Technical note: In Mexico, the majority of 147 traumatic spinal cord injuries occurred in the thoracic spine for young males

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INTRODUCTION

Traumatic spinal cord injuries (TSCIs) are catastrophic. They typically occur in young adult males, their reported incidence varies depending on the country studied; 20.7–83.0/per million residents/year in America, 8.0–130.6 in Europe, 10.0–77.0 in Oceania, and from 14.6 to 246 in Asia. However, there are few TSCI statistics available from developing countries. Here, in Mexico, we evaluated 147 consecutive TSCI patients treated from 2017 to 2018 (i.e., a “developing country”).

MATERIALS AND METHODS

We reviewed the electronic files of 147 patients treated from 2017 through 2018, who sustained TSCI. A detailed analysis of the multiple epidemiological and clinical variables was performed that included age, sex, affected vertebral level, associated injuries, Frankel Grade, and treatment.
The statistical analysis was performed by two independent researchers. All information was collected in a Microsoft Excel spreadsheet (Office 2016, Microsoft) and then analyzed with IBM SPSS (Version 21, IBM).

Clinical data

Of the 147 cases, 78% (115) were male, and 22% (32) were female, averaging 38.61 and 37.03 years of age, respectively [Table 1 and Figure 1]. Other data, such as marital status, educational background, and scholarship, were also analyzed [Table 1]. The most common etiology of TSCI was a fall from a height greater than 1 m (53.74%) followed by motor vehicle accidents (30.61%) and succeeded by lower-level falls (7.48%) [Table 2 and Figure 2]. Most lesions involved the thoracic spine (40.13% [59] of the cases) followed by the lumbar (30.61% [45]) and the cervical spine (43 cases corresponding to 29.25%) [Figure 3]. In 40% of cases, patients had associated injuries (i.e., thoracic lesions, most of whom had an attendant hemothorax). Cranioencephalic trauma and thoracic limb injuries each occurred in 12.92% of cases, while subdural hematomas and clavicular fractures were the next most common injuries [Table 3].

RESULTS

Frankel and AO spine classification

Most patients were classified as Frankel, Type E (TSCI: 42.17% [62]), followed by Type A 28.57% (42), Types C, D, and B [Table 4]. According to the AO spine classification system, most cases were Type C 36.22% (46) followed by Type B 34.64% (44) and Type A 29.13% (37).

In-hospital complications

Notably, 19% (28 patients) of patients sustained in-hospital complications: pulmonary (14%), urinary tract infections (2%), decubitus ulcer (2%), and deep venous thrombosis (two cases) [Table 5].

Table 1: Demographic characteristics of patients with traumatic spinal cord injury.

|                         | 2017 | 2018 | Total |
|-------------------------|------|------|-------|
| Gender                  |      |      |       |
| Male                    | 48   | 67   | 115   |
| Female                  | 16   | 16   | 32    |
| Age (Years)             |      |      |       |
| 0–15                    | 1    | 5    | 6     |
| 16–30                   | 28   | 29   | 57    |
| 31–45                   | 13   | 20   | 33    |
| 46–60                   | 14   | 14   | 28    |
| 61–75                   | 7    | 15   | 22    |
| 76–                     | 1    | 0    | 1     |
| Marital status          |      |      |       |
| Married                 | 33   | 32   | 65    |
| Unmarried               | 31   | 51   | 82    |
| Scholarship             |      |      |       |
| Any                     | 4    | 7    | 11    |
| Elementary school       | 25   | 26   | 51    |
| Middle school           | 24   | 23   | 47    |
| High school             | 6    | 14   | 20    |
| Technical               | 2    | 2    | 4     |
| College degree          | 2    | 3    | 5     |
| Unknown                 | 0    | 8    | 8     |
| Occupation              |      |      |       |
| Peasant                 | 10   | 19   | 29    |
| Housewife               | 10   | 12   | 22    |
| Student                 | 11   | 8    | 19    |
| Unemployed              | 7    | 9    | 16    |
| Bricklayer              | 4    | 9    | 13    |
| Merchant                | 5    | 6    | 11    |
| Other                   | 17   | 20   | 37    |

Figure 1: Distribution histogram between age and number of cases.

Figure 2: Distribution histogram of the etiology of the 147 traumatic spinal cord injury patients.
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Table 2: Etiology of trauma.

| Etiology               | n   | %   |
|------------------------|-----|-----|
| High fall              | 80  | 54.42|
| Motor vehicle          | 45  | 30.61|
| Low fall               | 11  | 7.48 |
| Falling objects        | 4   | 2.72 |
| Run over               | 4   | 2.72 |
| Wounded by others      | 3   | 2.04 |

Table 3: Associated injuries in patients with TSCI. TBI: Traumatic brain injury.

| Injuries              | n   | %   |
|-----------------------|-----|-----|
| Chest trauma          | 28  | 19  |
| TBI                   | 19  | 12.92|
| Upper members         | 19  | 12.92|
| Lower members         | 9   | 6.12 |
| Facial trauma         | 3   | 2   |
| Abdominal trauma      | 3   | 2   |

Table 4: Relationship between the affected level and Frankel classification.

| Frankel grading | A | B | C | D | E | Total |
|-----------------|---|---|---|---|---|-------|
| Cervical        | 15| 5 | 6 | 3 | 14| 43    |
| Thoracic        | 25| 3 | 5 | 5 | 21| 59    |
| Lumbar          | 2 | 0 | 8 | 9 | 26| 45    |

Table 5: In-hospital complications in patients with TSCI. UTI: Urinary Tract Infection. DVT: Deep Vein Thrombosis.

| Complication      | n  | %   |
|-------------------|----|-----|
| Pneumonia         | 21 | 14.28|
| UTI               | 3  | 2   |
| Decubitus ulcer   | 3  | 2   |
| DVT               | 2  | 1.36|
| Delirium          | 1  | 0.68|

Nonsurgical versus surgical management

Of the 147 cases, 74.2% (109) required surgery consisting of posterior instrumentation (46.25%) and 360 fusions (27.89%). The remaining 25.8% were managed non-surgically [Figure 4]. The mortality rate included five patients; two died before surgery and three after surgery [Table 6].

DISCUSSION

This is a retrospective descriptive study aimed at defining preventive strategies for spinal trauma. Is it generally knows that TSCI exerts a substantial financial burden on patients and society.[5] Such epidemiological research of TSCI coming from developing countries (i.e., Mexico) is rare compared with developed countries.[6,8] Our population of young males (average age 38) appears to be at the greatest risk of TSCI compared with other countries such as Holland, where the average age of those affected is 62 years[9] and Finland, where the average age is 58.7 years.[4] Most patients are males worldwide.[9] The main etiology of the trauma in our study was falls from a substantial height (e.g., present in more than half of the cases [53.74%]), whereas in developed countries, most are due to motor vehicle accidents.[1] Most of our patients had thoracic TSCI (40.13%), whereas most international series
Knowledge of the cause of TSCI in Mexico and the associated factors should allow us to design a preventive program and better prepare our medical and surgical resources to treat these patients.

**Declaration of patient consent**

Patient’s consent not required as patients identity is not disclosed or compromised.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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