Send Orders of Reprints at bspsaif@emirates.net.ae

590 *The Open Orthopaedics Journal*, 2012, *6*, 590-592

Open Access

Loss of Consciousness in Injuries of the Extremities is an Alert to a Higher Probability of Death

José Eduardo Arantes Sanches[1], José Maria Pereira de Godoy[*,2], André Luciano Baitello[3] and Alceu Gomes Chueire[1]

[1]*Department of Orthopedic and Traumatology in Medicine School of São Jose do Rio Preto, FAMERP, Brazil*

[2]*Department Cardiology and Cardiovascular Surgery in Medicine School São José do Rio Preto, FAMERP and CNPq (National Council for Research and Development), Brazil*

[3]*Department of Trauma in Medicine School of São Jose do Rio Preto, FAMERP, Brazil*

Abstract: *Background*: There are many published studies about loss of consciousness related to general trauma however works on loss of consciousness in respect to orthopedic injuries are scarce.

Aim: The aim of this study was to investigate whether loss of consciousness worsens the prognosis of patients with orthopedic injuries.

Method: A retrospective cohort study of orthopedic traumas was performed in the university Hospital of Base in São José do Rio Preto. All accident victims with injuries of the extremities classified as Score 3 or 4 by the Abbreviated Injury Scale (AIS) were included in this observational quantitative study. Patients with minor injuries and injuries that did not involve the extremities were not included. The association of loss of consciousness at the scene of the accident with evolution to death was investigated. The t-test, chi-squared and Fisher exact tests, and relative risk were used for statistical analysis. An alpha error of 5% (p-value ≤ 0.05) was considered statistically significant.

Results: A total of 245 patients with ages between 13 and 98 years old and a mean of 45.4 years had extremity AIS scores of 3 or 4. Of these, significantly more men (170 - $p< 0.001$) suffered this type of injury than women (71). Thirty-six (14.94%) of these patients lost consciousness compared to 205 (85.06%) who did not lose consciousness. The total death rate in this group of patients was 5.39%; 9 (25%) of the 36 patients who lost consciousness and 4 (1.95%) of the 205 who did not lose consciousness died (Fisher exact test: p-value = 0.0001 and relative risk = 12,813 – 95% confidence index: 4,166 to 39,408).

Conclusion: Loss of consciousness in patients with orthopedic injuries of the extremities is associated to a higher death rate.

Keywords: Injuries of the extremity, trauma, loss of consciousness.

INTRODUCTION

Severe traumatic brain injuries (TBI) are linked to high morbidity and mortality rates and have important individual and social costs, not only because of the high incidence of deaths they cause but also owing to the large number of individuals who are left with some kind of disability [1]. The development of data processing techniques has enabled the establishment of large databases on brain injury.

Clinical features are described using clinical scoring scales, the main one being the Glasgow Coma Scale [2]. Transient Global Amnesia (TGA) is a benign and temporary loss of anterograde memory with the preservation of remote memories and immediate recall [3].

Post-traumatic amnesia (PTA), i.e. the period of time running from the injury to recovery of anterograde memory, constitutes the most important parameter in the classification of these injuries[1]. The duration of PTA alone was selected to predict late disability and independent living. The duration of PTA was the best predictor of outcome selected in this model for all endpoints with elements of the physical examination being of additional predictive value [4].

The strategy for care of mild head injury has recently been discussed and should be in-hospital observation or computed tomography (CT) and home care. A necessary requirement for guidelines and the design of clinical trials would provide knowledge on the risks of this condition [5].

There are many published studies about loss of consciousness related to general trauma however works on loss of consciousness in respect to orthopedic injuries are scarce. The aim of this study was to investigate whether loss of consciousness worsens the prognosis of patients with orthopedic trauma.

