

# Premature onset of degenerative disease of the cervical spine in rugby players

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## Summary

Rugby players and other individuals with the changes of degenerative disease of the cervical spine are at risk of spinal cord trauma after hyperextension injury. In an attempt to assess whether rugby players are prone to the development of premature degenerative disease, radiographs of the cervical spines of 150 rugby players were compared with a control group of 150 male hospital patients. The study revealed that rugby players showed premature and advanced changes of degenerative disease when compared with the control group. These changes were most marked in the cervical spines of the tight forwards. Rugby players so affected are therefore more likely to present with the symptoms and signs of cervical osteo-arthritis and are at greater risk of hyperextension injury to the cervical spinal cord.

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There have been very few studies of the effect of chronic recurrent trauma on the cervical spine. Schneider *et al.*<sup>1</sup> investigated this aspect in a small group of high-cliff divers from Acapulco, Mexico, and concluded that the recurrent trauma did not lead to premature or advanced degenerative disease of the cervical spine. Scher<sup>2</sup> investigated the effects on the cervical spine of carrying heavy loads (maize bags weighing > 90 kg) on the head and similarly concluded that the stress of this occupation did not lead to premature degenerative disease of the cervical spine.

Nevertheless, the observation of radiographic changes of severe degenerative disease of the cervical spine seen in rugby players with complaints of cervical and arm pain<sup>3</sup> suggested that players were prone to an earlier onset of degenerative diseases. Confirmation of this supposition was therefore investigated by obtaining radiographs of the cervical spine of a number of asymptomatic club rugby players.

## Subjects and methods

Lateral radiographs of the cervical spine were obtained from 150 men selected on the basis of age, still actively participating in club rugby. The three groups of 50 players were aged 20 - 25 years, 25 - 30 years and 30 - 35 years. Each group consisted of 25 forwards and 25 backs. All the subjects examined were volunteers and participated in the investigation with the co-operation of the secretaries of senior rugby clubs in Cape Town. It was not possible to interview the volunteers before their arrival at hospital for radiography but the request to the club secretaries had stressed that only asymptomatic players were required. All the subjects were asymptomatic at the time of examination, although this may represent a biased selection, since players with previous cervical problems may have been more willing to volunteer for radiological examination.

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Lateral cervical spine radiographs were taken at a focus-film distance of 180 cm. This long focus-film distance was employed to compensate for the increased object-film distance that occurs in this projection. All the films were taken with the subject standing erect with the chin up.

A control group of 150 men were selected from patients referred to the Department of Radiography from the General Outpatient Department. Similar criteria for selection were followed in order to provide an identical sample as regards age groups. These volunteer subjects had no symptoms or signs of arm or neck pain at time of examination.

The radiographs were assessed for the presence of the following conditions:

1. Degenerative disease of the cervical spine. The following criteria were used: (i) disc space narrowing of at least 50%; (ii) evidence of sclerosis of the subchondral bone of the vertebral body in relation to the disc space narrowing; (iii) osteophytic spurring, either anterior or posterior; and (iv) evidence of degenerative disease at the apophyseal joints as demonstrated by osteophyte formation, sclerosis or subluxation.

2. Any bony deformity suggestive of a previous fracture of the posterior elements or vertebral body.

3. Evidence of congenital or acquired fusion.

## Results

### Incidence of degenerative change

As can be seen from Fig. 1, a significantly higher percentage of rugby players showed changes of degenerative disease of the spine compared with the control group.

