INFECTIONS IN SPORT

Proceedings of the Sports Medicine Conference organised by the Edinburgh Post-Graduate Board for Medicine
4th March, 1988

INTRODUCTION

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The widening spectrum of sporting activities, their global extent and the increasing number of participants mean that almost every kind of human infection may be acquired directly or indirectly, in the pursuance of sport.

Up until 20 years or so ago, sport-related infections were largely confined to septic cuts and abrasions, possibly tetanus, the appropriately named "athletes foot" and other fungal infections, respiratory infections such as "flu" or "sore throat" or even on occasion pulmonary tuberculosis as happened to several players in a Scottish rugby club in the late 1940s.

While the potential or reality of most of these infections remain, some new ones have emerged in more recent years to cause additional concern. "Scrumptox" in one form or another has always been around, but the fear of herpes has nowadays taken on a new dimension along with viral hepatitis and AIDS. Other viral infections identified in recent years include the Coxsackie group of enteroviruses, which is known to be associated with myalgic encephalomyelitis — the "post-viral fatigue syndrome".

With the range of sporting activities nowadays involving overseas travel on club tours or in competition, and especially so if to Africa or Asia, an increasing number of athletes and officials become exposed to additional hazards such as travellers' diarrhoea in its various guises (e.g. cholera or typhoid) or to malaria, certain types of which may result in death.

On Friday, 4th March, 1988, the morning session of the annual Sports Medicine Conference arranged by the Edinburgh Post-Graduate Board for Medicine, was devoted to "Infection in Sport". Five papers were presented by various speakers from general practice, bacteriology and infectious disease.

INFECTIONS ASSOCIATED WITH SPORT

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Sport associated infections can be divided conveniently into (1) infections acquired by direct person-to-person contact (2) infections acquired by the participant's involvement with the sport-related environment e.g. changing room, playing field and (3) infections acquired during foreign travel (J. H. Cossar — vide infra). In addition to the most frequently encountered topical infections some of the rarer systemic infections will also be mentioned.

Infections by Person-to-Person Contact

Infections acquired by this route include impetigo, erysipelas, herpes simplex and tinea barbae, all of which can be transmitted by the grinding physical contact found in such sports as wrestling and rugby (especially in the scrum)

— hence their frequently being known as "scrumptox". Stud abrasions and the wearing of facial stubble facilitate the inoculation of the infecting agent.

Impetigo is a superficial bacterial infection of the skin caused by *Staph. aureus* or *Strep. pyogenes*, and is characterised by small crusted spots, somewhat similar to pustular acne. Erysipelas is an acute spreading skin infection due to *Strep. pyogenes*, usually involving the face and is characterised by redness, pain and swelling. In both conditions some of the strains of *Strep. pyogenes* can cause kidney damage in the form of glomerulonephritis. A well documented example of rugby acquired skin infection resulting in glomerulonephritis was described by Ludlam and Cookson (1986) who use the term "scrum kidney".

Prevention of the spread of such infections is best achieved by a combination of a responsible attitude of the individual participant and clinical awareness of medical and paramedical personnel. Staphylococcal skin infections can be rendered less contagious by using topical antiseptics such as chlorhexidine and povidone iodine. Similarly newly acquired cuts and abrasions, in addition to prompt physical cleaning with soap and water should have topical antiseptics applied. Erysipelas requires treatment with systematic antibiotics.

Infections Acquired from the Changing Facility Environment

The most frequently occurring examples are the superficial dermatophyte infections of the skin, tinea pedis ("athlete's foot") and tinea cruris ("Jock rot"). The infecting fungi are most frequently *T. interdigitale* and *E. floccosum*.

Definitive diagnosis can be made by microscopy and culture of scrapings taken from the scaly edge of lesions. With these anthropophilic dermatophytes infection is from person to person usually via fomites such as towels, sports clothing and shower areas which have become contaminated with infected shed skin scales. Moist, macerated skin is more susceptible to infection and the warm humid environment found in communal changing rooms facilitates spread. It is imperative that there should be no sharing of towels, soaps or sports equipment. The use of prophylactic anti-fungal powders in undergarments and footwear is probably of value. Established infections require prolonged treatment with imidazole creams and sometimes systemic griseofulvin is necessary.

Other infections associated with sports complexes include pseudomonas folliculitis and legionella infections. Pseudomonas folliculitis is associated with whirlpool spas and jacuzzis. Infection occurs by a combination of maceration of the skin from excessive immersion and contamination of the water with *Pseudomonas aeruginosa*. Prevention is by regular maintenance of the facility and adequate chlorination of the water. In recent weeks in Scotland, infection by *Legionella micdadei* has been associated with a sports and leisure complex. Design and regular inspection and maintenance with particular reference to water storage and delivery systems are essential if this potential hazard is to be avoided.

