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Hurstville	Suite F-Level 3 Medica Centre 29-31 Dora Street HURSTVILLE NSW 2220	Tel Fax	**02 9580 6066** **02 9580 0890**	Dr Paul Annett Dr Mel Cusi Dr Jerome Goldberg Dr Todd Gothelf Dr Andreas Loefler Dr John Negrine Dr Rodney Pattinson Dr Ivan Popoff Dr Allen Turnbull Dr Kwan Yeoh
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Time	Event	Who
07:30 – 08:00	Registration	
08:00	Welcome Message	Dr Doron Sher
	Resistance Training & Major Shoulder Pathology	Dr John Best
	Anterior Shoulder Instability Which operation is best?	Dr Jerome Goldberg
	Triangular Fibrocartilage Complex Injuries	Dr Kwan Yeoh
	Panel Discussion	
	PRPP Injection	Dr Paul Annett
	Graft choices for ACL reconstruction	Dr Doron Sher
	Posterior Cruciate Ligament Injuries	Dr Ivan Popoff
	Panel discussion	
10:00 – 10:35	**Morning Tea**	
	Thoracic spine and ribs	Dr Mel Cusi
	Anterior approach to the hip	Dr George Konidaris
	The Posterior approach for total hip replacement	Dr Andreas Loefler
	Panel Discussion	
	Turf Toe injury	Dr Todd Gothelf
	What’s new in foot and ankle?	Dr John Negrine
	Panel Discussion	
12:30	Close	

Dr John P Best
B Med, Dip Sports Med (London), FACSP, FFSEM
Sport & Exercise Medicine Physician

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Resistance Training and Major Shoulder Pathology

Overview

The popularity of physical training has increased significantly over the last 15 years. The 1990's saw an increase in the number of gyms and gym franchises with numbers almost tripling in most Western countries. There is also a change in what gyms offer. More resistance training (RT) is available as well as a diverse range of organised training including circuit classes, pilates, yoga, combat classes, stretching and so on. Concurrently the gym membership profile has altered with a significant increase in the number of over 50 year olds attending. This group invariably participates in RT, comprising an increasing portion of the over 50 million Americans who regularly participate in RT.

Very little is known about the effect of RT with major shoulder pathology. The pathologies to be addressed are rotator cuff disease (in over 50's) and gleno-humeral instability (in under 40's).

What is resistance training?

Resistance training may be defined as any exercise that causes muscles to contract against an external resistance with the aim of increasing muscle strength, tone, mass and endurance. The external resistance may be one's own body weight or training devices such as weights and bands.

The health benefits of RT are clear and include an increased ability to perform daily activities, joint protection, improved bone strength, protection from cardiovascular disease, improved proprioception, psychological benefits and reduced risk of injury including tendinopathy. Many health groups, ranging from the National Heart Foundation to the American College of Sports Medicine, support these benefits.

It should also be noted that age-related sarcopenia (skeletal muscle atrophy) is now much better understood with studies showing reversibility in elderly patients.
There is an ever-changing variety of programmes and lifting techniques. The training weight may vary from 50-100% of one repetition maximum (RM) with variable frequency. A basic RT approach with weights is summarised below:

Strength Program	Purpose	Example
Toning	Commencing weights	2-3 sets of 10-15 reps
Endurance	Develop a base	3-4 times / week to start
	Strength maintenance	Maintain at twice / week
Hypertrophy	Greater power	4 sets of 6-8 reps
	Bulking up	Alternate days
	Appearance	'Split' program
		3 times/week/muscle group

Dr John P Best
B Med, Dip Sports Med (London), FACSP, FFSEM
Sport & Exercise Medicine Physician

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Resistance Training and major shoulder pathology

The shoulder is highly susceptible to injury with RT, comprising 36% of new injuries. In addition the injury rate when testing with a 1RM is higher than any body area. In patients with major shoulder pathology, the injury risk occurs when a weight-bearing load is created through the shoulder girdle. The common positions where this occurs include bench press, shoulder press, military press, various push-up positions (including yoga) and dips. This is a greater problem with older patients suffering rotator cuff disease.

a) Rotator Cuff Disease. Most patients over 50 years with advancing rotator cuff weakness have associated tendinopathy. Weakness on manual testing in more than one plane is not uncommon following rotator cuff repair (even if the patient is symptom free). Studies have shown that the rotator cuff may remain fatty and degenerate following surgery. There are no published studies examining moderate weight RT following rotator cuff surgery. In patients who have undergone rotator cuff repair surgery, the outcomes of revision surgery (if the rotator cuff is re-torn) are worse. Movements such as forward and lateral raises may recreate impingement and tear the rotator cuff.

b) Gleno-humeral Joint Instability (GHJI). In patients aged 20-40 years GHJI often requires surgery. Open surgery frequently violates the subscapularis which remains at risk of re-injury. Revision surgery for recurrent instability is also less successful. GHJI often leads to secondary gleno-humeral osteo-arthritis, with articular cartilage changes often seen in young patients. It must be appreciated that allowing RT in the ABER position is common but anecdotally is a source for re-injury. Alternate exercises are recommended.

c) Biomechanics and safety. Increasing the weight-bearing load through the GHJ, especially in the ABER position, significantly increases the demand on the rotator cuff and increases shear forces through the capsulo-labral complex. Older patients and those who are technically untrained or deconditioned are at higher risk of injury. Alternatives for pectoral strengthening could include standing cable press, water based exercises or lowering the RT load using bands.

References:
Exercise and Nutrition to Target Protein Synthesis Impairments in Aging Skeletal Muscle. Dickinson et al. Exerc. and Sport Sci. Rev., Vol 41, No 4, pp216-223, 2013
Progressive RT and the related injuries in older adults: the susceptibility of the shoulder. Sousa et al. Aging Clin Ex Res. 2014, Jun, 26(3):235-40.
Shoulder injuries attributed to resistance training. Kolber MJ et al. J.Strength Cond. Res. 2010 Jun:24(6):1696-704.
Fatty infiltration and atrophy of the rotator cuff do not improve after rotator cuff repair and correlate with poor functional outcome. Gladstone J, Flatow E, Lo I, et al. AJSM 2007, May, 35(5):719-728.
Biomechanical Analysis of the Bench Press. Duffey, Michael, PhD. The Pennsylvania State University, 2008. http://gradworks.umi.com/33/46/3346302.html

NOTES:

