useful as an initial treatment.

Eccentric exercises are the most evidence-based treatment modality. There is a small advantage for eccentric versus concentric exercises (Silbernagel 2001). Eccentric exercise is less effective in insertional than midportion tendonopathy. Eccentric exercise reduces neovascularisation and increases type 1 collagen synthesis. Eccentric exercise also leads to increased ankle dorsiflexion range. It is less effective for Insertional Achilles Tendonosis, with a 35% response. This may be improved by not stretching beyond neutral and hence avoiding impingement.

Nonsteroidal anti-inflammatory medication - No benefit from piroxicam against placebo in a small but adequately powered RCT (Astrom 1999). Simple analgesia should be the first line of pain management in this condition.

Transcutaneous glyceryl trinitrate (GTN) - Paoloni (2007) reported an RCT comparing 6 months of daily local glyceryl trinitrate patches to placebo in midportion tendonopathy. There is some evidence to recommend topical GTN patches for the management of Achilles tendinopathy.

Steroid injections - Steroid injections into or around the Achilles tendon are controversial. The intention is to reduce the peritendonitis. The tendonopathy is a degenerative, non-inflammatory condition in which steroids have not been shown to have an effect.

Sclerosant injections - New vessel formation is associated with pain mediating nerves. Polidocanol is a sclerosing agent that destroys the neovessels and presumably, the adjacent nerves. Good results have been demonstrated for the use of this agent in the treatment of midsubstance Achilles tendinopathy. However there may also be a small risk of TA rupture

Volume injections (brisement) - Another method of disrupting neovessels and the accompanying nerves is to inject substantial volumes of fluid into the space between the Achilles tendon and the paratenon, described as brisement. There is some evidence to support its use. (Chan 2008)

Prolotherapy - Injections of hyperosmolar dextrose with local anaesthetic are intended to create local inflammation that may initiate a healing response.

Aprotonin - A protease inhibitor aprotonin injected to the peritendonous area in patients with non-insertional Achilles tendonopathy. Orchard (2008) reported a large retrospective series of 430 patients in whom 76% considered themselves to have benefited from aprotonin injections.

Shockwave therapy - ESWT is hypothesized to improve symptoms by promoting neovascularization and angiogenesis at the tendon-bone junction and inducing degeneration of epidermal nerve fibers with subsequent reinnervation. Randomized controlled trials comparing ESWT to placebo in non-insertional Achilles tendinopathy have shown conflicting results. In insertional tendonopathy, Rompe (2008) found that shockwave treatment produced pain relief in 64% of patients compared with 28% for eccentric exercise. Currently it appears that shockwave treatment is more effective in insertional than non-insertional tendonopathy.

Platelet-rich plasma and autologous blood -
The aim is for an injection of concentrated platelet-derived growth factors to stimulate a healing response. Standardisation of collection and hence concentration varies. A RCT by de Vos (2010) found no difference in outcome between platelet-rich plasma and eccentric exercises compared with eccentrics alone. There is no evidence to justify a PRP injection in patients with Achilles tendinopathy.

Surgical management options

Patients with persistent pain and disability at the Achilles insertion after adequate non-surgical treatment may be offered surgical debridement of the tendon and excision of the calcaneal prominence

The options include:

- excision of the calcaneal prominence and retro-calcaneal bursa, with minimal if any debridement of the tendon. This is appropriate only in patients with minimal tendonopathy and no large posterior spurs, including younger patients who have only a prominence. There is increasing interest with endoscopic "calcaneoplasty".
- excision of the calcaneal prominence and retro-calcaneal bursa and debridement of the Achilles insertion, with reattachment of the Achilles or reconstruction (FHL or other tendon transfer).

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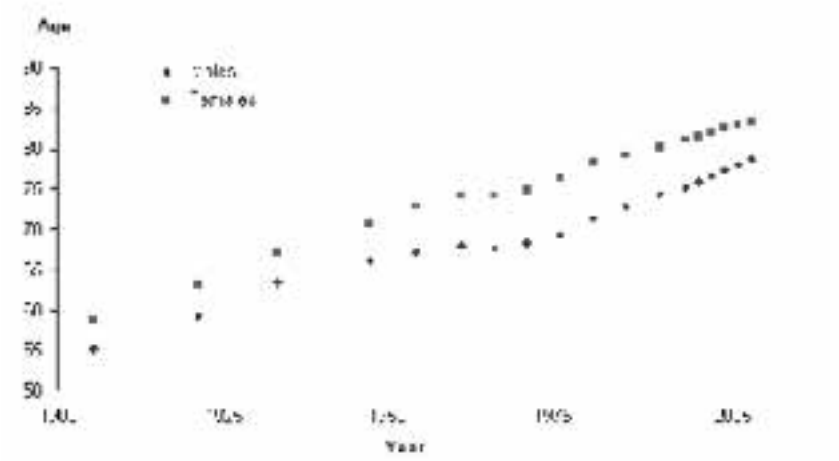
Midfoot miscellany and lateral ligament repair

