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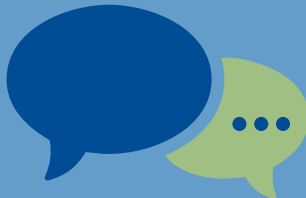
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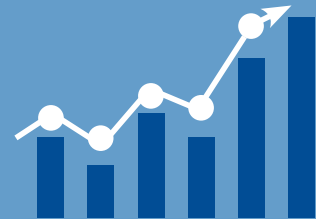
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Guest editorial



Technological advances in orthopaedics

The 20th century saw massive developments in orthopaedics, with procedures such as joint replacements that transformed the quality of life for many disabled people. Arthroscopic surgery reduced tissue trauma and thus surgical complications, with enhanced ability to recover better after surgery. Alongside these technological advances we have also seen concomitant improvements and understanding of rehabilitation, analgesia and anaesthetic techniques. We now appreciate the importance and relationship of all these aspects in enhancing patient treatment with orthopaedic conditions. Surgery and physiotherapy have seen more sub-specialisation and the development of tertiary referral centres with multi-disciplinary teams managing complex conditions. This has led us to appreciate that patients with the same pathology may have differing needs and symptoms. Therefore the real skill has been in using all these new technologies in the right way, for the right patient at the right time. In this series of articles we have recruited sub-specialist orthopaedic surgeons from Wrightington and Manchester, who collectively work at The Arm Clinic and HCA at the Wilmslow Hospital to highlight, in respect to their own specialisms, where the recent advances in the area of orthopaedics have transformed how we approach complex joint conditions.

LENNARD FUNK | GUEST EDITOR



The Arm Clinic

HCA Healthcare uk
at The Wilmslow Hospital

Private Care



From our Editor

It is a very great pleasure to welcome you to this edition of *In Touch*, and we are honoured to have been able to produce it in collaboration with Lennard Funk and his colleagues. Each of their articles is a true gem of clinical, cutting-edge knowledge that will enhance your understanding of the various aspects in treating joints, and ultimately inform your clinical decision making.

The whole collaborative experience of this edition has reinforced my view of how much we, as health professionals, can gain from each other and how, by staying open-minded and being prepared to learn from best, evidence-based practice in all aspects of patient care, we can enable our patients to receive treatment that is tailored to their specific needs, achieve their individual goals, and improve our patient outcomes.

I would like to express my sincere gratitude to all of our authors in this edition, and especially to Len for co-ordinating such great content. I hope you enjoy it as much as we have enjoyed bringing this edition together.

TOBIAS BREMER | EDITOR

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Massive rotator cuff tears: new and evolving treatments

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Massive rotator cuff tears (MRCTs) are tears over 5cm in size and often are not directly repairable, or have high failure rates with direct repair. They can present with pain, functional disability or both. Treatment is often multimodal and focused on the patient's specific functional requirements. Improvements in function can often be obtained with patient-specific deltoid rehabilitation regimens, as long as pain is controlled. A large variety of novel surgical reconstructive options are now available and their indications are still being defined. In this article we will review the current new technologies and advancements in the management of MRCTs, while describing our approach to these often complex patients.

LEARNING OUTCOMES

TO SUPPORT PHYSIO FIRST QAP

- 1 Understand that massive rotator cuff tears require an informed multimodal approach to achieve the best rehabilitation outcome for each individual patient.
- 2 Function can often be improved with a patient-specific deltoid rehabilitation regimen.
- 3 Tendon reconstruction options are preferred for the best outcomes in younger, higher demand patients.
- 4 In older, lower demand patients, reverse shoulder arthroplasty is usually the best option for good outcomes.

What is a massive rotator cuff tear?

The traditional definition of a massive rotator cuff tear (MRCT) is a tear of more than 5cm in length when measured in the medio-lateral direction. This can be assessed on MRI scan or during surgery. A recent Delphi consensus study has

defined massive tears as retraction of tendons to the glenoid rim in either the coronal or axial plane and / or a tear with $\geq 67\%$ exposure of the greater tuberosity measured in the sagittal plane. The measurement can be performed either with MRI or intra-operatively (Schumaier *et al* 2020).

Several factors affect the outcome of a tendon repair. These include the patient's age, the size (figure 1) and chronicity of the tear, the degree of muscle atrophy and fatty changes. In the presence of these factors, there is a high probability that the tendons will not heal owing to biological insufficiency, even

if mobilisation and repair is technically feasible.

In practice, we often refer to MRCT as irreparable, i.e. tears that are not directly repairable with predictable good outcomes of a repair, therefore management of the MRCT is complex, and there are a number of different treatment options.

Recognising and diagnosing MRCT

Massive tears are unusual in patients under 60 years of age. Tears may be traumatic or degenerative, but most frequently occur as a combination of an acute episode on a background of a

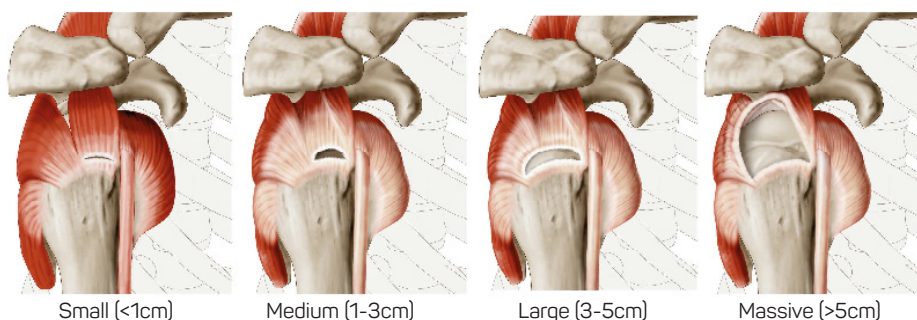


FIGURE 1: Tear sizes (image courtesy of Lennard Funk www.shoulderdoc.co.uk)

“WHEN AN ASYMPTOMATIC DEGENERATIVE ROTATOR CUFF TEAR IS PRESENT, A MINOR INJURY CAN TIP A PREVIOUSLY SYMPTOMLESS SHOULDER INTO A PAINFUL AND WEAK ONE”

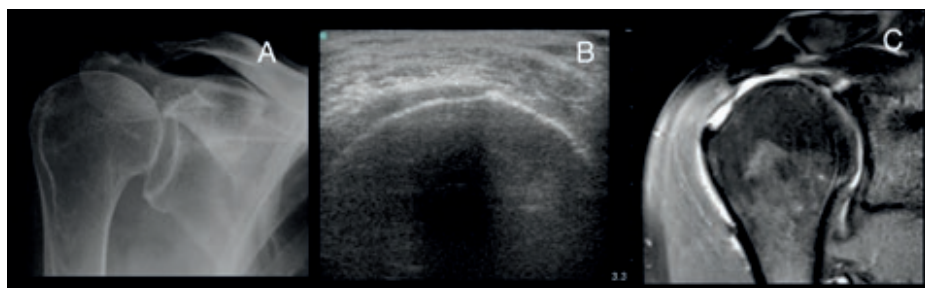


FIGURE 2: (A) Radiograph of MRCT with cranial displacement of the humeral head; (B) Bald head on ultrasound scan; (C) MRI scan showing retracted massive tear with cranially displaced humeral head and muscle wasting

chronically degenerating tendon. It is well recognised that a large proportion of people develop asymptomatic degenerative rotator cuff tears with age, but a minor injury can tip a well-compensated tear to a decompensated tear. Thus a previously symptomless shoulder can suddenly become painful and weak. It is often hard to determine how much of the tear is acute, but there are a number of clues to assist in their assessment.

Patients often present with a loss of strength and pain after a fall, lifting or wrenching injury. Weakness is often such that they are unable to lift their arm without assistance. Clinical findings

include rotator cuff weakness with positive lag tests and a drop arm sign. Sometimes more chronic tears have some degree of deltoid compensation. Joint stiffness and pain, however, can affect adequate clinical assessment of the rotator cuff.

Radiographs often show some cranial displacement of the humeral head on the glenoid, with a reduced acromio-humeral interval. If arthritis is present, this is known as a “rotator cuff arthropathy” and not solely a MRCT.

Ultrasound may show an absent rotator cuff, with a “bald head” appearance of the greater tuberosity.

MRI scan is the imaging investigation of choice as it will show the size of the tear, muscle atrophy, fatty infiltration of the muscles, degree displacement of the humeral head, degenerative joint changes and associated pathologies, all of which are important in determining the most appropriate type of treatment and prognosis (figure 2).

Assessing the glenoid inclination and acromial shape on radiographs or MRI may be beneficial. Recent studies have shown that the shape of our bones may alter the balance of forces around the shoulder and thus predispose to advancing rotator cuff disease (Nyffeler 2019). Patients with a glenoid socket that tilts upwards (superior inclination) and has a larger acromial overhang may be more prone to develop larger tears with poorer outcomes. This relationship between the acromial shape and glenoid inclination is known as the “critical shoulder angle” (figure 3).

Decision making

There are a number of different options for managing MRCT. Therefore, by inference, there is no single definitive solution. This is probably due to the wide spectrum of MRCT patients who present with an equally wide variety of symptoms and functional requirements, in addition to the range of patho-anatomical considerations as mentioned previously. The optimum treatment needs to take all of this into account, together with the experience of the clinician, current evidence and cost-to-risk benefit considerations for the various treatment options.

From the patient’s perspective, their main problems will usually be pain and functional limitations, so it is also important to consider these when selecting the optimum treatment strategy. It should also be born in mind that symptoms may change and, therefore, treatment strategies may need to change accordingly.

IMPROVING FUNCTION

Functional therapies focus on optimising or enhancing the deltoid to compensate ➔

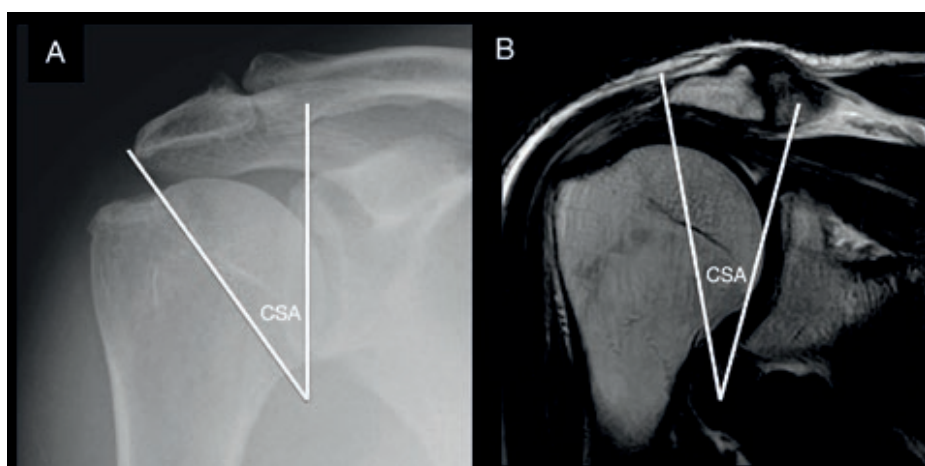


FIGURE 3: The critical shoulder angle (CSA) is measured on true AP radiographs or coronal MRI scan and corresponds to the angle formed between the glenoid plane and a line connecting the inferior glenoid rim with the lateral aspect of the acromion. A high CSA is associated with rotator cuff tears

for the loss of the stabilising effect of the rotator cuff, along with improving scapula dynamics. Activity modifications are important.

Each MRCT shoulder is individual and unique and may require a combination of different compensation muscle recruitment strategies to provide functional movement into elevation. The primary destabilising force in a MRCT shoulder is predominately from the deltoid, which causes humeral head superior migration in the absence of the inferior translation force that is provided by the rotator cuff. The most obvious biomechanical strategy would be to activate the latissimus dorsi and teres major to provide inferior translation, and re-centering of the humeral head. However, addressing these muscles in isolation may be counter-productive for function as they also have a powerful internal rotation and adduction activation. This recruitment strategy could, therefore, be considered useful in conjunction with other strategies to enhance functional arm elevation in the presence of a MRCT.

Ainsworth (2006) described successful outcomes with a graded anterior deltoid strengthening programme requiring a comfortable movement exercise window to strengthen the anterior deltoid through forward elevation. The rehabilitation principles are in harnessing the effects of gravity by progressing from supine to upright positions, and using lever length by progressing from elbow flexion to extension. The aim is to appropriately challenge the shoulder in flexion in order to provide optimal functional strength and movement (figure 4). Theoretically, strengthening the deltoid is somewhat counterintuitive, given that it has been considered to be a key deforming force in MRCT. However, recent biomechanics research by Hawkes *et al* (2015) challenges the traditional description of the deltoid as only being a humeral head elevator, and highlights its importance for compensatory movement with increased fatiguability demonstrated in shoulders with MRCTs, therefore providing scientific rationale for the re-education of the deltoid.

“EACH ROTATOR CUFF TEAR IS INDIVIDUAL AND UNIQUE AND MAY REQUIRE A COMBINATION OF DIFFERENT COMPENSATION MUSCLE RECRUITMENT STRATEGIES TO PROVIDE FUNCTIONAL MOVEMENT INTO ELEVATION”



FIGURE 4: Early stage anterior deltoid rehabilitation with short lever in supine

It is also important to consider that most patients with MRCTs will have some residual cuff function, particularly in the transverse force couple of the subscapularis and teres minor. Proprioceptive exercises with the use of hand grip address the activation of the remaining rotator cuff function and enhance the recruitment of scapulothoracic musculature (Alizadehkhayat *et al* 2011). Combining this with anterior deltoid activation can further enhance the compensation strategies for shoulder flexion and therefore increase shoulder functional strength (figure 5).

