Track and Field

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Key Points

- Track and field encompasses a wide variety of throwing, jumping, and running sports with different injury profiles and sporting demands.
- Due to the repetitive nature of many of the events, bone stress injury and tendinopathy are frequently seen.
- Track and field events pose an inherent risk to the athlete and officials.
- Thigh injuries, in particular hamstring strains, are the most common injury type seen.
- Male athletes are more commonly injured than their female counterparts.

Introduction

Track and field (athletics) encompasses a variety of Olympic sports including throwing events, jumping events, sprints, and middle-/long-distance running. Track and field events date back to 884 BC and the first ancient Olympics [1]. Each individual sport carries with it an inherent risk of injury, depending upon the nature of the requirements of the event.

Certain events have a low incidence of acute, traumatic injury (e.g., a "spiking" laceration injury in the 10,000 m). Other sports have a much greater incidence of acute trauma (e.g., hamstring or calf strain in the 100 m). Events such as the pole vault have a low overall incidence of injury but a far greater risk of catastrophic trauma (e.g., cervical spine injury or traumatic brain injury) [2].

The risk of acute illness and injury remains high enough to necessitate having a trackside medical team at track and field events, which normally includes a sports medicine physician, paramedics, ambulance technicians/first aiders, and nurses.

Ideally these personnel should be situated to ensure that all areas of the track and field competition and training arena are covered. Busy athletics meetings can often involve simultaneous track and multiple field events requiring effective communication and vigilance on the part of the attending medical team. It is not uncommon for several medical incidents to occur at the same time, requiring careful rationing of medical resources and personnel.

Extraction of injured athletes from the field of play requires detailed planning prior to the event. It is essential for the medical team to be aware of the nature of the different sports as certain events (e.g., discuss, javelin, and hammer pose an inherent risk to both noncompeting officials and athletes). The environment should always be assessed for potential danger prior to the entry of medical personnel onto the field of play.

Injury Epidemiology

The overall incidence of injury in track and field has been reported at an elite level as 134.5 injuries per 1000 registered athletes during competition [3].

When considering all events at an elite competition, the majority of injuries involve the lower limb (~80%) with the hamstring/posterior thigh being the most common, representing one quarter of all injuries [1, 3]. The most common acute injury in track and field is a muscle strain, accounting for 20% of all injuries.

In general, male track and field athletes appear to be more susceptible to acute injury than female athletes. The majority

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of injuries in major championships occur during active competition, with a greater injury risk seen during finals events, when compared with qualifying rounds [3].

When considering the risk of injury in competition for each event category, the highest incidence occurs among individuals competing in combined events such as decathlon and heptathlon (288 injuries per 1000 athletes), followed by middle- and long-distance runners (176 and 188 injuries per 1000 athletes), jump events (139 injuries per 1000 athletes), throw events (100 injuries per 1000 athletes), and sprint events (84 injuries per 1000 athletes) [1].

Track

Sprint

The sprint events include 100 m, 100 m (women) and110m (men) hurdles, 200 m, 400 m, and 400 m hurdles. Team sprint events include the 4×100 m and 4×400 m relays. Sprinters tend to have greater muscle mass, explosive speed requirements, and are therefore more likely to suffer from acute lower limb muscle injuries such as hamstring, quadriceps, and calf sprains [4]. These injuries present with a sudden, "pulling up" from the sprint position with the athlete commonly grasping the affected muscle group and slowing to a stop with an antalgic gait.

Among men, the 100 m (Fig. 73.1) represents the sprint event with the greatest injury risk, with 147 injuries per 1000 athletes during competition. For women, the 100 m hurdles offer the greatest risk with 205 injuries per 1000 athletes [3].

Initial trackside management of an acute muscle injury includes icing and compression of the affected muscle group. The athlete is then assisted off the track with support/using a carry chair, depending on the likely injury severity. Ongoing management will depend on the extent and location of the injury within the musculotendinous unit, with MRI and/or ultrasound imaging used to grade and potentially prognosticate the pathology.