Tibialis anterior insertional tendinosis:

The tibialis anterior is the largest muscle of the anterior compartment. It is the principal dorsi-flexor of the ankle. There is little literature available to cover the spectrum of pathology seen from tendinosis to rupture.

As the population ages (life expectancy in the 20th century went from approximately 56 in 1900 to over 80 in the 2,000's) people are "outlasting" their joints and their tendons.



Functional expectations have also risen. Patients fully expect to be able to be active to play sport, to walk, to dance and to "party" well into their 90's.

As Bernard Salt the demographer once put it: "This is a boom time for orthopaedic surgeons". This boom will of course extend to physiotherapists.

Tibialis anterior insertional tendinosis is a disorder of active ladies (compared to tibialis posterior tendinosis a disorder of obese, diabetic, hypertensive ladies).

These (average age 66) ladies patients are the walkers, tennis players and golfers. They present with pain and tenderness at the insertion of the tendon. The medial border of the foot where it inserts into the base of first metatarsal and medial cuneiform. In 25% of cases the pain is <u>bilateral.</u>

The pain is aggravated by activity especially walking on heels and is curiously often a problem in bed at night where we theorise that plantar flexion in bed stretches the tendon and reproduces the pain.

Differential diagnosis is midfoot arthritis which occurs in the same age group and can present with pain and tenderness in a very similar location.

Diagnosis is clinical for the most part. Plain xrays are always taken and will show arthritis if severe. Ultrasound as usual in good hands and MRI are the most helpful investigations.

Non-surgically rest in a walking boot, anti inflammatories, shock wave lithotripsy and the "dreaded injectables" have all been tried without any level 1 evidence as cases are too few.

Surgically I have had success with transfer of peroneus tertius to tibialis anterior as a free tendon weave.

Midfoot arthritis:

Patients commonly present with pain and swelling over the tarso-metatarsal joints. The second and third joints are most often involved (theorised because their respective metatarsals hit the ground first and transmit greater force. The medial naviculo-cuneiform joint is also frequently involved.

Once again the diagnosis is clinical most often. Plain x-rays will show joint space narrowing and osteophytes if the beam is correctly angled. Bone scanning is frequently mis-reported as showing a stress fracture when the problem is arthritis. CT and MRI are also helpful.

Non-surgically anti-inflammatories, rocker soled shoes, skip-lacing shoes will help. A steroid injection under x-ray or ultrasound control will give transient relief.

The definitive treatment is an arthrodesis which affords good pain relief but requires a lengthy convalescence (6 week in plaster non-weight bearing 4 weeks in a walking boot). As these are considered "non-essential" joints in the foot the patients do not lose any appreciable movement.

Lateral ligament reconstruction – How I do it:

Lateral ankle ligament injuries are very common. With a population of 4.6 million people, 460 will occur in Sydney today!
Most lateral ligament injuries will make an uneventful recovery without surgery.
Some patients however will have ongoing symptoms of pain, stiffness and instability.
I never repair lateral ligaments acutely, but for chronic instability I perform a modified Brostrum type reconstruction and use early motion functional rehabilitation according to Karlsson.

This section will describe my surgical technique which yields consistently good results with minimal morbidity to the patients.

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How I assess the SIJ

A. History
The typical presenting symptom is low back pain. Pain maps have identified the distribution of symptoms related to the sacro-iliac joint. It is never above the level of L5, and includes the overlying area, buttock and posterior aspect of thigh and lower leg. There is evidence that dysfunction of this joint could, similar to a herniated lumbar disc, produce pain along the same distribution as the sciatic nerve. The presenting symptom is often described by the patient as ''sciatica''. Episodes of pain are typically recurrent, triggered sometimes by trivial actions such as bending and twisting, without any substantial lifting involved. The initial episode can be either during or soon after pregnancy, or traumatic such as a fall, head on motor vehicle collision, 'hard braking' whilst driving a car or a transverse 'crushing' mechanism which compresses the pelvis. Pain is worse when the SIJ is loaded (sitting, standing, walking and negotiating stairs). Patients typically have difficulties turning in bed. Dyspareunia and changes in bladder habit are also described.