ADDRESSING PAIN

While some patients may have pain

but retain good function, for others pain may be limiting their function and it is important to manage the pain to facilitate rehabilitation of function. Options for pain management include:

- **Corticosteroid injections.** These allow short-term anti-inflammatory benefit only, but can be useful in assisting with rehabilitation.
- **Hyaluronan injections.** There is no good evidence for the use of hyaluronan injection in MRCTs, but they have been shown to offer some anti-inflammatory benefit without the adverse effects of corticosteroids.
- **Suprascapular nerve injection or ablation.** The suprascapular nerve provides 70% of the sensation to the shoulder joint (Ergonenc & Beyaz



FIGURE 5: Anterior deltoid rehabilitation with cuff facilitation and proprioception

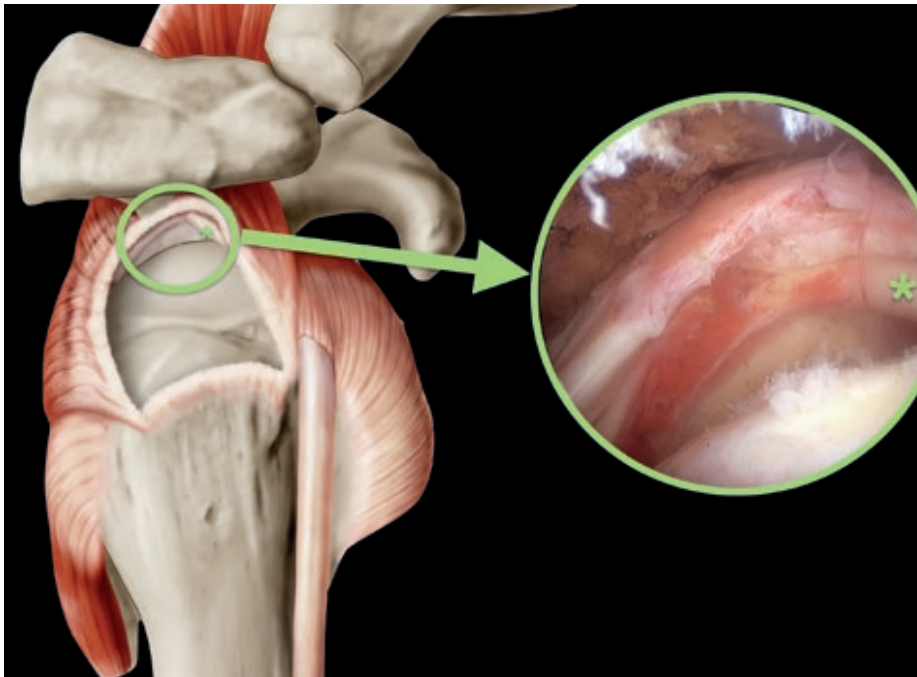


FIGURE 6: MRCT viewed at arthroscopy prior to biceps tenotomy. * denotes the long head of biceps tendon (Image courtesy of Lennard Funk www.shoulderdoc.co.uk)

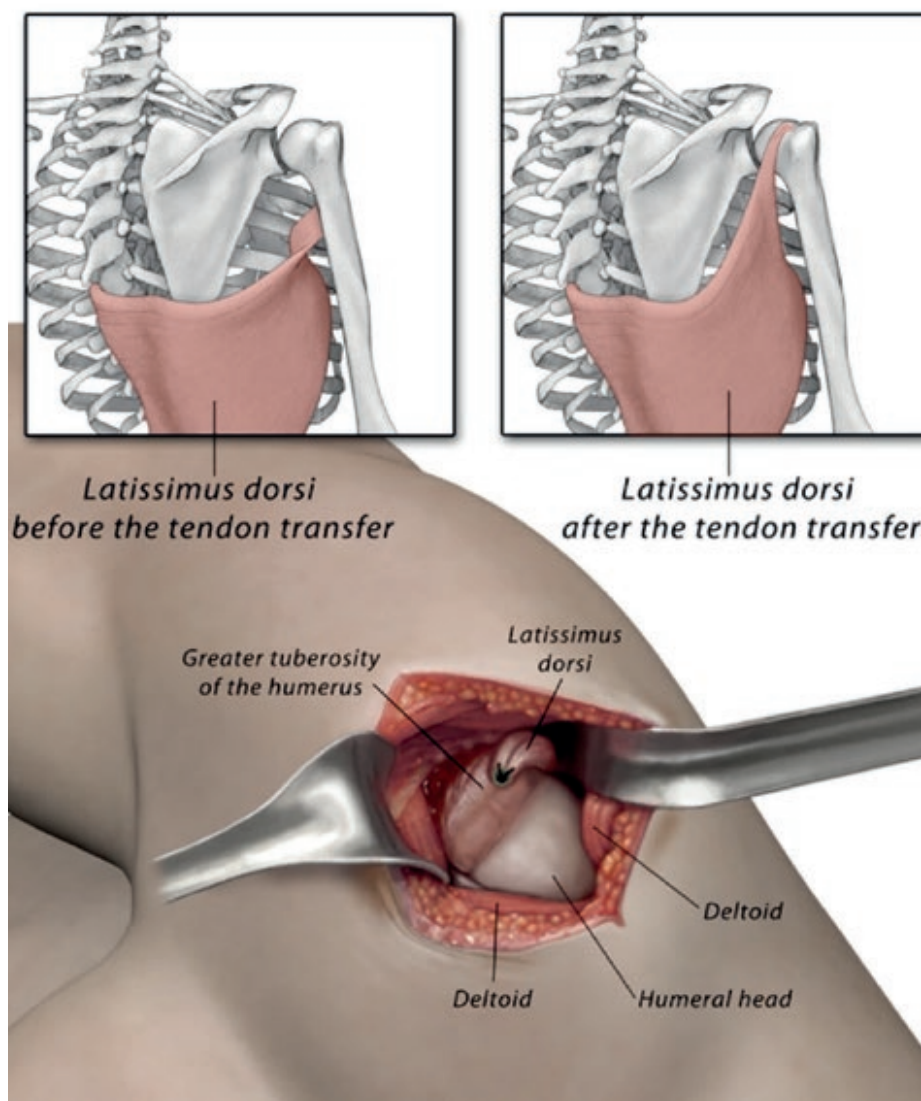


FIGURE 7: Lat dorsi tendon transfer (Image courtesy of Lennard Funk www.shoulderdoc.co.uk)

2018), this treatment inhibits that nerve.

- **Arthroscopic biceps tenotomy & debridement.** The long head of the biceps tendon (LHBT) is a recognised pain generator owing to its high content of pain receptors (Walch *et al* 2005). Pain can be relieved by releasing the LHBT from the shoulder joint (figure 6).

Surgery options

As MRCTs are not directly repairable, or where repair is attempted have a high rate of failure, surgery intervention is aimed at reinforcing and enhancing a partial repair, or reconstructing and restoring some mechano-functional of the rotator cuff.

- **Tendon transfers.** In high functional demand patients with work-related weakness, a tendon transfer can improve functional strength. Latissimus dorsi is usually employed for external rotation strength, but there has been recent interest in utilising the middle trapezius with good results in the right patient. Pectoralis major is traditionally preferred for internal rotation strength, but latissimus dorsi (figure 7) has been a recent option (Clark & Elhassan 2018).
- **Patch augmentation.** Reinforcement of a partial repair is used to biomechanically enhance the repair and / or improve healing, thereby reducing the possibility of failure. Human allograft patches have so far been shown to be the most successful reinforcement option, but new biological patches may offer some other benefits (Ravipati & Wong 2019; Murthi & Lankachandra 2019).
- **Superior capsular reconstruction (SCR).** The superior capsule has been shown to be a stabiliser of the humeral head, preventing upward migration on arm elevation (Ishihara *et al* 2014). A superior capsular reconstruction (figures 8a and 8b) aims to restore this stabilisation with an allograft or autograft fixed to the glenoid, humerus, and remaining anterior and posterior cuff. This is indicated for cases where a partial

repair is not possible. Early results are favourable for the right indications, which include younger, active patients with good rotation strength but weak arm elevation (Garrigues 2019).

- **Balloon interposition.** The InSpace™ balloon (Orthospace) is a biodegradable, and therefore temporary spacer that is inserted arthroscopically into the acromio-humeral space to act as a humeral head “depressor”. It theoretically improves deltoid function by limiting the upward migration of the humeral

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head during arm elevation (figure 9). The interposition may also help with pain relief. It is less invasive than other reconstruction options, but definitive clinical data is limited. Pain relief is similar to other constructive options, but function and strength is less, therefore its indication seems to be for patients who prefer a less invasive procedure, are elderly, have medical

comorbidities, and / or have lower functional demands (Liu *et al* 2020).

- **Reverse shoulder arthroplasty (RSA).** This method works by reversing the geometry of the shoulder joint with a ball (glenosphere) on the glenoid side and a cup on the humerus (figure 10); a configuration that lateralises the humerus to both increase deltoid efficiency and, if semi-constrained, to prevent upward migration. Of all the options, RSA is the largest and most invasive procedure, with the highest complication rates. However, it also has the best and most predictable outcomes in improving both pain and function in the most severe cases. It is primarily indicated for rotator cuff arthropathy, but is becoming increasingly used for more elderly patients with irreparable cuffs and pseudoparalytic shoulders (Petrillo *et al* 2017). For younger patients, RSA is rarely used as a primary procedure, but may be used for revision cases.

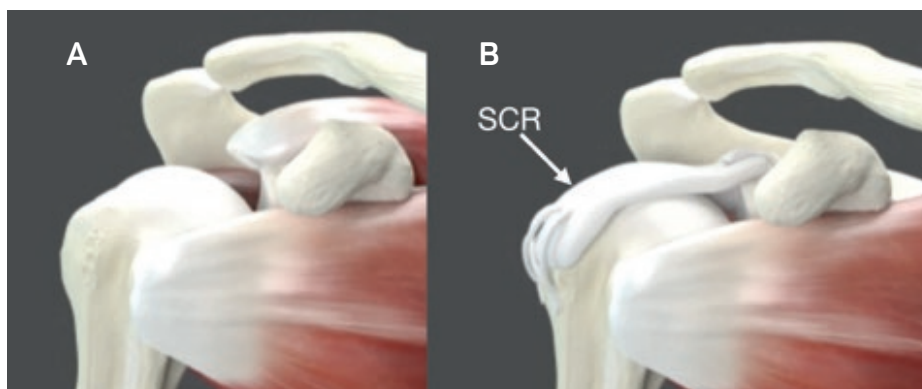


FIGURE 8a: Superior capsular reconstruction. A = before and B = after



FIGURE 8b: MRI scans of superior capsular reconstruction. A = before and B = one year post-operatively (images courtesy of Lennard Funk www.shoulderdoc.co.uk)



FIGURE 9: InSpace™ balloon being inserted into acromio-humeral space through percutaneous skin portal (Image courtesy of Orthospace Ltd.)

Biological therapies

These encompass a wide range of bio-active exogenous therapies that can be injected, or added to the repair or reconstruction, to improve healing and reduce failures. Current biological therapies include Platelet-Rich-Plasma, Bio-active scaffolds, stem cell therapies, Bio-active hydrogels and recombinant collagen.

A lot of work has been done in developing biological treatments to enhance healing. Although laboratory research and small clinical studies are promising, higher levels of evidence studies, such as randomised controlled trials, have not shown much benefit for current therapies. However, technologies and knowledge are always evolving and refinement of these treatments will almost certainly define their roles (Samitier *et al* 2020).

Summary

Management of MRCTs usually involves multimodal treatment and a patient-centred approach. The management will depend on:

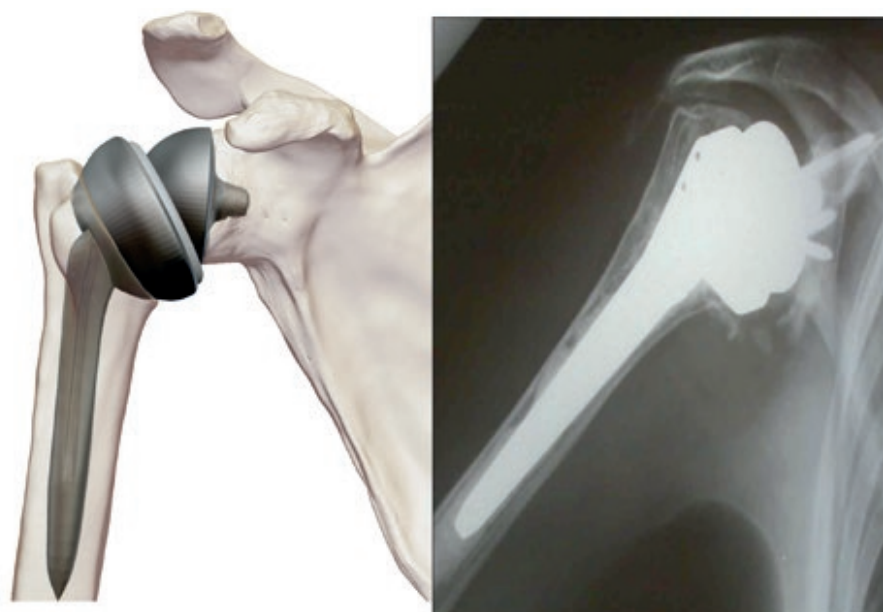


FIGURE 10: Reverse geometry shoulder replacement (Image courtesy of Lennard Funk www.shoulderdoc.co.uk)

- Patient factors: age, activity level, functional requirements, comorbidities and preferences
- Patient symptoms: pain level, functional limitations or both; presence of pseudoparalysis
- Pathology: type of tear, chronicity, muscle atrophy, fatty infiltration, containment of the humeral head, degenerative joint changes and associated pathologies
- Institutional factors: availability and mix of skills, cost implications and clinician bias.