Dr Jerome Goldberg
M.B., B.S., F.R.A.C.S., F.A. Ortho. A.
Shoulder Surgery

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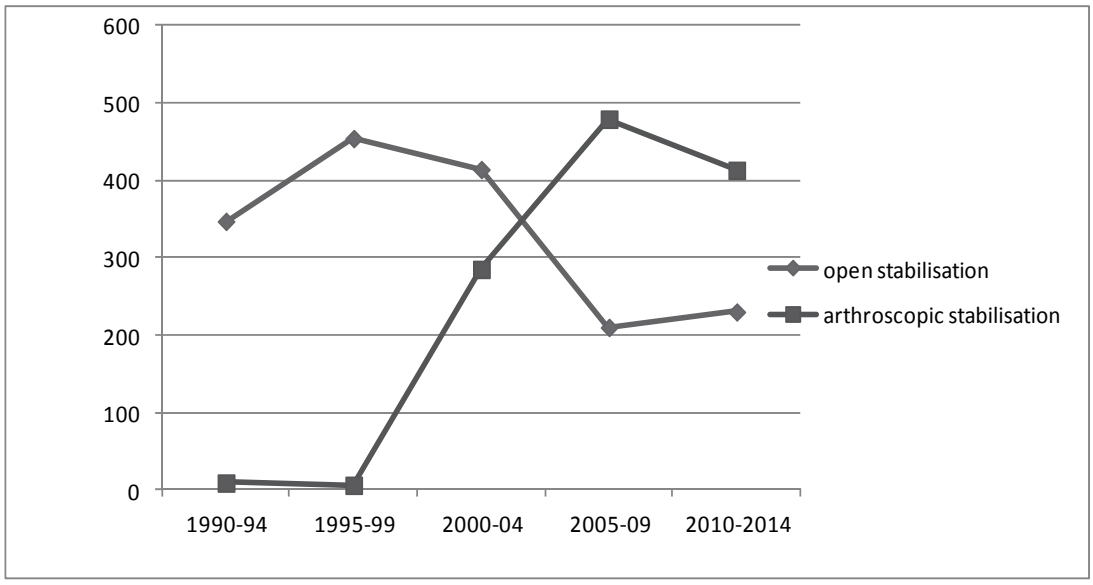
Anterior Shoulder Instability – which operation is best?

Stabilisation surgery is required for anterior instability because of the high recurrence rate and because each dislocation does significant damage to the articular cartilage of the joint increasing the risk of osteoarthritis.

There are many different techniques available to stabilise the shoulder including arthroscopic surgery, open surgery and bone grafting procedures, but which operation is best?

I have analysed 1652 arthroscopic procedures and 1655 open procedures done over a 25 year period. After an initial period of enthusiasm for arthroscopic surgery in the late 1990s, it became apparent that not all patients had good outcomes and the current trend is to consider open surgery in more patients.



When deciding which operation is best one needs to consider

- Extent of labral pathology
- Capsular pathology present
- Bone loss present

To make this decision one needs

- Plain xrays
- MR Arthrogram
- 3D CT if significant bone damage

Types of surgery available

- Arthroscopic labral repair
- Arthroscopic capsular plication (tightens capsule by 25%)
- Arthroscopic remplissage
- Open labral repair combined with a capsular shift (tightens capsule by 50%)
- Coracoid bone graft procedure (Latarjet)

Dr Jerome Goldberg
M.B., B.S., F.R.A.C.S., F.A. Ortho. A.
Shoulder Surgery

What I have learned

- Arthroscopic surgery works well in low demand patients with labral tears only
- Arthroscopic surgery is unreliable in high demand patients especially when bony pathology present
- The results of arthroscopic surgery can be improved with a capsular plication and remplissage if indicated
- Significant bony damage requires a bone grafting procedure (Latarjet)

MY PARADIGM:

	Non Contact/Low Demand	**Contact/High Demand**
Labral Tear or ALPSA only	Arthroscopic	Open (except in season)
HAGL	Open	Open
Capsular Stretch Only	Arthroscopic	Open
SLAP	Arthroscopic	Arthroscopic plus plication
Mild Bone Damage	Arthroscopic with remplissage	Open
Significant Bone Damage	Latarjet	Latarjet

NOTES:

Dr Kwan Yeoh
M.B., B.S. (Hons) (Syd), F.R.A.C.S. (Ortho)
Hand, Upper Limb & General Orthopaedics

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Triangular fibrocartilage complex injuries

Basic science

The TFCC consists of an articular disc, a meniscal homolog, the ECU subsheath, the ulnar capsule, dorsal and palmar radioulnar ligaments, and ulnolunate and ulnotriquetral ligaments. The TFCC is an important stabiliser of the distal radioulnar joint (DRUJ) and the ulnar side of the wrist joint.

Injuries are broadly classified as acute or chronic/degenerative:

Class I: Acute

Subclassified according to location

A: Central perforation
B: Ulnar avulsion
C: Distal avulsion
D: Radial avulsion

Class II: Chronic, degenerative

Subclassified according to severity

A: TFCC wear
B: + lunate or ulnar chondromalacia
C: + TFCC perforation
D: + lunotriquetral ligament perforation
E: + ulnocarpal arthritis

Clinical features

Ulnar-sided wrist pain

May follow trauma, often associated with distal radius fracture

Tenderness over TFCC *NB. Foveal area on volar aspect of wrist, just ulnar to the ECU tendon.*

Ulnocarpal grind

DRUJ stability

Assessment of DRUJ stability is the key in managing acute TFCC injuries.

Investigations

Plain wrist radiographs
- PA view in neutral forearm rotation (90/90 view)
- True carpal lateral view (pisiform overlying distal pole of scaphoid)

MRI
- Beware of false negatives, with sensitivity of approximately 82-90% (Anderson, JHS Am 2008; Magee, Am J Roentgenol 2009)
- Beware of false positives, with TFCC tears reported in 37.8% (39/103) of asymptomatic wrists (Iordache, JHS Am 2012)

Dr Kwan Yeoh
M.B., B.S. (Hons) (Syd), F.R.A.C.S. (Ortho)
Hand, Upper Limb & General Orthopaedics

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Natural history

Unrepaired TFCC tear after distal radius fracture is associated with a non-statistically-significant trend towards poorer long term outcomes, but only 2.6% (1/38) of patients required operative repair (Mrkonjic, JHS Am 2012).

Symptomatic degenerative tears associated with ulnocarpal impaction usually will not improve unless the mechanics are corrected.

Management options

Acute tear with DRUJ instability = Early operative repair.

