American Journal of Emergency Medicine xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

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

Prognosis at 6 and 12 months after self-attempted hanging☆,☆☆

Guillaume Gantois, MD, Erika Parmentier-Decrucq, MD *, Thibault Duburcq, MD, Raphaël Favory, MD, PhD, Daniel Mathieu, MD, PhD, Julien Poissy, MD, PhD

Intensive Care Unit and Hyperbaric Center, Lille University Hospital, F-59037 Lille cedex, France

ARTICLE INFO

Article history:
Received 2 February 2017
Received in revised form 22 May 2017
Accepted 23 May 2017
Available online xxxx

Keywords:
Prognosis
Self-attempted hanging
Suicide
Neurological sequelae

ABSTRACT

Introduction: Patients surviving a self-attempted hanging have a total neurological recovery in 57–77% of cases at hospital discharge, but no long-term data are available.
Methods: In this observational study, all patients hospitalized post-self-attempted hanging in the intensive care unit (ICU) in a 5-year period were included. Neurological evaluations at 6 and 12 months were performed according to Cerebral Performance Category (CPC) scores. Factors associated with neurological recovery were determined by comparing CPC2 + 3 + 4 (bad recovery) vs. CPC1 (good recovery).
Results: Of 231 patients included, 104 (47%) were found to have cardiac arrest (CA). Ninety-five (41%) patients died in the ICU: 93 (89%) in the CA group and 2 (1.6%) in the group without CA. Neurological evaluations at 6 and 12 months were obtained in 97 of the 136 surviving patients. At 6 months, in the CA group (n = 9), the CPC score was 1 for 6 patients, 2 for 2, and 4 for 1 patient. In the group without CA (n = 88), 79 patients had normal neurological status at 6 months and 78 at 12 months. Among these patients, 96% returned home, 77% returned to work, 16 (18%) patients re-attempted suicide within the year. Risk factors of neurological sequelae at 6 months were a CA at the hanging site (P = 0.045), an elevated diastolic blood pressure (87 vs. 70 mm Hg; P = 0.04), a lower initial Glasgow score (4 vs. 5; P = 0.04), and an elevated blood glucose level (139 vs. 113 mg/dL; P < 0.001).
Conclusion: Patients surviving a self-attempted hanging who did not have a CA had a good neurological outcome. The rate of suicidal recidivism is particularly important, which justifies joint work with psychiatrists.

1. Introduction

Hanging is a frequent method of suicide, leading to a significant number of deaths [1,2]. Two-thirds of patients with self-attempted hanging died at the hanging site and the other one-third were admitted to the hospital. Many of these patients presented a cardiac arrest (CA) at the hanging site, and others had respiratory and/or neurological distress [3]. Self-attempted hanging causes brain damage by reducing venous return and cerebral blood flow and the occurrence of cerebral edema with intracranial hypertension, a potentially life-threatening prognosis [4]. The prognosis for hanging attempts is first neurological: The reported prognostic factors are the length of the hanging, the depth of the initial occurrence of coma, and CA [5]. Patient management is not standardized after a CA. In this case, patient management is the same as that for all other causes of CA. Although there is no randomized controlled clinical study on this aspect, hyperbaric oxygen therapy (HBOT) is accepted as an optional indication for patients surviving a self-attempted hanging [6,7].

The abovementioned neuropathology often leads to high mortality in young adults and with significant neurological sequelae. Previous studies by our team have shown a total neurological recovery in 57–77% of patients. However, these data are determined at hospital discharge but not in the long-term. Although the mortality risk factors of these patients have been identified, the long-term morbidity factors are yet to be determined [3,4,8-10].

Our study aims to evaluate neurological outcomes of patients who survived a self-attempted hanging at 6 and 12 months post-hanging.

