



## ORIGINALES

### Traumatic spinal cord injury in Asturias: clinical features, complications and patient support

Características clínicas, complicaciones secundarias y apoyos en personas con lesión medular traumática en Asturias

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<https://doi.org/10.6018/eglobal.421941>

Received: 6/04/2020

Accepted: 5/07/2020

#### ABSTRACT:

**Background:** Traumatic spinal cord injury is a supervening and often devastating event due to functional loss, secondary complications and lack of curative treatment. It is posed as a personal, health and social challenge.

**Objective:** The objective of the study is to describe the epidemiological, clinical and support characteristics of people with traumatic spinal cord injury in the Principality of Asturias.

**Materials and method:** Observational, descriptive and cross-sectional study. The population comprised people with traumatic spinal cord injury admitted for any reason at the Central University Hospital of Asturias from January 1, 2005 to January 31, 2015.

**Results:** The number of cases was 92. 76.9% were men. The average age was 48.5 years old and the average age when the injury occurred was 40.2 years old. The most frequent causes were accidents: traffic, labor and fortuitous. The most frequent type of injury: according to limb involvement, paraplegia with 38.5%; according to the extension, the incomplete lesion with 52.6%; according to the neurological level, the dorsal lesion with 45.4% and according to the classification scale of the American Spinal Injury Association (ASIA), the ASIA A lesion with 50.7%. As most frequent secondary complications: 68.7% have neurogenic bladder, 60.2% neurogenic bowel, 46.5% pressure ulcers, 46.4% spasticity and 30.1% neuropathic pain.

**Conclusions:** There is a high prevalence of secondary complications in spinal cord injury, being necessary to join efforts in the prevention and treatment of them.

**Key words:** spinal cord injuries, pressure ulcer, muscle spasticity, neurogenic urinary bladder, neurogenic bowel, neurologic gait disorders.

#### RESUMEN:

**Introducción:** La lesión medular traumática es un acontecimiento sobrevenido y frecuentemente devastador debido a la pérdida funcional, a las complicaciones secundarias y a la inexistencia de tratamiento curativo. Se plantea como un reto personal, sanitario y social.

**Objetivo:** El objetivo del estudio es describir las características epidemiológicas, clínicas y los apoyos utilizados de las personas con lesión medular traumática del Principado de Asturias.

**Materiales y método:** Estudio observacional, descriptivo y transversal. La población estuvo conformada por personas con lesión medular traumática ingresadas por cualquier causa en el Hospital Universitario Central de Asturias del 1 de enero de 2005 al 31 de enero de 2015.

**Resultados:** El número de casos fue 92. Un 76,9% eran hombres. La edad media fue 48,5 años y la edad media cuando se produjo la lesión 40,2 años. Las causas más frecuentes fueron los accidentes: de tráfico, laborales y fortuitos. El tipo de lesión más frecuente: según afectación de miembros, la paraplejía con un 38,5%; según la extensión, la lesión incompleta con un 52,6%; según el nivel neurológico, la lesión dorsal con un 45,4% y según la escala de clasificación de la American Spinal Injury Association (ASIA), la lesión ASIA A con un 50,7%. Como complicaciones secundarias más frecuentes: el 68,7% presenta vejiga neurógena, el 60,2% intestino neurógeno, el 46,5 úlceras por presión, 46,4% espasticidad y el 30,1% dolor neuropático.

**Conclusiones:** Existe una alta prevalencia de complicaciones secundarias en la lesión medular, siendo necesario aunar esfuerzos en la prevención y tratamiento de las mismas.

**Palabras clave:** traumatismos de la médula espinal, úlcera por presión, espasticidad muscular, vejiga urinaria neurogénica, intestino neurogénico, trastornos neurológicos de la marcha.

## INTRODUCTION

Spinal cord injury (SCI) is defined as the pathological process, produced by whichever etiology, which affects the spinal cord, and which may alter motor, sensory and/or autonomic function below the level of the injury. The complexity of the neurological deficit and, therefore, of the resulting clinical picture, depends on the level of the injury and its extent and the involvement of the white or gray matter<sup>(1)</sup>.

