GETTING A GRIP OF ROCK CLIMBING INJURIES

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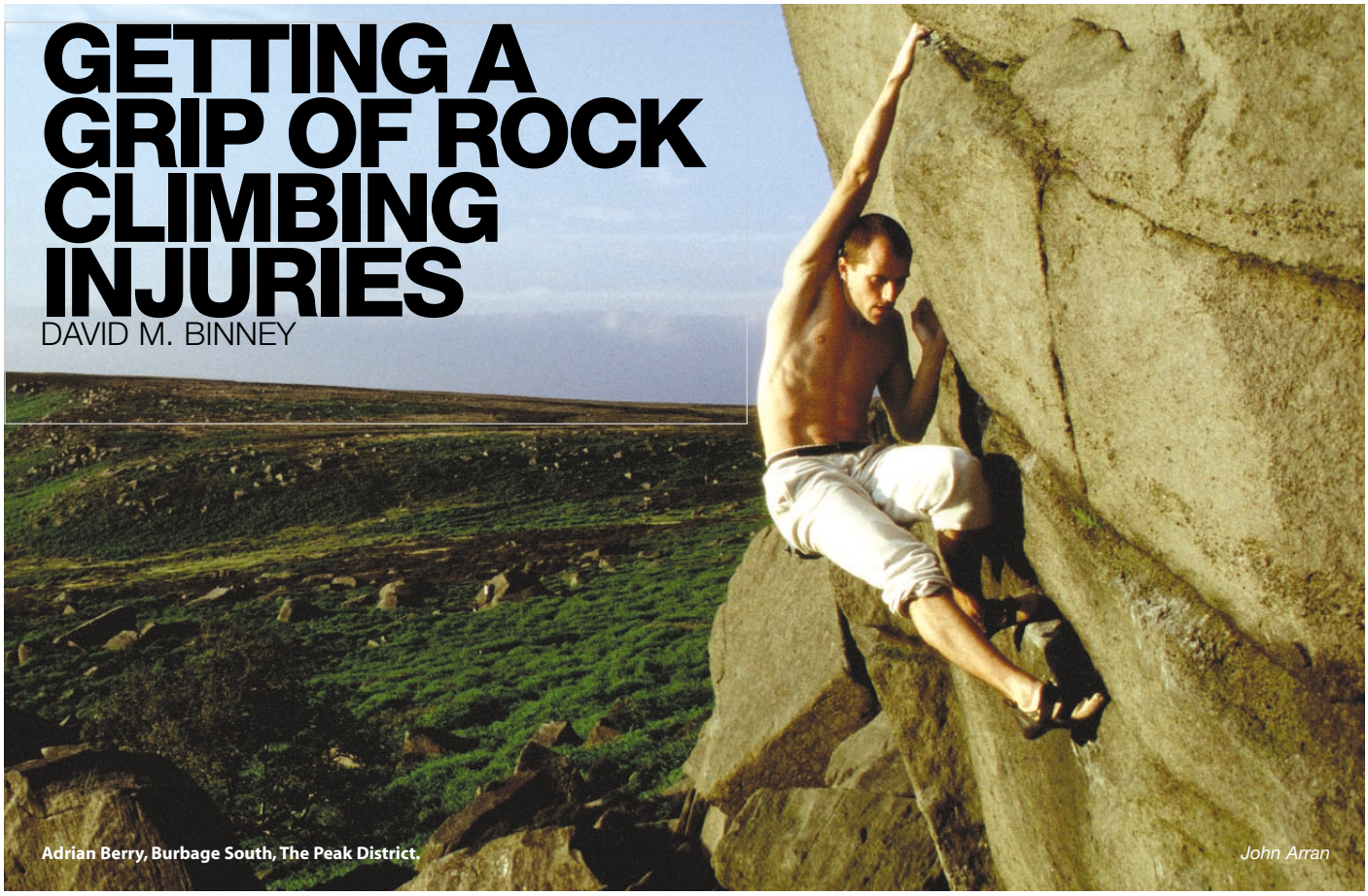


