What Influences Outcome of Patients with Suicidal Hanging

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Abstract

Aim: Suicidal hanging is an uncommon medical emergency with significant neurological morbidity. The aim of the study was to identify factors that have a bearing on the final outcome.

Materials and Methods: Retrospective analysis of 37 consecutive cases of suicidal hanging admitted to our ICU from July 1996 - December 2002 was performed. Outcome at discharge was defined as good (complete neurological recovery) or poor (death or incomplete neurological recovery). Three clinical variables (at presentation) namely Glasgow Coma Scale (GCS) at presentation, time lapse (in hours) from the incident to arrival at our hospital and the presence of Hypotension (defined as a systolic blood pressure ≤ 90 mm Hg) at admission were recorded and tested individually for an association with the outcome. Statistical analysis was done using the Odds ratio (OR ± 95% Confidence Intervals) and Chi-square test of significance for categorical data.

Results: Patients with suicidal hanging constituted < 1% of ICU admissions (mean age 27 years). 34/37 survived giving a survival rate of 92%. Of those who survived, 31 patients (91%) had complete neurological recovery at the time of discharge from hospital. Among those who presented <4 hours of the incident (25 patients), 2 had an adverse outcome as compared to 4/10 patients who presented 4 hours or more after the incident (OR 7.6, 95% CI 1.12-52.3). A low GCS (GCS <7) at presentation was also statistically associated with a poor outcome (OR 10.4, 95% CI 1.08–102.1). Hypotension was present in approximately 33% of patients (12/37) at presentation. Of these 12 patients, 3 had an adverse outcome as opposed to 3 patients among the remaining 25 (OR 1.6, 95% CI 0.41 – 14.47, NS).

Conclusions: Suicidal hanging is an unusual medical emergency that is common among young individuals in developing countries. Our study indicates that a delayed presentation to a medical facility and a low GCS at presentation predict a poor outcome.

INTRODUCTION

There is worldwide concern over an observed rise in the rate of suicide, especially among young adult males. Hanging is a prominent cause of suicidal death in Europe and Australia and is increasingly described in India as a method chosen by young adults to attempt suicide. Hanging victims present, not infrequently to Emergency Department (ED) of hospitals and need specialized care in Intensive Care Units (ICU). Unfortunately, suicidal hanging (SH) is one medical emergency about which there is very little information available in medical literature. Whereas a number of reports describe post-mortem findings in near-hanging, there is virtually no published data on clinical aspects of the problem and means of prognostication to guide the clinician. We therefore decided to review our experience on the management of a series of patients whose presentation to our hospital with attempted hanging raised several clinical questions. Our aim was to assess the efficacy of our management strategy and also identify some clinical variables that have a bearing on the final outcome.

MATERIALS AND METHODS

A retrospective study was conducted at the Intensive Care Unit (ICU) of Manipal Hospital, a tertiary-care referral hospital in Bangalore catering to acute cases of all specialties. Consecutive cases of SH admitted to this ICU over a six and a half-year period from July 1996 to December 2002 were included. Records of 37 patients were thus identified and charts were reviewed to extract information about patient characteristics and clinical details at presentation. Details of ICU management as well as outcome of hospitalization were also recorded.

We identified three clinical variables (recorded at presentation) namely Glasgow Coma Scale (GCS) at presentation, time lapse (in hours) from the incident to arrival at our hospital and the presence of Hypotension (defined as a systolic blood pressure ≤ 90 mm Hg) at admission were recorded and tested individually for an association with the outcome.
presentation) that we considered prognostically important in this condition. Glasgow Coma Scale (GCS) at presentation, time lapse (in hours) from the incident to arrival at our hospital and the presence of hypotension (defined as a systolic blood pressure ≤ 90 mm Hg) at admission. All three were recorded and were later tested individually for an association with the outcome. Outcome was classified as good if the patient had a complete neurological recovery at the time of discharge from hospital. A poor or adverse outcome was defined as death in the ICU or incomplete neurological recovery at the time of discharge from the hospital. Data from all patients was tabulated on a spreadsheet and statistical analysis was done using the Odds ratio (OR) and Chi-square test of significance for categorical data. Statistical significance in univariate analysis was assumed if the 95% confidence interval of OR did not include the value of 1.

All patients with SH were managed as per our protocol with little or no variation over the period of the study. Management comprised of neuroprotective measures, prophylactic anti-convulsants and therapy for cerebral edema as needed. Intubation with cervical stabilization was done for the institution of mechanical ventilation in the presence of respiratory insufficiency or airway compromise or for airway protection among patients with GCS ≤ 10. CT imaging of the brain was not done immediately even in those with a profound depression of sensorium at admission.