Various reviews of the incidence of traumatic spinal cord injury appear in the literature, although with great variability among them. Thus, in the systematic review of global incidence by Wyndaele et al.<sup>(2)</sup>, the incidence ranges between 4.5 and 83/106 cases per year. In Spain, incidence figures for traumatic and non-traumatic injury are considered between 12-20 / 106 inhabitants / year<sup>(3)</sup>. In his doctoral thesis on traumatic spinal cord injury in Asturias, Álvarez Pérez<sup>(4)</sup> estimated an incidence of 9.2-21.3 / 106 cases / inhabitant in the period between 2000 and 2012.

It should be noted that a change is taking place in spinal cord injury profile, with a tendency towards an increase in the average age, and towards falls as the main cause<sup>(5)</sup>. As there are no national records on spinal cord injury, it is not possible to determine the epidemiology of the injury<sup>(3)</sup>.

Spinal cord injury is a devastating clinical situation, both due to the functional loss it entails and to the individual's loss of independence. To this we must add the inexistence of a curative treatment, and the secondary complications present throughout life, with urinary tract and intestinal involvement, pain, spasticity, and autonomic dysreflexia are among the most important. For all the above, spinal cord injury represents a challenge at a personal, family, health, social, and economic level, and one which requires interdisciplinary and intersectoral care and rehabilitation processes<sup>(6,7)</sup>.

## OBJECTIVES

- Describe the epidemiological and clinical characteristics of people with traumatic spinal cord injury (SCI) in the Principality of Asturias from January 1, 2005 to December 31, 2015.

- Identify the support products used by the study population.

## MATERIALS AND METHODOLOGY

An observational, descriptive, cross-sectional study was carried out. Since there is no specific regional registry of traumatic SCI, together with the fact that the Central University Hospital of Asturias (HUCA) is the center of reference for this type of injury, the study population was made up of people with traumatic spinal cord injury between the ages of 18 and 65 years who had been admitted for any reason to the Central University Hospital of Asturias (HUCA) from January 1, 2005 to December 31, 2015. The study was carried out throughout 2018.

The hospital and primary care electronic medical records (EMR) of the study population were reviewed, and a database designed for this purpose constructed with the following variables collected:

- **Sociodemographic variables:** sex, age, education, marital status, employment prior to injury, and pharmacies contribution as per individual healthcare card (TSI – tarjeta sanitaria individual).
- **Variables related to the injury:** cause, previous history of alterations in mental health, age at injury, time of injury, season of the year in which injury occurred, type of injury according to limb involvement, to extent, to neurological level, and to bone level, surgical intervention to stabilize the lesion, ASIA at discharge, and presence of recognizable clinical syndromes.
- **Variables related to hospitalization:** referral from other hospitals in the region, referral to other hospitals, admission to the Intensive Care Unit (ICU), length of stay in ICU, length of stay in hospitalization unit, total time of hospitalization.
- **Variables related to secondary complications related to the injury:** presence of pressure ulcers (PU), urological disorders, gastrointestinal disorders, pain, muscle spasticity, presence of episodes of autonomic dysreflexia, respiratory disorders, alterations in the mental sphere, and gait alterations.
- **Variables related to support after the spinal cord injury:** use of support products, use of aids for personal mobility, and associationism related to the injury.

### Statistical analysis

A descriptive analysis of each variable was carried out, providing the absolute and relative distributions for the qualitative variables, together with position measures such as the mean or median, and, in the case of quantitative variables, dispersion measures such as standard deviation.

The relationships between qualitative variables were assessed with Pearson's Chi Square test or Fisher's test, depending on whether or not the expected frequency hypothesis was verified. The differences of quantitative variables between two groups were evaluated through the Student's t test for independent samples, with Welch's correction for non-equality of variances. For groups of 3 or more, the Anova test or the Kruskal-Wallis test was used in function of the fulfillment or otherwise of the hypothesis of normality and homoscedasticity.

