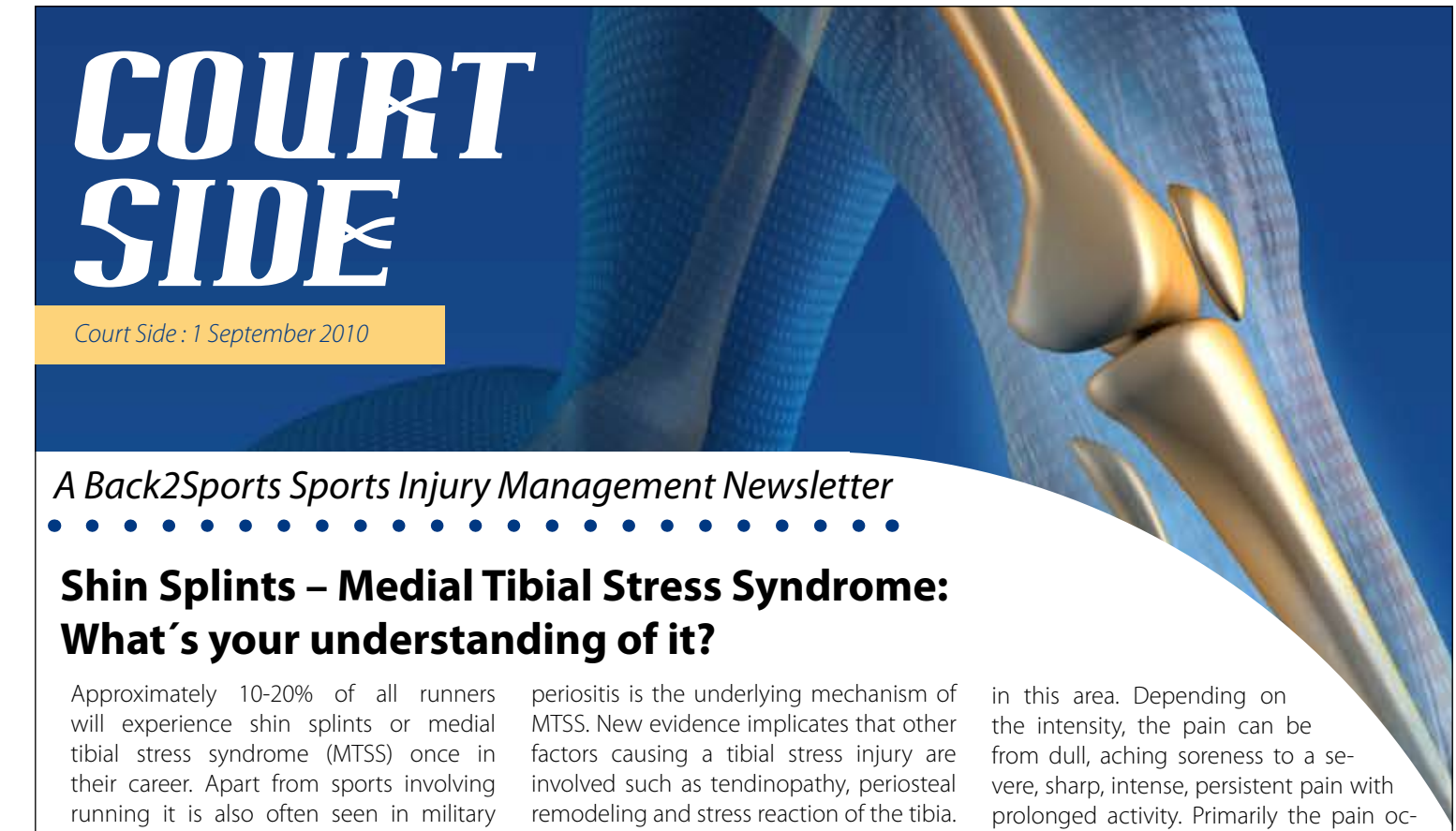
COURT SIDE

Court Side : 1 September 2010



A Back2Sports Sports Injury Management Newsletter

Shin Splints – Medial Tibial Stress Syndrome: What´s your understanding of it?

