Journal of Clinical Neuroscience 22 (2015) 726–729

Contents lists available at ScienceDirect

Journal of Clinical Neuroscience

journal homepage: www.elsevier.com/locate/jocn

Clinical Study

Management and neurological outcome of spontaneous spinal epidural hematoma

Tomasz Dziedzic *, Przemysław Kunert, Piotr Krych, Andrzej Marchel

Department of Neurosurgery, Medical University of Warsaw, 02–097 Warszawa, Banacha 1a, Poland

ARTICLE INFO

Article history:
Received 2 August 2014
Accepted 2 November 2014

Keywords:
Anticoagulant therapy
Spinal cord injury
Spontaneous spinal epidural hematoma
Vascular

ABSTRACT

This study assesses the etiology, clinical management, and outcome of patients with spontaneous spinal epidural hematoma (SSEH). SSEH is an uncommon neurosurgical emergency. We analyzed data from 10 patients (six women, four men) treated for SSEH (mean age, 63.5 years). Five patients had bleeding disorders due to anticoagulant therapy at the time of diagnosis. The initial clinical symptom in most patients was severe pain (n = 8). Spinal injury was assessed using the American Spinal Injury Association (ASIA) scale, with six Grade A, one Grade C, and three Grade D patients. Lesions were in the cervicothoracic (n = 4), thoracic (n = 5), and thoracolumbar regions (n = 1). Location was dorsal in seven patients and ventral in three. SSEH extension ranged from three to 15 spinal levels (mean, 6.9 levels). ASIA scale outcomes for the entire group were Grade A, n = 2; Grade B, n = 1; Grade C, n = 1; Grade D, n = 2; and Grade E, n = 4. Outcomes for patients with no bleeding disorders (n = 5) were Grade D, n = 1; and Grade E, n = 4. Outcomes for patients with bleeding disorders (n = 5) were Grade A, n = 2; Grade B, n = 1; Grade C, n = 1; and Grade D, n = 1. After surgical treatment, patients improved by at least by one ASIA grade. The patients with mild neurological deficit who were treated conservatively also improved. Emergent spinal cord decompression is the only way to preserve spinal cord function in patients with severe deficit. Coagulation disorders were related to poor neurological status at admission and with poor neurological outcome. Conservative treatment was acceptable in patients with minimal neurological deficit.

1. Background

Spontaneous spinal epidural hematoma (SSEH) leads to neurological deterioration and spinal cord injury and is thus considered a neurosurgical emergency. In terms of location, spinal epidural hematomas (including SSEH) are by far the most common (75%) followed by subarachnoid hematomas (15.7%) and subdural hematomas (4.1%) [1]. Hematoma etiology is unknown in 38.2% of cases; in cases with a suspected etiology, coagulation disorders are the most common (28.5% of all spinal hematomas), followed by vascular deformities (9.1% of all SSEH); however, other rarer etiological factors, such as malignancy and trauma, are reported in the literature [1]. Usually the first symptom of SSEH is acute progressive neurological deficit accompanied by pain [1,2]. Some patients have a gradual onset of symptoms [3]. Due to its rarity (0.1 patients/100,000 people) and non-specific symptoms, the correct diagnosis can be challenging [4–7]. The first case report of SSEH was published by G.J. Duverney in the seventeenth century. The first attempts to treat SSEH in the early 1900s aimed to resolve the symptoms of spinal cord compression [1]. Currently, causal treatment is mandatory in the majority of cases, with exceptions for severe multi-organ failure or mild improving neurological deficits [8,9]. Neurological outcome depends mainly on the extent of the preoperative spinal cord injury [10]. According to the literature, about one-third of patients are on anticoagulant therapy [1]. The aim of this study was to assess the etiology, clinical management, and outcome of 10 consecutive patients with SSEH treated at one department.

2. Methods

Data were collected from the medical records of 10 patients (four men, six women) treated for SSEH in our department between 2002 and 2013. The age of onset ranged from 28 to 84 years (mean, 63.5 years). The SSEH diagnosis was based on MRI and was confirmed intraoperatively in the patients who underwent surgery (n = 5) (Table 1). Surgery was not indicated for five patients, due to mild deficit (American Spinal Injury Association [ASIA] Grade D) plus improvement in neurological deficit (n = 3) or multi-organ failure (n = 2). Neurological deficit at admission was assessed using the ASIA scale (Table 2). Long-term

* Corresponding author. Tel.: +48 22 599 2575; fax: +48 22 599 1575.
E-mail address: tomasz_dziedzic@wp.pl (T. Dziedzic).

http://dx.doi.org/10.1016/j.jocn.2014.11.010
0967-5868/

Table 1
Clinical characteristics of spontaneous spinal epidural hematoma patients (n = 10)

Patient	Age, years	Level	Number of affected spinal levels	Anticoagulation therapy	ASIA grade at admission	ASIA grade at final follow-up
	Patients with preoperative bleeding disorders					
1	79	Th	4	Acenocoumarol	A	B
2	83	Th-L	8	Acenocoumarol	C	D
3	72	C-Th	15	Acenocoumarol	A	C
4	77	Th	8	Acenocoumarol	A	A
5	84	Th	3	Acenocoumarol	A	A
	Patients without bleeding disorders					
6	46	C-Th	6	-	D	E
7	35	C-Th	9	-	D	E
8	57	Th	6	-	D	E
9	28	C-Th	7	-	A	E
10	74	Th	3	-	A	D

ASIA = American Spinal Injury Association score, C = cervical, L = lumbar, Th = thoracic.