The level of significance used was 0.05.

Statistical analysis was performed using R (R Development Core Team program), version 3.4.4.

### **Legal and ethical aspects**

Authorization to carry out the study was granted by both the Research Ethics Committee of the Principality of Asturias, and the Area IV (Oviedo) Management and the Nursing Directorate.

The list of patients was kept by the main researcher on an electronic device without connection to the internet, and the EMRs were encrypted and anonymized.

The confidentiality and anonymity of the data used were guaranteed following the provisions of Organic Law 15/1999 for the Protection of Personal Data, which was the law in force at the time of the study.

## **RESULTS**

92 SCI cases were studied, of which 76.9% (n = 70) were men. The mean age was 48.5 years with a standard deviation of 11, the median being 50 years.

The level of studies was reflected in 14% (n = 13) of the EMRs, and of these 76.9% (n = 10) had completed university studies, 15.4% (n = 2) had basic studies, and 7.7% (n = 1) upper-secondary studies. Marital status is registered in 58.7% (n = 54) of the clinical histories: 57.4% (n = 31) are married or cohabiting, 29.6% (n = 16) are single, and 13 % (n = 7) separated and/or divorced.

Regarding pre-injury employment, 76.5% (n = 52) were active workers, 10.4% (n = 7) were retired, 8.8% (n = 6) were students, 2.9% (n = 2) were unemployed, and 1.5% (n = 1) were engaged in housework. A significant association was found between pre-injury occupation and the degree of injury with a p value = 0.043, 86.2% (n = 25) of complete injuries, and 63.6% (n = 21) of incomplete injuries occurring in active workers.

The pharmaceutical contribution according to individual healthcare card (TSI): 76.6% (n = 59) had a TSI 2 (contribution of 10% with different monthly contribution limits), 11.7% (n = 9) a TSI 1 (exempt from contribution), 6.5% (n = 5) a TSI 3 (contribution of 40%), 3.9% (n = 3) a TSI 6 (belonging to private healthcare programmes (mutuas) with a contribution of 30%), and 1.3% (n = 1) had a TSI of 4 (contribution of 50%). The pharmacies contribution according to TSI is significantly related to the use of support products (p value <0.001) and specifically, to the use of aids for personal mobility (p value = 0.019).

### **Results related to the injury**

The most frequent causes of injury were: traffic accidents, 30.3% (n = 27), which break down into 19.1% (n = 17) car accidents, 10.1% (n = 9) motorcycle accidents, and 1.1% (n = 1) other types of traffic; workplace accidents, 25.8% (n = 23), and fortuitous accidents, 20.2% (n = 18). Spinal cord injuries produced after an autolytic attempt

correspond to 11.2% (n = 10) of all injuries. Sports accidents account for 5.6% (n = 5), and 3.4% (n = 3) are from accidents diving into shallow water. 1.1% (n = 1) is due to direct trauma to the spine, 1.1% (n = 1) to assault, and 1.1% (n = 1) to unknown causes.

25.8% (n = 23) had a history prior to injury of mental health disorders: 6.7% (n = 6) had an anxiety-depressive disorder, 6.7% (n = 6) a personality disorder, 5.6% (n = 5) drug addiction, 3.4% (n = 3) schizophrenia, 1.1% (n = 1) bipolar disorder, 1.1% (n = 1) chronic alcoholism, and 1.1% (n = 1) other mental illnesses. Relating the cause of the spinal injury to the presence of a history of mental health disorders reveals that these are not present in people who suffered a sports accident or in those who suffered an occupational accident, but do appear with a  $p < 0.001$  in 24% of those who suffered a traffic accident, in 26.3% of what was labelled a fortuitous accident, and in 100% of those whose injury was secondary to an autolytic attempt.

The mean age at injury was 40.2 years, with a standard deviation of 12.1 and a median of 41 years. The median time from injury to study was 109 months, with a standard deviation of 160 and a median of 76 months.