B. Clinical examination
The pelvic bony structure is inherently stable. Its principal function is to The small range of movement, the absence of muscles that execute active movements of the joint and its position in the pelvic ring suggest that its function is one of stress relief for torsional forces across the pelvis, transmit the weight of the trunk and upper limbs to the lower limbs and distribute ground reaction forces from below.

Firstly, it must allow passive movements imposed on the pelvis, such as rotation during the walking gait sequence, and thus avoid pelvic ring fracture. Secondly, it must be strong and stable to transmit forces from the vertebral column to the lower limb and vice versa, absorb twisting forces and provide a locking mechanism. This is possible with a combination of complementary fitting surfaces and strong ligaments, as described in reference a). Posterior ligaments (dorsal sacro-iliac and interosseous) are particularly important.

Historically mechanical tests for the sacroiliac joint can be divided into two broad categories: pain provocation tests and palpation tests (for assessment of position and movement). There appears to be no single mechanical test for the sacro-iliac joint that provides sufficient reliable information. Studies have shown that if considered in 'clusters' their reliability increases. Manual tests attempt to identify structures and relationships that can give a clue to the cause of the pain. Manual tests rely heavily on the palpation skills of the examiner, and are ultimately ''operator dependent''. Other tests assess the onset timing of muscle activity patterns around a joint, which in turn reflect motion patterns. The following tests have been proven to appropriately assess different aspects of the function of the sacro-iliac joint.

1. The posterior pelvic pain provocation test (also known as thigh thrust) has been identified as reliable in the diagnosis of pelvic girdle pain in pregnant women.

2. Palpation of the long dorsal sacro-iliac ligament. It becomes taut and painful on palpation e when the sacrum is counternutated; it provides information on inappropriate patterns of relative motion between sacrum and ilium.

3. The Trendelenburg test in its different forms indicates poor muscle activity of gluteals.

4. The stork test (also known as Gillet test), assesses intra-pelvic motion. More importantly, it recognises changes in muscle activation patterns in the action of weight transfer and elevation of the contra-lateral knee. In patients with sacro-iliac joint pain there is early activation of biceps femoris and delayed contraction of internal oblique and multifidus (the opposite of normal subjects).

5. The active straight leg raise (ASLR), tests the load transfer through the sacro-iliac joint, and has been shown to be reliable and reproducible.

6. Patrick's Fabere and Gaenslen's test are also useful when used in clusters.
Other clinical manouvres have been used by a large number of clinicians, and provide valuable information of intra-articular motion, when compared from side to side, particularly the SIJ glide test as described by Diane Lee

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Pudendal Nerve Entrapment (PNE)

PNE is an uncommon syndrome, but may be a source of chronic pelvic pain. Symptoms include genital numbness, pain, hyperaesthesia, urinary, bowel, and sexual dysfunction. Pain is often positional, worse with sitting, relieved by standing, and absent when lying down. The typical symptoms are seen in male competitive cyclists, who develop recurrent numbness of the penis and scrotum, especially when cycling for longer distances.

There are numerous causes of PNE. These include inflammatory and autoimmune conditions, recurrent infections, pregnancy, accidents, surgery, physical training and sports. The nerve is often trapped between the sacro-tuberous and sacro-spinous ligaments, similar to carpal tunnel syndrome. PNE is a rare condition and the diagnosis is often delayed as patients are referred to urologists, gynaecologists, and not infrequently to psychiatrists.

There are no specific clinical signs for the syndrome. Digital palpation of the ischial spine may produce pain and a pudendal nerve block may relieve symptoms temporarily. A pelvic MRI may show anomalous sacro-tuberous and or sacro-spinous ligaments or direct compression of the pudendal nerve.

Treatment of PNE is as challenging as the diagnosis. Various ergonomic devices can help, such as doughnut shaped pillows or changing the height of desks and chairs. Some patients prefer to work at a standing altogether. Varying the height and angle of bicycle seats or changing to another type of saddle may also help.

