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## **Severe cervical spine trauma in senegalese wrestling: Anatomical, clinical, and therapeutic aspects about 15 cases**

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### **Abstract**

We report a series of 15 patients who presented with serious trauma to the cervical spine during sports practice accidents (Senegalese wrestling). The fall, head first leading to a compression-flexion, was the most frequent mechanism. These included severe cervical sprains, uni- or bi-articular dislocations, and vertebral body fractures. Surgical management was performed in 12 patients: anterior cervical arthrodesis in 8 cases and posterior arthrodesis in 4 cases. Five patients died, including 4 in the postoperative period due to neurovegetative complications associated with ASIA A paralysis. An improvement in regulations could help prevent certain complications that can sometimes be fatal for the wrestler.

**Keywords:** Wrestling, cervical spine, severe trauma, anatomical, clinical

### **Introduction**

Senegalese wrestling is a bare-handed combat sport between two wrestlers during which each wrestler tries to take down their opponent. Wrestlers may strike with fists and engage in close combat. A head-first fall results in victory for the opponent, encouraging strategies to force the adversary's head to touch the ground.

We have thus seen a proliferation in recent years of severe cervical spine injuries in both amateur and professional wrestlers, with significant functional and vital consequences.

The objective of this study is to analyse the mechanisms leading to these injuries and their functional and vital outcomes.

### **Patients and Methods**

This is a retrospective, descriptive, multicentre study (HALD, HOGGY, Fann, and HPD) spanning 18 years, from January 1, 2006, to December 31, 2024. Fifteen patient records were included. The mean age was 22.7 years (range: 17-28), all male.

Lesions were classified according to Argenson (lower cervical spine injuries), Anderson-Alonso (upper cervical spine injuries) radiologically, and ASIA score neurologically.

We also analysed treatment delays, therapeutic methods, and outcomes.

### **Results**

Eleven (11) patients were admitted within 24 hours. Three others between 24 hours and day 7, and one at month 8.

Two patients underwent inappropriate manipulations by traditional healers.

In our series, type C extension-distraction injuries were found in 7 cases; flexion-distraction injuries in 3 cases, including 1 case in hyperflexion and 2 cases of type D rotational injury (Table).

The AII and CIII lesion subtypes were the most implicated in complete spinal cord injuries. The involvement of levels C4-C5 and C5-C6 concerned 9 patients. In terms of fractures, the C5 vertebral body lesion was the most common (2 cases).

According to the mechanism, Argenson type C extension-distraction injuries were more frequent (7 cases, see table). Thirteen patients had partial or complete neurological deficits. One patient died from post-traumatic neurovegetative disorders. Surgical treatment was performed in 12 patients. Four patients died postoperatively due to neurological complications, 3 of whom were ASIA A. At a mean follow-up of 7 years, the results were mixed, with 4 of our patients having a complete neurological recovery, 2 patients having a partial neurological recovery, and 2 patients remained unchanged. It should be noted that two patients had no initial neurological deficit.

**Table 1:** Neurological involvement by lesion subtype (Claude Argenson classification)

|       | AII | AIII | BIII | CIII | DIII | Total |
|-------|-----|------|------|------|------|-------|
| A     | 2   | 1    |      | 2    |      | 5     |
| B     | 1   |      | 1    | 1    |      | 3     |
| C     |     |      |      | 1    | 1    | 2     |
| D     |     |      |      | 1    | 1    | 2     |
| E     |     |      |      | 2    |      | 2     |
| Total | 3   | 1    | 1    | 7    | 2    | 14    |



**Fig 1:** Head locked to the ground; one of the injury mechanisms in severe cervical spine trauma



**Fig 2:** Single-segment C4-C5 arthrodesis of a bifacet dislocation

## Discussion

No prior studies specifically addressed severe cervical spine trauma in traditional wrestling. However, similar injuries are reported in sports such as judo<sup>[1]</sup> and rugby<sup>[2]</sup>. Sports involving collisions such as American football, rugby,

Judo, and Sumo are particularly implicated in severe cervical spine injuries in athletes<sup>[3-5]</sup>. In Japan, Nagakawa<sup>[6]</sup> describes a C7-D1 bifacet dislocation during a Sumo championship. The wrestler's head would be pinned at the level of his opponent's abdomen at the moment of his fall on the edges of the arena, keeping his neck in hyperflexion.

In Rugby, situations that pose a risk to the cervical spine are mainly represented by tackles (where the "tackled" player is as often involved as the "tackler"), collapsed or turned scrums, and rucks. Hyperflexion injuries are usually encountered during a scrum recovery, but this type of injury can also occur during a scrum collapse or ruck<sup>[7]</sup>. According to Sénégas<sup>[7]</sup>, a straight injury, such as during a scrum entry or tackle, often results in an extension lesion that can subsequently shift to flexion. In our series, type C extension-distraction injuries were found in 7 cases; flexion-distraction injuries in 3 cases, including 1 hyperflexion injury and 2 type D rotational injuries.

The Torg-Pavlov index was long used to assess the risk of cervical spine injuries in American football. The sport was banned if the Torg-Pavlov index was less than 0.8. However, this index is now of little use due to the availability of MRI.

Two patients underwent inappropriate manipulation of the cervical spine by traditional healers, resulting in paralysis accompanied by reports of electric shocks and paresthesia predominantly affecting the upper limbs. These healers invariably assume a cervical spine dislocation in any trauma patient complaining of neck pain and exhibiting abnormal neck posture. This justifies their reduction maneuvers performed without radiological guidance.

The mean surgical delay was 48 hours, with extremes of 24 hours and 120 hours (day 5). This timeframe was close to that found by some authors<sup>[8-11]</sup>.

Regarding the surgical approach, lower cervical spine surgery can be performed via an anterior pre-sternocleidomastoid approach, a posterior approach, or a combined approach (mixed approach). The choice of approach depends on the type of injury.

The anterior approach is very direct for reaching the injured disco-vertebral region, it results in minimal bleeding, and it is minimally invasive to the muscles (anatomical approach). It was used in 8 of our patients.

Furthermore, it does not require turning the injured patient, which is often dangerous in cases of highly unstable injuries, and the fixation achieved with this approach is very stable.

It can be performed on the left or right side depending on the level of the injury and the surgeon's preference<sup>[10-12]</sup>.

The posterior approach retains its indications and advantages. Uniarticular dislocations with fixation and biarticular dislocation-fractures irreducible by cranial traction are all indications for the posterior approach<sup>[13]</sup>.

With this approach, reduction is easy, but fixation is not secure; therefore, a rigid collar or cervical collar is mandatory postoperatively. It was used in four of our patients.

## Conclusion

Cervical spine injuries during wrestling are severe, threatening both functional and vital prognosis. Improved regulation could reduce the number of such injuries.

## Conflict of Interest

Not available

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Not available

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