Acute tear without DRUJ instability:
- Temporary immobilisation
- Steroid injection
- Surgical repair if still symptomatic at 3 months

Chronic tear with ulnocarpal impaction:
- Temporary immobilisation
- Steroid injection
- Arthroscopic debridement
- Ulnar shortening osteotomy
- Salvage procedure if ulnocarpal arthritis

Prognosis

TFCC repair: Return to full activities approximately 6 months. Approximately 70-90% good/excellent outcome.

Arthroscopic debridement of degenerative TFCC tear: Return to full activities approximately 6-12 weeks. Approximately 70-80% good-excellent outcome.

Ulnar shortening osteotomy: Return to full activities approximately 3-6 months. Approximately 90% good-excellent outcome.

Suggested reading

Jarrett CD & Baratz ME. The management of ulnocarpal abutment and degenerative triangular fibrocartilage complex tears in the competitive athlete. Hand Clinics. 2012; 28:219-337.

Ko JH & Wiedrich TA. Triangular fibrocartilage complex injuries in the elite athlete. Hand Clinics. 2012; 28:307-321.

NOTES:

Dr Paul Annett
M.B.,B.S,(Hons I) FACSP,
Sport & Exercise Medicine Physician

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PRPP Injection

Plasama rich platelet protein (PRPP) injections are becoming a more widely accepted treatment alternative for managing chronic tendinopathy and also degenerative joint disease. This paper will provide an overview of the basic science and indications for PRPP injection.

PRPP is defined as a solution that has a concentration of platelets above the baseline of whole blood (150-400 X10 9/litre). Platelets are the cells of healing and repair. They contain over 1100 proteins including growth factors, immune system messengers, enzymes, enzyme inhibitors, and other bioactive compounds contained in the alpha granules that are involved in various aspects of tissue repair.

PRPP solutions aim to harness this 'healing potential' of blood to stimulate a regenerative process in tendons and potentially articular cartilage.

Whilst the pathogenesis of tendon problems is not universally understood, it usually involves overload in a degenerative structure followed by an aberrant microvascular response known as angiofibroblastic hyperplasia.

Tendon conditions are well described to heal slowly, sometimes taking 12-18 months to improve, much of this being attributable to poor blood supply failing to stimulate the process of tissue repair. These prolonged time frame are not always acceptable to a professional athlete or manual worker.

Standard treatment of tendinopathy usually involves relative rest, anti-inflammatory measures, physiotherapy with a rehabilitation program and consideration of a local cortisone injection. Whilst this approach is successful in many patients, a small proportion do not improve and require further treatment. Historically this has involved surgery, which is not always universally helpful.

Biologic therapies have been available in other fields of medicine for a number of years, and have stimulated a lot of interest in filling the gap between standard conservative and surgical treatment. Initial methods involved the injection of whole blood around tendons with a view to stimulating a healing response. In one study 22/26 patients with tennis elbow improved after a single autologous blood injection for tennis elbow (1).

The logical next step involved concentrating the active component of the blood, the platelets, whilst removing the parts that were not directly useful for healing, mainly the red blood cells and excess plasma. Injection of this 'platelet rich plasma' or PRP, should theoretically enhance tissue healing in chronic tendon conditions.

There are many different ways PRP may be prepared leading to variable platelet counts. Some authors attribute this as a reason for lack of scientific evidence of PRP efficacy, depending on the preparation used. Ideally platelet concentrations should be greater than 4 times baseline, reaching 1000 X10 9/L. This is most reliably achieved using a commercial kit for preparation. Ideally an anti-coagulant such as citrate-dextrose should be added to the whole blood to prevent activation of the platelets and subsequent clotting until they are delivered into the required area, a process which occurs rapidly within minutes in the absence of an anti-coagulant.

Dr Paul Annett
M.B.,B.S,(Hons I) FACSP,
Sport & Exercise Medicine Physician

Where possible the PRP should be delivered to the affected area with imaging guidance, such as ultrasound, to maximize the accuracy of delivery.

On the whole, PRP injection is a safe procedure. The use of the patients own blood does make this a true 'natural therapy'. The main side-effect is with local pain around the injection site. The severity and duration is variable, but generally lasts for a few days (coinciding with a period of acute inflammation) and will often require stronger pain killers. Some patients do develop pain for a few weeks. Ice is initially helpful. Pain is generally worse in tight tissue spaces such as the common extensor origin. Other side-effects could include local infection, which is uncommon.

The PRP injection usually takes 2-3 weeks to take effect, but it will often take a good 6 weeks before pain will improve. There is a role for repeating the injection at around the 6-8 week mark if initial improvement has occurred. Uncommonly a third injection can be required.

PRP injections are not universally beneficial. The success rate for various tendon conditions in papers of variable quality is around the 70% rate. One higher quality randomized double blind study looking at PRPP injection versus cortisone injection for chronic tennis elbow found a 75% improvement rate in the PRPP group at 12 months compared to a 49% improvement in the cortisone group (2). A recent study looking at PRPP injection versus normal saline injection for osteoarthritis of the knee showed a significant improvement in pain in the PRP group with a deterioration of symptoms in the saline group at 6 months (3).

Summary

PRP injections seem to be a reasonable treatment option for tendinopathy that sits between standard conservative management and a surgical option that is not always helpful. It may also improve pain in osteoarthritis. The basic science of PRP use in soft tissue healing is sound and there does appear to be supportive laboratory and clinical evidence for its use in treating tendinopathy and degenerative joint disease. There are few downsides apart from post injection pain. The success rate, however, is not guaranteed and on average it is helpful in around 70% of patients.

1. *Edwards S, et al. Autologous blood injections for refractory lateral epicondylitis. Am J Hand Surg. 2003;28(2):272-8.*
2. *Gosens T, et al. Ongoing positive effect of platelet rich plasma versus corticosteroid injection in lateral epicondylitis: a doubleblind randomized controlled trial with a 2 year follow-up. The American Journal of Sports Medicine. 2011;39(6):1200-8.*
3. *Treatment with platelet-rich plasma is more effective than placebo for knee osteoarthritis: a prospective, double-blind, randomized trial. Patel S[1], Dhillon MS, Aggarwal S, Marwaha N, Jain A. Am J Sports Med. 2013 Feb;41(2):356-64.*

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Dr Doron Sher
M.B., B.S. (NSW), M.Biomed.E., F.R.A.C.S. (Ortho.)
Knee, Elbow, Shoulder Surgery

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Graft Choice for ACL Reconstruction

Successful ACL surgery is dependent on a number of factors. These include: patient selection, surgical technique, concomitant injuries and postoperative rehabilitation. One of the surgeon's roles in ACL reconstructive surgery is to individualize the graft choice for each patient. The patient's occupation, the type of sport they play, their skeletal age, associated ligamentous pathology, the chronicity of the injury, and their inherent degree of ligamentous laxity are important factors to consider.