Physical therapy is mainly aimed at pelvic floor exercises, stretches and at a modification of sports and training regimes.

Medications include antidepressants, anti-epileptics, and nerve specific medications. Injections are mainly diagnostic with long acting local anaesthetics and occasional use of steroids. Radiofrequency has been used in some cases.

Surgical decompression is a last resort. There are two surgical approaches, trans-vaginal or ischio-rectal and trans-gluteal. The trans-gluteal approach involves division of the sacro-tuberous ligament and any aberrant deep fibres and septa, which may compress the pudendal nerve. The nerve can be inspected and followed in its course, as it passes through the greater sciatic foramen, over the spine of the ischium and then forward into Alcock's canal. An unhappy nerve looks compressed, flattened and may be adherent to surrounding tissue. There may be tortuous and widened veins, suggesting obstruction and possible pressure on the nerve. The nerve may also have aberrant branches, which can traverse the ligaments. Once the nerve has been identified and mobilised the deep sacro-spinous ligament is divided, allowing medial and anterior transposition and relaxation of the nerve. The major challenge of this surgery is to identify the nerve and to be wary of unusual branches, which are common.

The operation takes about an hour per side. Two thirds of patients have bilateral symptoms. The gender ratio is about 4 to 1, with females much more commonly affected. Patients are hospitalised for one or two nights. In the first week after surgery, sitting is possible, but uncomfortable. Once pain permits patients are encouraged to start stretching their hamstrings to encourage some gliding of the pudendal nerve and reduce deep scarring.

As many patients present with chronic pain, results are judged with caution, and patients are told that it may take six months for their symptoms to improve. Approximately one third are expected to make a good recovery, one third will make a partial recovery and one third of patients will fail to improve.

Patients with a particularly irritable bladder may also benefit from a sacral nerve root stimulator, which is an additional procedure, but can be done at the same time. Modern nerve root stimulators and be controlled trans-cutaneously and work similar to TENS machines.

Patients frequently ask whether division of the sacro-tuberous and sacro-spinous ligaments destabilises the pelvis. The trans-gluteal approach has been performed in Nante for more than 25 years. Although there is no good clinical test to demonstrate pelvic stability, the French team have not seen patients with pelvic instability or with mechanical symptoms as a result of the surgery. They have also performed mechanical testing on cadaver specimens, whereby the stability of a pelvis was studied in a mechanical testing machine before and after the ligaments were divided. It seems that the sacro-tuberous and sacro-spinous ligaments do not contribute a major part to the stability of the adult pelvis. They may have an important function in shaping the pelvis as it grows. It has also been suggested that the sacro-tuberous ligament may be a vestigial structure and more important in species, which wag their tails.

Many patients are not diagnosed in a timely fashion, as doctors are not aware of PNE. Now patients frequently consult the Internet and there is a lively PNE community with dedicated websites and chat rooms. Wikipedia has more on PNE than most standard medical textbooks. HOPE, or the Health Organization for Pudendal Education, declared the May 1st 2013 the first Pudendal Nerve Awareness Day.

At this time there are very few centres in the world for the treatment of PNE. The trans-gluteal decompression is performed in perhaps as few as five centres only, with two in France, two in the USA and one here in Sydney.

PNE is a rare, but a debilitating condition, which needs to be considered in patients with persistent pelvic pain.

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Managing Gluteal Weakness and Pain

Most patients with problems around the hip girdle present with pain. The additional finding of hip weakness, in particular gluteal weakness, creates a more serious and difficult management problem (1).

The hip girdle is a complex region where co-existing pathologies are common. Athletic screening and prospective injury data confirms that hip weakness is a risk factor for many injuries and also recovery from hip surgery (e.g. arthroplasty)(2,3).

Neurological causes (L4,L5,S1,S2) or associated sacro-iliac joint pathologies should always be considered.

1. The problem of gluteal weakness

The gluteal complex comprises gluteus medius, gluteus minimus, gluteus maximus and the tensor fascia lata (TFL). TFL has a role in assisting gluteus maximus in active movement but has a greater role in stability. Gluteus maximus is enriched in power fibres and therefore is prominent in younger individuals where power movements are required – sprinting, climbing. Gluteus medius and minimus have major stabilising roles and if deficient cannot be well compensated by other structures.

