

Hand injuries in competition climbers

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All 67 of the competitors at the first British Open climbing competition were examined for signs of previous or present hand injury. The most important clinical findings were that 26 per cent of the climbers had signs of previous injury to the A2 pulley of the ring finger, and that fixed flexion deformity of the proximal interphalangeal joints of the fingers was present in 24 per cent.

Keywords: Rock climbing, injuries, hand

Introduction

A previous study on the patterns of soft tissue injury in extreme rock climbers, using a questionnaire, identified the hand and wrist as the commonest site of injury¹. Within this region the commonest site was around the proximal interphalangeal (PIP) joint. It was thought from an analysis of the mechanics involved, that this was likely to be flexor digitorum superficialis tenoperiostitis, although increased bow-stringing of the flexor tendons had been noticed in a few cases.

It was therefore decided to carry out a further study, concentrating on hand injuries, to examine these problems in more detail.

The first sport climbing competition of a world-wide Grand Prix circuit organized by the Union International des Associations d'Alpinisme, was held in Leeds in May 1989. To eliminate variations in such things as the weather, and to protect the environment, this was held indoors on an artificial, purpose built wall (Figure 1). Each route increases in difficulty as it gets higher, and the aim is to get as high as possible until falling off, reaching the top, or the set time limit expires. Each competitor is tied into a rope and has to clip this into protection points on the wall as he climbs higher, eliminating the possibility of injury from falling. The authors formed the medical team for this event.

Materials and methods

As part of the qualifying rounds for the international event, a British Open Championship was held, with

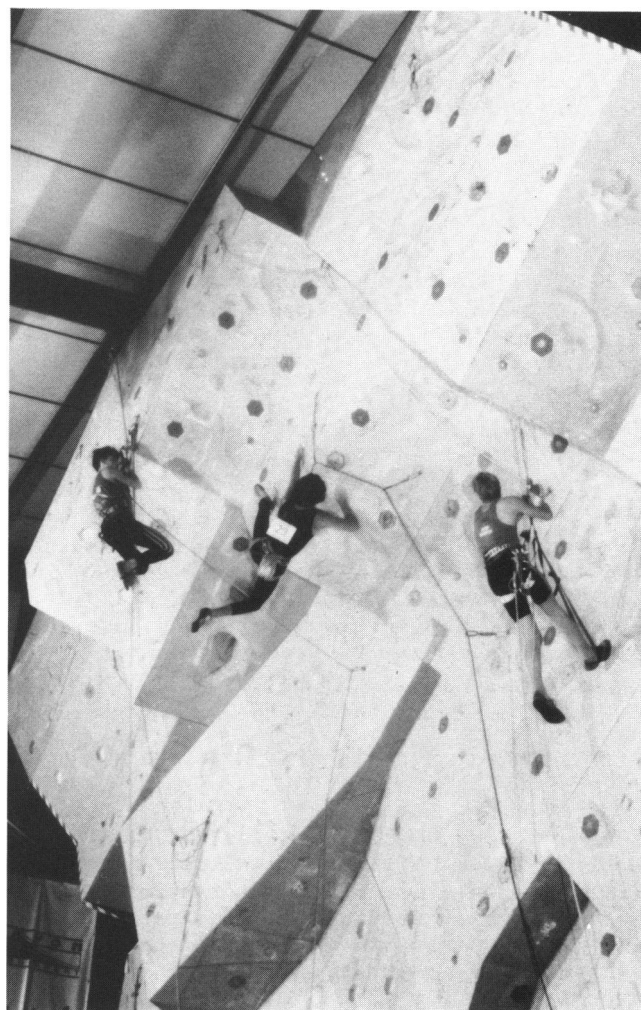


Figure 1. Purpose built climbing wall used for the Leeds competition. A competitor nears the top, watched by two judges.

the first three competitors proceeding directly to the international competition semifinals. Virtually all Britains' top rock climbers took part.

As part of a pre-competition medical check-up, all 67 of the male competitors were examined by the authors, with special reference to hand injuries. In each case, a history of any previous hand injury with mechanism and site, and the relevant clinical findings were recorded on a standard proforma.