In general, younger patients have better healing potential, therefore reconstruction with existing tendons is preferred. This often involves partial repairs with scaffold patch and / or biological augmentation. In the elderly patient there is less healing potential and it is desirable to limit the number of surgical procedures, therefore the preference is for reverse arthroplasty. Superior capsular reconstruction appears to have a place for younger patients where a partial repair is not possible, whilst the debridement and biceps tenotomy is for those patients who have pain only and prefer a lesser procedure. Tendon transfers are to improve external rotation strength in high demand workers.

Table 1 presents an algorithm that we use as part of our decision making.

About the authors

Lennard Funk

Len is a Consultant Orthopaedic Surgeon and is part of the large upper limb unit at Wrightington Hospital, has a private practice in Manchester, and has established and runs [shoulderdoc.co.uk](http://www.shoulderdoc.co.uk). Len is passionate about patient information and education, and providing the best quality of care through a multidisciplinary team. He routinely treats elite and professional athletes.

Len's practice, the Arm Clinic, specialises in sports and soft tissue injuries of the shoulder. Providing second opinions, treating complex cases and performing revision surgery makes up a large proportion of his work. He practices closely with colleagues who specialise

in complex trauma and shoulder replacement surgeries, and therapists dedicated to complex shoulder rehabilitation.

Academically, Len has written numerous books and contributed to publications on shoulder surgery and rehabilitation. He is actively involved in research, with more than 100 research publications. He teaches undergraduate and postgraduate medical, sports therapy and sports medicine students.

Michael Walton

Mike is Clinical Director of the Upper Limb Unit at Wrightington Hospital, Centre of Excellence for Orthopaedic Surgery. His practice is exclusively in shoulder surgery with particular specialist interest in revision shoulder replacement and sports injuries. He routinely treats professional athletes from many of the country's leading teams and extreme sport athletes from around the globe. He was recently awarded the prestigious Copeland Fellowship by the British Elbow and Shoulder Society. Mike is married to Julia, specialist shoulder therapist, and has two young sons. He is a keen runner, skier and water sports enthusiast.

Julia Walton


Julia has specialised in shoulder rehabilitation since 2002. She is an Advanced Upper Limb Physiotherapy Practitioner at Wrightington Upper Limb Unit and at Manchester Shoulder Clinic. She works closely with her surgical and therapy colleagues and has extensive experience treating all shoulder conditions from elite athletes, to shoulder complaints that trouble patients in their everyday .

	PAIN	WEAKNESS	ER LAG
Young (<60yrs)	Repair + Augment / SCR		Lat Dorsi / Trapezius Tendon Transfer
Intermediate (60-70yrs)	Biceps Tenotomy +/- Balloon	Deltoid rehab	
	Repair + Augment / SCR		Tendon Transfer
Elderly (70+yrs)	Biceps Tenotomy +/- Balloon	Deltoid rehab	Reverse Arthroplasty +/- Tendon Transfer
	Reverse Arthroplasty		

TABLE 1: Simplified decision-making guide to MRCTs

life. She also lectures nationally and internationally on shoulder rehabilitation and is actively involved in clinical research.

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What's new in tennis elbow?

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Tennis elbow (TE) is a common diagnosis for patients presenting with lateral elbow pain. While many patients improve quickly with therapy, some can be more resistant. Over the years, a huge variety of further therapeutic options have become available for these patients. This article aims to review the evidence behind some of the newer treatments on offer, as well as refreshing the principles behind making sure the diagnosis is right.

LEARNING OUTCOMES

TO SUPPORT PHYSIO FIRST QAP

- 1 Understand that tennis elbow is a *degenerative* tendinosis most commonly of the extensor carpi radialis brevis tendon.
- 2 Lateral elbow pain in adolescents, or pain that starts following injury or trauma is unlikely to be tennis elbow. Be mindful of other causes.
- 3 Evidence shows that corticosteroids may improve pain for a short period but that this treatment method does not improve patient outcomes in the longer term.
- 4 Platelet-rich-plasma injections have been shown to prevent patients with refractory symptoms from needing surgery.

Introduction

Tennis elbow (TE), or lateral epicondylitis, is one of the most common diagnoses in those of working age with lateral sided elbow pain. It affects up to 3% of the general population (Sanders *et al* 2015), with an equal prevalence between men and women (Shiri *et al* 2006) and a peak incidence in the 40 and 50-year-old populations (Bot *et al* 2005). While the exact cause of the disease is not fully understood, studies have shown an association both with repetitive actions

such as those in a work environment (Descatha *et al* 2016) and in those individuals with a genetic predisposition (Altinisik *et al* 2015). Population studies have also shown an increase in odds of those suffering from TE to be diabetic (type II) and have a smoking history (either current or former). However, no association has been seen with other disorders that affect the vascular system, hypertension or obesity (Shiri *et al* 2006).

All four of the extensor tendons in the forearm can be affected by TE, however extensor carpi radialis brevis (ECRB) is the main culprit in 95% of cases (Verhaar 1994). The ECRB tendon fits the classic criteria of a tendon susceptible to overuse injury; it is subject to repetitive tension, transmits loads under elastic and eccentric conditions, crosses two joints, wraps around convex surfaces and has areas of scant vascular supply.

With these criteria present it can, therefore, be understood how repetitive microtrauma to the tendon can lead to tendinosis at its point of origin on the lateral aspect of the elbow. It is important to note here that the pathology of tendinosis is characterised by a degenerative process of disorganised collagen, increased vascularity and large populations of fibroblast cells (Kraushaar & Nirschl 1999). This is in contrast to a tendonitis that contains an abundance of acute inflammatory cells, a distinction

that is important when considering the numerous treatment options available for this condition.

Diagnosis of tennis elbow

The diagnosis of tennis elbow can usually be made based on the clinical history and physical examination, but there are some vital factors to consider before excluding alternative causes.

The age of the patient is important. Teenagers, especially if athletic, do not get TE and lateral elbow pain, so any presentation should raise a suspicion of osteochondritis dissecans. Tendinopathies may exist in the athletic elderly, but other causes should also be considered in this group of patients. While most patients with TE will complain of lateral elbow pain, not all lateral elbow pain is TE.

The pain usually starts gradually, apparently “out of nowhere” and builds up over time. It is typically localised to the lateral epicondyle but may well radiate distally down the forearm and sometimes also proximally up the arm. If the patient knows exactly when the pain started, or there is a history of trauma, then a diagnosis of soft tissue tear or fracture should be considered for exclusion. The exception to this is the patient who reports developing pain shortly after an unfamiliar burst

"WHILE MOST PATIENTS WITH TENNIS ELBOW WILL COMPLAIN OF LATERAL ELBOW PAIN, NOT ALL LATERAL ELBOW PAIN IS TENNIS ELBOW"

of heavy manual work, such as laying a patio. Importantly, the pain will not have started at the time of the activity but have been felt shortly afterwards. Occasionally, the patient will report the pain starting after a minor trauma, such as hitting their elbow on a door frame, but it is likely that such an incident will have simply unmasked a developing problem. Unlike in trauma or inflammatory joint disease, the elbow is likely to be pain free at rest in TE, with recurrence of pain on activity such as lifting or loading. Tennis and Golfer's elbow may co-exist, in which case the patient will report pain on both sides of the elbow. It is worthwhile asking the patient to score their average level of pain on activity in the past week, using a linear numerical rating scale to provide a baseline to monitor the effect of treatment.

Reports of stiffness of the elbow, especially first thing in the morning, are not uncommon in TE. The stiffness usually eases quickly as the elbow is mobilised, but persistent elbow stiffness or mechanical symptoms of locking, "catching" or grinding should raise a suspicion of joint pathology. Any neurological symptoms reported are usually non-dermatomal and intermittent. The patient may report swelling over the lateral epicondyle but soft spot swelling is more likely to be caused by fluid or synovitis in the joint. In this case, the patient should be asked about past history of trauma or joint disease and family history of joint disease.

Physical examination starts with inspection of the whole limb and posture. Signs of muscle wasting, swelling, skin discolouration that may indicate previous steroid injection and scars should be specifically looked for. Loss of elbow range of movement (ROM) will suggest joint pathology rather than tendinopathy. Palpation should start

remote to the lateral epicondyle with pressure over the medial epicondyle, triceps insertion, bicipital tuberosity and soft spot to exclude more generalised pathology. Point tenderness just distal to the most prominent point of the lateral epicondyle is typical of TE. An absence of tenderness makes the diagnosis less likely, but does not exclude it.

There are numerous special tests for TE but the Mills' and Maudsley's tests are useful indicators of pathology. In the Mills' test, the wrist is flexed in a bent elbow and the elbow is slowly extended, reproducing the pain. The Maudsley's test is performed by applying resistance while the patient maintains middle finger extension with the elbow in full extension. A positive test reproduces the pain. The grip and grind test is useful to exclude radiocapitellar arthritis. The plica compression test can be performed to assess for a radiocapitellar plica by applying pressure over the soft spot, while extending the elbow passively and holding the forearm in pronation and valgus. If there is concern about involvement of the biceps tendon, a resisted O'Driscoll's Hook test can isolate and stress the distal biceps tendon to try to elicit symptoms. The integrity of the lateral ligament can be assessed with a varus stress test, the bench press test and posterior draw test. The pivot shift test is not usually helpful in the clinic as guarding will prevent a positive test. A neurovascular assessment should be undertaken.

In most cases the diagnosis will be clear. If there is a history of recent or historic trauma, any mechanical symptoms,

or the patient is a teenager, plain anteroposterior and lateral radiographs of the elbow should be obtained. Ultrasound and magnetic resonance imaging (MRI) can be used to confirm the diagnosis and exclude other pathology, but these methods will not give an indication of prognosis.

Differential diagnosis

In the adolescent presenting with lateral elbow pain, where concern still exists after an apparently normal x-ray, it is vital to rule out osteochondritis dissecans with further x-rays or MRI. Tennis elbow should not be considered in this patient group.

Other causes of lateral elbow pain in adults include:

- radiocapitellar osteoarthritis
- radiocapitellar plica syndrome
- synovitis, lateral ligament injury resulting in posterolateral rotatory instability (PLRI)
- extensor tendon traumatic avulsion
- radial head or capitellum fracture
- radial tunnel syndrome (rare).

Consideration should be given to more proximal lesions including a C5 radiculopathy. Some conditions such as radiocapitellar plica syndrome and distal biceps tendinopathy may masquerade as TE or co-exist with it, making the diagnosis more challenging. Again, history and physical examination should narrow down the differentials.

Patients presenting with pain following significant trauma should be assessed with plain radiographs in the first instance and plain MRI or MR arthrography if there is concern for lateral ligament injury. Lateral ligament incompetence can arise from steroid injection causing ligament atrophy, and radiocapitellar plica syndrome ➡

"SOME CONDITIONS MAY MASQUERADE AS, OR CO-EXIST WITH TENNIS ELBOW, MAKING THE DIAGNOSIS MORE CHALLENGING"

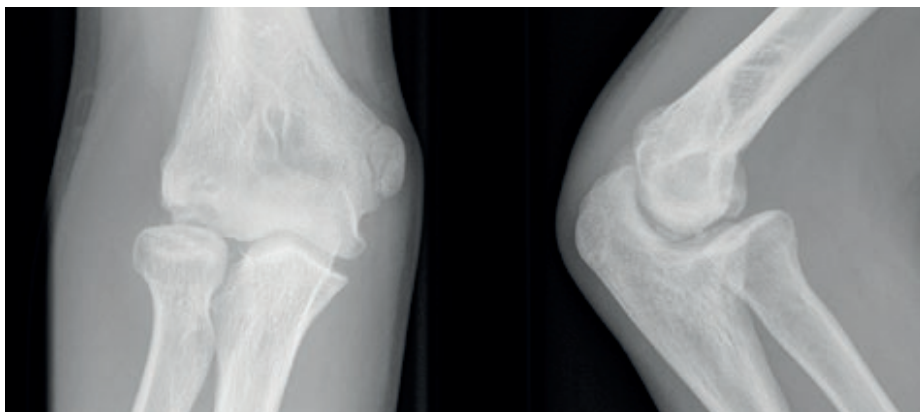


FIGURE 2: Radiographs showing osteochondritis dissecans on the capitellum. A differential diagnosis for lateral elbow pain

can develop as a result of TE, so it is important to determine whether the symptoms have changed over time.

New treatment strategies and the evidence

For the majority of those affected, TE is a self-limiting condition. With a wait-and-see approach and avoidance of aggravating activities, 80% of patients will recover in six months (Bot *et al* 2005), and 90% of patients (figure 1) can expect recovery within a year (Bisset *et al* 2005). These timescales can be improved further with a variety of treatment strategies. There is evidence behind current practice, as well as on some of the newer treatment modalities.