Approximately 10-20% of all runners will experience shin splints or medial tibial stress syndrome (MTSS) once in their career. Apart from sports involving running it is also often seen in military recruits and ballet dancer. While MTSS accounts for nearly 60% of all overuse injuries seen in the leg, the real cause is not well known and is often multi-factorial including biomechanical abnormalities and training errors. Even if it might be not a serious injury it can be debilitating and if not adequately treated, can progress to a more severe state. Current treatment and prevention programs are mainly based on expert opinion and clinical experience. This article will review current opinions about cause, symptoms, treatment options and prevention programs.

Definition and Pathophysiology

Shin splints is often simply described by physicians and athletes as lower leg pain which can include tibial stress fracture, chronic compartment syndrome, medial tibial syndrome, soleus syndrome and muscle hernia. This broad description is not consistent with the American Medical Association's (AMA) definition of shin splints: "*pain and discomfort in the leg from repetitive running on hard surfaces, a forcible excessive use of the foot flexors; diagnosis should be limited to musculotendinous inflammation excluding fracture and ischemic disorders*". More widely accepted is the term Medial Tibial Stress Syndrome (MTSS). Nowadays it is acceptable to use the term shin splints in a descriptive but not diagnostic way, and should only be used to describe lower leg pains which are not due to stress fracture, compartment syndrome or muscle hernia. It is thought by many clinicians that a periositis is the underlying mechanism of MTSS. New evidence implicates that other factors causing a tibial stress injury are involved such as tendinopathy, periosteal remodeling and stress reaction of the tibia. Dysfunctions of several muscles including the soleus, tibialis anterior, tibialis posterior and soleus muscle are also possible sources causing increased stress to the tibial bone. These numerous tibial stress injuries appear to be caused by alterations in tibial loading, as chronic, repetitive loads cause abnormal strain and bending of the tibia.

Others believe that morphologic bone changes as a result of continues bone–stress are the basis for shin splints and attribute the pain to stress microfractures.

In summary, MTSS is an overuse injury or repetitive-stress injury of the shin area where various stress reactions of the tibia and the surrounding musculature occur and the body is unable to heal properly in response to repetitive muscle contractions and tibial strain.

Shin splints or MTSS is a complex problem where the cause remains unknown and expert opinions are not consistent. Without knowing the real cause treatment and prevention becomes difficult. As with all overuse injuries it is important to distinguish if it is an acute or chronic problem. Two common sites of exercise-induced tibial pain are described posteriomedial and more proximally anteriorlateral.

Signs and Sypmtoms

Usually patients report a diffuse pain along the posteromedial border of the tibia. In some cases a swelling can also be present in this area. Depending on the intensity, the pain can be from dull, aching soreness to a severe, sharp, intense, persistent pain with prolonged activity. Primarily the pain occurs with the onset of activity which can be different from case to case regarding the intensity of the activity. Initially the pain increases at the beginning of running and decreases after a warm up period. In a more progressed state the pain persist during and after workout. Most athletes can run through their pain but will still feel symptoms at the next morning. In a chronic state symptoms are easier to provoke and can even persist during normal activities of daily life. X-rays are usually negative, MRI may show diffuse edema and bone scan are highly detective to show stress fractures.

On palpation there might be local tenderness. Muscle tightness of the soleus, gastrocnemius, hamstring and quadriceps might be present.

Risk and Contributing factors are:

- Overuse
- Muscle fatigue or imbalance
- Adverse biomechanics
- Repetitive axial loading
- Poorly conditioned running
- Hyperpronation of the foot
- Previous injury
- Abrupt increase in training intensity
- Inadequate calcium intake

Although the singular cause for MTSS is not described, Hubbard, Carpenter and Cordova (2009) made a distinction between

intrinsic and extrinsic mechanisms that could have an impact on the development of shin splints.

Intrinsic mechanisms are:

- Altered biomechanics and/or alignment
- Decreased muscle strength
- Decreased flexibility
- Low bone mineral density
- Hormonal change
- External mechanisms are:
- Type of surface the activity occurs (asphalt, grass etc.)
- Running composition and style (uphill, downhill)
- Shock absorption
- Shoe wear

Conditions comprising shin splints can be:

Acute:
- Tibial stress reaction /periostitis
- Traction periostitis, bone strain
- Tendonitis of : Tibialis anterior, Tibialis posterior, Soleus, Flexor Hallucis Longus
- Enthesis, fibrositis, myositis

Chronic:
- Bone stress reaction (periosteal reaction)– microfracture
- Traction periostalgia
- Chronic tendonitis
- Chronic compartment syndrome with associated periostitis and/or periostaligia

