

Editorial

Recent Advances and Developments in the Management of Soft Tissue Injuries

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Although most attention is given to bones in trauma and orthopaedics, soft tissues form a crucial component of the musculoskeletal system. Soft tissue injuries can occur with fractures and without and include a wide and heterogeneous range of injuries. In this issue we cover a range of these topics including tendon and ligament injuries around the knee, wrist and spine with a relevant emphasis on sports injuries. We also discuss recent tissue engineering developments and preclinical studies in dealing with these difficult injuries. We also look at the use of prophylactic antibiotics in preventing infection of traumatic injuries, the current evidence for the management and soft tissue debridement of open fractures, and compartment syndrome.

ACL rupture is a common injury, particularly among young sporting adults. Early onset osteoarthritis can be a devastating and difficult to manage consequence of such an injury. The techniques for reconstructing the ACL are advancing all the time, but the effect that this has on the progression of osteoarthritis is less well understood. Many factors affect the development of osteoarthritis following an ACL injury, including direct and indirect trauma to the articular cartilage, associated meniscal injuries, chronic tibiofemoral joint instability, and multiple enzymatic pathways. Norris *et al.*, discuss the effect of Anterior Cruciate Ligament (ACL) reconstruction on the progression of osteoarthritis. Their review summarises the current evidence surrounding each of these areas, and describe some of the recent developments that may have an impact on the management of these injuries in the future.

Lateral wedges were originally proposed to manage medial compartment osteoarthritis of the knee but recent reviews suggest that lateral wedges do not affect disease progression. Malvankar *et al.*, present a systematic review of the recent literature looking at how effective lateral wedge orthotics are in treating medial compartment osteoarthritis of the knee. The authors performed a systematic review to

analyse the recent literature and define how effective, if at all, lateral wedges are in the management of medial compartment osteoarthritis of the knee. Although there was not enough evidence in the literature to prove that lateral wedge orthotics are an effective treatment for varus osteoarthritis of the knee, there was some evidence to suggest that they do have some symptomatic effect. Patients with early osteoarthritis and higher Body Mass Index (BMI) may benefit to a greater extent than those with a greater extent of degenerative changes and lower BMI. The literature is unclear as to what the optimal duration for the use of lateral wedges is, but does support the prolonged use of the wedges as the benefits at one month are maintained at one year. Future studies should be randomised controlled trials with a large sample size with long follow-up, and use objective clinical, biomechanical and radiological outcome measures.

Saithna *et al.*, present a systematic review looking at the use of eccentric exercise protocols for patella tendinopathy and try to determine whether we should be withdrawing athletes from sport. An earlier review had concluded that athletes with patella tendinopathy should be withdrawn from sport whilst engaging in eccentric exercise rehabilitation programs. However, deprivation of sport is associated with a number of negative psychological and physiological effects. Withdrawal from sport is therefore a decision that warrants due consideration of the risk/benefit ratio. The aim of this study was to determine whether sufficient evidence exists to warrant withdrawal of athletes from sport during an eccentric exercise rehabilitation program. A systematic review of the literature was performed to identify relevant randomised trials. This review has demonstrated that there is no high quality evidence to support a strategy of withdrawal from sport in the management of patella tendinopathy.

The role of growth factors and stem cells in the management of ACL tears are reviewed by Rizzello *et al.* Nowadays, the gold standard for the management of ACL tears remains the surgical reconstruction with autografts or allografts. New strategies are being developed to resolve problems of ligament grafting and promote a physiological healing process of ligamentous tissue without requiring surgical reconstruction. Moreover, these strategies can be applicable in association surgical reconstruction and may be useful to promote and accelerate the healing process. The use

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of growth factors and stem cells seems to offer a new and fascinating solution for the management of ACL tears. The injection of stem cell and/or growth factors in the site of ligamentous injury can potentially enhance the repair process of the physiological tissue. These procedures are still in their infancy, and more *in vivo* and *in vitro* studies are required to clarify the molecular pathways and effectiveness of growth factors and stem cells therapy for the management of ACL tears. Their review summarises the current knowledge in the field of growth factors and stem cells for the management of ACL tears.

Longo *et al.*, present two interesting papers that deal with research in the field of orthopaedics. The first paper deals with animal models of osteoarthritis, and the second paper deals with tissue engineered strategies for pseudoarthrosis. Osteoarthritis is the most frequent and symptomatic health problem in the middle-aged and elderly population and comprises a significant disease burden. The aim of the present study was to perform an overview on the available animal models used in the research field on the osteoarthritis. Discrepancies between the animal models and the human disease are present. With regards to human 'idiopathic' osteoarthritis with late onset and slow progression, it is perhaps wise not to be overly enthusiastic about animal models that show severe chondrodysplasia and very early osteoarthritis. The advantage of using genetically engineered mouse models, compared with other surgically induced models, is that molecular etiology is known. Finding potential molecular markers for the onset of the disease and paying attention to the role of gender and environmental factors should be helpful in the study of mice that acquire premature osteoarthritis. Surgically induced destabilisation of joint is the most widely used induction method. These models allow the temporal control of disease induction and follow predictable progression of the disease. In animals, ACL transection and meniscectomy show a speed of onset and severity of disease higher than in humans after same injury. Numerous classification systems of non-union have been proposed based on: presence or absence of infection, radiographic features, clinical findings, biologic activity, location and shape. The management of pseudoarthrosis is strongly related to the type of non-union (infected versus uninfected, atrophic versus hypertrophic). Surgical management of pseudoarthrosis is generally effective with a success rate ranging from 75 to 100%. Nevertheless, in a relatively high number of instances several combined treatments are required for the fracture healing. The current gold standard to stimulate the bone regeneration is represented by the revision surgery with the application of autologous bone grafts. However, several approaches have been described to promote and enhance the bone tissue regeneration, including extracorporeal shock wave therapy (ESWT), ultrasound, electromagnetic, bone morphogenic proteins (BMPs) and platelet-rich-plasma (PRP). Longo *et al.*, perform a systematic review of the literature evaluating the current therapies to promote and enhance the bone tissue healing. The systematic review was performed according to PRISMA guidelines with a PRISMA checklist and algorithm. Limitations of the present systematic review are mainly related to the scanty quality of the studies available in the literature. Although the therapies previously described for the management of patients with non-unions

seems to be effective, the limitations of the included studies, especially the extensive clinical heterogeneity, make not possible to provide clear recommendations regarding the application of these approaches. The problems remain the need to better understand the most effective treatment options, subject to surgical stabilization as a first step.