Regardless of the graft chosen it probably takes 9 months for the neurological function of the knee to return to normal to reduce the likelihood of reinjury with return to sport.

The ideal graft would have similar anatomic and biomechanical characteristics to the native ACL, provide for strong initial fixation, allow for prompt biologic incorporation, have minimal donor site morbidity, have no risk of rejection or disease transmission, be cost effective and be readily available.

In revision ACL reconstruction there are additional considerations such as which graft was used for the primary reconstruction and the presence and degree of bone tunnel enlargement that is present. Grafts that include a bone block may be more suitable where enlarged bone tunnels are present.

Surgeons performing only a relatively small number of procedures should probably stick to one graft type. If this graft type is not suitable for a particular patient then that patient should be referred to a surgeon who is familiar with a more appropriate alternative.

Many materials have been used over the years. Some have worked well but some have failed rapidly. The failures include meniscus and fascia lata and the successes include varying bone tendon grafts and varied numbers of hamstring grafts. When endoscopic fixation techniques such as the endobutton, RCI screw and transfix came along bone blocks were not as essential for initial fixation and hamstring autograft became more popular.

The main graft choices are: Middle one third of patellar tendon with bone blocks, quadrupled hamstring tendons, synthetics, quadriceps with or without bone block and allografts.

Patellar Tendon:

Advantages	Disadvantages
• Early bone to bone healing at 6 weeks • Consistent size and shape of the graft • Ease of harvest • Slightly less anterior knee laxity as measured by arthrometer • Higher rate of return to pre-injury sport (In some studies) • Can be taken from the other knee • Performs better than hamstring autograft at 2-year follow-up in patients with excessive joint laxity, including hyperextension.	• Increased risk of extension deficit • Harvest site morbidity: patellar tendonitis anterior knee pain patellofemoral joint tightness late chondromalacia, late patella fracture late patellar tendon rupture loss of range of motion • injury to the infra-patellar branch of the saphenous nerve.

Dr Doron Sher
M.B., B.S. (NSW), M.Biomed.E., F.R.A.C.S. (Ortho.)
Knee, Elbow, Shoulder Surgery

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Relative contraindications
History of patellar tendinopathy
Osgood Schlatter's disease
Needing to kneel (Bone grafting of the patellar and tibial tubercle defects and the use of transverse incisions may reduce the incidence of kneeling pain).

Hamstring Autograft:

Advantages	Disadvantages
• Multiple bundle graft is strong and stiff Semitendinosus/Gracilis composite graft is equal to an 11 mm patellar tendon graft but can fail by stretching out rather than by catastrophic failure Double stiffness of patellar tendon and triple the normal ACL stiffness but this can stretch out with time. • Less anterior knee pain • Less pain on kneeling • Anterior knee pain 3-21% vs 12-40% for BTB • No demonstrable weakness of knee flexion • Has been shown to withstand aggressive rehab and early return to sports. • Method of graft fixation does not affect results	• Graft harvest can be difficult • The tendons can be cut off short • Injury to the saphenous nerve (uncommon complication) • Longer time for graft healing to bone (approximately 10-12 weeks) During this period of time the graft has to be protected if the fixation is not strong • Various methods used to fix the graft to bone: staples, endo-button, interference fit screws • Bone tunnel enlargement seen on xray • Theoretical concern for revision surgery but so far no difference in clinical outcomes (probably related to graft tunnel mismatch, the graft needs to be very snug in the tunnel) • A slightly increased objective laxity Clinical significance of a mean difference of 0.8mm is unclear

Synthetics:

The initial attraction of synthetics was as an alternative to the patellar tendon graft harvest problems. However, with long term follow up the failures became unacceptable. LAD (ligament augmentation device), Leeds Keio, Gore-Tex, Dacron – all failed but often not until about 7 years post op.

Synthetic grafts can be classified as:
(1) Scaffolds
    a. A scaffold is made of synthetic tissue (e.g. carbon fiber) that stimulates fibrous tissue ingrowth
        i. Carbon fiber scaffolds have been associated with synovitis, lack of fibrous tissue ingrowth and failed adhesion to the bone tunnels with subsequent poor biomechanical properties
(2) Stents
    a. Kennedy LAD - was designed to protect the healing of the biologic graft during its incorporation phase into the joint.
        i. Complication rates from 0 % to 63 % : effusion, synovitis, and infection were the more frequent causes of failure

(3) Prostheses

a. Mainly made of polyethylene and Gore-Tex these substitute the biologic graft. Higher rate of complications compared to autograft and allograft. Increased risk of developing chronic instability, joint effusions, and synovitis. Potential to 'destroy' the knee.

Advantages	Disadvantages
• No harvest site morbidity • No disease transmission • Readily available • Shorter operative time • Faster immediate post-operative recovery • Less post-operative pain	• Expensive • Higher rate of late graft failure • Increased risk of late infection • Potential to create arthritis

Allograft:

Allografts were initially sterilized using ethylene oxide which led to very poor results because the graft was weak and failed easily.
Freeze dried, fresh frozen and cryopreserved seem to perform better. Minimal risk of disease transmission or graft weakness.

Advantages	Disadvantages
• Absence of harvest site morbidity • Shorter operative time • Available off the shelf • Faster immediate post-operative recovery • Less post-operative pain • Good for multi ligament injuries	• Risk of disease transmission - The risk for HIV transmission with connective tissue allografts is estimated to be 1 : 600,000 and for bacterial infections 26 : 1,000,000. • A weak graft, if radiated or from an older patient • Longer time to incorporate into the bone tunnels, • Graft is not universally available • Expensive. • High failure rate in young, active patients

Quadriceps tendon:

Advantages	Disadvantages
• Easy to harvest • Large cross sectional size • Can be taken without a bone block	• Harvest site morbidity • Bone block on only one end of graft

Errors in graft selection, tunnel placement, tensioning, or fixation methods lead to graft failure. **The most important aspect of the operation is to place the tunnels in the correct position. The choice of graft is really incidental.** If nonanatomic techniques are used; it makes no difference which type of graft is used, the risk of graft failure is highly increased.