Clinical testing of the gluteal complex must be performed carefully:

- Abduction through range
- External rotation through range
- Abduction with external rotation
- Extension (usually preserved)
- Extension with internal rotation
- Flexion (may be diminished)

Assessment of gluteal strength is best performed pain-free.

2. The problem of gluteal pain (lateral and posterolateral hip) and weakness

Most lateral hip pain is associated with a degree of trochanteric bursitis. An irritable hip associated with hip osteoarthritis, femoro-acetabular impingement (FAI) or labral pathology often co-exists with gluteal weakness. In this setting clinical assessment must be performed avoiding creating impingement of the hip. The clinical assessment may need to be performed with the patient prone or in hip extension.

Postero-lateral hip pain with gluteal weakness is often associated with a hyperactive piriformis muscle. It is uncommon that ‘pirformis syndrome’ is the sole pathology.
Investigations to image the gluteal tendons are indicated in the presence of night pain, persistent weakness or failure to respond to initial treatments.

The tests include:

- Plain X-rays with weight-bearing films
- Ultrasound (in the non-obese)
- MRI to assess tendon tearing (and differentiate bursal pain from tendon pain)

In addition to exercise therapy, interventional treatments to be presented include:

- Non-surgical – medications (analgesia and NSAIDs); corticosteroid injections; tendinopathy therapies (including platelet rich plasma)
- Surgical – bursectomy, tendon repair (note this is uncommon)

Combined gluteal pain and weakness requires a patient, lengthy, graduated treatment program and invariably remains non-operative.

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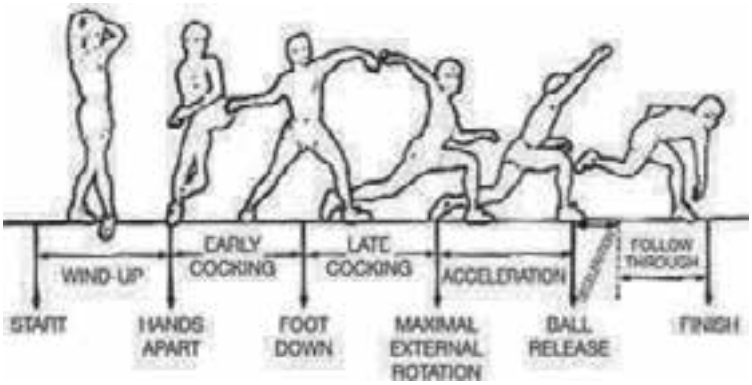
Thrower's Shoulder

Thrower's Shoulder is an overuse type of injury that is becoming increasingly common in throwing sports such as baseball and tennis. It is also known as internal impingement and Glenohumeral Internal Rotation Deficit (G.I. R. D.) . This is a preventable injury with the correct training protocols and when it becomes established is very difficult to treat. Prevention is much better than the cure.

The throwing motion can be divided into several segments



The concept of the Kinetic Chain is important in the throwing mechanism. It is a series of links and segments which link multiple body parts into a single functional segment. It allows the large leg and core muscles to transmit forces to propel the ball with significant force and velocity.

Hyperabduction and external rotation of the arm assists to increase throwing power.

The pathology involves 5 stages

- Overuse of the shoulder causes a scapular dyskinesis
- At ball release the GH distraction force is 1.5 times body weight. Normally the scapular stabilisers compensate for this but when there is a scapular dyskinesis there is continued capsular distraction followed by a fibroblastic response and contraction of the posteroinferior GH ligaments
- The contracture drives the humeral head posterosuperiorly and causes a Type 2 SLAP tear
- The contracture also causes impingement of undersurface of R.C. against the glenoid (internal impingement) and R.C. failure
- Finally there is anterior capsular failure and instability.

The symptoms are pain with abduction and external rotation and the inability to throw. There may also be symptoms in the proximal kinetic chain
.
The signs include scapulra dyskinesis, a positive anterior apprehensive sign and a Glenohumeral internal rotation deficit.

An MR Arthrogram is mandatory. An MRI without intraarticular contrast will not demonstrate the pathology.

Interestingly some studies show very high rates of SLAP lesions and partial R.C. tears in asymptomatic throwers so this may be an adaptive change seen in most throwers.