Many of these risk and contributing factors can be addressed during therapy but unless there is a better understanding about the true cause of MTSS, attempting to control all the risk factors in our athletes is nearly impossible. So far research failed to show any effective prevention programs but experts seem to agree on 2 etiological components. They include an involvement of the soleus muscle in MTSS and insufficient bone-remodeling capabilities to compensate for persistent insults to the tibia. In accordance to these clinical components the treatment and prevention programs should address:

- Increase strength and endurance in soleus muscle
- Control and reduce over-pronation to decrease stress on the medial fascial attachment of the soleus
- Promotion of adequate shock absorption via appropriate shoes, insoles and maintenance of optimal biomechanics
- A work out 1 day per week which unloads the tibia and allows remodeling of the bone, e.g. pool exercises

Until the causes of MTSS are well known it will be hard to find an effective prevention program. Currently, there is limited evidence (Thacker et al. 2004) for some promising prevention programs which include:

- Shock-absorbent insoles
- Pronation-control insoles
- Graduated running programs.

Conservative Treatment Options

A comprehensive physical examination is required to make the diagnosis of MTSS. This includes assessment of the whole kinetic chain of the lower limb including pelvis, sacoiliac joint and lumbar spine. Stress fractures or other pathologies should be ruled out whereas bone scans or MRI´s showed to be most appropriate. Treatment options are:

Acute phase:
- Rest or "relative rest" (depending of severity) for 2-6 weeks
- NSAID´s are used for pain relief
- Cryotherapy- ice for 15-20 min at affected area after exercise
- Physiotherapy modalities such as soft tissue mobilization, ultrasound, pool exercises

Subacute phase:
- Modify training routine – adjust running intensity and avoid running hills or on uneven or very firm surfaces
- Address biomechanical factors: reduce factors who can lead to an increased tibial stress. This can include:
  - » Manual Therapy for the correction of key dysfunctions in the kinetic chain and to restore normal range of motion and improve symmetry of muscles and soft tissues
  - » Stretching and stretching exercises: especially of the calf muscles, tibalis anterior, hip and core stabilizing muscles
  - » Footwear: appropriate shoes to reduce shock absorption, new shoes after 250-500 miles of running since most shoes lose their shock absorption after this distance
  - » Orthotics: to reduce and prevent over-pronation and optimize biomechanics
  - » Proprioceptive training to improve stability and proprioception
- Other options are: Extracorporeal shock wave therapy (ESWT), acupuncture and splinting/bracing for more severe cases

In general the key treatment is to develop an injury prevention program to avoid and reduce the risk of re- injury. Training errors, alignment abnormalities and poor training techniques should be corrected and minimized as much as possible.

References

1. *Batt, ME 1995, ´Shin Splints - A Review of Terminology´, Clinical Journal of Sport Medicine, vol. 5, pp. 53-57.*
2. *Craig, DI 2008, ´Medial Tibial Stress Syndrome: Evidence-Based Prevention´, Journal of Athletic Training, vol. 43, no. 3, pp. 316-318.*
3. *Galbraith, RM & Lavallee, ME 2009, ´Medial tibial stress syndrome: conservative treatment options`, Curr Rev Musculoskelet Med., vol. 2, pp. 127–133.*
4. *Hubbard, TT, Carpenter, EM and Cordova, ML 2009, ´ Contributing Factors to Medial Tibial Stress Syndrome: A Prospective Investigation´, Medicine & Science in Sports & Exercise, pp. 490-496, <DOI: 10.1249/MSS.0b013e31818b98e6>*
5. *Thacker SB, Gilchrist J, Stroup DF and Kimsey CD 2004 ´The impact of stretching on sports injury risk: a systematic review of the literature´, Med Sei Sports Exerc., vol. 36, no. 3, pp. 371-378.*
6. *Thacker SB, Gilchrist J, Stroup DF and Kimsey CD 2002, ´ The prevention of shin splints in sports: a systematic review of literature´,Medicine & Science in Sports & Exercise, pp. 32-40. <http://www.acsm-msse.org>*

This newsletter is produced by Back2Sports - a division of Core Concepts

We can be reached at
T: 6226 3632 or
E: enquiry@back2sportscom.sg
W: www.Back2Sports.com.sg

BACK 2 SPORTS
SPORTS INJURY MANAGEMENT