THERAPY

Fortunately, the vast majority of UK clinicians recommend an exercise based therapy programme as their first line intervention for patients presenting with TE (Bateman *et al* 2019). There is good evidence of improved outcomes with a home exercise programme of stretching and strengthening and these improve further when these exercises are performed under supervision (Menta *et al* 2015). Sport specific guidance or coaching may also be beneficial, and for tennis enthusiasts in particular a number of technique flaws have been identified that may be exacerbating symptoms. These include shot techniques, racquet size, string tension, court surface and ball weight (Keijsers *et al* 2019). Other areas to explore include

work activities that may exacerbate symptoms, together with psychological factors such as the patient's social support network (Haahr & Andersen 2003).

ELECTROTHERAPY

More than 20 randomised control trials (RCTs) have been performed comparing the range of electrotherapy modalities such as ultrasound, laser, extra-corporeal shock wave, and pulsed electromagnetic field therapy, against a variety of other treatment strategies including placebo, acupuncture and manual therapy. Larger trials have shown no clear evidence of significant patient benefit, in fact many studies have shown conflicting outcomes. Ultrasound and laser therapy have shown the greatest potential in the treatment of TE. However, when reviewed, ultrasound (Lundeberg *et al* 1988) and laser therapy trials showed benefit only for short-term outcomes at 8-13 weeks (Stergioulas 2007). Extra-corporeal shock wave has not shown to be more effective than placebo in systematic review of several RCTs (Bisset *et al* 2005). Further high quality research with larger patient numbers to investigate sustained benefit is required to validate these findings.

CORTICOSTEROID INJECTIONS

Steroid injections have often been used by a variety of practitioners to achieve pain relief for TE. There is evidence that this treatment method is beneficial to patients over the short term (Nimgade *et al* 2005), but this is outweighed by the negative effects steroids have in the longer term. Several studies have shown that patients who undergo corticosteroid injection are worse off in terms of TE conditions (figure 2) when reviewed one year subsequently (Bisset *et al* 2005) and steroid injections, particularly if repeated, may alter local skin pigmentation and cause atrophy to the lateral ligamentous structures (figure 1).

PLATELET-RICH-PLASMA INJECTIONS

This procedure involves drawing the patient's blood and then spinning it in a centrifuge to separate the different constituents, allowing the platelet rich

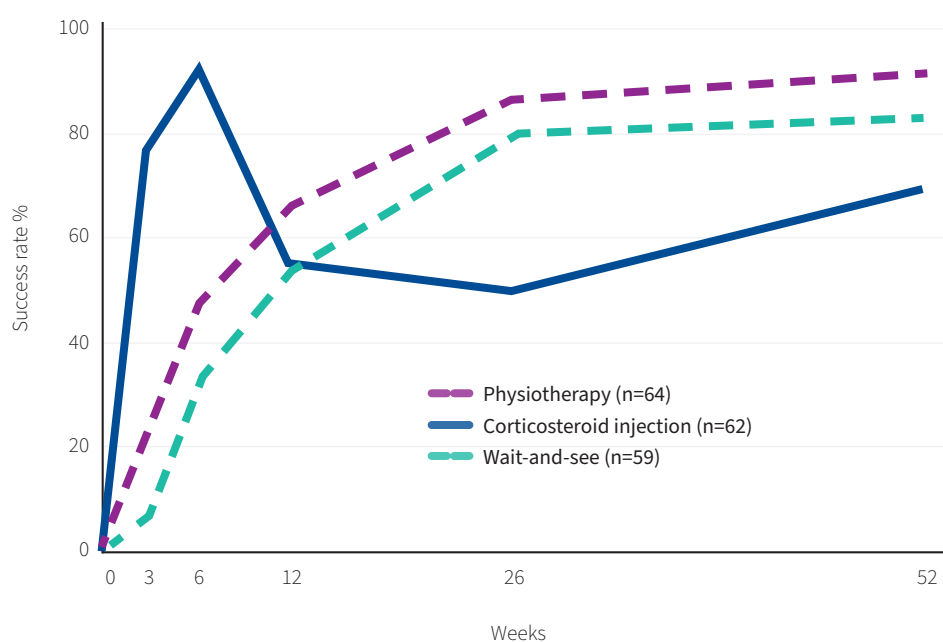


FIGURE 1: Graph showing the effects of different treatment strategies over 52 weeks follow-up (Bisset *et al* 2005)

section to be extracted and used for injection. Platelets are rich in growth factors that can stimulate soft tissue healing and they play this important role by recruiting repair cells to their locality. There have been numerous RCTs that have shown the superiority of this intervention compared to corticosteroid injection (Gosens *et al* 2011) and dry needling procedures over long term follow-up (Mishra *et al* 2014), and a recent meta-analysis of seven different RCTs has shown the results of platelet-rich-plasma (PRP) to be favourable to corticosteroids at more than six months follow-up (Xu *et al* 2019), and the use of PRP injections have shown to be effective in the avoidance of surgery in more than 70% of patients with refractory TE (Watts *et al* 2020).

SURGERY

An operation to debride, release and resect the affected tendon is the last stop for patients who have failed other treatment strategies. The release can be performed as an open procedure (Nirschl & Pettrone 1979) or arthroscopically (Baker *et al* 2000). Open surgery involves resecting the diseased section of tendon through a small incision over the lateral aspect of the elbow, and can often be performed under local anaesthetic. Arthroscopic surgery is a more involved procedure (figure 3) that requires greater technical skill, but has the advantage of allowing assessment of the articular surfaces of the elbow in its entirety. Some authors have found additional elbow pathology in more than half of TE patients assessed with arthroscopy (Kaminsky & Baker 2003). Results for both treatment strategies are good with long-term improvement in pain found in more than 80% of patients treated.

Conclusion

Tennis elbow is the most common cause of lateral elbow pain in middle-aged patients. Despite this commonality, it's important to remember that not all patients presenting with lateral elbow pain will have TE. A careful history and examination with knowledge of the other differentials will help to avoid misdiagnosis. Further investigations can

be helpful, but they are only largely required when the diagnosis is in doubt. A wide variety of treatment strategies have been described in the literature. However, more than 80% of patients will improve within six months with reassurance and physiotherapy. Corticosteroid injections have previously been routine for this condition, but poorer patient outcomes in the longer term have been seen and they are now discouraged. In contrast, PRP injections have shown good outcomes and recent work shows they can prevent patients suffering with refractory TE from the need to proceed to surgery.

About the authors

Andrew is a Consultant Elbow and Shoulder Surgeon at Wrightington Hospital Centre of Excellence. He graduated from St Andrews University with Honours, and from the University of Manchester before completing Fellowships in Wrightington and in Tampa, Florida. He has recently been awarded a master's from the University of Central Lancashire for work in upper limb kinematics. Andrew's practice specialises in surgery for all aspects of elbow and shoulder sports injuries, pain and instability, as well as trauma to the

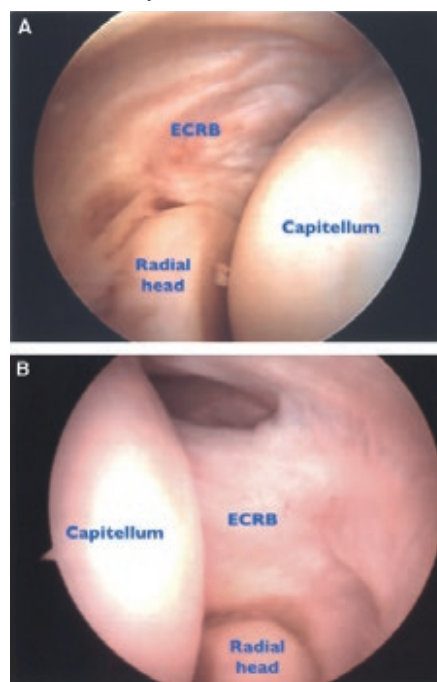


FIGURE 3: Intra-operative elbow arthroscopy images. A = a diseased ECRB tendon. B = a tendon with a more normal appearance

whole upper limb. Andrew is passionate about teaching, education and providing bespoke, evidence based care for his patients.

Adam is a Consultant Orthopaedic Elbow Surgeon at Wrightington Hospital and visiting Professor at the University of Manchester. He trained on fellowship in Adelaide, Australia and at Wrightington. He works with a number of national sporting organisations. Adam has more than 130 publications in upper limb surgery, he has contributed to national guidelines on wrist fractures, elbow arthroplasty and infection, and is a designer of surgical techniques and implants. He is a speciality editor for both the *Bone and Joint*, and *Shoulder and Elbow* journals and sits on the editorial board for the national joint registry. Adam is a National Institute for Health Research grant award holder and he is a research lead at Wrightington, Wigan and Leigh teaching hospitals NHSFT.

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- Members who have input more than 50 discharged records within a 12 month period will then receive an individualised report at each download
- These reports can be used for practice profiling, identifying CPD needs, marketing and demonstrating outcomes of care
- Members have the opportunity to be assessed for our Physio First **QAP** and/or **QAC** awards

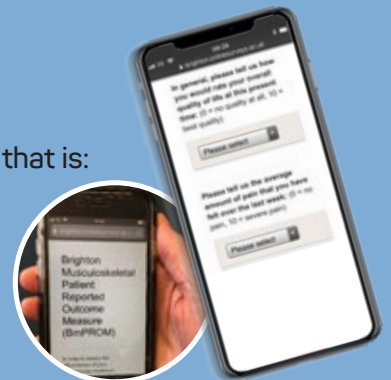
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Modern technologies in hand and wrist surgery

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Over the past decade, there have been numerous advances within the field of hand and wrist surgery and surgeons have been able to adopt these new technologies to improve the accuracy of surgery with the goal to optimise functional outcomes for patients. This article provides an up-to-date overview of some of these developments, such as advanced imaging techniques, three-dimensional printing and new materials, and the advantages these new technologies offer to both patients and healthcare professionals.

LEARNING OUTCOMES TO SUPPORT PHYSIO FIRST QAP

- 1 Be aware of the developments in technology in surgery for hand and wrist conditions.
- 2 Collecting data on pre and post operative scoring to assess the patient outcomes of the interventions performed is vital to assessing the efficacy of the techniques and technologies involved.
- 3 Computer modelling and 3D printing can aid complex deformity surgery, making it more precise and predictable.
- 4 Understand the possibilities and limits technology can offer for treating patients with the aim of optimal outcomes.

Computer modelling

There are many challenges for a surgeon faced with a patient with complex wrist deformities that cause impaired function or pain. Such deformities can be due to an underlying disease, a traumatic event, a previous infection or a congenital defect. It is sometimes difficult with conventional two-dimensional imaging such as traditional x-ray or CT scans to

assess the degree of bone loss or the anatomy of the deformity. With modern CT scanning, a detailed analysis with a 3D reconstruction of the wrist can be obtained, enabling the surgeon to rotate the image in all planes and gain a better understanding of the base line anatomy and the defect in order to allow for the more accurate planning of surgical cases.

In wrist replacement surgery, 3D modelling can be used to assess the optimal position of the implant and determine whether extra steps are required to provide a stable structure for the prosthesis. In some cases impaction bone grafting may be required to ensure optimal implant positioning is achieved. In the case of severe bone defects, 3D printing can provide the surgeon with a physical model of the defect to examine. This again aids surgical planning and ensures that, where a bone graft is required, the correct size is taken (Han *et al* 2017). Both 3D modelling and printing techniques can be used for complex

cases to enable appropriate planning of efficient surgery, decreased intra-operative complications, and provide the best outcomes for the patient.

At present, computer software programmes used for planning shoulder surgery allow for the assessment of the patient's presenting anatomy and then aids in choosing the optimal implant position, enabling the surgeon to predict the expected range of movement (ROM) for that simulated position and alter as required. Of course, the predicted ROM is a calculated estimate and does not fully take into consideration the soft tissue element of the joint, which is as important as the bony element when achieving a ROM. This limitation of the technology, together with some studies, demonstrates a variability between preoperative measurements with the use of different computer programmes and, therefore, should be used only as a guide by the surgeon and not as a definitive treatment (Denard *et al* 2018; Brandon *et*

"3D MODELLING AND PRINTING TECHNIQUES CAN BE USED TO PLAN COMPLEX SURGERY CASES"

al 2020). It is, however, only a matter of time before these major advances in the software development for implants in the shoulder joint are developed for use within the wrist, enabling surgeons to predict and achieve, through wrist replacement, the best ROM and potential function outcomes for the patient.

New materials

Patients with sustained significant trauma to a joint, or premature degeneration, often require a joint replacement and this can be a daunting prospect, particularly as there is, historically, a high chance of revision surgery being required at a later date. When joint preserving surgery is not feasible, and arthroplasty is the only option, then it is highly desirable to use a material that allows for the best wear characteristics in order to increase the longevity of the implant. Common metals used in orthopaedics include steel, cobalt-chrome and titanium (Ratner *et al* 2013), each of which have properties that result in different wear characteristics. However, new materials are entering the orthopaedic market with theoretically improved wear characteristics.