Prevention involves

- Sleeper stetches in training
- Rationing throwing drills and game time

Established conditions (when GIRD < 20 degrees)

- Scapular rehabilitation
- Kinetic chain rehabilitation
- Sleeper stretches
- Activity modification

Surgery (when GIRD > 20 degrees or failed conservative treatment)

- EUA and arthroscopy
- Posterior capsular release
- SLAP repair (limits Abd/ER)
- Repair partial RC tear +/- acromioplasty
- Need to mobilize early but not stress repairs - very difficult

Surgical results are, at best, fair only

- 50% of elite throwers return to preinjury level
- 70% of recreational throwers return to preinjury level

SUMMARY

- Prevention is better than cure
- Overuse and scapula dyskinesis cause the problem
- Look at the whole kinetic chain when treating this condition
- Surgical results are fair only

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Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 29, No 1 (January), 2013: pp 141-161

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ORTHOSPORTS

Posterior Interosseous Nerve Compression Syndrome

PIN Compression syndrome is an unusual and often missed cause of lateral side pain of the proximal forearm. Further complicating matters it can coexist with lateral epicondylitis, which is the condition, which it is often confused with.

Clinically it differs from lateral epicondylitis in that the pain is more distal (about a 1/3 along a line between the lateral epicondyle and Lister's tubercle), the absence of the provocative tests for lateral epicondylitis (unless coexisting), there will be no response to the injection of the common extensor origin with local anesthetic and corticosteroid (if it is coexisting the lateral epicondylar pain will disappear but the more distal pain will remain, it may be associated with wrist pain and weakness of finger and wrist extension.

Historically there are two syndromes affection the radial nerve; PIN compression syndrome, and, radial tunnel syndrome. The difference being the presence of objective findings, (i.e. positive nerve conduction studies) in PIN syndrome and not in radial tunnel syndrome. The results for surgery for Radial Tunnel Syndrome are traditionally poor as it was often the last resort for undiagnosed lateral proximal forearm pain.

In the diagnosis of symptomatic PIN compression NCS and MRI scans are often negative. The most helpful test is ultrasound-guided injection of local anesthetic and corticosteroid in to the radial tunnel by a skilled radiologist.

In our practice a study of 12 patients with suspected PIN compression (2 bilateral) 2 had positive NCS, 3 subtle signs on MRI. All had temporary relief with U/S guided injection and had resolution of symptoms with surgical release.

In Conclusion ultrasound guided injection is a reliable procedure in identification of Posterior interosseous nerve compression and this condition should be suspected in atypical or recalcitrant lateral epicondylitis.

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ORTHOSPORTS

Tendinopathies and overuse syndromes

The underlying cause of tendinopathy is repetitive tissue microtrauma at a rate greater than that at which the tissue itself can adapt or heal. This then leads to pain. In nerves, this may lead to relative ischaemia and neurological symptoms such as numbness, paraesthesia or pain.

Overuse syndromes are most common in work and sports with repetitive actions (eg. gripping, throwing) or vibrations (eg. cycling, vibrating tools). The risk of developing an overuse syndrome is increased with greater force and with longer duration of exposure. Limbs malpositioned away from the natural positions also have increased risk, hence the push for improved ergonomics in work environments.

Assessment of patients

As with all conditions, the patient history and examination are the most important parts of obtaining a diagnosis. In the absence of any single traumatic episode, be watchful for repetitive actions in work or sport. Be precise in examination, especially in palpation. Know and use specific provocation tests for particular overuse syndromes.

Diagnostic investigations:

- X-ray – Essential!
- Bone scan
- MRI
- Nerve conduction study
- Local anaesthetic injections

General principles of treatment

Treatment will go through various phases. Initial therapy is aimed at settling acute inflammation and pain. This may consist of modalities such as RICE (rest, ice, compression, elevation), splints or anti-inflammatory medications. As the condition settles, other therapies, such as stretching, strengthening and functional rehabilitation, can be introduced.

The use of steroid injections is controversial. Whereas steroid may help with pain relief, in the absence of other treatments such as activity modification, the condition is likely to recur. Steroids may mask the presence of continuing tissue damage, or may weaken tissues in their own right.

Given the underlying cause of the condition, activity and technique modification are essential elements of treatment. A workplace assessment may be necessary.

In some conditions, surgery is indicated to relieve compression of tendons or nerves.