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Table 1. Distribution of tendon and ligament injuries in competition climbers

	Right hand	Left hand
A2 pulley injury	12 – Ring finger	6 – Ring finger
FDS tenoperiostitis	1 Ring finger 1 Middle finger	1 Ring finger
Tendon nodule	2 – FDS Ring finger	1 – FDS Ring finger
Collateral ligaments	1 Ulna collateral PIP middle finger	1 Radial collateral PIP middle finger

FDS = Flexor digitorum superficialis
PIP = Proximal interphalangeal joint

Results

There were several interesting findings. The commonest reported previous acute hand injury affected the proximal phalanx of the ring finger (Table 1). There were 18 climbers (26 per cent) with this problem. The injury had occurred either when falling or slipping while holding onto a small hold, or pulling up on a small hold with one or two fingers. This was generally followed by pain and swelling over the volar aspect of the proximal phalanx and a variable degree of bruising. Pain had persisted for several months in some cases.

On examination of these subjects, increased ‘bowstringing’ of the flexor tendons on resisted flexion (Figure 2) when compared with the other hand, was present in all cases (although there was considerable variation in the magnitude of this sign), implying previous injury to the A2 pulley of the flexor sheath.

The other common finding was of fixed flexion deformity of the PIP joints, affecting 16 climbers (24 per cent) (Figure 3). The fixed flexion averaged between 10 and 15 degrees and again, the commonest affected finger was the ring finger, followed by the middle finger (Table 2). The deformities tended to be bilateral. The mean age of climbers affected by this problem was 29yr (range 19–40yr).

The other findings only affected small numbers of climbers. There were two cases of chronic collateral ligament injury of the PIP joint, affecting the middle finger, one ulnar collateral ligament, and one radial

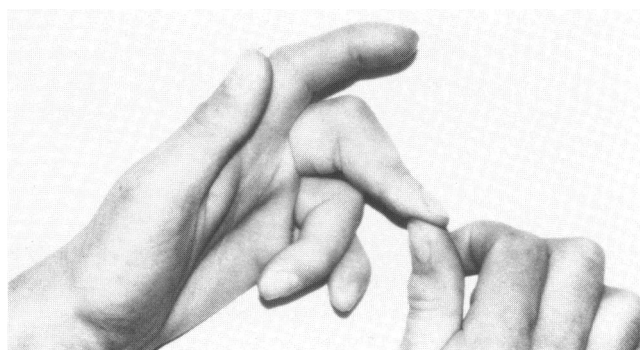


Figure 2. Obvious bowstringing of the flexor tendons across the PIP joint, in a climber not at the competition. This sign is usually more subtle and may only be palpable as opposed to visible. It should always be compared with the opposite hand.

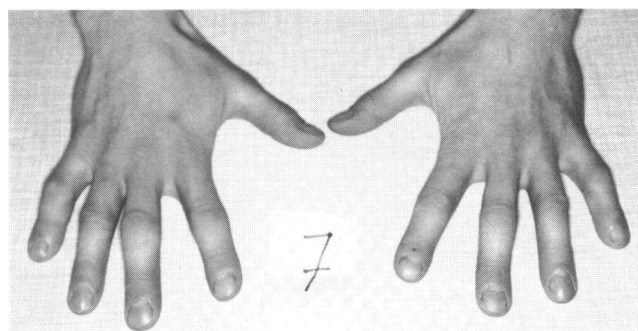


Figure 3. Fixed flexion deformities of the PIP joints.

collateral ligament. These occurred while moving rapidly up (known as ‘dynoing’ to rock climbers) past a small pocket in the rock into which one finger had been inserted as a hold, and not removing the finger in time.

There were two climbers who had flexor digitorum superficialis (FDS) tenoperiostitis at the time of the competition. In one it was affecting the ring fingers bilaterally and in the other the right middle finger.

In three competitors there were palpable nodules in the FDS tendons of the ring fingers following a history of acute injury.