Pyrocarbon is one of these. It is a form of carbon that has been manufactured for its wear properties and bio-compatibility and has been shown, when compared with other materials used in arthroplasty, to have an elastic modulus most similar to bone (Ratner *et al* 2013; Bengezi & Vo 2014). The enhanced wear characteristics of this pyrocarbon are particularly appealing when performing a hemiarthroplasty as one of the articular surfaces remaining is natural cartilage which is softer than bone and can, therefore, wear away when a metal surface articulates with it. A pyrocarbon component reduces wear of the native cartilage and underlying bone and, in turn, gives the implant a longer life span. Owing to these properties, pyrocarbon materials have been used to create implants in the wrist, elbow and shoulder.

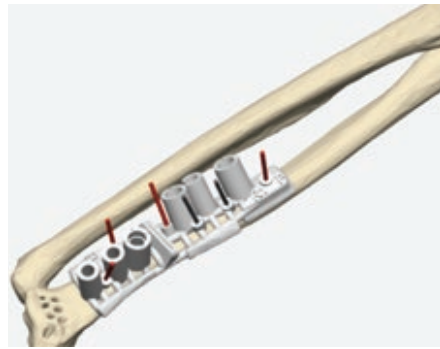


FIGURE 1: A custom made 3D model of an osteotomy jig and its position for the osteotomy on a radial deformity

Deformity surgery

Computer-generated custom jigs have been used previously for the resection of bone tumours, with the technology evolving into the field of corrective osteotomies of the upper limb (Khan *et al* 2013). When faced with a significant deformity to the distal forearm following trauma, or as a result of a congenital condition, the management of these can be challenging. The forearm is particularly susceptible to a loss of movement and poor function in the presence of a deformity. Corrective osteotomy surgery and re-alignment of the bones can be performed, and 3D CT scans allow for a better understanding of complex deformities and can be used to obtain custom made, patient specific osteotomy jigs, manufactured with the aid of CT reconstruction to enable the surgeon to accurately perform the osteotomy (figure 1).

Custom jigs for the upper limb are designed and produced based upon the corrections requested by the operating surgeon. This will have followed a planning meeting centred around the 3D CT scans of the deformity and is often compared with scans of the patient's non-deformed opposite limb (figure 2). The 3D model demonstrates the corrections that can be achieved through an osteotomy (figure 3). The 3D printed plastic guide can be sterilised and used in the surgery to aid in producing accurate osteotomy cuts in all three-dimensional planes. These custom jigs are designed to sit on the bone in one position and allow an



FIGURE 2: A computer model of the correction following the osteotomy for the deformity illustrated in figure 1

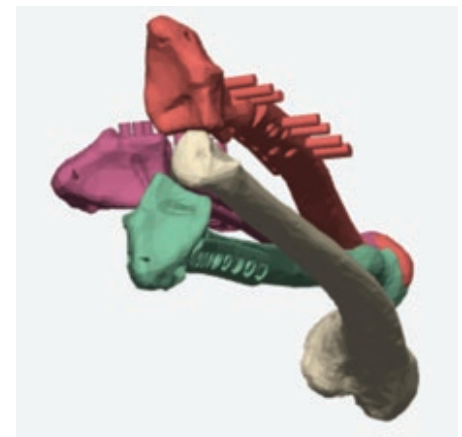


FIGURE 3: A computer-generated model of a distal radius following an osteotomy, moving through pronation and supination

accurate osteotomy to be performed. The bone is then fixed in the new position using traditional plates and screws.

Patient outcome scoring systems

Online platforms and secure databases for the collection of outcome scores are increasingly being developed and used to assess the performance of the technological advances in surgery. The range of different outcome measures used in the hand and wrist most commonly include the Disabilities of the Arm, Shoulder and Hand (DASH) score (Changulani *et al* 2007; Beaton *et al* 2001; Gummesson *et al* 2003). By comparing the scores in elective patients pre- and post-operatively, surgeons can assess the impact of their procedures. Online access has made it increasingly easier for patients to complete outcome

"BY COMPARING PATIENT OUTCOME SCORES PRE- AND POST-OPERATIVELY, SURGEONS CAN ASSESS THE IMPACT OF THEIR PROCEDURES"

measures in their own time, and the central database storage has transformed our ability to access this valuable data. Patients are automatically reminded, at set time periods post-operatively, e.g. three, six and 12 months, to complete the scoring questionnaire and this data is then fed back to the surgeon.

Summary

The development of new technologies and techniques is important for progressing the field of orthopaedic surgery, but it should be regulated and the patient follow-up should be rigorously implemented. It is vital to assess the impact of the procedures performed and techniques used to ensure that patients undergoing surgery have improved outcomes. Planning the optimal position of implants through 3D modelling techniques is particularly helpful in complex arthroplasty cases. The future will be computer software that can demonstrate predicted functional outcomes and provide both the surgeon and the patient with more information. The aim of these new technologies is to improve the outcomes for the patient, but it is vital that this is monitored to ensure that this is the case. As these new surgical technologies develop, the role of the physiotherapist is vital in the early post-operative mobilisation and rehabilitation. It is important for the allied healthcare professional to understand what is performed and why new technologies are being adopted into the field to allow them to deliver the best care for their patients.

About the authors

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private practice is based at the Arm Clinic, and Spire Cheshire Hospital in Warrington. Matthew is an Upper Limb Fellowship Trained Surgeon, having completed fellowships in Melbourne, Australia, Nice, France and at Wrightington Hospital, UK. Matthew treats all disorders of the upper limb with a particular interest in trauma injuries, sports injuries and degenerative conditions. He has maintained a strong interest in research and has completed a BSc and two master's degrees in the area of Trauma & Orthopaedics. Matthew has more than 30 peer review publications and regularly presents his work around the globe. He has a particular interest in teaching healthcare professionals and is course organiser for the FRCS course.

David is a Consultant hand, wrist and elbow Surgeon and works in the Arm Clinic in Wilmslow Hospital and with the Pennine Acute NHS trust in Manchester. He is actively involved in teaching and research and is an Honorary Senior University Lecturer for injuries of the hand and wrist. He works closely with the medical teams of professional sports clubs and individuals, at regional and national level.

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"PHYSIOTHERAPISTS HAVE A VITAL ROLE IN THE EARLY MOBILISATION AND REHABILITATION FOLLOWING SURGERY"

PHYSIO FIRST VALUES OF MEMBERSHIP

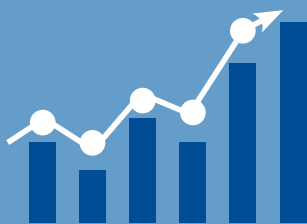
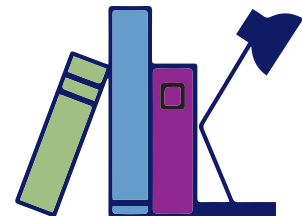


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Is it more than 'just' a torn ACL?

NEIL JAIN FRCS Tr & Orth

Consultant Orthopaedic Surgeon with a specialist interest in sports trauma and arthroscopy



A large proportion of individuals who undergo anterior cruciate ligament (ACL) reconstruction surgery will describe, through their rehabilitation period, that they continue to experience a degree of rotational instability. This may contribute to a decision for them not to return to their previous level of sport, and may be in spite of excellent rehabilitation. This article highlights factors related to the original injury of an ACL tear that, until recent times, have not been considered surgically. Given that physiotherapists tend to have more contact time with patients in their rehabilitation than do surgeons, the ability of the physiotherapist to recognise, during compliant rehabilitation, a post-operative rotational instability may mean it will prompt a surgical referral where it can be addressed and improved.

LEARNING OUTCOMES TO SUPPORT PHYSIO FIRST QAP

- 1 Introduce the possibility of pathologies responsible for continued rotational instability following ACL reconstruction surgery.
- 2 Identify clinical clues to the existence of such pathologies.
- 3 Popularise the RAMP Lesion and Anterolateral Ligament amongst physiotherapists.
- 4 Provide awareness of surgical solutions to these injuries.

Background

We all know that many factors are involved in a successful return to play following anterior cruciate ligament (ACL) reconstruction surgery. This journey begins before surgery with the beneficial effects of prehabilitation and planning the surgery appropriately (van Melick *et al* 2016), it continues during the operation with good surgical technique and, importantly, the journey further continues in the post-operative months with structured and goal setting rehabilitation. In addition to the physical journey to return to play, other factors are now emerging that highlight the importance of the psychology of the patient in their recovery, and

kinesiophobia in the ACL reconstruction patient has become a topic of interest (Cozzi *et al* 2015).

In spite of all our research, experience and knowledge gained regarding ACL surgery and rehabilitation, it is suggested that as low as 60% of ACL patients return to their pre-injury level of sport (McCormack & Hutchinson 2016). Even allowing for recreational athletes who make an informed decision owing to the changes in their life circumstances not to return to play, the percentage of those returning is still strikingly low given the interest in this injury, and the frequency of its occurrence.

From a surgical point of view we have, for many years, looked to see if there is anything that might be done to optimise and improve outcomes for our patients. Surgical techniques have changed from open to arthroscopy to

those that involve less of a traumatic insult to the knee, and the timing of the operation has been reviewed in terms of whether it should be performed early, or delayed until the knee is quiet in a bid to avoid the risk of arthrofibrosis. Additionally, there is the debate about whether autograft, allograft, or synthetic graft is the best option, and whether the graft is best donated from the patella, hamstrings or quadriceps tendons from the ipsilateral or contralateral knee, all designed to limit donor site morbidity while still providing a suitable ACL graft. There is also discussion on whether an aperture fixation, i.e. screw is better and more stable than suspensory, i.e. cortical button with looped suture fixation and, in turn, whether a suspensory fixation is better with a fixed or adjustable loop. We have considered whether keeping as much of the native ACL stump as part of the reconstruction offers a benefit to the patient in terms of post-operative

“IN ADDITION TO THE PHYSICAL JOURNEY, FACTORS ARE EMERGING THAT HIGHLIGHT THE IMPORTANCE OF THE PSYCHOLOGY OF THE PATIENT IN THEIR RECOVERY AND RETURN TO PLAY”

proprioception and re-rupture rates, and consideration is given to different procedures such as the trans-tibial technique that achieves the isometric point, or the anteromedial portal technique to target the anatomical origin in order to create a femoral tunnel (Siegel *et al* 2012).

So many hours are spent presenting, discussing and debating all of these factors at our surgical conferences, yet the truth is that there is little compelling evidence to suggest any significant superiority to most of these variables over the others, something that is probably a testament to the effect of good rehabilitation for these patients as it seems that the quality of the rehabilitation has a greater influence on whether the patient has a good or bad outcome. We all can relate to the fact that the compliant and committed patient tends to have a better outcome than one who is not.

We have all encountered patients post-operatively who have had a technically satisfactory operation, been compliant in their rehabilitation and extremely committed to their recovery, yet still have a degree of rotational instability. The following highlights why this might be.

CO-EXISTING INJURIES

Physiotherapists will be familiar with the O'Donoghue's unhappy triad which, for many years, has been recognised as describing the ACL tear that is accompanied by a torn meniscus and

torn medial collateral ligament (MCL) (O'Donoghue 1964). Most physios will also be aware that sometimes, where the patient has an ACL tear and a posterolateral corner (PLC) injury, the PLC injury might be missed. This can cause ongoing rotational instability following ACL reconstruction. Cartilage defects can also lead to continued instability if not addressed at surgery. This highlights the importance of looking for and identifying other injuries sustained at the time of the ACL tear. However, it would be wrong to assume that it is possible to detect everything that can occur as a co-existing injury, even when we are satisfied that we have investigated all possible co-existing injuries previously described.

Two less well known potential co-existing injuries have been described and popularised in recent years; the so-called RAMP lesion and the anterolateral ligament (ALL) tear.

THE MECHANISM OF INJURY

While many mechanisms of injury have been described as causes of an ACL tear, including an impact injury forcing the knee into valgus or a combined hyperextension varus injury, the most common mechanism of injury remains the "pivot-shift". This occurs when an athlete is running and as they plant their foot on the ground it remains static while the rest of the body shifts position. This event is said to result in an anterior tibial, shear force knee abduction, and tibial internal rotation moment that

exceeds the force the ACL can withstand, thereby causing it to rupture (Dordevic & Hirschmann 2014).

However, in the same way an excessive valgus force event is likely to injure the MCL and the ACL, and an excessive hyperextension varus force is likely to injure the PLC, this excessive rotational pivot-shift mechanism may injure those structures placed under excessive force and strain from this excessive rotation of the knee.

When considering the basics of biomechanics in terms of torque and moments (where torque = force x distance), if the ACL is the central point of rotation of the knee, any force that is strong enough to exceed the yield point of the ACL will also likely affect more peripheral structures, namely the capsule of the knee, that are strained in rotation. With this particular excessive rotation, it is predominantly the anterolateral and posteromedial capsule that come under increased stress (figure 1).

RAMP LESION

The RAMP lesion is a disruption of the meniscotibial ligament and the posteromedial meniscus in the meniscocapsular zone. The knee capsule detaches from the posterior aspect of the medial meniscus, caused by the excessive rotation as described previously. This co-existing injury can be confirmed at the surgical stage as the lesion appears wider when the leg is internally rotated (figure 2).

