SIGNIFICANCE OF SCIWORA IN ADULTS

SIGNIFICÂNCIA DA SCIWORA EM ADULTOS

TRASCENDENCIA DEL CUADRO SCIWORA EN ADULTOS

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ABSTRACT

Objective: Recognizing the importance of SCIWORA in adult age; analyze the usefulness of complementary studies; evaluating therapeutic options; learn about the evolution of the treated patients. Methods: A prospective evaluation with a minimum follow-up of 5 years, eight elderly patients with cervical arthrosis and diagnosis of SCIWORA. The Japanese Orthopaedic Association (JOA) scale and ASIA were used on admission and at 6, 12, 24, 36, 48 and 60 months. Results: The central cord syndrome (CCS) was the neurological condition at admission. One patient recovered after corticosteroid therapy, but later, his disability worsened, and he was operated at 18 months, another patient recovered and a third died. The other patients underwent laminoplasty in the first 72 hours; patients with partial severity condition had a minimum improvement of five points in JAO scale and those with severe conditions died. Conclusions: The low-energy trauma can decompensate the relationship between container and content in the spine with asymptomatic arthrosis, and can be devastating to the patient. The diagnosis of intramedullary lesion is made by magnetic resonance imaging. Patients with incomplete deficit undergoing laminoplasty reached at least one level in ASIA score. The potential postoperative complications can be serious.

Keywords: Spinal cord injury, Central cord syndrome; Cervical vertebrae.

RESUMO

Objetivo: Reconhecer a importância de SCIWORA na idade adulta; analisar a utilidade dos estudos complementares; avaliar as opções terapêuticas; conhecer a evolução dos pacientes tratados. Métodos: Foi realizada uma avaliação prospectiva com acompanhamento mínimo de 5 anos em oito pacientes idosos com artrose cervical e diagnóstico de SCIWORA. Foram usados a escala da Associação Japonesa de Ortopedia (JOA) e o escore da ASIA à internação e aos 6, 12, 24, 36, 48 e 60 meses. Resultados: A síndrome medular central (SMC) foi o quadro neurológico à internação. Um paciente recuperou-se depois de corticoterapia, mas a incapacidade piorou posteriormente, sendo operado aos 18 meses; outro atingiu a recuperação e outro morreu. Os outros pacientes foram submetidos à laminoplastia nas primeiras 72 horas; os que tinham gravidade parcial tiveram melhora mínima de cinco pontos na escala da JAO os que tinham afecção mais grave morreram. Conclusões: O trauma de baixo impacto pode desequilibrar a relação entre o continente e o conteúdo na coluna vertebral com artrose, podendo ser devastador para o paciente. O diagnóstico de lesão intramedular é realizado por ressonância magnética. Os pacientes com déficit incompleto tratados com laminoplastia atingiram pelo menos um nível na escala ASIA. As possíveis complicações pós-operatórias podem ser graves.

Descritores: Traumatismos da medula espinal; Síndrome medular central; Vértebras cervicais.

RESUMEN

Objetivo: Reconocer la importancia de SCIWORA en la edad adulta; analizar la utilidad de los estudios complementarios; evaluar las opciones terapéuticas; conocer la evolución de los pacientes tratados. Métodos: Se realiza una evaluación prospectiva con un seguimiento mínimo de 5 años, de ocho pacientes mayores con artrosis cervical y diagnóstico de SCIWORA. Se utilizaron la Escala de la Asociación de Ortopedia Japonesa (JOA) y ASIA al ingreso, 6, 12, 24, 36, 48 y 60 meses. Resultados: El síndrome medular central (SMC) fue el cuadro neurológico de ingreso. Un paciente recupero luego de la corticoterapia, posteriormente, empeoró su discapacidad, siendo operado a los 18 meses, otro recupero y otro falleció. Al resto se les realizó laminoplastia en las primeras 72 horas; los cuadros de severidad parcial tuvieron una mejoría mínima de cinco puntos en escala JAO y los cuadros severos fallecieron. Conclusiones: Un trauma de baja energía puede descompensar la relación continente contenido en columnas artrósicas asintomáticas, pudiendo ser devastador para el paciente. La resonancia magnética hace diagnóstico de lesión intramedular. Los pacientes con déficit incompleto, tratados con laminoplastia ganaron por lo menos un nivel de ASIA. Las posibles complicaciones post operatorias pueden ser graves.