2. Methods

We reviewed all records of patients hospitalized in our ICU and hyperbaric center post-hanging over a 5-year period. Prehospital and ICU data were collected from medical records. The following information was collected: epidemiological data (age, gender, medical background,

Abbreviations: CA, cardiac arrest; ICU, intensive care unit; CPC, Cerebral Performance Category; ROC, Receiver Operating characteristic Curve; HBOT, hyperbaric oxygen therapy; SAPS2, Simplified Acute Physiology Score 2.

☆ No source of funding was provided for this work.
☆☆ The authors declare no conflict of interest.

* Corresponding author at: Pôle de Réanimation Médicale et Médecine Hyperbare, Hôpital Salengro, Centre Hospitalier et Universitaire de Lille, F-59037 Lille cedex, France.
E-mail addresses: erika.parmentier@chru-lille.fr (E. Parmentier-Decrucq), thibault.duburcq@chru-lille.fr (T. Duburcq), raphael.favory@chru-lille.fr (R. Favory), daniel.mathieu@chru-lille.fr (D. Mathieu), julien.poissy@chru-lille.fr (J. Poissy).

http://dx.doi.org/10.1016/j.ajem.2017.05.037
0735-6757/

and/or psychiatric history); hanging-related characteristics (location where the patient was discovered, tool used for the hanging, hanging type (complete: where the whole body hangs off the ground; or incomplete: where some part of the body is touching the ground)), prehospital clinical data (term of sight; and patient lost-sight delay, which is the maximum possible delay between the last time a patient was seen and the moment he or she was found hanged); no-flow duration; low-flow duration; clinical examination, especially a neurological examination with the Glasgow and Liege score [11] (Annex 1); therapies administered before arrival at the ICU; gravity scores like Simplified Acute Physiology Score (SAPS II) [12], data during the ICU stay (clinical; biological; and evolutive data such as mortality, length of ICU stay, and duration of mechanical ventilation); evaluation of the neurological status at ICU discharge (CPC scale, electroencephalogram, or brain imaging); and patient outcome.

The long-term evaluation of the surviving patients was performed by a doctor interview using a telephone questionnaire after discharge from the ICU. We wanted to examine possible neurological sequelae. Neurological evaluations at 6 and 12 months were performed according to the CPC scale. The CPC scale is the historical gold standard outcome measure post-CA (Annex 2). For example, CPC 1 corresponds to a good cerebral performance with a normal consciousness and a patient able to work. Along with the telephone questionnaire, we also sought information about the resumption of a professional activity or possible suicidal recurrence.

For statistical analysis, qualitative variables are expressed in number (n) and percent (%) of the total population. Because of an abnormal distribution, quantitative variables are presented in median (first to third interquartile). Qualitative variables were analyzed using the chi-square test and Fisher's exact test. The quantitative variables were compared using the Wilcoxon signed-rank test. Receiver Operating Characteristics (ROC) curves were computed. A multivariate analysis was performed using a model of the binary logistic regression method by upward step, including the variables identified in the initial management of patients for which $P < 0.1$. A P value <0.05 was considered statistically significant. We conducted an analysis of mortality risk factors and an analysis of the neurological sequelae using the CPC scale. The statistical software used was SPSS 22.0.

The Ethics Committee of the Institutional Review Board for the University Hospital of Lille approved the design of our study. Because of the non-interventional nature of our study, patient consent was waived.

3. Results

3.1. Demographic data (Table 1)

Overall, 231 patients were included in our study. Approximately 98% of the hangings were secondary to suicidal acts. There were 199 men and 32 women with a median age of 40 years (30–50.3 years). Six were children, including one 10-year-old, three 12-year-olds, and two 17-year-olds. Thirteen patients were over the age of 70 years. The patients' histories were mostly psychiatric, psychological, or toxicological. Only a quarter of the patients had no medical history at admission. From a psychiatric point of view, depressive syndrome predominated and was found in 52% of the patients. Precedent suicide was found in 21.9% of the patients and 3.3% had psychotic disorders (4 with manic depression and 2 with schizophrenia). Alcohol addiction was found in 25.4% of the patients. Drug addiction was noted in 3.4% of the patients for hard drugs and in 2.5% of cases for cannabis.