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Common overuse syndromes of the hand and wrist

Tendons	De Quervain's Trigger finger ECU/FCR tendonitis Intersection syndrome
Nerves	Carpal tunnel syndrome
Ligaments	Gamekeepers' thumb

Some examples:

De Quervain's tenosynovitis

- Inflammation around APL and EPB tendons.
- Symptoms: Radial-sided wrist pain, weakness, crunching sensation.
- Signs: Tender 1st dorsal wrist compartment, painful resisted thumb abduction, positive Finklestein test.
- Investigations: X-ray.
- Treatment:
    - Non-operative: As described above.
    - Operative: Release of 1st dorsal compartment.

Carpal tunnel syndrome

- Compression of median nerve under wrist flexor retinaculum.
- Symptoms: Numbness, paraesthesia, weakness, night waking.
- Signs: Median nerve distribution signs, intrinsic wasting and weakness, specific tests (Phalen's, Durkan's, Tinel's).
- Investigations: X-ray, nerve conduction study, Semmes-Weinstein monofilament.
- Treatment:
    - Non operative: Wrist splints, steroid injection, acupuncture.
    - Operative: Endoscopic or open carpal tunnel release.


Endoscopic carpal tunnel release


Transverse carpal ligament released


Final endoscopic surgical incision

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ORTHOSPORTS

Lower Leg Pain &Chronic Exertional Compartment Syndrome

Introduction:

Lower leg pain is relatively common in the running athlete. Studies have shown that it is second only to the knee in causing lower leg pain, and makes up around 20% of running injuries.

There are numerous causes of lower leg pain in the younger athlete. The most common of these include tibial periostitis (the old 'shin splints'), stress fracture and chronic exertional compartment syndromes. In the older athlete peripheral vascular disease and spinal canal stenosis should be considered.

Aetiology:

Tibial periostitis is an overuse related inflammation of the attachment of the deep calf (generally considered the soleus) to the medial tibial border. It generally comes about with increased training load on top of intrinsic factors such as poor foot biomechanics (particularly over-pronation), and calf inflexibility.

A stress fracture is a failure of normal bone to cope with abnormal loads. It generally occurs in the tibia at the junction of the upper 2/3 and the lower 1/3. Similar factors may cause a tibial stress fracture that cause tibial periostitis, and there may be a continuum between the 2 conditions. In the older female athlete bone mineral density issues should be considered

Chronic exertional compartment syndrome is a condition where the fascial covering of a muscle group becomes excessively stiff. With activity muscles swell and the fascia will stretch to accommodate this. If the fascia becomes stiff – and this may occur due to ageing, genetics or trauma – then the muscle becomes constricted. The causes the microvascular blood supply to become compromised, causing a claudicant type pain.

Diagnosis:

A good history and examination is essential to make a definitive diagnosis. In tibial periostitis the pain may initially warm up with activity and disappear. There may, however, be prolonged post-activity pain. This is an inflammatory history. In contrast, compartment syndrome is usually painless for the first 5-10 minutes of activity and then the pain slowly worsens. It may be severe enough to make the athlete stop and subsides quickly with rest. This is a claudicant history. Stress fracture pain is largely insidious and progressive, occurring initially after exercise only, then progressing to pain during activity and even rest and night pain.

Accurate examination will aid diagnosis. In tibial periostitis the patient has widespread, exquisite tenderness along the medial tibial border, maximal in its mid-third. In a stress fracture there will be one area of more focal tenderness, generally at the junction of lower 1/3 and the upper 2/3 of the tibia. Chronic exertional compartment syndrome may show little at rest, although examination post-exercise may show increased tension through the affected compartment and sometimes a palpable muscle hernia.

Investigation will help confirm clinical suspicions. A plain x-ray is appropriate to demonstrate a stress fracture, and exclude other pathology, such as a tumor. A bone scan is a helpful second line investigation for demonstrating tibial periostitis and also stress fractures. Similar information may be achieved with MRI scanning without the same radiation. If a compartment syndrome is suspected the gold standard is a compartment pressure test. This involves placing a needle catheter attached to a pressure gauge into the affected compartment. Pressures are obtained both pre and post exercise to establish the diagnosis.

Treatment:

Treatment of tibial periostitis and stress fracture is similar. It includes a period of pain free rest of around 6 weeks with 'hands on' physiotherapy to release tight soft tissue structures, a rehabilitation program of stretching and strengthening exercises and a biomechanical assessment, possibly with orthotic prescription. In the case of compartment syndrome, surgery may required to release the affected compartment

Appropriate assessment and advice from a practitioner with experience in this area can greatly shorten the time to diagnosis. Institution of appropriate management plan will help get both elite and recreational athletes quickly back to their preferred sport.

