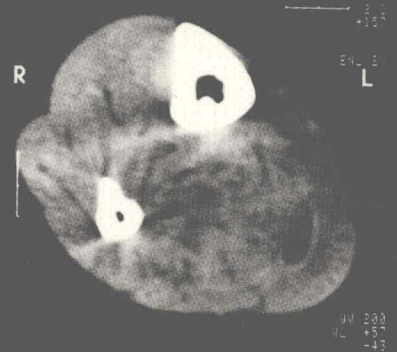

Color Atlas of
INJURY IN SPORT

Second Edition

J.G.P.Williams



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INJURY IN SPORT

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Year Book Medical Publishers, Inc.

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Preface

It has been very exciting to note how the practice of sports medicine and the management of injuries in sport have attracted more and more attention in the years since this Atlas was first published. Greater understanding of the underlying causes and factors in the development of injury in sport and the steady evolution and expansion of the techniques of diagnosis and treatment are reflected in the increase in the size and scope of this new edition.

It has been possible to incorporate much of the useful and constructive ideas and criticism received since the Atlas first appeared. New and better illustrations of a number of conditions and injuries have become available, refinements in imaging techniques – particularly CT and MR scanning – have clarified diagnosis, while the number of off-beat and unusual presentations continues to intrigue and astonish. Many well-known conditions, such as a fractured clavicle, can now be depicted in a variety of different presenting forms, and it has also been possible to illustrate several new rarities for which clinical material has become available.

As with the first edition, the basic material included here forms the basis of lectures on injuries in sport presented in the United Kingdom and

abroad. The same principle of focusing attention primarily on those injuries which are peculiar to sport, and seldom encountered outside the sporting context, prevails. However, as before, injuries of a wider incidence are also included where they have particular relevance to sport (for example, severe ligament injuries of the knee).

There has been some improvement in the general pattern and layout of the Atlas, and a number of additional diagrams have been provided – for example, those showing common sites of tendon injury and stress fracture in sport. Where appropriate, legends accompanying illustrations have been developed to provide greater explanation; in the case of the mechanical aspects of injury, in direct response to the interest shown in the Atlas by lay sportsmen and women.

I am delighted to have had the opportunity to update and enlarge the Atlas, which I hope will continue to demonstrate the extraordinarily wide range of clinical problems associated with sport – many of which form an increasingly important part of everyday general, accident and orthopaedic practice.

Acknowledgements

I would like to thank my friends and colleagues:

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Sport for their magnificent portfolio of colour action photographs which have given real life to the Atlas.

In preparing the second edition I would like to add my particular thanks to Michael Edgar, John King and James Robertson for their useful suggestions for modifications and especially to John Buck who has provided a wealth of useful tips and ideas which I have incorporated in this new edition. I am particularly grateful to Peter Dovey and Roderick Grant for their help, specifically with radiological and other imaging material. I am also grateful to Jean Tyler, Clinical Photographer at Wexham Park Hospital, and Daphne Bannister, Clinical Photographer at King Edward VII Hospital, both of whom have helped with the provision of new material.

For Sally,
Stephen, Philippa and David,
again with love

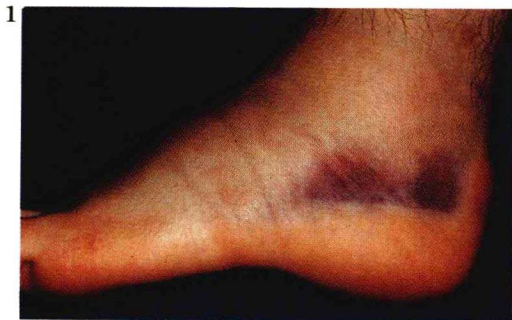
1 Nature and incidence of injury in sport

The term 'sports injury' is something of a misnomer. Injury is the result of the application to the whole body or part of the body of forces which exceed the ability to adjust to them. These forces may be applied instantaneously or over a considerable period. The exact nature of the injury – the tissues involved and the way in which the damage is sustained – depends upon the mechanism by which excess force is applied. The body is able to differentiate between different types of stress (for example, the tissue response to a direct blow is different from that to a sudden stretch), but it is not able to differentiate between the different activities in which one particular mechanical type of violence is applied.

Most injuries sustained in sport are essentially no different from those sustained in other activities. However, the degree of damage, particularly secondary damage such as haemorrhage and haematoma formation, may be greater in the sportsman because (a) training affects tissue states and (b) exercising tissue is metabolically more active than tissue at rest. In addition, the demand of the patient in terms of rehabilitation and return to activity may be significantly greater.

From a practical point of view studies of patients attending clinics for sports injuries show that a very substantial majority of problems could be well handled either by general practitioners, hospital accident and emergency departments (in America, 'emergency rooms'), or by hospital specialists in appropriate disciplines as part of their normal practice. However, there are numerous injuries and clinical problems which are peculiar to sport (though the number unrelated to ordinary day-to-day activities is relatively small), and sporting injuries do require particular expertise in their diagnosis and management.