33.7% (n = 31) of the injuries occurred in summer, 23.9% (n = 22) in winter, 21.7% (n = 20) in autumn, and 17.4% (n = 16) in spring. There are no statistically significant differences that relate the cause of the injury to the season.

The most frequent type of injury is paraplegia with 38.5% (n = 30), followed by paraparesis with 28.2% (n = 22). 20.5% (n = 16) have tetraparesis and 12.8% (n = 10) have quadriplegia. If the injuries are grouped according to their extension, it is observed that 52.6% (n = 41) have incomplete injuries and 47.4% (n = 37) have complete injuries.

According to neurological level, dorsal injury is the most frequent with 45.4% (n = 39), followed by cervical injury with 30.2% (n = 26), and lumbar injury with 24.4% (n = 21). There is a gender difference: in men the most frequent injury is dorsal injury with 45.6% (n = 31), followed by cervical injury with 35.3% (n = 24) and lumbar injury with 19, 1% (n = 13). In women, the most frequent injuries are dorsal and lumbar with 44.4% (n = 8), followed by cervical with 11.1% (n = 2). There is a statistically significant relationship between sex and level of lesion, with a p value = 0.045.

The distribution of lesions according to bone level is reflected in Table 1:

**TABLE 1: DISTRIBUTION OF SPINAL CORD INJURY ACCORDING TO BONE LEVEL**

Zone		Vertebra	Frequency	%
Cervical	27 (30,3%)	C1	1	1,1
		C2	0	0
		C3	3	3,4
		C4	5	5,6
		C5	7	7,9
		C6	10	11,2
		C7	1	1,1

<b>Dorsal</b>	<b>42 (47,2%)</b>	<b>D1</b>	0	0
		<b>D2</b>	0	0
		<b>D3</b>	1	1,1
		<b>D4</b>	4	4,5
		<b>D5</b>	7	7,9
		<b>D6</b>	5	5,6
		<b>D7</b>	2	2,3
		<b>D8</b>	2	2,3
		<b>D9</b>	2	2,3
		<b>D10</b>	2	2,3
		<b>D11</b>	3	3,4
		<b>D12</b>	14	15,6
<b>Lumbar</b>	<b>20 (22,5%)</b>	<b>L1</b>	12	13,5
		<b>L2</b>	4	4,5
		<b>L3</b>	2	2,2
		<b>L4</b>	1	1,1
		<b>L5</b>	1	1,1
		<b>Total</b>	89	100

81.6% (n = 71) have undergone some sort of surgical intervention to stabilize their SCI.

According to ASIA at discharge, 50.7% (n = 35) have an ASIA A injury, 27.5% (n = 19) an ASIA D injury, 14.5% (n = 10) an ASIA C injury, 4.3% (n = 3) an ASIA B injury, and 2.9% (n = 2) an ASIA E injury.

Among the incomplete clinical lesions that produce recognizable clinical syndromes, 10.3% (n = 8) have Brown-Séquard syndrome, 7.7% (n = 6) have central cord or Scheneider syndrome, 5.1% (n = 4) conus medullaris syndrome, and 2.6% (n = 2) cauda equina syndrome. Table 2 shows the most important relationships between the presence of syndromes and the associated secondary complications.

**TABLE 2: PRESENCE OF SYNDROMES AND ASSOCIATED SECONDARY COMPLICATIONS**

			<b>NO SYNDROMES</b>	<b>TOTAL</b>	<b>P VALUE</b>
<b>PU</b>	YES	5 (25%)	15 (75%)	20(100%)	0,014
	NO	32(57,1%)	24(42,9%)	56(100%)	
<b>UROLOGICAL COMPLICATIONS</b>	YES	13(65%)	7(35%)	20(100%)	0,012
	NO	50(90,9)	5(9,1%)	55(100%)	
<b>GASTROINTESTINAL COMPLICATIONS</b>	YES	12(60%)	8(40%)	20(100%)	0,078
	NO	44(80%)	11(20%)	55(100%)	

## Results related to hospitalization

In the first admission after the injury occurred, 41.4% (n = 36) were referred from other hospitals in the region to the HUCA, as this is the center of reference for the treatment of people with spinal cord injury at the regional level.