**RESULTS**

Patients with suicidal hanging constituted less than 1% of admissions to our ICU over a six-and-a-half year period (July 1996 – Dec 2002). The condition was seen in young adults (mean age 27 years) with a nearly equal sex distribution (Table 1). Thirty-four patients out of 37 survived giving a survival rate of 92%. Of those who survived, 31 patients (91%) had a good neurological outcome characterized by complete neurological recovery at the time of discharge from hospital. None of the patients had any form of cervical spine injury.

We evaluated the association of final outcome with a delay in presentation to our hospital. Information on the amount of time lapsed from the incident to arrival at our hospital was available in only 35 patients. Among those who presented to us within 4 hours of the incident (25 patients), only 2 had an adverse outcome as compared to 4 out of 10 patients who presented 4 hours or more after the incident. Statistically this was significant (OR 7.6, 95% CI 1.12-52.3) and meant that presentation for definitive therapy to a medical facility 4 hours or more after the incident was associated with a greater risk of having a poor outcome. A low GCS (<7) at presentation was also statistically associated with a poor outcome (OR 10.4, 95% CI 1.08 – 102.1) (Table 2). There were 20 patients with GCS ≥ 7 at presentation and only 1 had an adverse outcome. On the other hand, an adverse outcome in our series was seen more frequently among patients who had a GCS < 7 at presentation. Surprisingly, hypotension was present in only 33% of patients (12/37) at presentation. Of those who did present with hypotension, 3 out of 12 had an adverse outcome (OR 1.6, 95% CI 0.41 – 14.47, NS).

Most patients required a short period of ventilation (Median 2, IQR 1-3 days) and an equally brief stay in the ICU (Median 3, IQR 2-4 days). CT imaging of head and neck was needed in only six patients (<20%) who did not improve neurologically within 24 hours of admission to our ICU. Cervical spine was cleared after clinical assessment in all other patients. Three patients died in our ICU and all deaths occurred on Day 2 or later. Three other patients had a poor neurological recovery and spent a longer time in the ICU. All of them required a tracheostomy for ongoing airway management and ventilatory care.

**DISCUSSION**

Suicidal hanging (or near hanging) is distinctly different from judicial hanging. Cervical spine injury is rare because the body of the victim rarely ever, falls from a great height. Instead, death usually occurs as a result of asphyxial cerebral injury and local complications related to the noose around the neck. In a recent review of literature, cervical spine injury was identified in only 4 out of 689 patients (0.6%) with near hanging. Injuries

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency</th>
<th>%</th>
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<tbody>
<tr>
<td>Total number</td>
<td>37 patients</td>
<td></td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>27 years (7.79)</td>
<td></td>
</tr>
<tr>
<td>Gender distribution</td>
<td>19 M, 18 F</td>
<td></td>
</tr>
<tr>
<td>GCS &lt;7 at admission</td>
<td>15</td>
<td>40.5%</td>
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<tr>
<td>SBP &lt;90 at admission</td>
<td>12</td>
<td>32.4%</td>
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<tr>
<td>Aspiration</td>
<td>8</td>
<td>21.6%</td>
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<tr>
<td>Seizures</td>
<td>5</td>
<td>13.5%</td>
</tr>
<tr>
<td>Cervical spine injury</td>
<td>Nil</td>
<td>...</td>
</tr>
<tr>
<td>Ventilated in ICU</td>
<td>33</td>
<td>89.1%</td>
</tr>
<tr>
<td>Tracheostomy in ICU</td>
<td>3</td>
<td>8.1%</td>
</tr>
<tr>
<td>Laryngeal dysfunction</td>
<td>4</td>
<td>10.6%</td>
</tr>
<tr>
<td>Mortality</td>
<td>3</td>
<td>8.1%</td>
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<tr>
<td>Good outcome</td>
<td>31</td>
<td>83.8%</td>
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<tr>
<td>Poor outcome (inc death)</td>
<td>6</td>
<td>16.2%</td>
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* Information available in 35 out of 37 cases; ** Statistically Significant
to soft tissue structures of the neck,\textsuperscript{11} fracture of laryngeal cartilages and hyoid bone,\textsuperscript{12-14} cricotracheal separation,\textsuperscript{15} carotid artery dissection\textsuperscript{16} or carotid occlusion\textsuperscript{17} have all been reported in literature. Life threatening systemic complications like acute pulmonary edema,\textsuperscript{18} adult respiratory distress syndrome,\textsuperscript{19,20} hyperthermia\textsuperscript{21} and multi organ failure\textsuperscript{22} have also been reported.