NOTES:

Dr Ivan Popoff
BPhEd (1986), MBChB (1991), F.R.A.C.S. (Ortho.)
Shoulder, Knee and Elbow Surgery

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Posterior Cruciate Ligament Injuries

Posterior cruciate injuries although not as common as ACL injuries (ratio of 10:1), are not seen uently and their diagnosis and management is often poorly understood.

The posterior cruciate ligament runs from the anterior aspect of the lateral wall of the medial femoral condyle, posteriorly, inferiorly and laterally to attach to a large flattened area in the middle of the posterior tibial plateau inferior to the joint surface.

It is comprised of two bundles; an anterolateral portion which is tight in flexion, and a posteromedial portion which is tight in flexion.

It's major function is to prevent posterior subluxation of the tibia. It also provides, along with the ACL and the adjoining boney segments, a 2 bar linkage responsible for the multi centric center of rotation in the knee and consequent roll back mechanism, as well as being a secondary restraint to valgus force.

Isolated PCL injuries are generally due to one of two mechanisms; either a direct blow to the proximal tibia,such as striking the dash board in MVA or striking the ground heavily in a tackle, or being forced into the extremes of flexion under load ,such as a mistimed landing from a ski jump or falling awkwardly on a flexed knee in a tackle.

Clinically the patient will give a suggestive history. The examination is slightly tricky as it is easy to confuse a PCL injury with an ACL injury.

With the patient relaxed and the knees flexed at 90 degree (with the feet on the examination table), the tibia of the affected knee will sag back, losing the usual step forward between the femoral condyles and the proximal tibia. The degree of sag provides a handy classification system, if the step is reduced but still present – grade one, if the condyles and proximal tibia are level – grade two and if the tibia sags posterior to the condyles – grade three.

When an anterior directed force is applied to the tibia it will reduce to its normal position – the false anterior draw test (as opposed to an ACL deficient knee in which the tibia will sublux forward from its normal position –the anterior draw test).

A posteriorly directed force may result in increased posterior subluxation- the posterior draw test.

Because a PCL injury is often associated with other ligamentous injuries the ligamentous stability of the knee should be fully assessed - in particular the posterolateral corner. The most useful test being the external rotation recurvatum test: pick up the patient's legs by the big toes – the tibia externally rotates and the knee goes into recurvatum; and the dial test, patient prone, knees flexed at 30 degrees: externally rotate the tibia by holding the feet, an increase in external rotation of greater then 10 degrees on the affected side is significant.

Treatment of isolated PCL injuries in all grades is usually non surgical with the majority of patients returning the pre-injury levels of activity (including world class athletes).

Dr Ivan Popoff
BPhEd (1986), MBChB (1991), F.R.A.C.S. (Ortho.)
Shoulder, Knee and Elbow Surgery

Occasionally patients with grade three injuries will require surgical reconstruction for instability and/or pain. Results for PCL reconstructions are not as predictable as ACL reconstruction. Generally a grade three PCL deficient knee will become a grade one with surgery.

Patients with other significant associated ligament injuries will require surgery.
Graft options are auto graft (hamstring or middle third patella tendon) or allograft in the multiple ligament injured knee. Results with synthetic ligament grafts have been very poor with a high associated failure and complication rate. These devices are best avoided.

Non-operative management involves physiotherapy and gym rehabilitation. Patients can generally make a graduated return to normal activities from six to twelve weeks.

The long term sequelae of a PCL injury are less favorable with a high rate of arthrosis, particularly in the patello-femoral and the medial joint. This is probably a result of both the original injury and the altered mechanics of the PCL deficient knee. Whether surgical reconstruction can prevent this is highly debatable.

In summary: PCL injuries usually occur with a well defined mechanism of injury, are often confused with ACL injuries and usually do not require surgery.

NOTES:

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

Thoracic spine and ribs

Pain in the thoracic spine is regarded as less frequent than low back or neck pain, but point prevalence has been shown to vary between 4-72% across diverse populations (Briggs, 2009). The lumbar spine is generally considered to be unstable, and a large body of research has resulted from this conception. By contrast, the thoracic spine is considered to be inherently stable because the rib cage provides stiffness. In this paradigm the motor control provided by the Central Nervous System has been neglected, yet its contribution appears to be just as important as in the lumbar or cervical spine segments as it is in the lumbar spine. Recent data suggest that small changes in thoracic spine alignment in flexion/extension create three-dimensional changes in the shape of the ribcage at multiple levels (Lee LJ et al, 2010).

The concept of a stiff ribcage needs re-thinking if we consider that there are 136 different joints in the thoracic spine/rib cage complex. The concept of “thoracic rings” is a first step in this direction. A typical "thoracic ring" consists of two adjacent vertebrae and the related intervertebral disc, the right and left ribs (attached to the vertebra-disc-vertebra complex at the costovertebral joints), and the anterior attachments to the sternum/manubrium and related cartilages. So the "5th thoracic ring" is defined as the T4-5 vertebral segment and disc, the right and left 5th ribs, and the anterior attachments of the 5th rib to the sternum (Lee, D).

Each ring acts in combination with the others, but there are differences between them according to the different movements: rotation, side-bending, flexion and extension, as well as motor control with arm movements and breathing. There is evidence that deep and superficial paraspinal muscles are recruited en bloc in sagital plane motion (flexion/extension) but they are recruited differentially for rotation tasks. This suggests that control of paraspinal muscle recruitment is task specific (Lee at al, 2011). Multifidus and longissimus act together in flexion/extension movements of the thoracic spine, but longissimus activity is increased in ipsilateral rotation and decreased in contra-lateral rotation. Multifidus was equally active in both instances, supporting the idea of a controlling role in the motion of the T5 ring, whereas at T8 and T11 it may control the coupling between rotation and lateral flexion (Lee at al, 2005).

There is increasing evidence to suggest that correct biomechanics of the pelvis are essential for the performance of almost every task. However, how do we know if the loss of pelvic function is the ‘driver’ of the patient's complaint or merely the ‘passenger’ of a problem elsewhere? How do we know if the loss of function of the thorax is the cause of the loss of pelvic function or the opposite holds true? How do we know if the relationship between the thorax & the pelvis is responsible for the failure of the lumbar spine to transfer loads optimally?