38.7% (n = 33) were referred from the HUCA to other national reference hospitals to complete treatment: 23.3% (n = 20) were referred to the National Hospital for Paraplegics in Toledo, which is the national reference hospital; 2.3% (n = 2) were referred to the Institut Guttmann de Barcelona; 12.8% (n = 11) to other hospitals.

62.5% (n = 57) required admission to the ICU. The average length of stay in the ICU was 12.1 days, with a standard deviation of 21.9 and a median of 3; the time of hospitalization unit was 93.8 days, with a standard deviation of 81.8 and a median of 75; the total hospitalization time was 106 days, with a standard deviation of 83.4 and a median of 88. Table 3 shows the most important relationships between hospitalization times and types of injury.

**TABLE 3: RELATIONSHIPS BETWEEN THE TIME OF HOSPITALIZATION IN THE ICU IN DAYS, TIME IN UNIT OF HOSPITALIZATION, TOTAL TIME OF HOSPITALIZATION, AND THE TYPES OF INJURY**

Injury		Time of hospitalization in UCI			Time in unit of hospitalization			Total time of hospitalization			
		n	Media	DE	p valor	Media	DE	p valor	Media	DE	p valor
By limbs affected	Paraparesia	22	9	13	0,368	132,1	84,3	<0,001*	141,1	84,6	<0,001*
	Paraplejia	30	12	18,3		133,9	78,6		145,9	85,8	
	Tetraparesia	16	7	15,7		67,3	44,1		74,3	44,5	
	Quadraplejia	10	35,1	44,9		13,7	21,4		48,8	37,5	
By extent	Complete	37	18,3	29,3	0,094	110,9	85,9	0,714	129,2	86,1	0,392
	Incomplete	41	9,2	14,5		104,1	77,4		113,3	77,0	
By neurological level	Cervical	26	17,9	32,7	0,063	50	45,6	<0,001*	67,9	42,8	<0,001*
	Dorsal	39	13,6	17,8		149,2	73,7		162,8	77,4	
	Lumbar	21	5,4	10,9		67,4	80,3		72,8	78,9	

\*Statistically significant with  $p < 0,05$ .

### Results about secondary complications related to spinal cord injury

46.5% (n = 39) had PU, of which 26.2% (n = 22) had PU in multiple areas of the body, 7.1% (n = 6) had sacral ulcers, 4.8% (n = 4) occipital ulcers, 3.6% (n = 3) on the toes, 2.4% (n = 2) on the heels, 1.2% (n = 1) in the ischium and 1.2% (n = 1) in the trochanter. There is a relationship between the presence of a history of mental health disorders and PU complications with a p value = 0.01.

Among urological complications, 68.7% (n = 57) have neurogenic bladder, of which 31.3% (n = 26) have this condition added to repeated urinary tract infections (UTIs).

2.4% (n = 2) presented repeat UTIs without neurogenic bladder. Other complications are urinary urgency, 4.8% (n = 4) and incontinence, 2.4% (n = 2). 21.7% (n = 18) did not present urological complications.

With regard to gastrointestinal complications, 60.2% (n = 50) presented neurogenic bowel, 8.4% (n = 7) constipation, 1.2% (n = 1) incontinence, and 1.2% (n = 1) gas incontinence. 28.9% (n = 24) did not present any gastrointestinal alteration.

30.1% (n = 25) of people with spinal cord injury have neuropathic pain, compared to 19.3% (n = 16) who have mechanical pain. 13.3% (n = 11) presented both neuropathic and mechanical pain. 37.3% (n = 31) have no pain.

46.4% (n = 39) presented muscle spasticity.

3,6% (n=3) of patients presented an autonomic dysreflexia crisis.

With regard to respiratory complications, 10.7% (n = 9) presented or present respiratory complications.

Tables 4, 5 and 6 show the most important relationships between complications secondary to traumatic SCI and the type of lesion according to involvement, extent, and neurological level, respectively.