It is important to detect the RAMP lesion pre-operatively. This can be achieved with a detailed history of the mechanism of injury to raise suspicion of the lesion and through clues during clinical examination. Posteromedial tenderness in palpation is the biggest suggestion of a RAMP lesion in the patient with a significant, thrusting (so-called Grade III) pivot-shift test. A RAMP lesion can occasionally be seen on MRI, however even where an MRI image shows an absence of a lesion, it should be looked for at the time of ACL reconstruction. ➡



FIGURE 1: Rotational biomechanics of the knee demonstrating greater moment arm through peripheral capsular structures than the central ACL (Moment = Force x distance)

A RAMP lesion can be repaired through a posteromedial portal and the placement of arthroscopic sutures (figure 3). While technically demanding, it is important that this “hidden” lesion is addressed as evidence is emerging that demonstrates its importance in persistent rotational instability. Studies have been published that describe more than 40% of patients who undergo ACL reconstruction will have a medial meniscus tear, and 50% of these, i.e. present in 20% of ACL reconstructions, are located in the posteromedial compartment of the knee and will be missed unless that area is visualised during surgery. Such high frequencies of this lesion had not previously been recognised and it is suggested that failure to address the lesion will lead to persistent rotational instability even following ACL reconstruction (Sonnery-Cottet *et al* 2014).

Studies currently being published describe the improved results of addressing the RAMP lesion when performing an ACL reconstruction. Anecdotally, I have a number of patients who were referred following a satisfactory ACL reconstruction, but who still demonstrated rotational stability. Upon arthroscopic evaluation it was found that they each had a RAMP lesion and that repairing this co-existent injury provided a rotationally stable knee in all of these individuals. These may have been small numbers, but the results were clinically impressive (Alessio-Mazzola *et al* 2020).

ANTEROLATERAL LIGAMENT TEAR

With excessive rotation and strain on the posteromedial capsule of the knee, biomechanical theory would suggest similar forces being placed on the

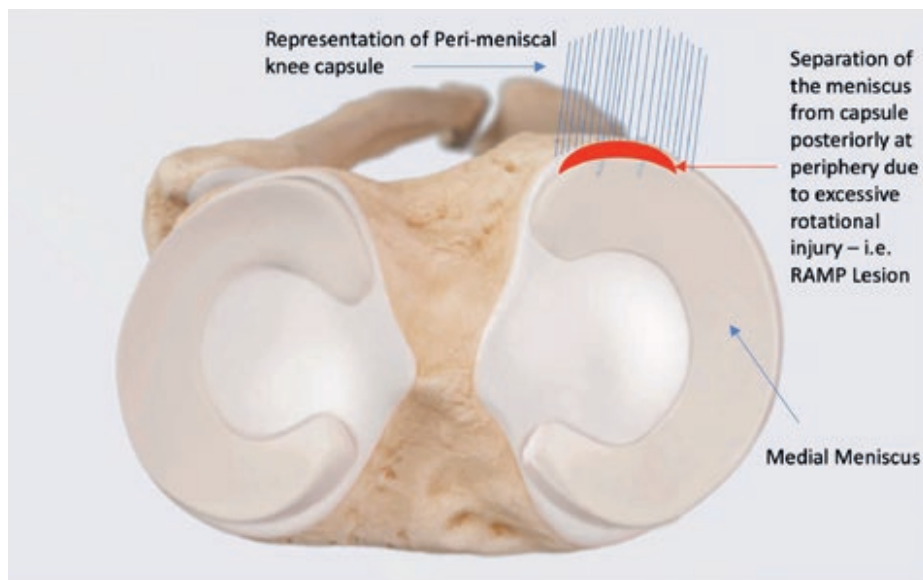


FIGURE 2: Diagrammatic representation of a RAMP lesion

anterolateral capsule. Indeed, dating back to 1879 in France, Paul Segond demonstrated through cadaveric experiments that an avulsion fracture of the anterolateral tibial plateau was associated with tears of the anterior cruciate ligament and medial meniscus. This has since become eponymously known as the “Segond fracture” (Milch 1936). When seen on x-ray, it would appear to be consistent with an “avulsion” type fracture (figure 4). As in all such fractures, there must be a structure that inserts at this point and comes under strain in order to cause the avulsion. In recent years this prospect has received a great deal of interest in the orthopaedic world with the popularisation of a thickening of the anterolateral knee capsule demonstrated on many cadaveric specimens. This has been described as the anterolateral ligament (ALL) (Claes *et al* 2013).

While the ALL remains a hot topic for debate at orthopaedic meetings across



FIGURE 4: X-ray of a Segond fracture

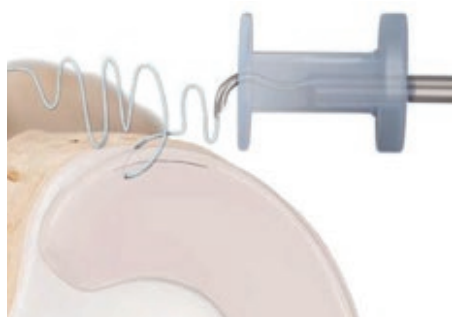


FIGURE 3: Left to right, RAMP lesion repair



“EVIDENCE IS GROWING REGARDING THE EXISTENCE OF THE ANTEROLATERAL LIGAMENT AND ITS CONTRIBUTION TO KNEE ROTATIONAL STABILITY”

the world, the evidence is growing not only about its existence, but also with regard to its contribution to knee rotational stability, and therefore the need to recognise it in the event of ACL injury. Once an injury to the ALL is recognised, it should of course also be addressed (figure 5).

As ALL and RAMP lesions often occur together, they can be identified by similar red flags, once again highlighting the importance of an accurate history of the mechanism of injury. Clinical examination may reveal tenderness along the line of the origin of the Lateral Collateral Ligament (LCL) to mid-point between Gerdy's tubercle and the tibial tuberosity, which roughly corresponds to the ALL. Again, suspicion should be heightened in the event of a thrusting pivot-shift test. The presence of a Second fracture on x-ray is pathognomonic of this lesion and with the growing interest in the ALL, radiologists are now beginning to identify it on MRI scans and, therefore, should be able to help identify when it is injured.

While the presence of an injured ALL is accepted, the surgical solution is not universally agreed. Some suggest that nothing needs to be done. Interventions can, however, include ALL reconstruction, an internal brace of the ALL, or the re-popularised Lemaire operation. These options are collectively known as Lateral Extra-Articular Procedures (LEAP).

An ALL reconstruction (figure 6) can be performed when using a hamstrings allograft for an ACL reconstruction, and techniques exist that utilise the length of the hamstring as an intra-articular graft

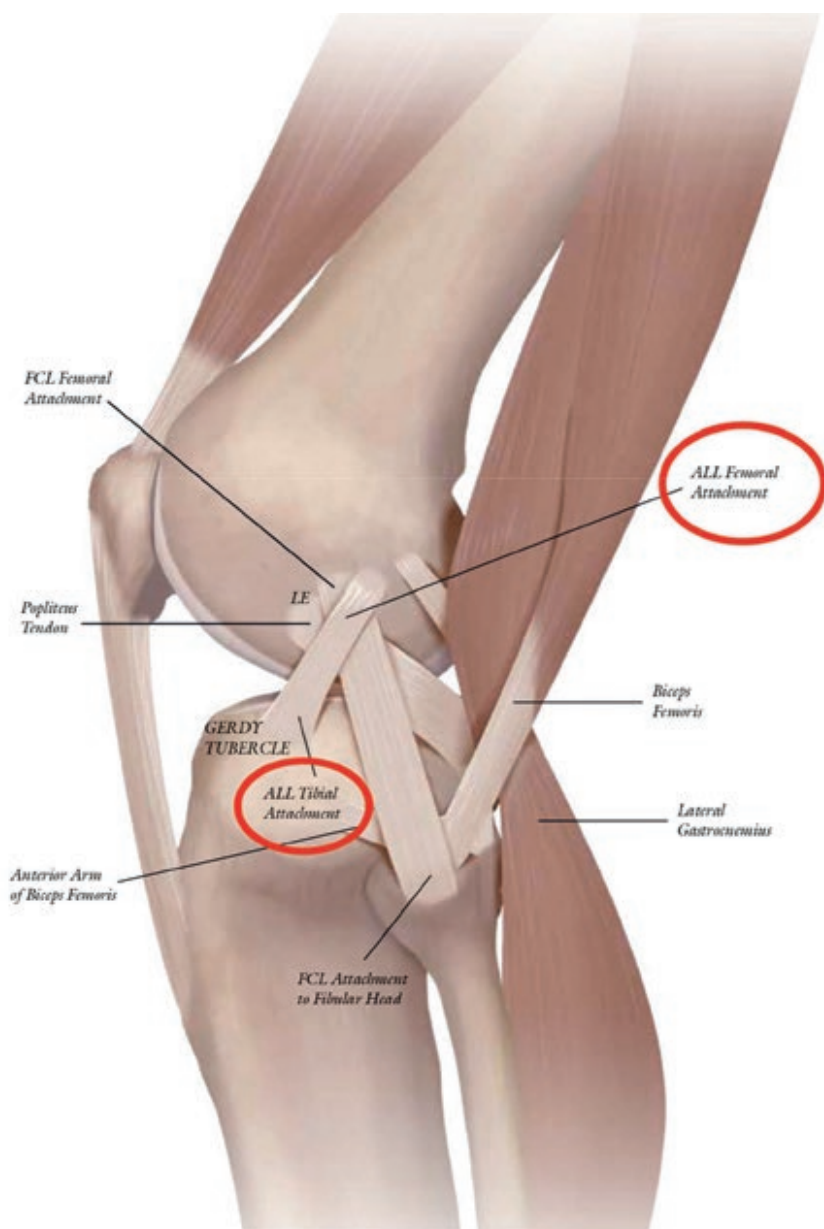


FIGURE 5: Diagram of the anterolateral anatomy of the knee highlighting the femoral and tibial attachments of the anterolateral ligament

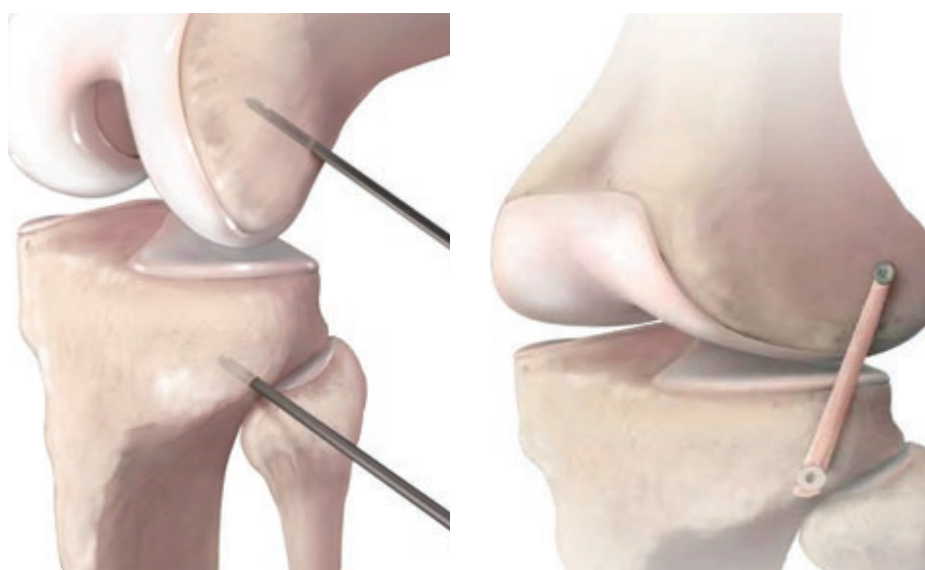


FIGURE 6: Anterolateral ligament reconstruction

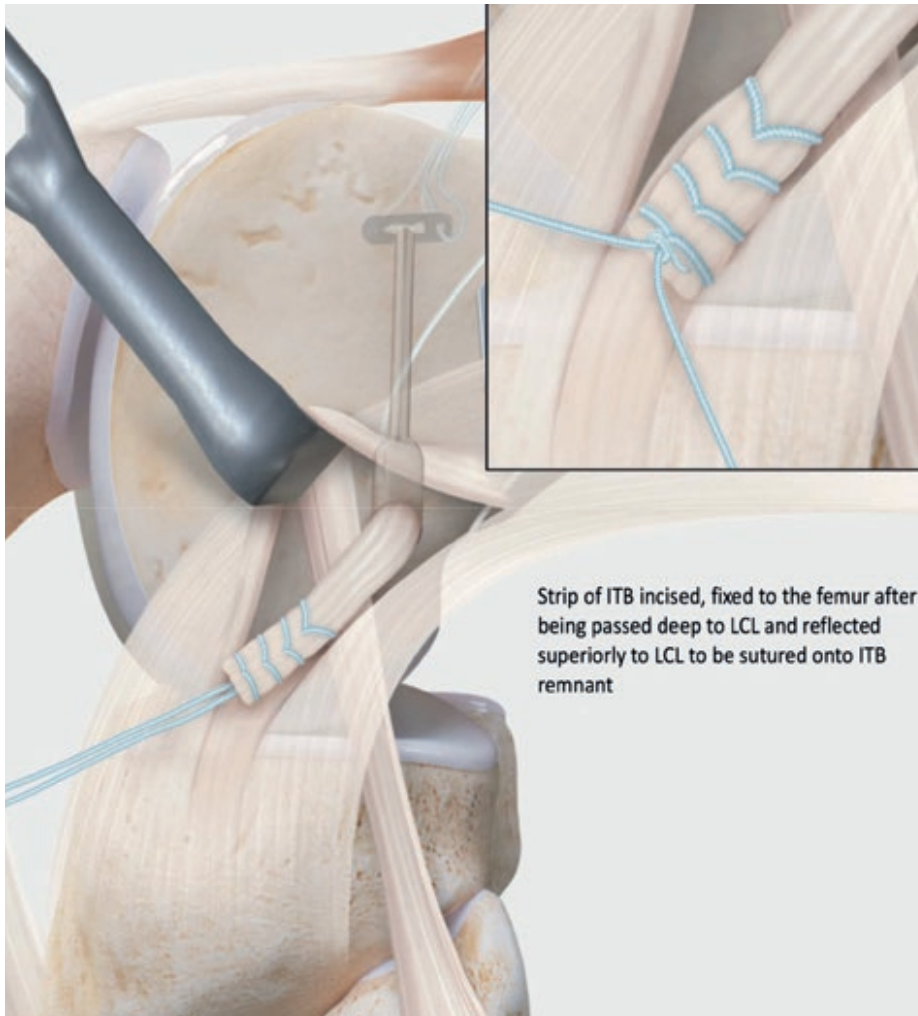


FIGURE 7: Modified Lemaire procedure

for the ACL that is brought through the lateral aspect of the femur and fixed anterolaterally on the tibia at Segond's point (Saithna *et al* 2018). This is dependent on the careful calculations required to ensure that the hamstring graft is of adequate length to reconstruct both the ACL and the ALL. Of the proposed LEAPs, this has the most impressive evidence in terms of decreasing the rate of re-rupture of the ACL following reconstruction (Helito *et al* 2018).