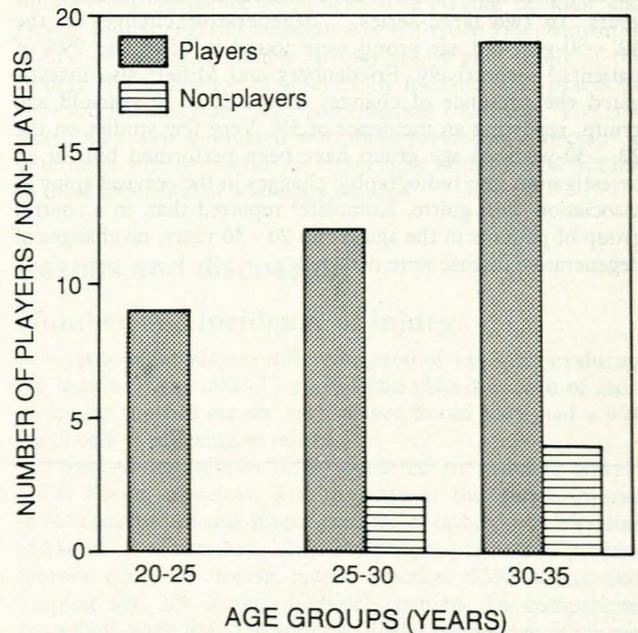


Fig. 1. Radiological changes of degenerative disease of the cervical spine in 150 rugby players and in a control group of 150 non-rugby players of different ages.

The 40 players showing degenerative changes were then divided according to their playing position. As can be seen from Table I, the highest incidence of degenerative disease was present in the tight forwards (props and locks).

**TABLE I. PLAYING POSITION IN THE 40 PLAYERS SHOWING CHANGES OF DEGENERATIVE DISEASE**

Position	No. of players
Front row and locks	30
Loose forwards	4
Backs	6

### Evidence of previous vertebral fracture

Eight of the 150 players showed evidence of healed fractures; 6 compression fractures of the vertebral bodies and 2 fractures of the spinous processes.

In the control group only 1 subject showed evidence of a fracture, a healed compression fracture of a vertebral body.

### Presence of congenital or acquired fusion

Only 1 of the 150 rugby players showed a change of congenital fusion. This player had fusion of both the vertebral bodies and neural arches of C2 and C3.

Two of the control group showed changes of fusion. One had fusion of the C2/C3 level and the second at the C3/C4 level. In both cases the radiological features suggested that these fusions were congenital in origin.

### Discussion

The findings indicate a higher incidence of degenerative disease of the cervical spine in rugby players than in the general population. Most previous investigations into the presence of changes of degenerative disease on cervical spine radiography in asymptomatic subjects have excluded patients under 40 years. In two large series,<sup>4,5</sup> degenerative changes in the 40 - 50-year-old age group were found in 25%<sup>4</sup> and 29% of patients,<sup>5</sup> respectively. Friedenberg and Miller<sup>4</sup> also investigated the presence of changes in the 30 - 40-year-old age group, reporting an incidence of 5%. Very few studies on the 20 - 30-year-old age group have been performed but, in an investigation into radiographic changes in the cervical spine in association with goitre, Komolafe<sup>6</sup> reported that, in a control group of patients in the age group 20 - 30 years, no changes of degenerative disease were detected.

Given the tremendous strain to which the cervical spine and supporting structures are submitted in the tight scrum, it is not surprising that degenerative disease of the cervical spine occurs at an earlier age and with greater severity in front-row forwards and locks. Forces of up to 1.5 tons are generated upon the cervical spine (D. A. Stubbs — personal communication) and this, coupled with sudden rapid changes in the direction and intensity of thrust, probably results in repeated minor traumatic changes. The disc space most frequently involved by degenerative disease is at the C5/C6 level followed, in order, by the C6/C7 and C4/C5 intervertebral discs. In general, the discs most frequently involved are also the discs most severely involved.<sup>4</sup>

The above results indicate that older rugby players, in particular those who play as tight forwards, are likely to have developed changes of degenerative disease. Symptoms of osteoarthritis of the spine include localised pain and stiffness, and radicular pain. The former originates in the joint capsules, periosteum, ligaments and paraspinal muscles. Radicular pain results from nerve root compression by osteophytes or may represent referred pain. Nerve roots may be compromised by osteophytes impinging on the neural foramina, by prolapse of the degenerated disc or by narrowing of the neural foramina as a result of apophyseal joint subluxation. Pressure on the nerve root may cause pain, paraesthesia, loss of reflexes and muscle weakness in the distribution of the affected nerve root.<sup>7</sup>

The risk of spinal cord injury is increased in the presence of degenerative disease. Under these circumstances, the spinal cord is vulnerable to damage after hyperextension injury to the head or neck, even in the absence of any fracture or dislocation.<sup>8</sup> The majority of these injuries occur in the presence of cervical spondylosis.<sup>9</sup> The cord is pinched between the degenerate vertebral discs and osteophytes anteriorly and protruding redundant folds of ligamentum flavum posteriorly.

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