Regarding post-injury complications in mental health, 30.1% (n = 25) suffered from anxiety-depressive syndrome, 3.6% (n = 3) from an autolytic attempt, 1.2% (n = 1) from insomnia, 16.9% (n = 14) have mental illnesses that they had prior to injury, and 2.4% (n = 2) have other illnesses of the mental sphere. 45.8% (n = 38) did not present complications in mental health.

There is a statistically significant relationship between marital status and mental complications derived from the injury with a p value = 0.045, such complications being more frequent in married people and less in unmarried people. There is also a relationship between having a previous mental health history and having post-injury mental complications, with a p value <0.001.

Regarding gait disturbances, 58% (n = 47) were unable to walk, 7.4% (n = 6) were able to walk short distances with support, 7.4% (n = 6) presented pareto-spastic gait, and 1.2% (n = 1) steppage gait. 25.9% (n = 21) presented other undefined gait disturbances.

**TABLE 4: SECONDARY COMPLICATIONS AND TYPE OF INJURY ACCORDING TO AFFECTION**

		PARAPRESIA	PARAPLEJIA	TETRAPRESIA	QUADRAPLEJIA	TOTAL	P VALUE
PU	YES	5(13,9%)	24(66,7%)	3(8,3%)	4(11,1%)	36(100%)	<0,001
	NO	16(40%)	6(15%)	13(32,5%)	5(12,5%)	40(100%)	
UROLOGICAL COMPLICATIONS	YES	17 (26,6%)	30 (46,9%)	9(14%)	8(12,5%)	64(100%)	<0,001
	NO	4 (36,4%)	0(0%)	7(63,6%)	0(0%)	11(100%)	
GASTROINTESTINAL COMPLICATIONS	YES	14(24,6%)	28(49,1%)	7(12,3%)	8(14%)	57(100%)	<0,001
	NO	7(38,9%)	2(11,1%)	9(50%)	0(0%)	18(100%)	



<b>SPASTICITY</b>	YES	7(18%)	19(48,7%)	5(12,8%)	8(20,5%)	39(100%)	0,007
	NO	14(37,9)	11(29,7)	11(29,7)	1(2,7)	37(100%)	
<b>AUTONOMIC</b>	YES	0(0%)	0(0%)	0(0%)	3(100%)	3 (100%)	0,001
<b>DYSREFLEXIA</b>	NO	21(29,2%)	30(41,7%)	16(22,2%)	5(6,9%)	45(100%)	
<b>RESPIRATORY</b>	YES	0(0%)	1(11,1%)	3(33,3%)	5(55,6%)	9(100%)	<0,001
<b>COMPLICATIONS</b>	NO	21(31,3%)	29(43,3%)	13(19,4%)	4(6%)	67(100%)	

**TABLE 5: SECONDARY COMPLICATIONS AND TYPE OF INJURY ACCORDING TO EXTENSION**

		COMPLETA	INCOMPLETA	TOTAL	P VALOR
<b>PU</b>	YES	28(73,7%)	10(26,3%)	38(100%)	<0,001
	NO	8(21%)	30(79%)	38(100%)	
<b>UROLOGICAL</b>	YES	36(58%)	26(42%)	62(100%)	<0,001
	<b>COMPLICATIONS</b>	NO	0(0%)	13(100%)	
<b>GASTROINTESTINAL</b>	YES	34(61,8%)	21(38,2%)	55(100%)	<0,001
	<b>COMPLICATIONS</b>	NO	2(10%)	18(90%)	
<b>SPASTICITY</b>	YES	26(66,7%)	13(33,3%)	39(100%)	0,001
	NO	10(27%)	27(73%)	37(100%)	