In the event of an insufficient length of hamstring, a possible alternative is the so-called Internal Brace. This is a form of synthetic tape that is used in a variety of surgical procedures throughout the body to great effect. The tape can be fixed at the origin of the ALL via a small incision and then run under the skin to be fixed at the insertion point of the ALL on the tibia. Fixation is commonly achieved with anchors. The use of a synthetic tape to reconstruct or brace the ligament requires

the utmost care and attention to achieve the correct amount of tensioning as, once fixed, there is no tolerance and an overly tight brace would cause lateral joint overload, and have the potential for the anchors to back out and be prominent under the skin, causing irritation for the patient (Monaco *et al* 2019).

The Lemaire procedure (figure 7) is one that was popular in the 1970s. It is an open lateral procedure that takes a longitudinal strip of iliotibial band and runs it around the LCL before fixating it proximally (Wurm *et al* 2019). While it is a very strong form of stabilisation, there is concern that it over constrains the lateral compartment of the knee, thereby increasing joint reaction forces that may lead to premature osteoarthritic change (Castoldi *et al* 2020). Feedback from physiotherapists has also been that it tends to lead to lateral tightness and persistent effusions during ACL rehabilitation; however,

these issues tend to pass with time and the outcomes, in terms of stability, have been encouraging. While it has become particularly popular when performing surgery on elite athletes, no randomised controlled trial exists for the Lemaire procedure that has shown a benefit for its use in the long-term. Short-term results from a modern randomised trial are encouraging, however (Getgood *et al* 2020).

It seems that, whatever method of LEAP is taken to augment an ACL reconstruction, there is certainly some benefit to doing so. One study has shown that augmenting an ACL reconstruction with ALL reconstruction decreases the re-rupture rate from 10% in a solely ACL reconstruction group, to 4% in a combined group at a minimum two-year follow-up (Sonnerly-Cottet *et al* 2018). It is also suggested that a lateral extra-articular tenodesis such as the Lemaire procedure is more likely to provide correction of a Grade III pivot-shift if performed with ACL reconstruction, compared with ACL reconstruction alone (Batty & Lording 2018).

Rehabilitation

As the evidence and understanding of these associated injuries grows, we will know more and that may change what we offer as treatment options in terms of surgery. That will then inform the research protocols for the rehabilitation. At the moment, in my practice at least, I do not change the rehabilitation programme or schedule for patients who have a RAMP repair and ALL reconstruction along with their ACL reconstruction. I believe that the modern techniques and materials used are suitable enough to allow this and, as we know that the rehabilitation from ACL reconstruction is a long process, there is enough time to allow healing from these additional procedures. This is a shared belief within the limited literature in this rehabilitation topic (Saithna *et al* 2018).

Summary

Physiotherapy has come a long way in the aim to return patients to their desired

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level of play following an ACL tear. It is already known that a successful return to play is dependent on many factors, and there are still new factors to discover that may help improve the rehabilitation results from a surgical perspective. The more aware physiotherapists are of these more subtle co-existing injuries, the better we will become at treating ACL patients. For patients with continued rotational stability following ACL reconstruction, it is suggested that consideration be given to whether the cause is an injury co-existent to the ACL, such as a RAMP lesion or ALL tear that has not been addressed during surgery.

About the author

Neil specialises in the treatment of sports injuries, including arthroscopy of knee and shoulder injuries, and non-operative joint preservation techniques. He is Honorary Senior Lecturer with the University of Salford, Honorary Treasurer for the British Orthopaedic Sports Trauma & Arthroscopy Association (BOSTAA) and an international committee member for the Arthroscopy Association of North America (AANA). Neil has worked with many clubs and associations, highlighted by a project that decreased injury rates in the England national football team. He has a sports medicine diploma with the International Olympic Committee (IOC) and a football medicine diploma with FIFA.

Acknowledgement

Many thanks to Arthrex Ltd who kindly provided and gave permission for the reproduction of the images used in this article. Further content is available at www.arthrex.com

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How Covid-19 has changed how we collect patient data: a personal perspective

LIZ PALMER MSc MCSP

There is little doubt that Covid-19 has brought about many changes in our physiotherapy working practices. The requirement to triage patients, use personal protective equipment (PPE) and the additional sanitising of our treatment space between each patient appointment being some of the most obvious. The pandemic has also meant that my own clinic has significantly reduced our non-essential face-to-face contact with patients who are now asked to complete their registration forms online and return them to the clinic electronically.

This move to online administration has included how we collect our patient recorded outcome measures (PROM), a major change that has been facilitated by using the online BmPROM from the University of Brighton. By using the BmPROM online system, I can send a link to my patient via email to complete the eight-question document which they can access with the four digit code that is specific to me as the treating practitioner. This information can be incorporated in the patient communication with confirmation of their initial appointment and other electronic documents. It makes collecting PROM data really easy. It is, however, a facility only available in electronic format to practices that are signed up, and inputting data to our Physio First standardised data collection, Data for Impact (Dfi) scheme.

Why collect a PROM?

- To meet the registration criteria for HCPC
- If we are registered to treat BUPA patients
- In order to qualify for the Physio First Quality schemes – QAP and QAC.

The advantages of the BmPROM

The BmPROM is a validated, eight-item outcome tool, sensitive enough to measure clinical effectiveness in

MSK physiotherapy across a range of conditions that evaluates both the functionality and wellbeing of the patient.

Patients are asked to complete the BmPROM independently before their first treatment and after the final one. It is freely accessible and available for all practitioners to use. However, the online version is exclusively available only to Physio First members who are signed up for Dfi.

The University of Brighton research team collates the received data and, at each data download, usually carried out January, May and September each year, participating practitioners receive feedback specific to their own practice. This personalised report includes information on the number of patients who completed the online BmPROM at the pre and/or post treatment stages, and breaks the data into the functionality and wellbeing scores, noting the changes that have taken place post treatment.

As the BmPROM is completed by the patient independently of the practitioner, it is a robust process that gives our data scheme increased credibility and validity. We are aware of the reality that not every patient will complete both the initial and the discharge data, but the more we can encourage, and make it as easy as possible for our patients to do, the better we can be at proving our outcomes and quality as private physiotherapy practitioners.

September 2020 download

BMPROM AND DFI DISCHARGED DATA TOTALS

- 109 practitioners have used the electronic BmPROM facility in addition to their data inputting
- In total, we have 7,259 BmPROM data entries
- Of these, 5,239 were pre-treatment BmPROM entries
- 4,878 BmPROM entries have been matched to a practitioner four letter code (91% match)
- Of the 4,878, 1,213 matched to a corresponding, post-treatment BmPROM data entry
- 24.8% of all of those data sets matched to a practitioner code had pre- and post- measures.

We have a total of 65,053 discharged data sets to the Dfi scheme from which to gather our data and prove our effectiveness.

These are impressive numbers, but we need more! The more data we collect means we have more robust statistics to use to prove how effective we are. Please input data from every patient you see.

To use the electronic BmPROM as part of your Dfi data collection contact the University of Brighton Physio First team: physiosurvey@brighton.ac.uk



// BY ENCOURAGING OUR PATIENTS TO COMPLETE INITIAL AND DISCHARGE DATA, THE BETTER WE CAN BE AT PROVING OUR OUTCOMES //

Exciting news: exclusively for Data for Impact participants



For those members who are collecting and submitting data to our Data for Impact (Dfi) tool, we have some really exciting news for you on a new resource from Physio First that is available only to Dfi participants.

Our research team at the University of Brighton (UoB) have been unstacking our large data bank our Dfi participants have inputted over recent years and, from that, they have created some powerful messages that we know will be useful for you in promoting and marketing the value of your practice to your existing and potential patients.

The messages have been collated and formed into straplines and our Physio First communications team created infographics as a powerful and visual way for you to use, and benefit from the data bank to which you have contributed. This information has been produced in the form of an e-booklet that can be downloaded only by Dfi participants.

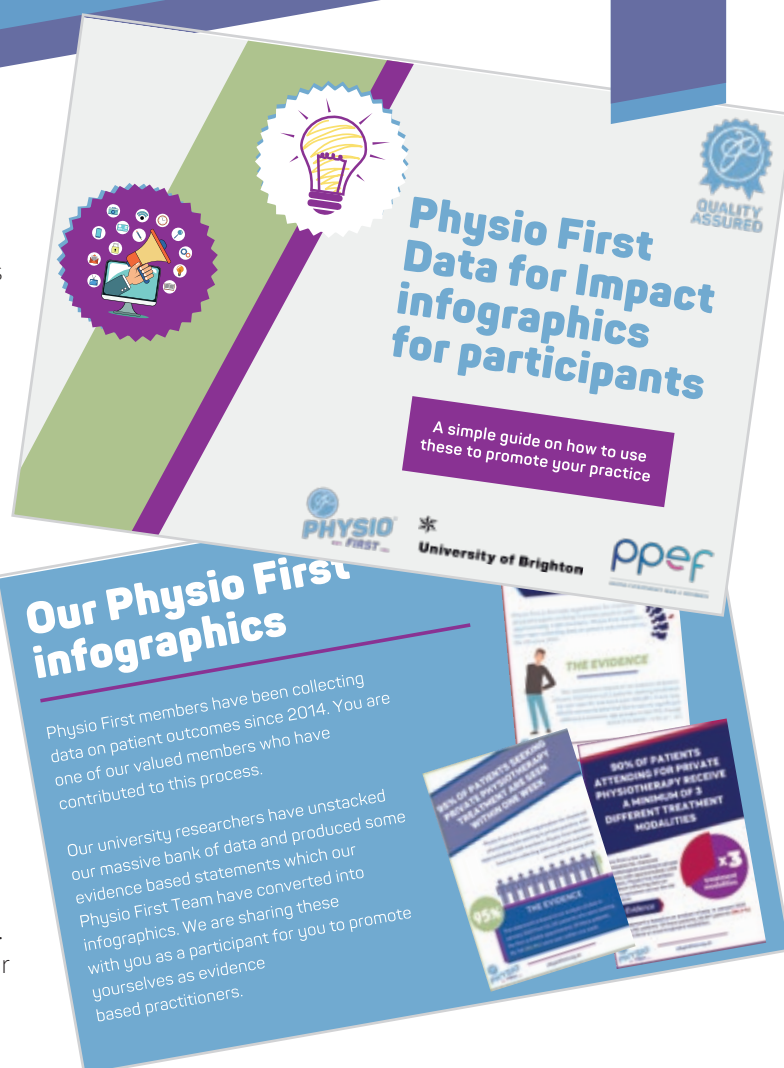
A link to our e-booklet will have been sent to you by the UoB team. This will allow you to access the full collection of infographics for use in your practice, on your website, on social media platforms and in any patient communications, such as newsletters.

The e-booklet also contains ideas about how you can use these infographics to best effect, and suggests ways in which you can communicate how your commitment to collecting data through our Dfi scheme is of value to your patients.

The value of DFI to your patients

If you are unsure about how collecting data through our Physio First Dfi scheme is of value to your patients, here are a few points that explain the benefits:

- Your existing and potential patients can feel confident that they have made the right choice for their physiotherapy treatment because
 - you are taking part in national data collection and are prepared for your practice and treatment methods to be measured
 - you benchmark yourself against national data reports
- Your patient will be fully involved with their treatment pathway and so will play a full part in their own treatment outcomes
- Your individual report from the UoB will give your patient



the benefit of a clear indication of what to expect from their treatment path, and their recovery time.

We welcome your feedback on the e-booklet and infographics. If you have already made use of the information to enhance your marketing and promotion activities for your practice, we would be interested to know what worked for you and any reaction you have received. Please do let us know by contacting us at physiosurvey@brighton.ac.uk

Pam Simpson
Hon Communications Officer

"COLLECT AND SUBMIT DATA TO OUR DFI SCHEME FOR EXCLUSIVE ACCESS TO OUR NEW, POWERFUL MARKETING TOOLS"



A view from the Chair

Changes are coming to our profession

Karen Lay, our Physio First Chairman, reflects on the CSP article written by Larry Koyama and how his conclusions may affect the future development of private practice



First contact physiotherapists – a workforce whose time has come

June 29, 2020 by NAPC

By **Larry Koyama**, Head of FCP Implementation at the Chartered Society of Physiotherapy and NAPC Faculty Member

The case for first contact physiotherapists (FCPs) has always been based on their expertise in managing musculoskeletal conditions, the additional capacity they provide for GPs and the pressures they help ease elsewhere in the system.