Adrian Berry, Burbage South, The Peak District. John Arran

CLIMBING IS AN INCREASINGLY POPULAR LEISURE ACTIVITY AND INJURIES ARE ALL TOO COMMON. INJURED CLIMBERS MOST FREQUENTLY SEEK MEDICAL ADVICE FROM THEIR GENERAL PRACTITIONER THEREFORE INCREASED AWARENESS AND KNOWLEDGE WILL HELP IMPROVE THE QUALITY OF CARE DELIVERED TO THIS GROUP OF PATIENTS. THE AIMS OF THIS ARTICLE ARE TO GIVE AN OVERVIEW OF THE SPORT OF ROCK CLIMBING IN ORDER TO PROMOTE UNDERSTANDING OF THE ATHLETE AND THE DEMANDS OF THE SPORT. USING CASE HISTORIES IT WILL DEMONSTRATE THE AETIOLOGY, DIAGNOSIS AND TREATMENT OF COMMON INJURIES.

BACKGROUND INFORMATION

Climbing, an activity that was born out of alpine mountaineering has, in modern times, gained an identity of its own. Although usually performed on the rock faces of low level mountains or rocky outcrops, climbers will climb almost any object sufficiently challenging, and large enough.

The major climbing activity of today is 'free climbing'. This involves the scaling of rock faces or boulders without the use of mechanical devices to aide progress. There are four main forms of free climbing. In Traditional (Trad) Climbing and Sport Climbing the climber is attached to a rope, which he/she anchors at intervals to the rock to safeguard a fall. The rope is linked to the anchors using an oval metal gated link called a karabiner. Trad climbing uses temporary safety devices which are placed by the first climber 'leader' and removed by the climber's partner 'second'.

In Sport Climbing, permanent anchors (bolts) are fixed into the rock, these are clipped to the rope using karabiners by the leader and unclipped by the second.

Bouldering and Soloing free the climber from the constraints of placing protection in order to concentrate on the movements. Bouldering takes place only a few metres above the ground and therefore does not require a rope.

In contrast, Soloing occurs on routes which would usually be climbed with a rope, this requires great mental control to avoid serious injury.

Climbing progress is aided by chalk to prevent hands from slipping on holds and specially designed tight fitting rubber soled shoes usually worn without socks to increase proprioception.

The climber must interpret the ever-changing structure of the rock and move accordingly, thus executing a process called route finding. To facilitate this, climbers develop a repertoire of energy efficient climbing movements which are linked together enabling progress and success.

Early accounts of rock climbing injuries described trauma resulting from falls. These included lacerations, lower limb sprains, fractures, head injuries, spinal injuries and major trauma. Improvements in modern equipment, knowledge and training have greatly reduced these types of accidents. Such injuries usually present to accident and emergency departments and do not come under the remit of this article.

The emergence of modern free climbing has resulted in the concept of training for climbing. Facilitated by improved access to indoor climbing gyms, more people are climbing more often and at higher intensities than ever before. This has increased the incidence and changed the aetiology of rock climbing injuries from impact trauma to overuse injuries.

COMMON INJURIES

As little as 30% of climbers seek professional help after a climbing-related injury and most attend their General Practitioner. In general, most climbers report being unimpressed with the treatment they received, and an 'if you go climbing, what do you expect' attitude is commonly encountered. It is evident that health professionals need more information as to how such injuries can be managed.

Epidaemiological studies of rock climbing injuries have reported that more than 65% are due to overuse. Taking all types of injuries into account, almost 90% affect the upper limb with between 40% and 60% affecting the hand. Lower limb injuries do occur, fractures and sprains of the lower leg due to a fall are relatively common. However, we shall concentrate on the far more common upper limb injuries.

Dynamic loading of the upper limb can lead to acute injury. However, the repetitive training required to perform high intensity movements in free climbing can lead to microtrauma involving all of the osteoarticular chain of the upper limb and chronic injury. When a chronic injury exists, acute injury of an already weakened ligament or tendon is more likely.

The following three case histories demonstrate common climbing-related injuries, their aetiology, diagnosis and treatment.

CASE 1

A 26 year-old male who had been climbing for six years presented with a six month history of intermittent right anterior shoulder pain, worse on lifting the arm above shoulder height. On examination there was tenderness over the upper anterior aspect of the shoulder. Abduction of the shoulder produced pain when the arm was between 80 and 120 degrees to the body.