**TABLE 6: SECONDARY COMPLICATIONS AND INJURY ACCORDING TO NEUROLOGICAL LEVEL**

		CERVICAL	DORSAL	LUMBAR	TOTAL	P VALUE
<b>PU</b>	YES	7(18%)	24(61,5%)	8(20,5%)	39(100%)	0,032
	NO	18(43,9%)	15(36,6%)	8(19,5%)	41(100%)	
<b>UROLOGICAL</b>	YES	18(28,1%)	36(56,3%)	10(15,6%)	64(100%)	0,014
	<b>COMPLICATIONS</b>	NO	6(40%)	3(20%)	6(40%)	
<b>SPASTICITY</b>	YES	13(33,3%)	24(61,6%)	2(5,1%)	39(100%)	0,004
	NO	12(29,3%)	15(36,6%)	14(34,1%)	41(100%)	
<b>AUTONOMIC</b>	YES	3(100%)	0(0%)	0(0%)	3(100%)	0,032
<b>DYSREFLEXIA</b>	NO	21(27,6%)	39(51,3%)	16(21,1%)	76(100%)	
<b>RESPIRATORY</b>	YES	8(88,9%)	1(11,1%)	0(0%)	9(100%)	<0,001
<b>COMPLICATIONS</b>	NO	17(23,9%)	38(53,5%)	16(22,6%)	71(100%)	

### Results on supports related to spinal injury

87.3% (n = 69) use support products in their daily lives. If we focus on aids for personal mobility, 59.3% (n = 48) move in a wheelchair, 28.4% (n = 23) with crutches or an English cane, 3.7% (n = 3) with some other aid, and 8.6% (n = 7) without aid for travel.

Table 7 shows the relationships between the type of injury, gait disturbances, and the use of support products.

In 16.3% (n = 15) of the EMR, membership or not of an association is reflected. Within this percentage, 73.3% (n = 11) belongs to the Asociación de Paraplégicos y Grandes Minusválidos Físicos (Association of Paraplegics and the Seriously Physically Handicapped), 6,7%(n=1) to the Confederación Española de Personas con Discapacidad Física y Orgánica (Spanish Confederation of People with Physical and Organic Disabilities), while 20%(n=3) do not belong to any association.

**TABLE 7: RELATIONSHIP BETWEEN THE TYPE OF INJURY, GAIT ALTERATIONS, AND THE USE OF SUPPORT PRODUCTS**

		PARAPARESIA	PARAPLEJIA	TETRAPARESIA	QUADRAPLEJIA	TOTAL	P VALUE
<b>GAIT ALTERATIONS</b>	<b>Short distances</b>	3(50%)	1(16,7%)	2(33,3%)	0(0%)	6(100%)	
	<b>Don't walk</b>	6(13%)	28(60,9%)	2(4,4%)	10(21,7%)	46(100%)	<0,001
	<b>Other gait disturbances</b>	11(47,8%)	0(0%)	12(52,2%)	0(0%)	23(100%)	
<b>USE OF SUPPORT PRODUCTS</b>	<b>Yes</b>	15(23,4%)	28(43,8%)	13(20,3%)	8(12,5%)	64(100%)	0,035
	<b>No</b>	4(50%)	0(0%)	3(37,5%)	1(12,5%)	8(100%)	
<b>USE OF MOBILITY AIDS</b>	<b>Wheelchair</b>	6(12,5%)	29(60,4%)	3(6,3%)	10(20,8%)	48(100%)	
<b>AIDS</b>	<b>No</b>	3(50%)	0(0%)	3(50%)	0(0%)	6(100%)	<0,001
	<b>Other aids</b>	11(52,4%)	0(0%)	10(47,6%)	0(0%)	21(100%)	

## DISCUSSION

There is no national or regional registry for spinal cord injury. Incidence and prevalence are found as a result of studies, and there is significant variability due to differences in criteria in each of them.