Descriptores: Traumatismos de la médula espinal; Síndrome del cordón central, Vértebras cervicales.

INTRODUCTION

Spinal cord injury is a devastating condition for the patient and their social circle. It is most frequently caused by fractures and/or dislocations, which are detected by radiographs or tomography scans.[1]

The term SCIWORA defines spinal cord lesions that are observed in magnetic resonance, but that does not show bone lesion in complete studies of radiographs and/or tomography.[2-9] The first to mention this condition was Loyd in 1907 *apud* Fermin[10] and Launay *et al.*[11] followed by Burke in 1947 *apud* Shen *et al*.,[12] it was described by Pang[13,14] and Pang and Wilberger[15] in 1982 for the pediatric population, particularly in children aged under 8 years, but authors like Hendey *et al*.[1] describe the adulthood form, caused by degenerative pathology.

The incidence of spinal cord lesion in cervical trauma varies between 0.9% and 6%.[6,16,17] When associated with other injuries, such as cranial trauma, the incidence increases to between 2% and 27%.[16,18] The presence of neurological lesion without traumatic bone lesion in adults can vary between 0.08 and 15%.[1,12,19-21]

While children under 8 years and those over 60 years are the most predisposed,[12,22] due to anatomical and biomechanical differences,

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individuals can be divided into four age groups predisposed to this syndrome, namely:

1. At birth: particularly longitudinal traction;
2. <16 years: the distraction mechanism is prevalent due to the ligament elasticity;
3. Between 16 and 45 years of age: in this age range, it is rare to have a spinal cord lesion without bone and/or joint lesion, except in the constitutionally narrow cervical canal;
4. >45 years of age: here spondyloarthrosic degeneration is prevalent, and the main mechanism is hyperextension.[9,15,22]

The neurological condition that prevails in these cases is central cord syndrome (CCS),[1,6,18,20,23-26] particularly in cases of low-energy trauma,[22] such as falling backwards from one's own height (43%), car accidents (33%), and falling from a height (12%).[9,27]

Magnetic resonance imaging (MRI) is the best exam to evaluate these patients.[12,20,28,29] This method can divide causes into extramedullary (herniated disc, spinal stenosis, injury to the anterior longitudinal ligament or posterior ligamentous complex and intracanal hematoma) and intramedullary (edema, contusion and bleeding).[21,29,30-32] The presence of hemorrhage in the spinal cord is a sign of poor prognosis in the patient's evolution.[6,23,29,32-34]

The factors that influence the survival of a patient with spinal cord injury are age, level and degree of the primary injury,[29,34,36] and secondary injury.[20,23,29,35] Young patients with stable neurological conditions can be treated non-surgically, while the elderly or individuals with progressive defect should be treated surgically.[27] Between 4% and 11% of patients with SCIWORA die as a direct result of trauma or urinary complications (renal failure and infection) or cardiopulmonary complications (pulmonary thromboembolism, myocardial infarction or infection).[6,37]

The objectives of this study are: to recognize the importance of SCIWORA in adulthood; to analyze the usefulness of complementary studies; to evaluate the therapeutic options; and to follow the evolution of treated patients.

MATERIAL AND METHODS

A prospective observational study was conducted with eight male patients over 45 years of age suffering from cervical spondylosis who, following an injury, were admitted to the emergency service with a diagnosis of neurological deficit without traumatic osteoligamentary lesion, between June 2005 and May 2007, with a 5-year follow-up.

The neurological assessment on admission, and in the subsequent follow-up visits (6, 12, 24, 36, 48 and 60 months), was carried out using the ASIA scale and the Japanese Orthopaedic Association Scale.

In terms of imaging exams, x-rays, an MRI scan and a CT scan were performed on admission; the first two tests were repeated annually, with x-ray and MRI, followed by MRI only.

The treatment performed, the presence of complications, and the neurological clinical evolution were evaluated.

This study was not presented to the Ethics Committee as it was observational.

RESULTS

All patients reported mild symptoms associated with their spondyloarthrosis prior to the injury.