Patients who attempt hanging as a means of suicide are invariably young and otherwise healthy individuals. A number of victims are already dead when discovered and the few who make it to hospital represents a group that needs skillful medical management. Although 80\% survive,\textsuperscript{10} the possibility of permanent neurological damage\textsuperscript{23} or delayed neuropsychiatric sequelae\textsuperscript{24} among survivors remains an outcome feared more than death itself. A good neurological outcome is therefore highly desirable. The results of our study indicate that early and appropriately directed care is essential. Delay in presentation of 4 hours or more after the incident is associated with higher odds of a poor outcome (death or incomplete neurological recovery). Most of our patients attempted suicide at home and were discovered at the scene by one of the relatives. Nearly half of them presented to our ED within 1 hour but a significant number were initially taken to a small hospital with rudimentary emergency facilities. Prompt institution of care has formed the cornerstone of trauma care for a long time; the same concept should be extended to include patients with near hanging.\textsuperscript{25} They too, have a number of issues related to the airway, circulation and sensorium that need to be addressed expeditiously. Almost 90\% of our patients required the placement of an endotracheal tube either for airway protection or for institution of mechanical ventilation as part of a cerebral protective strategy. Visualization of the laryngeal structures for intubation was not a problem even though a number of reports have commented upon fracture of anterior neck bones including laryngeal cartilages.\textsuperscript{14}

Almost 75\% of our patients had a significant alteration in sensorium (GCS $\leq 10$) at presentation and close to 40\% had a GCS $<7$. A profound depression of sensorium on arrival (GCS $<7$) was prognostically significant. This group contained 5 out of 6 patients who had a poor outcome. In itself, a GCS $<7$ was recorded in a number of patients who recovered, including at least 6 who had decerebrate posturing on admission. A low GCS therefore, is a sensitive predictor of poor outcome, but under conditions of low prevalence, it is not a good predictor. A recent review\textsuperscript{10} made the observation that prognosis is not related to the initial state at presentation on the basis of full neurological recovery reported anecdotally amongst patients who arrived at hospital with a GCS 3. Observations reported in case series from Australia\textsuperscript{26} and USA\textsuperscript{27} have fortunately corrected the impression and have reiterated that sensorium at presentation is prognostically significant.

Only a few patients (5/37) presented with seizures; all these and three others (8/37) had features of aspiration at admission. Even hypotension at presentation was not a frequent finding (12/37) at admission and did not have a bearing on the final outcome. Clinical signs related to asphyxia were observed far too infrequently to have any diagnostic or prognostic significance.

Overall, the number of cases in this series, like in most others\textsuperscript{26-28} was small and could not lead to a more refined statistical analysis. Although only three variables were studied in a univariate analysis, the interval estimates of odds ratio were large. The interplay between time delay and low GCS was not evaluated statistically. The fact that a low GCS at admission, although statistically significant, could be due to a delay in presentation itself was not explored further. Outcome did not take into account long-term sequelae of near hanging, although an attempt was made by authors to contact all survivors through a letter posted six months after enrollment into the study ceased in Dec 2002.

Notwithstanding these shortcomings, there are important lessons for those who attempt to manage this condition in developing countries. Our experience indicates that a delay in presentation to an appropriate medical facility does affect outcome adversely. Where information about time delay is not available, we conjecture that GCS at presentation could be used as a surrogate for prognostication. Suicides in general\textsuperscript{29} and suicidal hanging in particular are common in India and among immigrants from India.\textsuperscript{30} Publications from India have thus far focused on post-mortem findings\textsuperscript{7} or specific clinical features\textsuperscript{31} or general observations\textsuperscript{32} of hanging victims. Only one publication of 12 cases\textsuperscript{6} has reported survival following hanging but has not elaborated further on factors that influenced survival. Our study, although limited in its focus and retrospective in nature, is the first one that has systematically looked at clinical variables that could be used in prognostication. Furthermore, our study has reaffirmed that resources should not be wasted for computed imaging of the head or neck at presentation.

The nomenclature to describe patients who survive hanging is also confusing.\textsuperscript{10} Near hanging is a term that should be used to refer to patients who survive a hanging injury long enough to reach hospital, irrespective of whether it is accidental or suicidal. This term is analogous to “near drowning” that describes victims who survive drowning. Clinical research in this area should focus, not so much upon clinical findings alone but also circumstances of the hanging. Data on duration of hanging is unlikely to be available with any degree of accuracy but the point of suspension (around the neck), drop force and totality of hanging (suspension in air or not) may have a bearing on prognosis. However, crucial questions related to prognosis and treatment may still...
remain unanswered if only single centre studies are undertaken in the future.

Declaration

The authors presented part of this data at the 8th Annual Congress of the Indian Society of Critical Care Medicine (ISCCM) held at New Delhi in Feb 2002. Authors have no affiliations to any pharmaceutical company or sponsors.

REFERENCES


Announcement

15th Annual Conference of API - Assam Chapter will be held on 26-27 November, 2005 at Digboi, Assam.

The members are cordially invited to attend and take part in the scientific deliberations.

Those desirous of presenting papers are to send abstracts latest by 30th October 2005.

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