The extent and severity of the injury are modified by a number of factors including the general physical and psychological fitness of the patient, his or her constitutional suitability for the sport, environmental conditions at the time of the injury, age and sex and general level of nutrition. The victim's general level of skill and proficiency is also significant. It is interesting to note how in body-contact sport most severe injuries occur in the first quarter of the game, whereas the last quarter of the game is marked by an excessive number of minor and relatively trivial injuries exacerbated by the players' fatigue.



1 Sprain of the lateral collateral ligament of the ankle. A common injury too frequently badly treated.

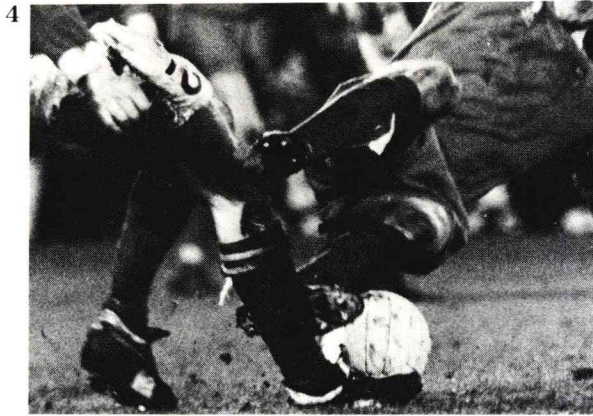


2 Haematoma – an exaggerated example of a relatively common condition.



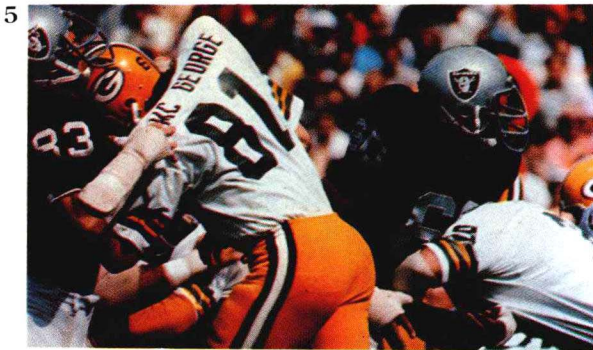
3 Anserine bursitis or 'breast-stroker's knee' – *not* common!

How different types of injury happen



Most injuries are accidental (though not always, 4), and most overuse injuries may be considered incidental, almost to be expected in consequence of severe training loads. They can be readily classified by cause and fall into two major groups.

Extrinsic injuries are caused by forces generated outside the patient which can be due to a wide variety of situations, while intrinsic injuries are those caused by forces generated within the patient's own body. The injury may be direct, at the point of application of the force, or indirect when the damage occurs at a distance. It may be instantaneous or due to repeated subliminal stress or microtrauma, usually due to overuse. These injuries may give rise to a secondary (later) injury or other cause of disability.

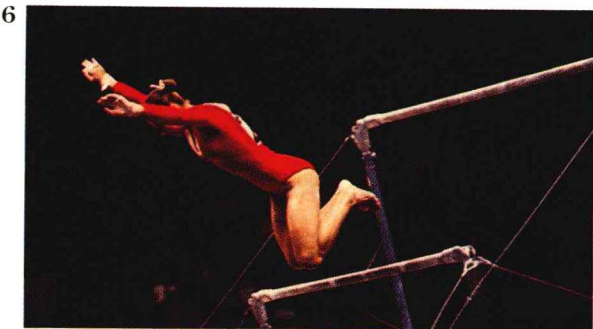


Extrinsic injuries may be due to . . .

4 An accident?

5 Human violence, as in body-contact sports.

6 Accidents with apparatus or implements. The latter may be instantaneous or due to overuse.

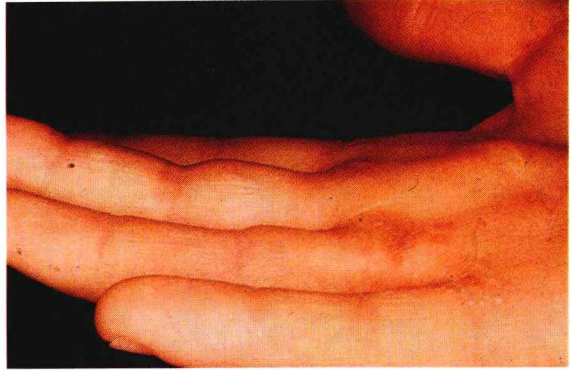


7



7 Bruised thigh showing the impact pattern of soccer ball.

8



8 Callosity overlying trigger finger in a fencer.

9



9 and 10 Vehicular and environmental forces also contribute to injury in sport.

10

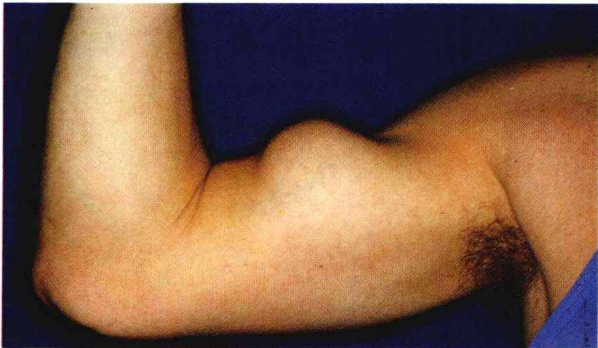


Intrinsic injuries

Injuries may also be intrinsic – that is, due to forces generated within the patient. They may occur either spontaneously, as in a rupture of the long head of the

biceps (**11**), or as a result of overuse – which may be acute as in tenosynovitis (**12**), or chronic as in fibrosing Achilles peritendonitis (**13**).