The restoration of function and performance depends on being able to identify and treat the underlying source of the problem and it is common to find the pelvis as the criminal in some cases and the victim in others. The same is true for the thorax. Do you have a way of knowing when to treat the pelvis, when to treat the thorax, when to treat the lumbar spine and when to look elsewhere?

Breathing movements

In the sitting position the 9th rib ring increases its lateral diameter with thoraco-lumbar extension. In the slumped position the AP distance increases at T1 and axilla levels. But with rotation movements the lateral diameter decreases at the level of the axilla. This would indicate a 3D configuration of rib cage changes to maintain function during breathing.

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

Assessment

When examining any segment of the spine it is important to look at all of them, as they are interconnected and influence each other along the biomechanical chain. An overall understanding of normal and loss of normal function is important, as treatment of one segment may not provide the desired results if they are in fact the result of compensation strategies for a functional deficit of any of the other segments. In this segment we will only consider some aspects of the assessment of the thoracic spine and ribcage.

A simple assessment routine

Begin by looking at the patient's posture in standing and sitting. When standing, arms should 'hang' by the hips, ears, shoulders and hips should be in the same vertical plane. Anterior arm hang indicates anterior pelvic tilt, likely increased lumbar and cervical lordosis and thoracic kyphosis. In the sitting position look again at the alignment of ears, shoulders and hips. A slumped position will result in loss of lumbar lordosis, increased thoracic kyphosis and cervical lordosis, as shoulders and chin jut forward.

Clinical assessment of the thoracic spine involves examination of the thoracic range of movement and identification of thoracic ring shifts. The control of rotation movements is crucial, and often the source of pain that can give clues to the origin of the problem.
The prone arm lift and seated arm lift tests can be considered the equivalent of the active straight leg raise test for neuromuscular control of the ribcage. The glenohumeral joint should reach the limit of its ROM without compensation strategies from the ribcage , spine erectors or indeed obliques.

An attempt should be made to correct the ring shifts and assess the effects on the range of movement. Lateral diaphragmatic breathing, active straight leg raise and active leg extension should also be assessed before and after ring shift corrections. Once the rings are 'racked and stacked' an exercise regime can be commenced to maintain the ring positions.

Summary:

Consider the following:

1. The thoracic spine is connected to the rest of the body
2. Look for the driver/ passenger
3. Where to begin? Pelvis is the base
   Then the ribs
   Modify external control
4. Rib cage: movement of the thoracic rings.
5. Lack of control leads to muscle tightness/imbalance and can lead to problems far away from the ribcage, in addition to providing pointers for treatment.

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Dr George Konidaris
M.B., B.S. (NSW), F.R.A.C.S. (Ortho)
Foot & Ankle, Hip & Knee Surgery

ORTHOSPORTS

Anterior approach to the Hip – What's all the fuss?

The Anterior, or Heuter approach is not actually a new approach or form of surgery. The approach was described way back in 1881. A French surgeon, Robert Judet introduced the approach for hip replacement surgery back in the 1950's. What is new is the improvement and development of minimally invasive instrumentation (such as retractors and bent acetabular reamers and femoral broachers) which makes the approach easier. In addition, the new leg holders that attach to the operating table allow manipulation of the hip joint.

The procedure can be performed with or without the special leg holder. There are advantages as well as disadvantages to both. Not having a table is simpler, but femoral exposure is generally more difficult and you will generally require an extra assistant. The table extension is more expensive. Many orthopaedic companies now make/provide special table attachments.

Hip replacement surgery generally has excellent long and short term results no matter which approach is used. The most important thing that affects the long term success of a hip replacement is the choice of prosthesis, (and there are many common well-functioning prosthesis on the market) as well as the surgical technique (i.e. the components are placed in the correct position and secured well).

The benefits of the anterior approach therefore relate to the small benefits in the early post-operative period (2-3 months). They allow the patient to return to their usual everyday activities and independence more quickly. Hip precautions, such as an abduction pillow, low chairs, and the crossing of legs do not need to be strictly followed in this initial period. Also since the gluteus maximus muscle is not split, an important muscle for many activities of daily living e.g. rising from a chair or toilet seat, walking, getting in & out of cars, and climbing stairs, this is believed to allow for a quicker recovery.

Precautions taken after a posterior approach, often require the patient to sleep only on their back for 6 weeks post-operatively. Whereas with the anterior approach, patients may lie or sleep in any position they find comfortable after their hip replacement. Saying this, there are studies showing that dislocation rates are not increased with or without post-operative hip precautions with the posterior approach if intra-operatively hip stability has been achieved. Still though, most orthopaedic surgeons are quite cautious and continue with these precautions.

There are disadvantages to this approach too: there is a learning curve, during which there can be a higher complication rate. Interestingly, in parts of Europe, it is the anterior approach which is taught to the trainees as their primary approach to hip replacement.

The anterior approach does provide a good view of the acetabulum, but the femoral side can be more difficult. And it is usually on this side that the complications can occur. Such as fractures of the greater trochanter or femoral shaft. Other complications can occur, such as injury to the Lateral femoral cutaneous nerve of the thigh.

This approach is used in other types of hip surgery commonly, such as for washout of a septic hip or open femoral acetabular impingement (FAI) surgery.

The factors I consider when deciding about which approach to use are: if the patient is obese or muscular, if they have abnormal anatomy on x-ray, the quality of their bones (osteoporosis), if they have large leg length discrepancies (which would require releases or osteotomies) and if they are having revision hip surgery. For the above conditions most surgeons I believe, would consider the posterior surgical approach. There are surgeons though who are comfortable doing all of their hip surgery via an anterior approach.

There are studies to show equivocal results and complication rates of the different approaches, and some studies showing benefit of the anterior approach in the early post-operative period. The results out to twelve months are generally agreed upon as being equal in both groups.

NOTES:

Dr Andreas Loefler
B.S.C., M.B., B.S., F.R.A.C.S. (Ortho.)
Joint Replacement & Spine Surgery

ORTHOSPORTS

The Posterior Approach for Total Hip Replacement

Total hip replacement is arguably the single best operation and has been performed for more than 50 years. In that time different approaches have been tried, and none are new.

The common approaches were the lateral or Hardinge, and the posterior or Southern, with all their variations. A German, Carl Hueter, first described the direct anterior approach, or DAA, in 1881. It became known as the Smith-Petersen Approach in 1917. Over the years surgeons and companies have developed instrumentation for mini approaches, two incision approaches and lately the Superpath. Each claims advantages, but these so far have remained unproven. The surgical approach has become a marketing tool, like computer assisted surgery, custom made prostheses and robotic surgery.