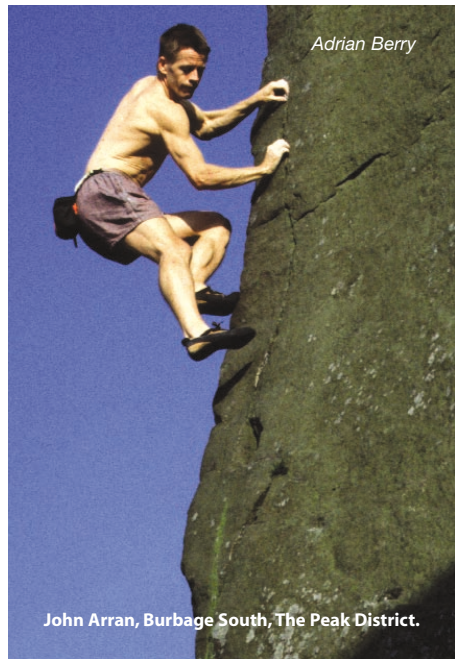
Shoulder injuries account for between 25% and 30% of all climbing injuries. Prolonged and repeated arm movements above shoulder level can lead to muscle imbalance resulting in malposition of the scapula and impingement of the supraspinatus tendon causing tendinitis. Initial treatment comprises rest and non-steroidal anti-inflamatories, whilst maintaining mobility. Long-term treatment involves specialist physiotherapy to re-educate motor unit recruitment thereby maintaining optimum scapula positioning and resolution of the tendinitis.

CASE 2

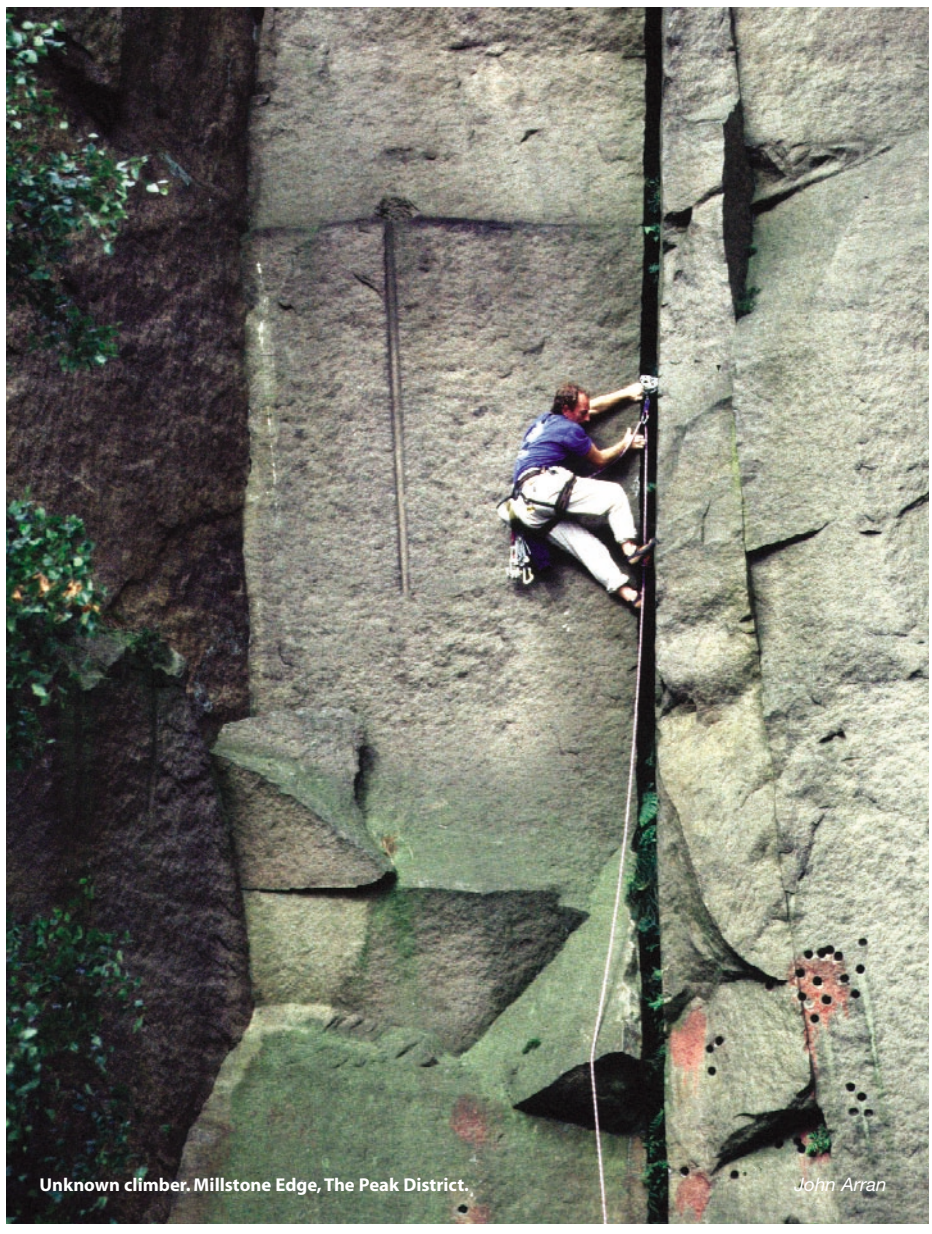
A 32 year-old male who had been climbing for two years presented with a three month history of pain over the inner aspect of the elbow. On examination there was tenderness over the medial epicondyle, flexion of the wrist against resistance caused acute pain in this same place. Elbow injuries account for 20% to 30% of climbing injuries. Repeated flexion of the wrist and fingers can lead to medial epicondylitis. Treatment in the acute stage involves rest, ice, and non-steroidal anti-inflamatories whilst maintaining mobility. Climbing can continue with avoidance of painful movements. Physiotherapy involving ultrasound treatment may be helpful. Long-term treatment involves strength, stamina and mobility training under the supervision of a sports physiotherapist once the initial pain has resolved.

