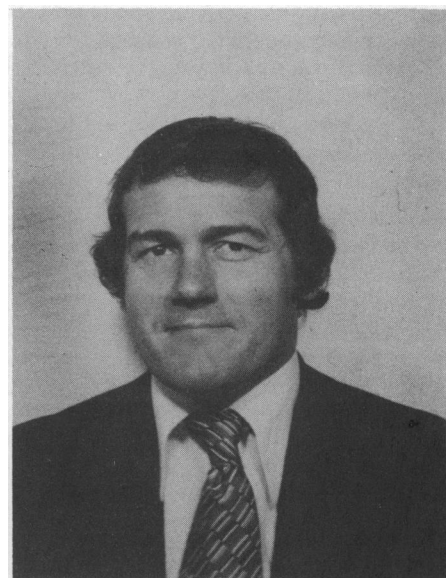


THE SPINE IN SPORT – INJURIES, PREVENTION AND TREATMENT

J. E. DAVIES

Guy's Hospital Sports Injuries Clinic, London



Preventive Medicine in sport comes under three categories:—

1. The prevention of injuries
2. The prevention of complications after injury
3. Education

The prevention of injuries can be carried out by undertaking injury surveys; one survey carried out in conjunction with Gibson, (1978) looking for risk factors in the Rugby Union, the largest risk factor that emerged was foul play – over 30% of injuries actually occurred as a result of such behaviour. The governing bodies of Rugby Football therefore are now considering allowing linesmen who are qualified referees, to adjudicate, to help the referee in the game, hopefully reducing the number of injuries resulting from foul play that the referee does not see. A new law has come into being now, to prevent the "pile-up" situation and only the ruck allowed, with players standing on their feet. New polyurethane rubberised studs have been introduced on the Continent, and likely to come into this country at the beginning of 1980, which should reduce the number of head injuries, especially the severe lacerations.

SPORTING INJURIES TO THE SPINE

No sport seems immune from the risk of injury to the spine and in particular to the lumbar area. Weightlifting accounts for proportionally more injuries than any other sport, although exact figures are difficult to obtain in view of the frequent adoption of weight training by participants in other sports. Field events in athletics – hammer, javelin and shot, high and long jumping, are particularly prone to causing muscle strains. In Rugby

Football two factors often combine to produce injuries – local violence and muscle strain. The local bruising – oedema in a muscle resulting from a violent tackle – may predispose it to strain, either at the moment of injury, or some time later. Errors in technique may be responsible when a particular sport seems to produce a number of injuries to the back – weightlifting with the knees straight and the lumbar spine flexed is obvious. Lack of training may be an additional factor in muscle strains while the degenerative changes of middle life are more likely to expose ligament tears.

No sport is really immune to back problems – certainly yachtsmen and sailors put tremendous strain on their backs. One aspect of a back injury or back pain to be borne in mind is a psychological aspect, tension in high pressure sportsmen.

In hang-gliding the number of back injuries and fractures in the lumbar and dorsal spines are causing concern. They also suffer from back strain due to hyperextension and organisers should look closely, at the harness they produce. Injuries to the spine are extremely serious. Weightlifters and shot putters may lift six tons in one training session alone in 2-2½ hours, so it is not surprising that they get problems with the spine.

Neck injuries may be divided into muscle strains, ligament tears, disc lesions and referred pain fractures and dislocations and brachial plexus lesions. Muscle strains are more commonly due to direct trauma than to spontaneous rupture and occur generally in football. The patient should be examined prone with the head supported adequately to relax the extensor muscles and the tender area can then be accurately localised –

usually to one side of the mid line. In ligament tears of the cervical spine, these occur when a joint is forced beyond its normal range of movement. Normally a joint is protected against sprain by the tone of the surrounding muscles. If these muscles are relaxed all the strain is taken off the ligaments. The strongest ligament in the cervical spine is the ligamentum nuchi. The interspinous ligament joint capsules and posterior common ligaments lie near the axis of movement and have less of a stabilising influence. Disc lesions in the cervical spine are rare. Occasionally one sees referred pain into the arm due to haemorrhage or oedema round the intervertebral foramina irritating the roots of the brachial plexus. Fractures of the spinous processes may occur as avulsion injuries when heading a football or when a scrum collapses. The more severe fractures and dislocations of the vertebral bodies are rare, but unfortunately increasing. Complete paraplegia from dislocation of the neck may occur from collapse of a scrum or high diving. The patient will complain immediately of total loss of sensation below the level of the injury and on examination will be found to have a complete flaccid paralysis. The respiratory distress becomes more marked the higher the dislocation. Dislocations above the level of the fourth cervical vertebra have been incompatible with life owing to paralysis of all muscles of respiration.