About 30 000 total hips replacements are performed in Australia each year. We need a reliable, versatile, and safe approach, which is also affordable, for what is a most successful operation.

Since 2003, the National Joint Replacement Registry has collected data on over 300 000 hip replacements. Whilst the approach is not recorded, most of the prostheses of a particular company have been implanted through the DAA. The registry has noted a higher early revision rate for this prosthesis, which may reflect the steep learning curve with this approach.

Many surgeons, who use the DAA, do not do so for all patients. They may exclude the very short, the obese, the osteoporotic, the patients with abnormal anatomy, as well as revision surgery. It is not possible to remove plates from previous surgery through this approach. Femoral shortening or acetabular augmentation is very difficult or impossible through the DAA. If one excludes all these and looks only at the outcomes for slim patients with good anatomy, then we would expect a better outcome no matter what the approach.

The posterior approach is by far the most common approach world wide and also here in Australia. It is a safe way to expose the hip joint and gives good visualisation of anatomy. The sciatic nerve can be palpated and seen. There is little blood loss. It is relatively fast and suitable for all cases. It is extensile, should the need arise, and there is no need for intra-operative x-rays or expensive equipment.

One can argue about the cosmetic benefits of a scar on the anterior thigh versus the side of the buttock. This is a personal issue, but is rarely raised by patients. The length of the incision depends on the size of the patient and is similar for both approaches, typically between 8 and 12 cm.

One cannot, however, argue about anatomy. The lateral cutaneous nerve of the thigh runs under the inguinal ligament and over the sartotius and the tensor fascia lata. It is at risk of being stretched by retraction and patients may experience burning and paraesthesia, sometimes for months, after a DAA. The incidence of transient paraesthesiae has been reported between 1% and 67%, perhaps reflecting more the interest with which the surgeon questions patients. Dislocation of the hip is a concern, but is becoming less common, not because of the approach, but due to better cup positioning and bigger prosthetic heads. Whilst patients with a posterior approach are more likely to get a posterior dislocation, especially with deep flexion, those with the anterior approach can dislocate with external rotation in extension. A dislocation rate of 1-1.5% has been reported for the DAA. This low rate is in keeping with the rate of dislocations currently reported for all approaches.

Dr Andreas Loefler
B.S.C., M.B., B.S., F.R.A.C.S. (Ortho.)
Joint Replacement & Spine Surgery

When performing the posterior approach, the patient lies on the side and the operated leg is free. The gluteus maximus is split in the line of its fibres. The tendons of the short external rotators are cut off the back of the femur and later repaired, together with the posterior capsule.

Proponents of the anterior approach claim that no muscles are cut, but in reality the intermuscular planes are not always easy to find, and the tensor fascia lata is often split. In order to expose the acetabulum, the rectus femoris is lifted off the bone. To gain entry into the femur, the trochanteric fossa has to be cleared, with risk to the piriformis. In every approach some muscles will have to be released or stretched.

In one series of 300 DAAs there were 2 femoral perforations, 3 calcar fractures, and 4 fractures of the greater trochanter. There were 42 postoperative complications, including 2 dislocations and 20 reoperations. This series represents the learning curve of a number of experienced hip surgeons. Many authors refer to the steep learning curve and some suggest that it may take 100 cases or more to become proficient in this technique.

So called minimally invasive surgery has become popular and claims of superior outcomes are frequently made. Proponents of the DAA state that it causes less muscle damage and pain, and allows a quick recovery with better gait mechanics. However, there is little evidence to back these claims. The outcomes of two randomised trials were published last year, but both were small single centre studies. A number of authors, who report early postoperative advantages of DAA, concede that these disappear with time. To date no studies have shown any long-term benefits in patients who had a THR through a DAA.

Physiotherapists see patients in the early postoperative period. With your help, patients mobilise quickly. It is important that you should be aware of a balanced view and that you also know the long-term results of surgery.

Since 2008, National Joint Replacement Registry has been able to give individual surgeons outcome data. My own revision rate for this period is 2.6%, which is approximately half of the national average. I only do the posterior approach and have many patients, who are discharged on the second of third day after. I have looked at the DAA and have seen it performed. For me the purported and at best temporary advantages do not outweigh the difficulties and potential complications of the DAA. I will continue to offer my patients what I think is a reliable, versatile, and safe approach, the posterior approach for total hip replacement.

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NOTES:

Dr Todd Gothelf
MD (USA), FRACS, FAAOS, Dip ABOS
Foot, Ankle, Shoulder Surgery

ORTHOSPORTS

Turf Toe Injury

- While the lateral ankle sprain is four times more common than a first MTP joint sprain, the first MTP joint sprain can account for double the number of missed practices.
- Turf Toe is a generic term used to describe a range of injuries to the capsuloligamentous structures of the first metatarsophalangeal (MTP) joint.
- Bowers and Martin recognized turf toe in 1976. They noticed a hyperextension sprain at the MTP joint due to the hard surface of artificial turf.
- A Turf toe injury should be suspected when there is pain and swelling around the first MTP joint after injury.
- Investigations should include plain radiographs and an MRI. A capsuloligamentous injury of the MTP joint can be detected on a standard AP weight-bearing radiograph as proximal migration of sesamoids, sesamoid fracture, or excess widening of a bipartite sesamoid. MRI is the modality of choice to demonstrate an acute or chronic injury.
- The following grading system can assist as a guide to treatment and to counsel patients on return to play expectations:

Grade	Description/Findings	Treatment	Return to Play
1	Attenuation of plantar structures Localised Swelling Minimal Ecchymosis	Symptomatic	Return as Tolerated
2	Partial Tear of Plantar Structures Moderate Swelling Restricted Motion due to Pain	Walking Boot Crutches as needed	Up to 2 weeks May need taping on return to play
3	Complete disruption of plantar structures Significant swelling/ ecchymosis Hallux flexion weakness Frank instability of Hallux MTP	Long-term immobilisation in boot or cast Or Surgical reconstruction	10 to 16 weeks depending on sport and position Likely to need taping on return to play

- Returning too early to competition almost always extends the convalescence and results in a more prolonged disability.
- The athlete with a grade 1 injury typically continues participation as symptoms allow. The toe is taped, and a stiffened insole is used for both practice and games. Usually, no playing time is lost. Grade 2 injuries usually result in loss of playing time ranging from 3 to 14 days. A grade 3 injury typically requires the athlete to use crutches and a walking boot for ambulation over the first few days to weeks. Loss of playing time is longer, often 2 to 16 weeks
- Below is a list of surgical indications where early and prompt referral is necessary:

Dr Todd Gothelf
MD (USA), FRACS, FAAOS, Dip ABOS
Foot, Ankle, Shoulder Surgery

ORTHOSPORTS

Indications for Surgical Repair of Turf Toe Injury
Large capsular avulsion with unstable MTP joint
Diastasis of bipartite Sesamoid
Diastasis of sesamoid fracture
Retraction of Sesamoid
Traumatic hallux valgus deformity
Vertical instability (positive Lachman tests result)
Loose body in MTP joint
Chondral Injury in MTP joint
Failed Conservative treatment

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NOTES:

Dr John Negrine
M.B., B.S. (Syd), F.R.A.C.S. F.A. Ortho. A.
Adult Foot & Ankle Surgery

ORTHOSPORTS

What's new in foot and ankle?