In younger athletes, with an immature skeleton and unfused bony apophyses, the tendon origin is more susceptible to injury than the relatively strong muscle-tendon unit. Avulsion of the bony apophysis is therefore far more common in the teenagers [5].

It is important for the trackside clinician to consider the possibility of an avulsion injury, particularly around the large muscles originating in the pelvis (e.g., rectus femoris origin, proximal hamstring origin, sartorius origin, iliopsoas insertion). If suspected, the athlete should be cautiously assisted from the track via a non-/minimal weight-bearing method and should be transported to hospital for plain radiography to investigate this injury initially [5]. A bony avulsion injury can often be managed conservatively but will generally require a longer recovery period, when compared with muscle-tendon unit injury.

Hamstring injuries are particularly common in adult sprinters and are seen more frequently in males than females [3]. The biceps femoris is the most commonly injured hamstring muscle in sprinters and is involved in three quarter of all hamstring injuries [6]. Significant early re-injury rates (30% in the first year) require a cautious and diligent rehabilitation approach.

Fig. 73.1 Sprinter Usain Bolt during the World Championships in Berlin 2009 where he ran the current 100 m world record in 9.58 s

The sprint hurdles pose a significant threat of injury to athletes. Sprint hurdlers often fall after colliding with the barrier, which frequently results in trauma that can range in severity from minor track abrasions or "burns" as a result of friction of the skin on an artificial track, soft tissue hematomas and lacerations, to upper limb fractures.

Abrasions occurring as a result of a fall on an artificial track surface are not uncommon. Track "burns" can be painful and often result in particulate debris becoming lodged in the wound. Removal may require irrigation with copious volumes of water (see Chap. 40) to extract solid debris.

Middle and Long Distances

The middle-/long-distance events include 800 m, 1500 m, 3000 m steeplechase, 5000 m, 10,000 m, marathon, and 20-km and 50-km race walk. Middle-/long-distance runners tend to be leaner, have greater endurance requirements, and are more likely to suffer from chronic injuries, as a result of a repetitive/overuse mechanism such as bone stress injury and Achilles tendinopathy. Acute exacerbations of these chronic injuries are most likely seen in a trackside environment [4].

For men, the 1500 m represents the highest risk middle-/long-distance event for injury with 308 injuries per 1000 athletes [3]. For women, the highest risk event is the marathon with 214 injuries per 1000 athletes [3].

Bone stress injuries occur as a result of repetitive bone loading when bone resorption exceeds bone formation. These injuries can range from a minor stress reaction, which responds well to load adjustment, to a cortical fracture, potentially requiring surgical intervention depending on anatomical localization (see Chap. 33). Bone stress injury incidence among track and field athletes is 21% in all disciplines [7].

The most common site for bone stress injury in track and field athletes is the tibia (51%) with the majority localized to the posteromedial tibia. Other common sites of bone stress include the metatarsals (21% of all bone stress injury seen), femur (7%), sacrum (5%), sesamoids (5%), fibula (5%), and navicular (3%) [7].

Risk factors for bone stress injury include previous history of stress fracture, an increase in frequency, duration, and intensity of training loads, inadequate recovery, and hard or cambered training surfaces. In addition to this, biomechanical abnormalities of the lower extremities and altered foot mechanics can contribute to the development of bone stress injury [8].

The female athlete triad is frequently seen in track and field athletes. It describes a combination of menstrual irregularities, disordered eating, and reduced bone mineral density (i.e., osteopenia and osteoporosis) and may predispose an athlete to bone stress injury [9, 12].

Spiking injuries can be seen in track events, particularly in fast-paced, close-packed events such as 800 m and 1500 m, and less frequently seen in events where athletes remain in their lanes such as 100 m, 200 m, and 400 m [10]. Lower limb lacerations, resulting from contact with running spikes, are frequently seen and are usually superficial. They may require closure with sutures or steri strips [11].