J. P. R. Williams and McKibbin (1978) looked at cervical spine injuries in Rugby amongst a small group of patients and tried to determine the exact nature of cervical spine injury. As a result of their analysis, they suggested that all players should be aware of the dangers of submitting their necks to flexion forces when movement of the top of the head is restrained by contact with another player or the ground, the deliberate clashing of heads constitutes a special danger in this respect. Referees and coaches should be aware of the dangers of scrum collapses, especially as it seems to be an increasingly popular tactic to bring this about purposely. The association with inexperience indicates the need for adequate tuition especially in the circumstances of a scrum collapse. Players should release binding in the second row, avoid pushing at this point to avoid flexing the necks of their colleagues in the front row further.

Finally the predominance of injuries early in the season points to the importance of fitness and the strength of neck musculature and suggests that special methods to strengthen the muscles would be appropriate before the beginning of the season. Neck strengthening exercises during school years are being discussed, but their desirability is not unanimous.

BACK INJURIES

The centre of gravity of a man standing erect falls

through the bodies of the middle lumbar vertebrae, and the muscle tone required to counteract gravity adds to the stress these joints undergo constantly as a link between fixed and mobile segments of the spine. The sacrum inclines backwards from the line of the lumbar vertebra so that the lumbo-sacral disc is at an angle of 20-30° to the horizontal. This joint will sustain a shearing force in addition to the constant strain of gravity and movement. It is hardly surprising that athletes should have lesions affecting the lumbo-sacral joint.

MUSCLE STRAINS

Many injuries and low back pain seen in general practice or Sports Injuries Clinics are strains and may occur anywhere in the erector spinae group of muscles. The sports most likely to cause these are where a sudden violent exertion is needed, for example high jump, long jump, javelin throwing and weightlifting. The diagnosis rests as with strains of the cervical muscles in locating the tender area to one side of the mid line and reproducing the pain by contracting the erector spinae.

A chronic strain causes pain for a few weeks only, is felt during vigorous exercise, and so differs from the pain of chronic ligament sprain which is frequently relieved by exercise.

LIGAMENT SPRAINS

The lumbar spine is supported posteriorly by strong ligaments, mainly the supraspinous ligament (Roaf 1960). Experimental work has shown that the intact spine is very resistant to flexion strains, fractures of the vertebrae occurring before rupture of the posterior ligaments. The ligaments are, however, highly susceptible to rotational strains or shear. Weightlifting is a common source of these injuries, particularly when attempting to lift a weight off the ground with the knees straight. The novice weightlifter should have an experienced catcher standing in front of him to guard against sudden forced flexion of the spine if he cannot sustain the lift. Pain in the lumbo-sacral area provides diagnostic problems.

PROLAPSED DISC

There could be two or more of the four following signs and symptoms.

1. Limited straight leg raising; a confirmatory point is to dorsiflex the foot.
2. Sciatic scoliosis where the patient, bending forward, goes into scoliosis due to muscle spasm and the corresponding lateral protrusion of the disc.
3. A positive cough impulse.

4. Objective neurological signs. If pain is either in the thigh or into the groin and there is a history of a back injury, the femoral nerve stretch test should be performed where the patient lies prone and complains of pain in the lumbar region, when the knee is flexed.

SPONDYLOLISTHESIS

The incidence of spondylolisthesis in athletes coming through the sports injuries clinic at Guy's Hospital is high. These are now thought to be stress fractures – not surprising when men of the immense size of Geoff Capes lift these tremendous weights.