The traumas were related to car accidents in five cases, with two passive mobilizations (one rotation in a robbery situation and one case of flexion-extension) and one fall from the patient's own height. One patient confirmed multiple traumas by association of cranial and thoracic trauma. (Table 1)

Severe neurological impairment (3 ASIA A and 2 ASIA B) was prevalent on admission, and all the patients presented with central cord syndrome. (Table 2)

All the patients were submitted to X-rays and MRI, and 6 were also evaluated with axial tomographies. (Figure 1)

Table 1. Kinematics and associated lesions.

Patient	Kinematics	Associated lesions
1	Driver without seat belt	Cranial and thoracic trauma
2	Driver	
3	Passive rotation	
4	Driver without seat belt	
5	Driver with seat belt	
6	Fall from height	
7	Passive flexion-extension	
8	Bicycle	

Table 2. Neurological syndrome according to the ASIA scale.

Patient	ASIA
1	C
2	B
3	C
4	A
5	D
6	A
7	B
8	A

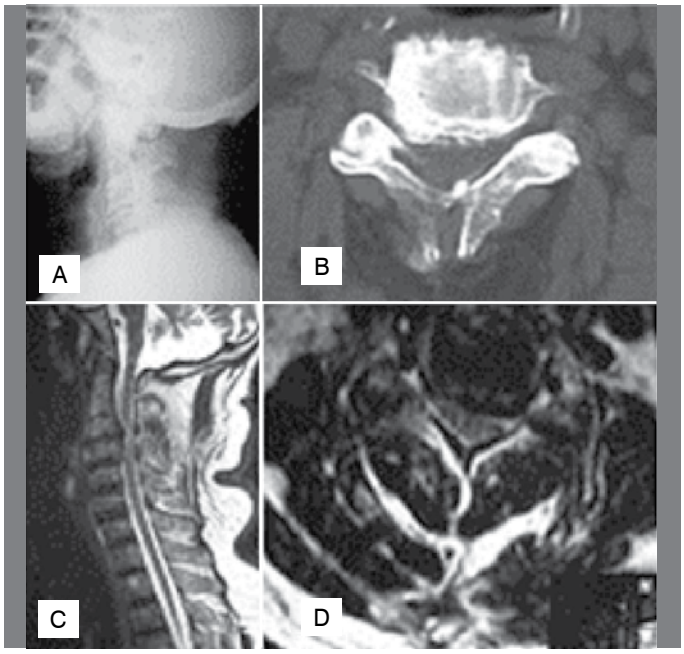

Figure 1. Patient aged 66, driver wearing safety belt with side impact . (A) Radiography showing cervical spondyloarthrosis; (B) axial sections with facet joint impairment and central osteophyte; (C and D) MRI scan showing spinal cord edema. Quadriplegic upon admission, with good response to corticoids.

All the patients received treatment with methylprednisolone, according to the NASCISS protocol.

Five patients underwent surgical release of pressure by the posterior approach using laminoplasty technique in the first 72 h. Two of the non-surgically treated patients died before the first follow-up visit, while another experienced deterioration of neurological state and had to undergo surgical intervention using the same technique, with good results, although with gait spasticity. (Figure 2)

There was one case of presurgical pneumonia, two of post-surgical pneumonia, and one of urinary infection.

All the patients initially treated surgically had neurological improvement, as did the patient who underwent surgery 18 months after the trauma, with improvement of at least one level on the ASIA scale (Table 3) and 5 points on the JAO scale (Table 4).

DISCUSSION

The most appropriate term for SCIWORA symptomatology in adults should be SCIWORET, which is the neurological deficit that presents no radiographic lesions in the absence of trauma, yet its occurrence in adults is rare. Degenerative changes produce excessive traction of the spinal cord during the accident,[38] although there are other authors who dismiss this relationship, and believe that degenerative changes or calcification of the posterior common vertebral ligament is not directly related to the presence of neurological deficit following low-energy trauma.[39]