11



11 Rupture of the long head of the biceps.

12



12 Tenosynovitis, the result of acute overuse.

13



13 Achilles tendonitis in a long-distance runner, a chronic intrinsic overuse injury.

Generally, as would be expected, extrinsic injuries produce more severe tissue damage than intrinsic because the forces involved are substantially greater. In intrinsic injury the key causes are either breakdown of technique under stress (which leads to instantaneous injury) or the overlong or too great application of training loads or competition (which produces overuse injury). In the management of intrinsic injury, therefore, correction of any technical faults in the practice of the sport, with modification of the training programme, is an essential component of patient management.

In addition, continued participation while injured may provoke an immediate (but not necessarily related) second injury, which may lead on to reinjury or the development of early or late secondary conditions.

Secondary conditions

14



14 Chondromalacia patellae (arthroscopic appearance), an early secondary condition.



15

15 Osteoarthritis of the hip in a race walker, a late secondary condition.

2 Types of tissue damage

Injury occurs when the body is unable to adapt to a force applied in the space/time continuum. Tissue response largely reflects the nature of the damaging mechanism, ie the manner in which the force is applied as well as its severity. The pattern of injury throughout the various tissues involved will tend to a degree of uniformity with some variation at

individual sites as a response to peculiar local factors. The general pattern of tissue damage, however, remains reasonably constant throughout the body. Typical examples of pathological response to trauma in the tissues are repeatedly reproduced at different anatomical sites.

Skin injury

A variety of different types of trauma may be noted:

- **Laceration** is damage to the skin involving the full thickness and exposing the underlying subcutaneous tissue.
- **Abrasion or graze** is an injury, often of the glancing type, where the surface of the skin is broken but there is no complete tear through the whole depth.
- **Haematoma**, contusion or bruise is due to a direct blow on the surface, usually with a blunt instrument.
- **Puncture wounds** are lacerations where the depth of the wound is greater than its length or

breadth. Typically they are the result of injury with a pointed instrument.

- **Burns** involve heat injury to the skin. In friction burns an abrasive component is invariably present as well.
- **Blisters** are injuries to the skin where one layer is detached from the layer beneath, the gap between becoming filled with a serous fluid exuded by the injured cells. (Blistering does not occur if the load is built up gradually, allowing the skin to adapt.)
- **Mixed injury** – for example, bruising and laceration together.



16 Scalp laceration through the full thickness of the skin, caused by the studs of a rugby boot.



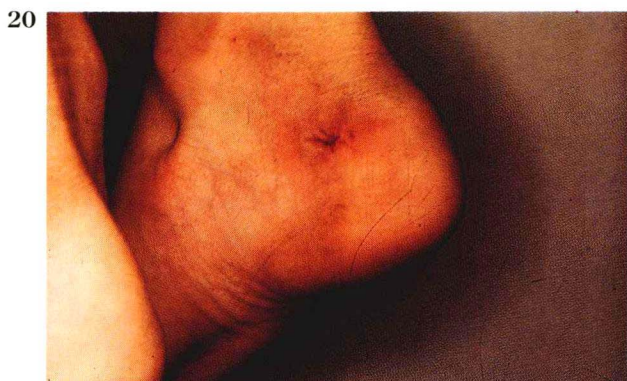
17 Abrasion due to direct violence – leg injuries to a cyclist after a fall in a road race.



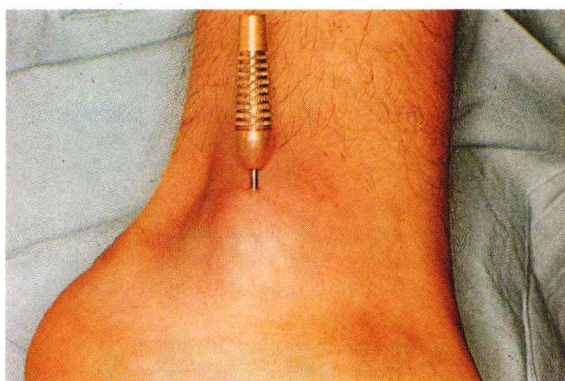
18 Haematoma from a blow from a field hockey ball.



19 Crush and laceration – a bite from an angry horse.



20 Puncture wound. An injury to the heel as a result of a bite from an irascible dog, suffered by a runner waylaid while out training. If a dog shows signs of aggression walk slowly. Don't run!



21 Puncture wound – off target!



22 Grass burns. A friction burn on the skin of the thigh over the greater trochanter, caused by a sliding fall on hard ground. These burns commonly become secondarily infected.



23 Hypertrophic scarring over the greater trochanter in a friction burn (in this case a cyclist fell during a track race) that healed with excessive scar-tissue formation.