The hanging site was at home in 87.8% of the patients, 5.3% in prison, and 4.4% in psychiatric institutions. The hanging was considered incomplete in 40% of cases, and 104 patients (45%) were found to have CA. Overall, 70% of the patients without CA at the hanging site presented with respiratory distress in addition to neurologic disorders, and the other 30% were intubated only for neurological distress. The median arrival time at our ICU was 90 min. All patients were medically transported. Nearly all patients had consciousness alteration on admission: 198 patients (86%) had a Glasgow score less than or equal to 7, including 116 patients (50%) who had a Glasgow score of 3. Nineteen patients presented with CA during the first 24 h of the ICU stay; all these patients were found to have CA at the hanging site, and all died during their ICU stay. Because of seizures or myoclonus, the use of propofol or pentothal was required in 28 patients. All these patients died during their ICU stay. HBOT was performed in 95% of the patients. The median delay between resuscitation and the first hyperbaric session was 120 min (a range of 90–180 min). Ninety-five patients died in the ICU (41%): 93 (89%) in the CA group and 2 (1.6%) in the group without CA. Neurological evaluations at 6 and 12 months were obtained in 97 of the 136 surviving patients. Upon discharge from the ICU, we evaluated a complete recovery in 108 patients (47%). Six of these patients presented with CA (6%) vs. 102 patients who did not present with CA (81%). The CPC scores of the patients at 6 and 12 months are shown in Table 2.

Table 1
Demographic data in all patients (n = 231).

Prehospital cardiac arrest	104 (45.2%)
Sex = man	199 (86.1%)
Age (years)	40.5 [30–50.3]
Death	95 (41.1%)
SAPS2	45 [32–54]
Depression	118 (51.8%)
History of suicide attempt	50 (21.9%)
Patient lost sight delay (min)	10 [5–20]
Presence of spontaneous ventilation	102 (73.9%)
Glasgow score	3 [3–5]
Liege score	0 [0–1]
Abnormal movements	82 (38.5%)
Agitation	20 (9.4%)
Diarrhea	20 (8.7%)
Arterial blood pH	7.36 [7.28–7.42]
Glycaemia (mg/dL)	146 [110–206]
Lactate (mg/L)	3 [1,8–6]
HBOT	219 (94.8%)
HBOT delay (min)	120 [90–180]

SAPS2: Simplified Acute Physiology Score 2.
HBOT: hyperbaric oxygen treatment.

3.2. Mortality risk (Table 3)

The major risk factor of mortality was the occurrence of CA at the hanging site ($P < 0.0001$). As a consequence, except for the age and sex, all the other factors found to be related to mortality are well-known risk factors in CA of other origin (management delay, SAPS II, Glasgow score at admission, heart rate, presence of vasopressors, lactate value, glycemia, and all biological items that comprise the SAPS II). In a multivariate analysis, only the presence of a CA (OR: 491 [51–4748]; $P < 0.0001$) and a high lactate value (OR: 1.8 [1.3–2.5]; $P = 0.001$) were independently associated with patient death in the ICU.

3.3. Risk factors for neurologic sequelae (Table 4)

At ICU discharge, 79% of patients had no neurological sequelae. A univariate analysis revealed the following neurological risk factors in surviving patients at hospital discharge: a prehospital CA ($P = 0.045$), glycemia at ICU admission (139 mg/dL [119–178] in the neurologic

Table 2
CPC score in total patient (n = 98).

CPC	6 months	12 months
1	86 (87.8%)	85 (86.7%)
2	7 (7.1%)	5 (5.1%)
3	3 (3.1%)	3 (3.1%)
4	2 (2%)	2 (2%)
5	0 (0%)	3 (3.1%)

CPC: Cerebral Performance Category.

Please cite this article as: Gantois G, et al, Prognosis at 6 and 12months after self-attempted hanging, American Journal of Emergency Medicine (2017), http://dx.doi.org/10.1016/j.ajem.2017.05.037