There are several studies<sup>(8–11)</sup> that speak of two peaks in incidence: one between 15 and 29 years due to traffic accidents, and another around 65 years caused by falls. In our study, we were unable to obtain this data, since the inclusion criterion regarding age was between 18 and 65 years old. The studies reflect a change in the classic pattern of spinal cord injury, with an increase in the average age, and a change in its aetiology. In our study, the mean age of the patient at the time of the injury was 40.2 years, lower than in the Montoto study<sup>(10)</sup> in Galicia, which was 50.2 years, and somewhat lower than in the Barbara–Bataller study<sup>(5)</sup> in the Canary Islands, which was 43.7. The most frequent cause in our study was traffic accidents, as was the case in the study carried out in Aragon by Van der Berg<sup>(11)</sup>. This differs from the studies in the Canary Islands and in Galicia in which accidents are in second place after falls.

In this study, an autolytic attempt appears as the cause of spinal injury 11% of the time, which is higher than found in other studies. In Álvarez Pérez's thesis<sup>(4)</sup> carried out in Asturias in 2015, suicide attempts represented 4.6%. The reasons may be due to underreporting of suicides that can be classed under other causes: falls, etc. A large part of the studies consulted on spinal cord injury exclude the population with a history of mental health, which could also explain this fact. However, it should be noted that from 2010 to 2015 Asturias presented the highest standardized suicide rate of all the Autonomous Communities, both in men and women, to the point that it was considered a public health problem<sup>(12)</sup>.

Secondary complications are frequent after spinal injury. In Stillman's research <sup>(13)</sup> after the first year after discharge, it appears that 44% of spinal cord injuries have 3 or fewer complications, 34% have 3 to 7 complications, and 22% 8 or more complications. The prevalence of complications is highly variable due to heterogeneity between studies when collecting data. However, there seems to be consensus in highlighting secondary complications as an important topic of study due to the severe impact they have on quality of life, hospitalizations, and morbidity and mortality in this group. It would be necessary to strengthen our understanding of this area in order to carry out both prevention and pertinent treatment.

People with spinal cord injury are a group in which PUs are particularly common due to impaired sensitivity, reduced mobility, and prolonged sitting <sup>(14)</sup>. The prevalence of PUs in the present study is 43.4%, concordant with other studies that place it between 33% and 49% (15–18), although there is a diversity of inclusion criteria in the different studies (population hospitalized or not, collection time, etc.). The systematic review by Di Prinzio et al. <sup>(19)</sup> shows that due to the heterogeneity of the studies it was not possible to meta-analyze the evidence. In our study, 26.2% presented ulcers in more than one place; this is consistent with the study by Deena Lala <sup>(18)</sup> in which 27% had more than one pressure ulcer. Regarding the factors that are related: in this study a statistically significant relationship appears between the presence of a mental history and the presence of PU, something that has not been found in any other study. However, there is a coincidence between the injury according to degree of limb involvement and the presence of PUs <sup>(20)</sup>. In the Di Prinzio <sup>(19)</sup> systematic review, the relationship between the severity of the injury according to the ASIA classification and the presence of PU appears in several studies. However, this has not been found in our study.

Given that there is no rigorous registry of traumatic SCI, and that the population has had to be obtained from the list of those who have entered the HUCA for whatever reason, the incidence of the injury could not be calculated.

As this was a cross-sectional study, it was not possible to study the factors that could contribute to the appearance of complications, and although it was not an aim of the present study, it would be an interesting fact to know. Not all complications have been described, only the most prevalent ones.

A limitation of the study is that the data has been extracted from what was recorded by professionals in the patient's medical records and a considerable under-registration has been observed, which raises the need for serious reflection on this matter.

## CONCLUSIONS

In order to know the real magnitude of spinal cord injury and to have an epidemiological perspective, it would be necessary to create standardized registries at regional and national levels.

There is a high prevalence of secondary complications after a spinal cord injury. A part of them, such as PU, are preventable, so it is important to join forces within the national health service in the prevention and treatment of these complications.

The vast majority of people with traumatic spinal cord injury use support products in their daily lives.

The records in the medical records can be improved, especially in their more social or relational aspects.

### Financing

This project has received the '2018 Best Doctoral Thesis Project in Family and Community Nursing' awarded by the Chair of Family and Community Nursing at the University of Alicante.

### Thanks

To the Statistical Consulting Unit of the University of Oviedo.

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ISSN 1695-6141

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