Key Points

- Lower leg pain is common in the running athlete
- Common causes in younger athletes include tibial periostitis, stress fracture and compartment syndrome
- In older athletes consider vascular and spinal causes
- Compartment syndrome presents with a 'claudicant' history and 'crescendo' pain
- Treatment of tibial periostitis and stress fracture requires rest, biomechanical assessment and correction
- Definitive treatment of compartment syndrome usually involves surgery

NOTES:

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An Update of ACL Surgery

ACL reconstruction is a very good operation which eliminates symptomatic instability of the knee for most patients. It has a high success rate and a low complication rate. Unfortunately, despite a technically successful operation, a few patients continue to complain about some residual laxity ("the knee just doesn't feel normal"). Over the last decade there have been major changes in the surgical techniques for ACL reconstruction. While the intra-articular anatomy of the ACL is now well understood, it has only recently become clear that in some people the extra articular stabilizers are just as important (more about this later).

David Dandy performed the first arthroscopic ACL reconstruction in the United Kingdom in 1980 and this then became the standard method for this operation. The trade off for smaller skin cuts was that the new graft was not inserted where the old ACL attached. Generally speaking most people were still happy after their operation but not many returned to the same level of sport they had participated in previously.

Recent Changes to surgical techniques

A few years ago surgeons started using the "anatomical" insertion point of the ACL as the attachment point for the new ACL. This required an extra skin cut but resulted in improved stability of the knee. There was also a push to perform 'double bundle' ACL reconstruction, which more closely mimicked the anatomy of the native ACL. Unfortunately this operation was technically difficult and gave higher complication rates, even in experienced hands; and has not been widely adopted.

Using the "Anatomical" insertion point for reconstruction places higher forces on the ACL compared to both the native ACL and non-anatomically placed grafts (it should result in a more stable knee though). This has resulted in a significantly higher re-rupture rate in professional soccer players returning to sport at 6 months. As a result, rehabilitation and return to sport after "anatomic" ACL reconstruction will need to be progressed more slowly than after traditional, non-anatomic ACL reconstruction. There is also a trend towards using either patella tendon or quadriceps tendon grafts rather than hamstring tendon grafts. These are stiffer grafts but can lead to problems with kneeling and jumping in some people.

Lateral Extra-Articular Tenodesis

The anterolateral capsule of the knee is frequently injured when you tear your ACL. The capsular avulsion is called a Segond fracture and is said to be pathognomonic of an ACL tear. This lesion has been shown to be present in the majority of acute ACL injuries and is associated with significantly increased rotational knee laxity. There have been recent anatomical studies suggesting that there is a ligament here which originates from the lateral femoral condyle and inserts on to the anterolateral tibial plateau. Over time this 'ligament' can stretch out and cause more anterior laxity in an already ACL deficient knee.

It makes sense that if this structure and the intra-articular ACL are both injured that repairing only one of them will leave the knee somewhat unstable. Since the reconstruction is outside the knee it is better at controlling tibial rotation and decreases the stress on intra-articular reconstruction by about 40%. These advantages are especially useful in cases of revision ACL reconstruction.

The challenge for surgeons now is to work out which patients require a traditional arthroscopic ACL reconstruction and which require an extra articular tenodesis. Unfortunately MRI scanning and clinical examination are not yet accurate enough to help us with our decision making. There is convincing clinical evidence that lateral extra-articular augmentation should be used in a revision ACL reconstruction where no clear reason for failure of the previous graft is seen. The exact method of reconstruction is still being studied and I expect it to improve with time and further research.

Rehabilitation

Over the last few years a great deal of time and energy has been placed on improving the rehabilitation after ACL reconstruction and reducing the re-injury rates, particularly in females.

Two of these programmes are the PEP programme and the FIFA11+ programme. Both have been shown to significantly reduce the re-injury rate when returning to side stepping sports.

http://f-marc.com/11plus/manual/
http://smsmf.org/files/PEP_Program_04122011.pdf

Summary

Traditional ACL reconstruction is an excellent operation. The surgical indications for this technique are evolving and being improved. At this stage only a small number of patients need an extra-articular tenodesis

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