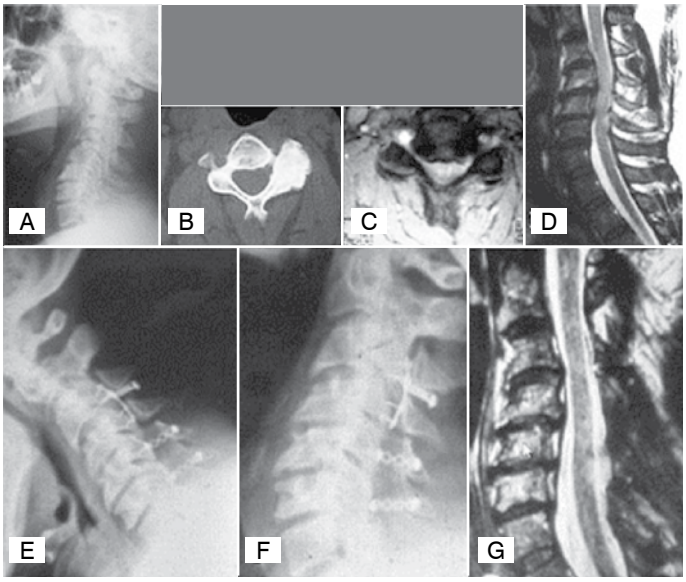

Figure 2. Patient age 56, driver wearing seat belt who had his vehicle rear-ended while stationary. Good initial response to treatment with corticoids and immobilization; however, in the annual follow-up visit he presents with deterioration of neurological state and undergoes surgery 18 months later with good functional outcome. A) Lateral radiography showing cervical spondyloarthrosis; B) axial sections with facet joint impairment and osteophytes; C) MRI axial section showing spinal cord compression due to narrow cervical spinal canal; D) MRI mediosagittal section showing spinal cord edema; E and F) Postoperative dynamic radiographies; G) MRI sagittal section one year after surgery showing correct spinal cord positioning.

Table 3. Evolution of neurological syndrome according to the ASIA scale. Patients 4, 6, 7, and 8 died in follow-up.

Patient	ASIA start	6 months	1 year	2 years	3 years	4 years	ASIA final
1	C	D	C	D	D	D	D
2	B	C	C	C	C	C	C
3	C	E	E	E	E	E	E
4	A	A					
5	D	D	C	D	E	E	E
6	A						
7	B	C					
8	A						

Table 4. Evolution of values of the Japanese Orthopaedic Association Scale (JOA). Patients 4, 6, 7, and 8 died in follow-up.

Patient	6 months	1 year	2 years	3 years	4 years	ASIA final
1	14	11	12	13	13	13
2	10	12	12	12	12	12
3	15	15	16	16	16	16
4	8					
5	14	10	13	15	15	15
6						
7	11					
8						

MRI should be used for the diagnosis,[21,40] but when this is not conclusive, diffusion MRI can be used instead. Proton emission tomography (PET) could be useful in cases with negative MRI, and is useful for the study of myelopathic neurological syndrome. Another option is somatosensory evoked potentials.[31] Lateral view radiography in maximum flexion and extension is contraindicated due to the possibility of exacerbating the neurological condition.[2,40]

The likelihood of neurological recovery[41] in these patients is related, in the first instance, to the initial injury, the canal diameter,[12,5,42,43] the patient's age, the extent of injury, and the severity of the neurological symptoms.[23] Therefore, surgical intervention is not the gold standard for treatment.[18,33] For Saruhashi *et al.,*[27] patients who responded well to corticoid therapy were indicated for immobilization, while those with severe or progressive symptoms should be surgically treated.

Bhatoe[43] advocate nonsurgical treatment in traumas by hyperflexion, considering them vascular lesions; authors like La Rosa *et al.*[44] also support nonsurgical treatment, due to the risk of increased complications.

On the other hand, authors like Dolan *et al.*[45], Chen *et al.*[46] and Lenehan[47] are in favor of rapid release to prevent secondary damage[34] and complications.[41]

CONCLUSION

Low energy trauma can cause an imbalance in the container-content relationship in symptomatic arthritic spines, which can be devastating for the patient.

Plain radiographies and CAT scans are useful for ruling out traumatic injuries, but MRI is used to perform the intramedullary diagnosis.

Laminoplasty patients gained at least one level on the ASIA scale, although the postoperative complications can be severe.

The patient who did not undergo surgery and with final follow-up lost one level on the ASIA scale 18 months later, and recovered satisfactorily with pressure release.

All authors declare no potential conflict of interest concerning this article.

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