Recognition of Complete Muscle or Tendon Ruptures

DALE J. BUTTERWICK, CAT(C), MSc • University of Calgary

Complete muscle–tendon ruptures occur rarely in some sports and with some regularity in others. One example of this condition specific to a sport is the avulsion of the extensor digitorum from the distal phalanx, which occasionally occurs in ball-handling sports such as baseball and basketball (Arnheim & Prentice, 2000). Ruptures of other muscle–tendon units might be more population-specific, such as rotator-cuff tears, which occur regularly in athletes over the age of 40 with degenerative tendons and in the under-35 age group participating in sports requiring explosive throwing-type motions of the upper extremity (Jobe & Pink, 1993). Although they occur rarely, pectoralis major muscle–tendon ruptures have been reported in sports such as football and hockey, in strength-training activities such as the bench press (Schepsis, Grafe, Jones, & Lemos, 2000), and in gymnastics (Carek & Hawkins, 1998).

Key Points

- Complete muscle–tendon ruptures are rare in most sports.
- A high index of suspicion is essential for the recognition of a complete muscle or tendon rupture.
- The history taken during the assessment must include a verbal re-creation of the actual injury-producing moment.

Key Words: rodeo injuries, muscle–tendon rupture

During the past 17 years a group of certified athletic therapists has created a team of health care providers including physicians, chiropractors, massage therapists, and physiotherapists to provide health care to professional rodeo athletes in Canada. Their role is to provide preevent preparation and on-site injury evaluation and management. Most rodeos do not have physicians present; consequently, injured rodeo participants often consult the athletic therapist about an injury before being referred to a physician. Because an athletic therapist is typically the first practitioner a rodeo participant will see in Canada, it is critical to perform a thorough musculoskeletal assessment, including appropriate muscle testing. In this professional-rodeo setting, many contestants have presented with complete ruptures of the distal biceps tendon and tendons of the long head of the biceps, finger extensors, pectoralis major, supraspinatus, and even one latissimus dorsi tendon rupture. Not all of these were recognized by the first examiner.

This experience in professional rodeo is not representative of all sports, because other sports have infrequent incidence of complete muscle ruptures. I have worked with two different Canadian university football programs as the head athletic therapist for 23 of the past 26 years and have witnessed ruptures only of finger-extensor tendons and various noncontractile tissues. Some athletic settings have infrequent severe muscle or tendon injuries, and thus student athletic trainers and therapists and professional health care providers early in their careers might not recognize complete muscle–tendon ruptures. The purpose of this article is to provide guidelines for recognizing complete muscle or tendon ruptures in athletes. Proficiency in the following assessment components is necessary in order to avoid false-negative impressions when evaluating athletes who have sustained complete muscle–tendon ruptures.

Index of Suspicion

One essential requirement for the recognition of a complete rupture of a muscle or tendon is a high index of suspicion that this event might have occurred. Knowledge about sport-specific mechanics, an understanding or estimation of the potential forces involved in typical injury-producing situations, and familiarity with related injury-prevention equipment provide a member of the health care team with certain impressions about the potential injury-producing mechanisms that occur in the sport in question. Experience and understanding of the injury potential in any sport should facilitate optimal preparation for the role of caregiver in that sport. Part of the preparation for effective injury assessment is to identify the worst-case scenario that is likely to occur and to prepare management strategies for it. This preparation should include both recognition and management strategies for complete muscle or tendon ruptures.

Safran, O'Malley, and Fu (1999) cited an appropriate index of suspicion as an important element in assessing soft-tissue injuries. Descriptions of case studies reporting rupture of the pectoralis major at or near the muscle–tendon junction (Kawashima, Sato, Torisu, Himeno, & Iwabuchi, 1975) include an index of suspicion as an essential prerequisite to the recognition of complete muscle–tendon ruptures. These cases illustrate that the more complete the knowledge about a particular sport, the more likely the index of suspicion will be appropriate to the injuries sustained by athletes in that sport.

Subjective

History taking must include a verbal re-creation of the actual injury-producing event. It is critical to establish a conceptual model of what actually happened to the athlete. Failure to establish such a conceptual model is common in the assessments made by inexperienced examiners or those with a low index of suspicion. Authors have addressed history taking in various ways, but in the context of a complete rupture of a muscle–tendon unit, the following have been reported as relevant. First, there is a description of muscle contraction against tremendous resistance (Ncube & Singhal, 1991), including weight training (Schepsis et al., 2000). These forces occur regularly to rodeo participants including bull riders and steer wrestlers. The riding arm, with which a bull rider maintains his grip, is often no match for a bucking bull weighing between 1,200 and 2,000 lb. Similarly, a steer wrestler must cope with tremendous forces such as a running steer, a running horse (from which he dismounts onto a steer at a full gallop), and the forces involved in stopping the steer and twisting it to the ground. These situations test human skill and strength against tremendous resistance.

Some patients describe a "crack" (Kristensen, 1991), "snap" (Carek & Hawkins, 1998), or tearing sensation, followed by an immediate feeling of loss of power (Kristensen; Gaffney, 1997). Authors have also reported no functional loss after acute serratus anterior rupture (Gaffney). Pain varies from severe (Kawashima et al., 1975; Ncube & Singhal, 1991) to a complete absence of pain while at rest (Gaffney). Although middle-aged (Dobbie, 1941) and degenerated tendons are reported as prerequisite to rupture (Davies & Yassine, 1956; Jarvinen, 1992), these injuries also occur in young athletes (age 21; Gaffney; Carek & Hawkins). The mean age of pectoralis major tendon rupture reported by Schepsis et al. (2000) was 29 years in a group of 17 patients. Hypesthesia has been reported in the case of a ruptured pectoralis major (Kawashima et al.). Obtaining a careful, complete history, coupled with knowledge and experience in sport-specific athletic health care, provides the examiner the background necessary to have an appropriate index of suspicion.

Objective

There is great variation in the visual image at presentation, depending on both the amount of time since injury and individual patient differences. Some patients have obvious ecchymosis (Carek & Hawkins, 1998; Kawashima et al., 1975; Ncube & Singhal, 1991; Schepsis et al., 2000) and local swelling (Carek and Hawkins; Kawashima et al.; Schepsis et al.), and others have no ecchymosis, even in an acute case (Spinner, Speer, & Mallon, 1998). Obvious deformities such as an unusual fullness or mass, displacement or retraction of a muscle belly, or an apparent defect might be present (Kristensen, 1991; Ncube & Singhal; Spinner et al.) either immediately or during the first 24 hr. Figure 1 illustrates the obvious deformity, including muscle