CASE 3

A 22 year-old female who had been climbing for one year presented two months after an acute right middle finger injury. This occurred when her foot slipped from a hold resulting in application of a large sudden load to the finger.



John Arran, Burbage South, The Peak District.


Unknown climber. Millstone Edge, The Peak District. John Arran

On examination there was a fixed flexion deformity of the proximal interphalangeal joint. On palpation, tenderness was elicited over the palmar surface of the proximal phalanx. Flexion against resistance caused pain in the same place. This history is highly suggestive of a flexor tendon pulley injury and when associated with a loud cracking sound is usually indicative of a ruptured pulley. Of hand injuries, the most commonly affected site is the proximal interphalangeal joint, or proximal phalanx of the middle and ring fingers. When using small holds the flexor digitorum profundus is put at a mechanical disadvantage, transferring the majority of the load onto the flexor digitorum superficialis. This puts the flexor tendon pulley system under considerable strain making it prone to injury. Over ambitious novice climbers are likely to be prone to this type of injury. A mismatch between muscle strength and tendon strength can result in relative weakness of the finger tendons and pulley system predisposing to injury from severe shock loading. Bowstringing, visible separation of the flexor tendons from the confines of the pulley system under load, is indicative of severe injury. Rupture of the A3 pulley along with either A2 or A4 if not the entire tendon pulley system is likely. The diagram below demonstrates the sites of these different pulleys.