Field

Throws

The throwing events include the javelin, shot put, discus, and hammer. Throwing athletes tend to have large muscle mass and greater height in order to optimize throwing distance. For men and women, the event with the highest risk of injury is the javelin with 189 (men) and 179 (women) injuries per 1000 athletes [3].

Blisters and palmar calluses are minor ailments seen in throwing athletes, resulting from repeated skin friction with the throwing object such as discus and javelin [4].

Upper limb injury is common in throwing athletes with shoulder pathology frequently seen. Rotator cuff pathology and subacromial pain syndrome (impingement) resulting from the demands of recurrent upper limb loading in an overhead position are also frequently observed [4].

Elbow injury, in particular UCL sprain, is seen in javelin-throwing athletes as a result of recurrent hyperextension of the elbow with valgus stress [4]. This may result in chronic UCL laxity or an acute UCL rupture which presents with sudden onset discomfort over the medial elbow joint, usually on release of the javelin. This requires thorough assessment, early offloading with a brace preventing excessive valgus stress, and investigation to determine the extent of the injury and likely prognosis, and management strategy.

Throwing events may place spectators, officials, and other athletes at risk of serious injury. In particular, caution must be exercised with javelin and hammer throw, with occasional high-profile trauma incidents resulting from errant throws. Landing areas must be clearly marked, and officials must maintain concentration at all times. In addition to this, throwing cages should be used for hammer and discus throw to reduce the risk of nonathlete injury.

Jumps

The jumps events include the high jump, long jump, triple jump, and pole vault. Jumping athletes tend to be lean and require explosive power to optimize jump distance or height.

Achilles and patellar tendinopathy (jumper's knee) are frequently seen in jumping athletes as a result of the repetitive nature of their training and competition. These injuries usually present with gradual onset, progressive discomfort localized to the anterior knee or posterior ankle.

Acute Achilles or patellar tendon rupture should be suspected in jumping athletes with a sudden onset of posterior ankle pain and collapse or anterior knee pain and loss of the extensor mechanism function such as inability to actively straighten the knee (see Chap. 34). If suspected, the athlete should be cautiously assisted from the trackside environment to the medical room for a formal assessment, ideally with point of care ultrasound.

For men and women, the highest risk jump event is pole vault with 276 (men) and 143 (women) injuries per 1000 athletes [10]. Pole vault also represents the track and field event with the single greatest risk of mortality, as a result of landing directly onto the head or neck from a height [4]. Catastrophic injury in pole vaulters is infrequent, with 11 major head injuries, four spinal fractures, one brain stem injury, and one pneumothorax in the USA over a 9-year period with two athlete deaths resulted from direct head trauma [2].

It is imperative for the medical personnel stationed by the vault to be well versed in acute traumatic head and neck injury management, including the use of manual in-line stabilization (MILS) techniques. Jump mat extraction can be complex as the surface is undulating and liable to destabilize once the medical team approaches the athlete. Moulage (practical hands-on) training prior to the event ensures that a plan of action has been established and that the paramedical team is aware of their roles and responsibilities in such a scenario.

What Is Unique About Track and Field Injuries?

- Track and field encompasses a wide variety of different disciplines with different injuries.
- Acute injuries can mostly be observed during competitions.
- Chronic or overuse injuries are often seen in training.
- Injuries are mostly sustained through noncontact as a result of musculoskeletal injuries or ligament sprains.
- Equipment failure is rare but can lead to significant injury.

What Do the Physicians Need to Know While Covering Track and Field Events?

- Knowledge of mechanisms and athletic discipline is important to diagnose and treat injury.
- Acute muscle injuries such as hamstring strains are common in sprinting events.
- Exercise associated collapse (EAC) is one of the most frequent causes of collapse seen mostly at the finish line of longer distance events (e.g., 10,000 m and the marathon). Runners generally recover quickly and fully [13].

General Rule About Return to Play

- Any athlete with suspected severe injury should be held from further competition until further assessment.
- Athletes with minor injuries may be allowed to continue competing, but the injury may have impact on performance.

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