Table 2
American Spinal Injury Association Spinal Cord Injury Impairment Scale

Grade	Description
A	**Complete:** No motor or sensory function is preserved in the sacral segments S4–S5
B	**Incomplete:** Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4–S5
C	**Incomplete:** Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a muscle grade of less than 3
D	**Incomplete:** Motor function is preserved below the neurological level, and at least half of the key muscles below the neurological level have a muscle grade of 3 or more
E	**Normal:** Motor and sensory function are normal

neurological outcome was assessed during a medical appointment at the Outpatient Clinic, and follow-up ranged from 6–24 months (mean, 16 months).

The SSEH diagnosis was based on MRI in all patients, and no patients had malignancies that could have caused the SSEH. The lesions were located in the cervicothoracic (n = 4), thoracic (n = 5), and thoracolumbar regions (n = 1). The location was dorsal in seven cases and ventral in three. The extension of the SSEH ranged from three to 15 spinal levels (mean, 6.9 levels).

Statistical differences between the groups were determined using the Mann–Whitney U or the Wilcoxon test. $p < 0.05$ was set as the level of significance. The small number of patients in both groups decreases the value of the obtained analyses and they should be interpreted with caution. During the study we followed The Ethical Principles for Medical Research Involving Human Subjects outlined in Declaration of Helsinki.

3. Results

The age at onset ranged from 72 to 84 years (mean, 79 years) in patients with a preoperative bleeding disorder (BD) and from 28 to 74 years (mean, 48 years) in patients with no bleeding disorders (NBD). The difference in age between these two patient groups was statistically significant ($p < 0.016$).

The main initial clinical symptom of SSEH was severe pain in most patients (n = 8). At admission, the ASIA grades were as follows: Grade A, n = 6; Grade C, n = 1; and Grade D, n = 3 (Table 3). Complete spinal cord injury at admission was present more often in BD patients (80%) than in NBD patients (40%). This difference was not statistically significant ($p = 0.120$). In the NBD group, the extension of the hematoma ranged from three to nine spinal levels (mean, 6.2 levels); this was 1.4 levels less than in the BD group, where the mean extension was 7.6 levels (range, three to 15 levels). The difference in terms of the hematoma extension between the two groups was also not statistically significant ($p = 0.673$).

At long-term follow-up (3–24 months after presentation at our department), the ASIA grades were as follows: Grade A, n = 2; Grade B, n = 1; Grade C, n = 1; Grade D, n = 2; and Grade E, n = 4. While 80% of patients (n = 8) showed improved neurological status, 20% (n = 2) showed no improvement. These two patients were not eligible for surgical treatment, and both had ASIA Grade A spinal cord injuries. Overall improvement in neurological long-term status as compared to the baseline was statistically significant ($p < 0.01$). Additionally long-term ASIA grades were significantly better in NBD patients ($p < 0.008$).

The surgically treated group (n = 5) included two NBD patients and three BD patients. Of the five BD patients, four were ASIA Grade A and one was ASIA Grade C. At long-term follow-up, the ASIA grades of all operated patients had improved by at least one grade, and three out of five patients achieved satisfactory neurological status (ASIA Grade D or E) (Table 3). Improvement in neurological status in the subgroup of patients who underwent surgery did not reach statistical significance.

The conservatively treated group comprised five patients (two BD, three NBD). In two ASIA Grade A patients, surgical treatment was not appropriate due to multi-organ failure with severe bleeding. It was appropriate to treat the remaining three patients with conservative therapy because of incomplete spinal cord injury (ASIA Grade D) with a tendency toward spontaneous recovery. The conservatively treated patients with complete spinal cord injury and multi-organ failure showed no improvement in ASIA grade at long-term follow up. The remaining three patients recovered completely (Table 3). In this group the long-term improvement in neurological status compared to baseline was statistically significant ($p < 0.039$).

In the NBD group, all patients showed good functional recovery at long-term follow-up (ASIA Grade D or E). In this group, two patients with ASIA Grade A at admission were treated surgically. One achieved an ASIA Grade D and the other an ASIA Grade E at final follow-up. The other three NBD patients were not treated surgically and improved from ASIA Grade D to E.