As we learn more about the NHS response to Covid-19, it is becoming clear that those fundamental arguments have only been strengthened during the pandemic.

Switching to virtual appointments, whether on the phone or by video, has offered FCPs the opportunity to showcase their ability to assess and diagnose MSK problems while safe-netting for serious pathology.

Supporting self-management is integral to this approach and a survey of physiotherapists working in primary care for the CSP revealed an enthusiasm on the part of patients to act upon this advice.

FCPs use personalised care to enable this self-management and effective management in the community where possible and make appropriate onward referrals where indicated, demonstrating their system wide impact.

As the lockdown continues to ease, and public confidence in accessing health

services returns, we are likely to see a significant backlog of MSK conditions emerging.

This will be a combination of existing problems for which people were reluctant to seek help, and the consequences of physical activity levels dropping as people spent more time at home.

The stress of the pandemic – whether related to health, family or work – could also contribute to more people finding themselves in pain and turning to primary care for help.

It will be crucial, then, that the primary care workforce is designed to take on this challenge.

FCPs can use their expertise to meet this demand, allowing GPs to concentrate on medical cases and the expected increase in appointments sought by people recovering from Covid-19.

The approach is also shown to reduce onward referrals and the number of patients sent for tests, which will help ease some of the pressures experienced elsewhere.

Darren Cocker, GP and Deputy Governing Body Member for Kent and Medway

CCG, has seen the benefits of the role for patients, GPs and the system.

‘In my view and experience FCP are a valued and now essential member of the primary care team,’ he said.

‘The role is effective both in delivering great outcomes and experience for patients but also in our area resilience for practices.

‘Their approach in my experience empowers patients to better self-manage their condition and become less reliant on traditional medical approaches such as analgesia.’

The role is now fully-funded under the GP contract and the results of a national, NHS England-backed evaluation will be released in July to help design services and identify workforce needs.

There is a whole structure in place to support implementation, with guidance on service design, employment models and training, as well as resources for practice staff and for promoting the role to patients.

First contact physiotherapists are a workforce whose time has come. Find out how you can benefit by visiting www.csp.org.uk/fcp.

Karen's comment

This excellent article by Larry Koyama highlights the response of physiotherapists working as first contact practitioners (FCPs) during the Covid pandemic, and emphasises how this has necessitated a change in clinical practice. So, how does the experience of Physio First members working in private practice compare, bearing in mind that private physiotherapists might also be described as 'practitioners of first contact'?

Many of our members work as sole traders, without the benefit of multidisciplinary teams, and are often the first healthcare professional a patient sees. During the national lockdown, it was necessary for our profession to rapidly upskill in the use of online platforms in order to offer virtual or telehealth appointments for patient assessment and treatment advice or exercise prescription, whilst still actively listening to their patients and being alert to red flag presentations.

Even as we make a return to face-to-face appointments, those digital skills learnt will remain as an additional strand for our practices, whether in offering Pilates classes online or addressing how to offer a greater flexibility and ease of access to accommodate the needs and geography of our patients.

Physio First members are also familiar with personalised care, as is evidenced in the responses to our most recent survey on patient demographics; 85% of

patients were self-funding 'returners' or 'word of mouth' referrals. In addition, for those Physio First members who have achieved our kite-mark of Quality Assured Practitioner (QAP) or Clinic (QAC), they will have reported and been measured on individual goal setting and achievement, referral outcomes and PROMs, differences in functional, physical and subjective (FPS) scores, waiting time since referral, and numbers of treatment sessions.

The comments in Larry Koyama's article that FCPs are autonomous health professionals trained to provide expert musculoskeletal (MSK) assessment, diagnosis and first-line treatment, self-care advice and, if required, appropriate onward referral is exactly what Physio First members in private practice aim to achieve.

The skills and knowledge requirements for the FCP role are attained through postgraduate-level MSK learning, and may include independent prescribing skills, injection therapy skills and imaging expertise. There are two national frameworks which outline the skills necessary for the FCP role: the core capabilities framework which details the competencies necessary to deliver high quality, consistent and patient-centred care for MSK patients, and the Advanced Practice framework which recognises the four pillars of advanced clinical practice: clinical capability, leadership and management, education, and research skills of advanced clinical practitioners.

As with all members of the CSP, our private practitioner members hold autonomous clinical responsibility for patients, are regulated professionals and hold appropriate indemnity cover for their scope of practice, and as the implementation of FCP is under way, Physio First is actively looking into how our QAP and QAC members might map their achievement to the Advanced Practice framework in order to provide a career pathway for private practice in MSK delivery.

As Larry Koyama points out in his article, the backlog of MSK cases likely to emerge post Covid and the change in working practices forced on our profession by the pandemic may require a more collaborative way of working, one in which private practitioners have the opportunity to expand on what they are already doing.

I will be attending CSP workshops in the coming months to understand and explore how advanced practice standards can be achieved and hope to report in the spring 2021 edition of *In Touch* on how those of our members who wish to expand their practice to the role of Advanced Practitioner can do so.

Karen Lay
Chairman

"PHYSIO FIRST IS ACTIVELY LOOKING INTO HOW OUR QAP AND QAC MEMBERS MIGHT MAP THEIR ACHIEVEMENT TO THE ADVANCED PRACTICE FRAMEWORK"

PPEF welcomes new trustees

As was announced in the autumn 2020 (172) edition of *In Touch*, we very much regret that we were forced to suspend applications for funds in 2020 due to the financial uncertainty of the Covid-19 situation.

We are, however, delighted to announce that we continue to plan for the future of the PPEF with the aim to review the funding situation in early 2021, and with the exciting appointment of three new members to our board of trustees.

Interviews for the vacant trustee positions took place virtually in August and were ratified at our AGM that was held belatedly on 18 September 2020.

The recruitment of these new trustees was a direct result



of vacancies following our 2019 AGM, and one of our members stepping down this year. We would like to take this opportunity to thank those standing down from the board for their efforts and dedication to the PPEF during their time with us. They have been invaluable in supporting our purpose to help physiotherapy make a difference, and they can be reassured that our three new trustees look forward to being part of building on our strategy for the future.

For many Physio First members, Sue England, Sandy Lewis and Ann Green will need no introduction, but we are pleased to include some short profiles for each of them as we welcome them to the PPEF board of trustees.

Fleur Kitsell, PPEF Chairman

Sue England

Having been one of the first elected trustees in the early years of the PPEF, Sue is returning to the board with a wealth of experience, not only from her 40 years as a clinician, but also as past Chair of the Chartered Society of Physiotherapy Charitable Trust. Sue was one of the first physiotherapists in the UK to carry out clinically based randomised controlled trials, as well as several small research projects. She also worked on and piloted the first therapeutic clinic-specific software in her practice, where she continues to work as a busy clinician.

Sue's passion and enthusiasm for the future of the PPEF, her financial understanding of grant awards, her knowledge of the legal requirements of the Charity Commission, and her prior involvement in various charity projects mean that she will be an invaluable asset to the PPEF board of trustees.



Ann Green

Ann has spent most of her physiotherapy career in the higher education sector and, until recently, was directly involved in teaching, research and leadership within a team of physiotherapists.

Throughout her career, Ann has been actively involved with the Chartered Society of Physiotherapy where she has held several roles including that of Chair of Council.

Having retired as Head of Life Sciences at Coventry University in September, Ann feels that this is now the perfect time to channel her energy and experience into supporting the work of the PPEF. Amongst the skills Ann brings is her recent research into, and understanding of the role of social media in professional networking. She has given presentations nationally and internationally on this area of communication that we are sure will help us to positively promote the understanding of the need for good quality physiotherapy practice, and publicise to a wider audience the excellent opportunities and research activities the PPEF has to offer.



Sandy Lewis

As the Physio First representative to the PPEF over the past six years, Sandy is not new to our objectives as a charitable organisation. Her appointment to the board of trustees will build on that experience and understanding and will give her the opportunity to contribute further in helping to develop our direction and strategic aim to offer excellent education opportunities to promote the physiotherapy profession.

In her 48 years as a clinician, business owner and in various volunteer roles, Sandy has gained a range of skills and knowledge. These include the ability to work collaboratively and with respect for others, problem solving and proactive listening, all of which are as important for a role in delivering our PPEF objectives as they are in a clinical setting. In addition, Sandy's past experience with the PPEF means she understands how applications for funding are assessed and the value of research and education in best clinical practice. She has an awareness of the impact charitable funding has on physiotherapy and we look forward to her being a member of our team in seeking to benefit the education of physiotherapists and their patients.





Tips from the team



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haven't already done so, please take the opportunity to connect with your Physio First colleagues and friends via our private forum. You can find out more about being part of this resource in the benefits section on our website www.physiofirst.org.uk/benefits



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Book reviews

If you have recently read a physiotherapy-themed book that you think would benefit fellow members, and that you would like to share, or if you would like to join our *In Touch* review team, please contact our **Book Editor SUSANNAH SOLT** susannah@activenowphysio.com



Baxter's The Foot and Ankle in Sport

David A Porter and Lew C Schon

Publisher: Elsevier | **ISBN:** 9780323549424 | **RRP:** £168.29 (hardcover)

My first impression of this book was how thorough and comprehensive a review of the foot and ankle it is. The introduction chapter is a brilliant refresher for any therapist, and the incredible detail within this whole publication is a great point of reference for the anatomy and pathology of this body region.

Any physiotherapy clinic treating the sporting foot and ankle will find that all sports are reviewed, not just the most obvious ones, which is something as a running, track and field specialist, I particularly liked.

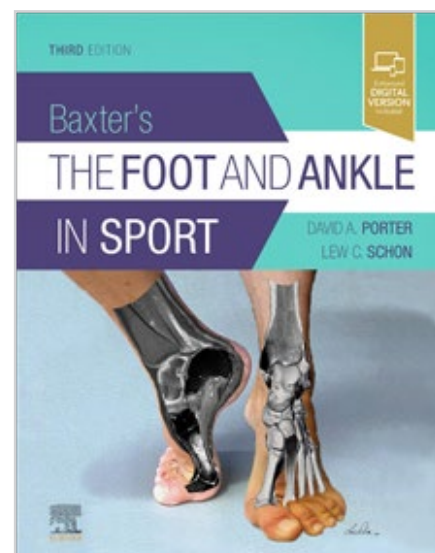
There are very good medical and surgical guidelines and protocols covered, which gives the reader full awareness of all treatment options available. Post-operative guidance for rehabilitation of the foot and ankle is nicely set out but, as it is

not purely written for physiotherapists, the role of this book is not about giving advice on hands-on techniques.

My only disappointment was in the lack of information on the plantar fascia, as this is an area of interest to me. However, the chapter on the Achilles is excellent and I particularly liked two chapters that outlined stress fractures in detail, and covering the background on the causative affects.

From my first impression, I did wonder whether there might be more of the lovely "pearls" of key facts included, but well done to the authors for producing a great point of reference for the foot and ankle region. It is one that I'm sure I will continually keep referring back too.

Sarah Connors
Sarah Connors Physiotherapy



Medical Therapeutic Yoga

Ginger Garner

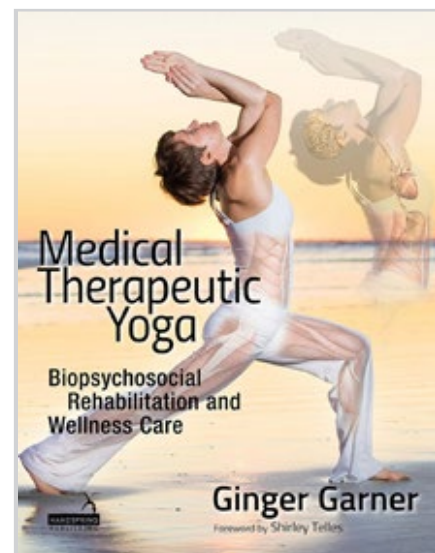
Publisher: Handspring publishing | **ISBN:** 9781909141131 | **RRP:** £37.50 (paperback)

I have nothing but good things to say about this book. Ginger Garner manages to marry in-depth anatomical knowledge, physiological responses to yoga with clinical application including the assessment of body structure through self-exploration and treatment, with graded yoga exercises. The book is stacked with easy to understand diagrams and photographs and the author explains the

reasons for various presentations and the considerations for treating these in a very holistic fashion.

If you are a practitioner looking to incorporate yoga into your clinic, or to enhance the knowledge and skills you already have, this well-balanced, non-dogmatic book is just the thing you need.

Tobias Bremer



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COPY DATE FOR *IN TOUCH* 174 SPRING EDITION 2021 – 05 FEBRUARY

Published by Physio First.

Physio First, Minerva House, Tithe Barn Way, Swan Valley, Northampton NN4 9BA.

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Design and production by Pages Creative (Cheltenham) Ltd.

www.pagescreative.co.uk

Printed by Severn, Gloucester on FSC® Essential Silk to ISO9001 quality and ISO14001 environmental standards.

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