Discussion

There is a lack of work reported in the English medical literature on the afflictions of rock climbers, despite the booming popularity of this exhilarating sport. The standards of technical difficulty have increased enormously, and a fairly standard climber of today will be able to climb routes that were the most difficult climbs of their time 10 or 15 years ago. After the first year of organized competitions, Britain now boasts the world champion sport climber and has other climbers in the world top ten.

Because of the rather anarchic nature of the sport and its’ participants, there has been little guidance for the aspiring climber on appropriate training schedules and techniques for trying to avoid injury. Not

Table 2. Distribution of fixed flexion contractures of the PIP joints in competition climbers

Subject	Index		Middle		Ring		Little	
	R	L	R	L	R	L	R	L
1	+		+	+	+	+		+
2	+	+	+	+	+	+		
3	+	+	+	+	+	+		
4			+	+	+	+	+	+
5			+	+	+	+	+	
6			+	+	+	+		
7							+	
8				+	+	+		
9				+	+	+		
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14					+	+		
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16							+	

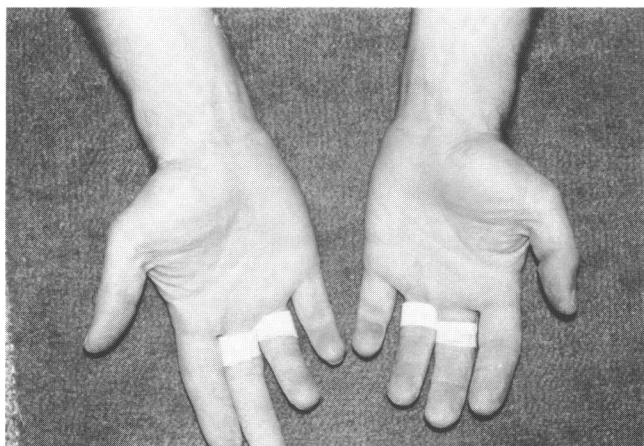


Figure 4. Firm taping around the proximal phalanges of the middle and ring fingers may help prevent A2 pulley injury.

surprisingly therefore, the boom in standards has been accompanied by a parallel increase in the number of acute and chronic injuries.

This study has focused attention on some of the common problems that affect today's high standard rock climber. A2 pulley injury has only recently been described in the literature² and there is still debate as to the correct course of treatment. Surgical reconstruction of pulleys is now technically feasible and these reconstructed pulleys may absorb more energy to failure than the original³. In most minor tears however, this is probably unnecessary and the support of a ring or firm taping during healing may be all that is required.

Whether firm taping of the proximal phalanges of the ring and middle fingers (*Figure 4*) will help prevent injury is unknown, and it is unlikely that a controlled trial is feasible. Experiments to determine the theoretical protection that taping can provide are currently in progress.

Fixed flexion deformity of the PIP joints is another worrying finding in this young group of subjects. It probably occurs because of the joint inflammation

which inevitably happens during the abnormally high loading of the fingers while climbing, or training on finger boards and climbing walls. The fingers are then left in the position of rest as this inflammation settles, eventually resulting in joint contractures. The reason the little finger is spared, despite being the most flexed in the position of rest, is that it is rarely used in power moves on small holds. The fingers used on small moves and pockets are usually the middle and ring fingers. Awareness of the importance of stretching the fingers after hard climbing or training sessions does not seem to exist at present amongst the climbing community.

Tendon nodules imply previous partial tears of the tendons and again there is little awareness of the importance of protecting this sort of injury from further stress during the healing period.

Rock climbing as a sport has changed rapidly over the last ten years. As protection has improved, the dangers of injury from falling have steadily decreased. Now the commonest problems are not broken bones but injuries of the soft tissues.

Hand problems among top climbers would appear to be very common. If competitions become popular and the financial rewards greater, this can only act as a spur for the aspiring young climber to train and climb harder, and will inevitably produce a crop of injuries about which there is presently little knowledge amongst those interested in sports injuries. Whether there will be any long term sequelae in terms of premature degenerative changes in the finger joints remains an unanswered question.

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