Lunate dislocations are well described in the volar direction as part of the perilunate dislocation, sometimes together with fractures of the other carpal bones or distal radius. It is a result of disruption of the complex inter-carpal and radio-carpal ligaments that hold the well conforming carpus in their normal position. Given the strength of these structures a significant trauma is required to cause them to fail. Siddiqui *et al.*, discuss lunate dislocations at the wrist and present an interesting case report of an isolated dorsal dislocation of the lunate. The authors present a case of a patient who not only presented late with relatively trivial trauma that resulted in a lunate dislocation, but it was also in the dorsal direction and not associated with any fracture or neurological compromise. The patient was managed with a closed manipulation and percutaneous K-wire fixation followed by a short period of immobilisation in a Plaster-of-Paris cast. As many volar lunate dislocations may be missed at presentation, the authors suggest that in patients with relatively trivial trauma there should also be a suspicion of the lunate dislocating dorsally, which may be treated successfully without the aggressive open surgery usually required in volar perilunate dislocations.

Cervical spine immobilisation is an essential component of the ATLS® system. Inadequate training in the management of trauma calls and hence failure of early recognition and proper immobilisation of the cervical spine can lead to disastrous consequences. Pre-hospital personnel such as ambulance crews are generally better trained and routinely more involved in the assessment and stabilisation of patients in the field. Bhamra *et al.*, review the current guidelines for cervical spine immobilisation in sports related injuries and present a case study of an injured athlete. The objective of this paper is to highlight the importance of sports related cervical spine injuries and provide a review of the proper guidelines in the early management of these injuries in the pre-hospital and hospital settings. This case study and review highlights the importance of early recognition, assessment, and correct stabilisation of cervical spine injuries both in the field and initial assessment by medical personnel in the hospital. Inadequate assessment, immobilisation and lack of standard guidelines on the management of suspected cervical spine trauma can result in secondary injury. Regular assessment and training of pre-hospital and medical personnel is essential to the proper management of these injuries.

Traumatic injuries cause 5.8 million deaths per year globally. Before the advent of antibiotics, sepsis was considered almost inevitable after injury. Today infection continues to be a common complication after traumatic injury and is associated with increases in morbidity and mortality and longer hospital stays. The use of prophylactic antibiotics in prevention of infection of traumatic injuries is reviewed by Lane *et al.*, Research into the prevention of post-traumatic infection has predominantly focused on thoracic and abdominal injuries. In addition, because

research on sepsis following musculoskeletal injuries has predominantly been on open fractures there is paucity of research into the prevention of soft tissue infections following traumatic injuries. The review analyses the evidence for the role of prophylactic antibiotics in the management of soft tissue injuries. Emphasis is placed on assessing the strength of the presented evidence according to the Oxford Level of Evidence scale. Jordan *et al.*, evaluate the current evidence for soft tissue debridement of open fractures. Open fractures are not uncommon injuries. The management of these types of injuries has long been researched and debated, with no fully conclusive assessment arising. Current guidance from the British Orthopaedic Association and British Association of Plastic Reconstructive and Aesthetic Surgeons is widely accepted as the gold level of therapy. In this paper the authors discuss the current evidence behind the initial management of open fracture type injuries, taking a journey from arrival up to the point of definitive closure, as well as discussing some less widely accepted therapies. Griffin *et al.*, present an update on the management of open lower limb fractures. Open lower limb fractures pose a significant challenging pathology for orthopaedic and plastic surgeons to manage due to the combined soft tissue damage, bone loss and potential vascular compromise. These fractures require extensive team-work and expertise between several surgical specialties and the advice of non-surgical specialties to ensure good clinical outcomes. Extensive research has improved the outcomes of open lower limb fractures and current recommendation on the optimal management is always being

updated to enhance patient outcomes. This review serves to provide an overview of the management of open tibial fractures using current evidence and recently updated UK guidelines. The optimal time for surgical debridement, surgical intervention, providing antibiotics and soft tissue coverage will be outlined as well as the indications for amputation.

Mabvuure *et al.*, present a clinical review of Acute Compartment Syndrome (ACS) of the limbs. ACS of the limb refers to a constellation of symptoms, which occur following a rise in the pressure inside a limb muscle compartment. A failure or delay in recognising ACS almost invariably results in adverse outcomes for patients. Unrecognised ACS can leave patients with nonviable limbs requiring amputation and can also be life-threatening. Where diagnosis is unclear there are several techniques for measuring intracompartmental pressure described in this review. As early diagnosis and fasciotomy are known to be the best determinants of good outcomes, it is important that surgeons are aware of the features that make this diagnosis likely. This clinical review discusses current knowledge on the relevant clinical anatomy, aetiology, pathophysiology, risk factors, clinical features, diagnostic procedures and management of an acute presentation of compartment syndrome.

We hope that all physicians, surgeons, therapists and practitioners involved in the care of soft tissue injuries find this issue useful.