Highlights of the combined IFFAS (International Federation Foot and Ankle Societies)/AOFAS (American Orthopaedic Foot and Ankle Society) meeting Chicago September 19th – 23rd 2014

1200 Foot and Ankle surgeons

- Mostly North American
- 48 countries
- 168 from Brazil
- 10 from Australia
- 135 podium presentation papers
- 300 e-posters

Meeting format

- Expert symposia: Trauma, Achilles tendon, ankle replacement, sports injuries, lesser toes, hallux valgus etc.
- Free papers
- Industry sponsored satellite sessions
- Showing an expert an xray on your phone over a beer….illegal in USA

Trends and vogues

- Arthroscopic everything
- Smaller incisions
- Biologic therapies big $$$$$
- Improved fixation for bone, tendon ligament
- Ankle replacement still in fashion but osteolysis problems arising
- Evidence evidence evidence

The search for solid evidence

- Level one = Double blind randomised prospective "gold cliché"
- Level Five = Expert opinion
- Great research is very difficult, very expensive, time consuming and labour intensive…industry funding an obvious bias

It's much easier to critisise a paper than to write a good one!!

Osteochondral lesions of the talar dome (OCL)

- Reviewed 95 papers, 2,703 patients
- Used a Coleman methodology score
- 40 prospective, 55 retrospective
- Publication year correlated with Coleman methodology measure
- Conclusions often difficult to substantiate

Novel plantar fasciitis treatment

- Gastrocnemius proximal release 50 cases 90% good or excellent results
- Hyaluronic acid injection and dry needling 57 patients reported good results
- RCT comparing saline to botox 24 patients botox did better (to FDB muscle)
- RCT steroid vs microlysed amniotic membrane 57 patients MAM did better

Dr John Negrine
M.B., B.S. (Syd), F.R.A.C.S. F.A. Ortho. A.
Adult Foot & Ankle Surgery

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New ideas
- iwalk 2.0 – hand free walker for non-weightbearing patients www.goodbyecrutches.com
- In office standing CT scanner

Some fast grabs we already knew
- Diabetic patients don't do as well with ankle replacement
- Hindfoot arthrodesis does increase the risk of failure in patients undergoing TAR
- Post operatively prolonged weight bearing or boot did not seem to make a difference in osteochondral lesions of the talar dome
- Small lesions do better than big lesions
- Old people and smokers have a higher incidence of complications after foot and ankle surgery
- In calcaneal fractures smaller wounds have less complications than bigger wounds
- The elderly with ankle fractures did better operatively than non-operatively (?like hips)

Ankle replacement
- Lots of papers
- Comparing different types of prosthesis
- In old people
- In obese people
- In diabetic people
- In people with concomitant subtalar or triple fusions

Comparison paper ankle replacement vs fusion
- Looked at parameters in barefeet, in runners and in rocker soled shoes
- Walking speed
- Maximal forefoot force

Conclusion: No significant difference in runners or rocker bottom shoes between TAR and ankle arthrodesis. Did minimal mechanical advantage in barefeet justify the higher complication and failure rate of total ankle replacement?

Ankle arthritis young person
- Still unsolved problem
- Re-align with osteotomy if deformed
- Paper on distraction 11 patients with deformity as well 75% improved
- 3 Months in a frame! Articulated better than static
- 18 – 24 months for full improvement

Ankle arthritis without surgery
- No evidence for PRP
- Some evidence for steroid injection but catabolic to cartilage
- NSAIDS do work but side effects
- Hyaluronic acid (synvisc) highly controversial
- No evidence for stem cells

NOTES:

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				Doctors Consulting here
Concord	47-49 Burwood Road CONCORD NSW 2137	Tel Fax	**02 9744 2666** **02 9744 3706**	Dr Mel Cusi Dr Todd Gothelf Dr George Konidaris Dr John Negrine Dr Rodney Pattinson Dr Doron Sher Dr Kwan Yeoh
				Doctors Consulting here
Hurstville	Suite F-Level 3 Medica Centre 29-31 Dora Street HURSTVILLE NSW 2220	Tel Fax	**02 9580 6066** **02 9580 0890**	Dr Paul Annett Dr Mel Cusi Dr Jerome Goldberg Dr Todd Gothelf Dr Andreas Loefler Dr John Negrine Dr Rodney Pattinson Dr Ivan Popoff Dr Allen Turnbull Dr Kwan Yeoh
Penrith	Suite 5B 119-121 Letherbridge St PENRITH NSW 2750	Tel Fax	**4721 7799** **4721 7997**	**Doctors Consulting here** Dr Todd Gothelf Dr Kwan Yeoh
				Doctors Consulting here
Randwick	160 Belmore Road RANDWICK NSW 2031	Tel Fax	**02 9399 5333** **02 9398 8673**	Dr John Best Dr Mel Cusi Dr Jerome Goldberg Dr Todd Gothelf Dr George Konidaris Dr Andreas Loefler Dr John Negrine Dr Rodney Pattinson Dr Ivan Popoff Dr Doron Sher

www.orthosports.com.au

47-49 Burwood Rd
CONCORD NSW 2137
Tel: 02 9744 2666
Fax: 02 9744 3706

Lvl 3, 29-31 Dora Street
HURSTVILLE NSW 2220
Tel: 02 9580 6066
Fax: 02 9580 0890

119-121 Letherbridge St
PENRITH NSW 2750
Tel: 02 4721 7799
Fax: 02 4721 7997

160 Belmore Rd
RANDWICK NSW 2031
Tel: 02 9399 5333
Fax: 02 9398 8673