Billings et al (1977) who carried out this work examined men and 13 women who had been referred to the sports clinic with low back pain from a sports injury: with a wide range of sporting ability from 23 sports. They completed a questionnaire relating to all aspects of their sports activities, circumstances of injury and previous medical history. Following examination, further investigations and treatment were requested as necessary. Whilst 42 were injured in competition, 37 injured their backs in training, weight training being the single most frequent cause of training injury. Rotation and combined rotation flexion movements of the spine were implicated most commonly as the movement at the time of injury.

Following injury 85 of these players had to give up sports partly or completely until the time they were seen at the sports clinic. 62 had received some medical attention within one month of their injury, 38 had delayed more than a month, and of the latter 12 players were five months or longer in seeking advice. Intervertebral disc injuries were assessed; 68% were the result from the recent injury while in the remaining 32% injury had aggravated long standing degenerative changes. Spondylolisthesis was found in 18 patients, sometimes in conjunction with disc degeneration or multiple defects, suspected by a history of recurrent episodes of severe short duration back pain provoked by activity. The study considered a very wide range of

sporting injuries to the low back in sportsmen and women of ages 15-52. It was apparent that these players, many of them national representatives, had sustained injuries which had had the gravest short and long term effects on their sporting career. A high proportion were not injured in competition, but in training, with weight training accounting for 38% of all training injuries. Of 100 players with back injuries arising from sport, 54 had no supervision of training activities at all. These high figures of training injuries taken together with the low degree of formal supervision, suggests a need to look more closely at this particular side of sport, as many sportsmen will undergo more vigorous physical exercise in training over a prolonged period than in competition.

MANAGEMENT

The role of extension exercises, and of flexion exercises is a matter of controversy. Simultaneous contraction of the abdominal and gluteal muscles tends to flatten the lumbar lordotic curve, whereas the often-prescribed extension exercises have never been evaluated thoroughly, though Anderson (1978) showed better symptom relief with extension exercises combined with short wave diathermy than with short wave alone, though measurements of the lordosis showed little change. Kendall and Jenkins (1968) however, claimed greater benefit from isometric lumbar extension exercises.

Initially an accurate diagnosis of spinal conditions must be made, and this is often difficult. Radiological and other investigations can be carried out; E.S.R. plasma viscosity, rheumatoid factor, serum uric acid, etc. Referral to an orthopaedic surgeon or rheumatologist may be advisable. There are a wide variety of therapeutic measures that can be taken; analgesics, anti-inflammatory drugs, muscle relaxants, rarely steroids, and frequently anti-depressants for those in a stressful situation such as injured athletes. Local treatment includes injections of steroids and local anaesthetics, heat, paraffin wax, ice, corsets, physiotherapy, hydrotherapy and only if indicated, surgery.

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DISCUSSION

THE SPINE IN SPORT

P. R. TRAVERS. Few people watching sport in a stadium or on television realize the high load that training produces. They may watch six shot putts or jumps without realizing the hundreds of equally good performances in training, perhaps twenty to thirty in one session, with resultant stress on the spine and limbs, a much greater stress than in competition. Distance runners will cover thousands of miles in training every year, so the production of overuse injuries is inevitable.

J. RUSHTON estimated that one shot putter making 30,000 lifts of 300 to 400 lbs. in a season in his training, is lifting weights amounting to six tons in each session.

J. E. DAVIES had reported earlier that only five of the patients seen by Billings showed injuries to the posterior apophyseal joints of the lumbar vertebral arches as opposed to thirty disc lesions. These results were questioned, as the posterior joints are structurally much weaker than the anterior ones. Disc lesions, easy to suspect, cannot always be confirmed, and a recent case of an apparently obvious disc prolapse proved at laminectomy to be a simple osteophyte whose radiological appearance was identical with a disc lesion, and with similar signs of cord compression.

Some question the frequency of muscle strains to the back, believing them to be rarer than apophyseal joint lesions. Others accept a diagnosis of muscle strain if there is a history of acute injury followed by muscle spasm, and without referred signs or symptoms.

J. G. P. WILLIAMS stated that Sullivan carried out electromyographic studies which suggested that muscle strains might occur more frequently than is generally accepted.



The spine in sport--injuries, prevention and treatment.

J. E. Davies

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