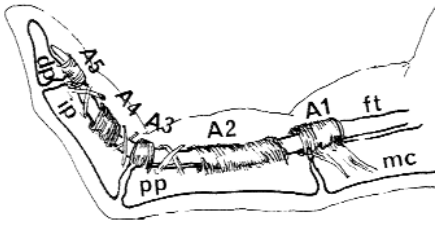
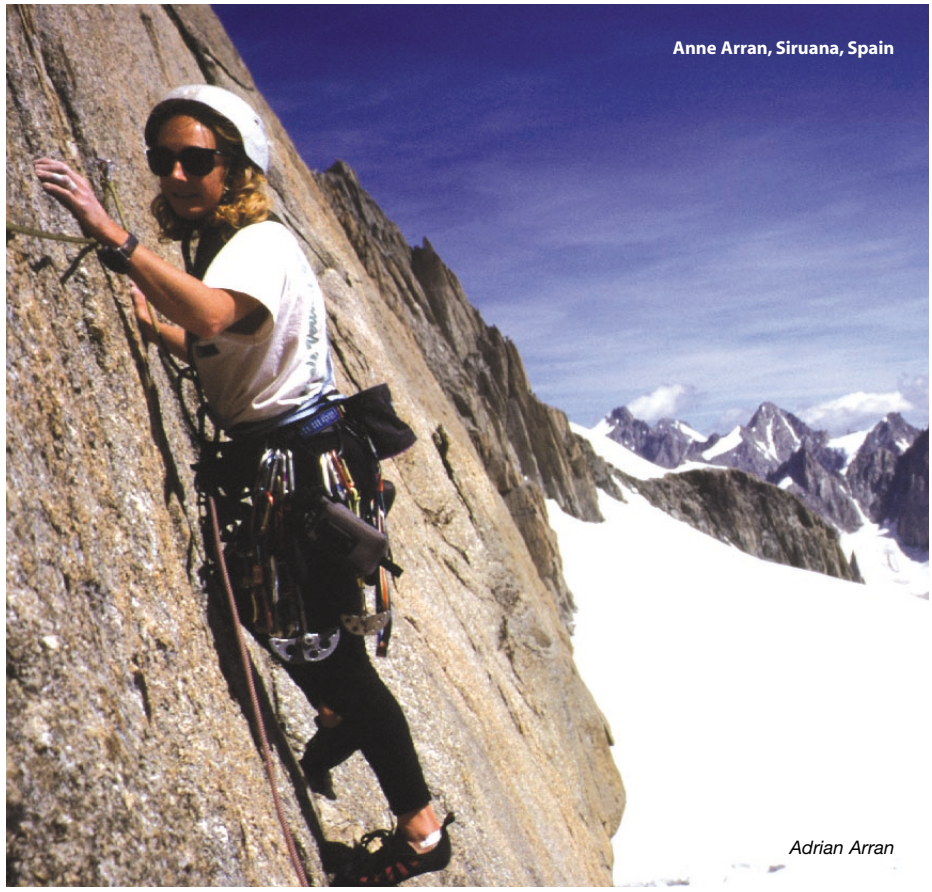


Diagram of flexor tendon pulley system with the hand supinated, mc.metacarpal, pp. proximal phalanx, ip. Intermediate phalanx, dp. Distal phalanx, ft. flexor tendon. Reproduced by kind permission of Gabl et al.

Sagital plane MRI scans of intact and ruptured A2 pulley. Reproduced by kind permission of Gabl et al.

Pulley ruptures are best visualised using MRI8, ultrasound images are more difficult to interpret, standard X-ray films are of little use for soft tissue abnormalities, but may show associated bone injury. The two MRI images show a healthy pulley system on the right with the tendon lying against the phalanx. The picture on the left shows rupture of the A2 pulley.



Treatment in the acute stage involves rest, ice, and non-steroidal anti-inflamatories whilst maintaining mobility. Once the acute pain and swelling have settled, climbing can resume at a lower level of intensity with avoidance of painful movements. Supportive taping can be helpful to protect against further injury. Ultrasound treatment may be of use. Long term treatment involves strength, stamina and mobility training under the supervision of a sports physiotherapist.

This injury is probably more benign than previously thought since climbers identified with pulley rupture can continue to climb at a high standard. However, referral is recommended when a pulley rupture is suspected.

SUMMARY

Climbing is a sport of interdependent components. Strength, endurance, technique and psychological control combine to ensure safety in an environment of potential danger. It is walking this tightrope between fear and arousal that inspires the climber to find a path through the seemingly impossible.

This relatively young sport has undergone considerable change in the last 20 years with the development of training methods which are pushing the human body towards the fine line between maximising performance and developing injury.

Primary care practitioners are ideally placed as a climber's first point of contact to provide effective treatment. However, they need to be aware not only of the common climbing-related injuries, but also the demands of this complex sport. This will promote a better understanding of the underlying aetiology and facilitate effective management. The general principles of acute and long-term management of soft tissue injury are applicable to the common climbing-related injuries. Early referral to a sports physiotherapist is essential in many instances. Recognition of serious injuries and referral to a medical specialist is also of paramount importance.

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