Infections from the Playing Environment (Water or Soil)

With the exception of tetanus (B. Watt — vide infra), the danger of infection from the playing environment is more theoretical than real. In almost all instances infection occurs because the area of activity is contaminated with infected animal (e.g. dog or rat) and less frequently human, excreta. Examples of such infections include salmonellosis, leptospirosis, giardiasis and cercarial dermatitis and schistosomiasis, all of which have been recorded in participants in water sports.

Reference

Ludlam, H. and Cookson, B., 1986 "Scrum kidney: epidemic pyoderma caused by nephritogenic *Streptococcus pyogenes* in a rugby team". *Lancet* II: 331-333.

TETANUS

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Tetanus is a serious, potentially fatal infection caused by *Clostridium tetani*. While uncommon in the UK, it is a common cause of death worldwide. It can be prevented by encouraging active immunisation of the population.

C. tetani is an obligately anaerobic bacillus that has two important properties — it forms spores and produces a potent neurotoxin. The spores are non-metabolising forms of the organism that can survive adverse conditions of temperature, dryness and pH, as well as being resistant to many antiseptics and disinfectants. They are found in human and animal faeces and can, therefore, easily contaminate soil and dust such as a sports field. The neurotoxin, (tetanospasmin), is a simple protein of molecular weight 150,000 and like other clostridial toxins, is extremely potent; the minimum lethal dose for man is only one nanogram.

Tetanus occurs when spores contaminate a wound in which oxygen levels are low. Such low levels could occur as a result of other bacteria contaminating the wound and "using up" available oxygen, and especially so in deep penetrating wounds such as those caused by thorns, splinters, nails or sports equipment or in the presence of tissue necrosis. Under such conditions, the spores revert to vegetative cells which produce tetanospasmin. The toxin, formed at the site of infection, is rapidly transported along peripheral nerves to the central nervous system. There it binds easily to specific ganglioside receptors and acts by inhibiting the secretion of certain neurotransmitter substances.

After a variable incubation period of a few days to two or three weeks, the patient complains of stiffness of the jaws followed by progressive difficulty in swallowing (hence the name "lockjaw"). This may progress to a general increase in muscle tone, followed by the onset of generalised muscle spasms that are initially triggered by external stimuli but latterly occur spontaneously. The patient may develop pneumonia and cardiovascular instability. Death rates for established tetanus vary from 15-70%. It should be noted that even in fatal cases, there may be little or no evidence of local infection — indeed the original site of infection may be impossible to find. It is generally believed that a short incubation period is associated with more severe disease. The subject is well reviewed by Smith (1984).

The main features of treatment relate to:

1. Early administration of antitoxin to neutralise any unbound toxin.

2. Attention to contaminated wounds.
3. Sedation, accompanied by elective muscle paralysis with curare-like drugs and by tracheostomy and artificial ventilation in severe cases.
4. Penicillin is often given concurrently to inhibit further growth (and therefore toxin production) of *C. tetani* at the site of infection. (Penicillin has no effect on the toxin itself).

It should be noted that patients who recover from tetanus are not immune from further attacks and therefore require to be immunised.

Prevention

The administration of a course of "toxoid" (toxin rendered harmless but retaining its antigenicity) renders individuals immune from tetanus by stimulating the production of protective antitoxin. Such active immunisation should be encouraged in sportsmen and sportswomen and anyone who comes into physical contact with soil, dust or animal or human faeces. Booster doses are required every 10 years, but if given more frequently there is a danger of developing hypersensitivity reactions. In the case of persons who present with a wound or with tissue damage, it is essential to have a clear policy about the prevention of tetanus. Measures to be used will depend on the type of wound and the immune status of the patient. An excellent schedule for wound management and tetanus prophylaxis is described by Collee et al. (1987).

References

- Collee, J. G., Macleod, D. A. D. and Little, K., 1987 "Wound Management and tetanus prophylaxis". *Communicable Diseases Scotland Weekly Report* 21 (50): 7-9.
- Smith, J. W. G., 1984 "Tetanus" in Topley and Wilson's *Principles of Bacteriology, Virology and Immunity*, edited by G. R. Smith, 7th Edition: 345-368, Edward Arnold, London.

HERPES SIMPLEX, HEPATITIS B AND THE ACQUIRED IMMUNE DEFICIENCY SYNDROME

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Herpes, hepatitis B and AIDS are viral infections, to which increased attention has been given in recent years, not least in relation to sport.

Herpes Simplex

Common presentations are stomatitis which is generally a primary infection usually occurring during childhood with fever and toxicity in addition to the painful intra-oral lesions, or localised skin infection (usually reactivation). Reactivation most commonly presents as "cold sores" around the lips which are uncomfortable but not usually associated with systemic features. Reactivation can be precipitated by a variety of factors such as exposure to sun, wind or febrile illness. The genital form of infection similarly occurs in both primary (generally more severe) or reactivation forms.

Infection is transmitted from person to person by droplets or where skin surfaces are directly opposed as in rugby ("scrumpox") or in wrestling ("herpes gladiatorum"), although "exposure" itself may be the precipitating factors when reactivation is involved.

Prevention depends upon hygiene, ultraviolet filter