METHOD

A retrospective cohort study evaluating orthopedic trauma was performed in the Emergency Department of the Regional University Hospital of Base in São José do Rio

*Address correspondence to this author at the Rua Floriano Peixoto, 2950, São José do Rio Preto, SP, CEP: 15010-020, Brazil; Tel: 551732326362; E-mails: godoyjmp@riopreto.com.br, mfggodoy@gmail.com

Preto from July 2004 to June 2005 after the implantation of an urban system of care for medical emergencies (SAMU). The inclusion criterion for this study was that the patient had suffered an accident with Score 3 or 4 injuries of the extremities according to the Abbreviated Injury Scale (AIS). Patients with minor Grade 1 and 2 injuries according to the AIS and injuries that did not involve the extremities were not included. The association between loss of consciousness at the scene of the accident and evolution to death was investigated.

The t-test, chi-squared and Fisher exact tests and relative risk were used for statistical analysis. An alpha error of 5% (p-value ≤ 0.05) was considered statistically significant. The study was approved of the Research Ethics Committee of the Medicine School in São José do Rio Preto (FAMERP) protocol $n^0$2665/04. The consent form was waived by the Research Ethics Committee of FAMERP.

RESULTS

A total of 241 accident victims suffered severe injuries of the extremities (AIS Score 3 or 4).

The ages of these victims varied between 13 and 98 years old with a mean of 45.4 years and a standard deviation of 23.2 years. Seventy-one of the patients were women and 170 were men; a statistically higher proportion of men suffered from extremity AIS Scores of 3 or 4 compared to women ($p < 0.001$). The mean ages of the men and women were 40.1 and 60.2 years old, respectively (paired t-test: $p = 0.0005$).

Of all the patients (360), loss of consciousness was evaluated in only 245 of the 360 patients. Of these, 36 (14.94%) lost consciousness and 205 (85.06%) did not. The overall mortality rate for this group of patients was 5.39%. Nine (25%) of the 36 patients that lost consciousness died and only 4 (1.95%) of the 205 accident victims who did not lose consciousness died (Fisher exact test: $p = 0.0001$ and relative risk = 12,813 – 95% confidence interval: 4,166 to 39,408). Table **1** shows all types of trauma associated with loss of consciousness.

The mean age of the patients who lost consciousness was 39.9 ± 23.9 years old and for those who did not lose consciousness it was 46.9 ± 23.9 years old (t-test: $p = 0.058$).

DISCUSSION

The current study shows that loss of consciousness at the scene of the accident was a factor predictive of death in patients with multiple injuries and with involvement of the extremities. Data evaluating orthopedic patients in respect to loss of consciousness and death have not previously been reported in any publication linked to the main electronic databases (PubMed, ISI and Scopus). Although these are simple data they should be considered in isolation and together with the historical data, physical examination and the scores of the trauma indexes used.

The design of this study emerged after identifying that higher death rates are seen in patients who suffer loss of consciousness associated with trauma of the thorax [6]. Similarly, patients with trauma of the extremities have a higher mortality rate compared to the group of patients who did not suffer injuries to the limbs [7]. Because of this, a need arose to promptly evaluate specific factors that might affect the mortality rate.

The patient's age, and the type of trauma and its severity influence the late mortality with brain death and multiple organ failure being the main factors involved [8]. Two of the main causes of mortality associated to trauma of extremities are vascular lesions [9] and the infections that occur during treatment [10]. The loss of a limb in isolated was not associated with death, however multiple amputations was an independent factor. Severe vascular injury is associated with the loss of limbs, but not always with mortality. The current study demonstrates that an important isolated factor related to the death of victims who suffer trauma of the extremities is loss of consciousness. It is known that TBI is associated with mortality [8], however at the scene of the accident loss of consciousness should be seen as a warning sign for the severity of these patients.

Mild head injury is defined as head trauma involving loss of consciousness or amnesia, but where neurological findings on arrival at hospital are normal (Glasgow Coma Scale 15). Of 1000 patients arriving at hospital with mild head injury, 1 will die, 9 will require surgery or another intervention, and about 80 will show pathological findings on CT [5]. In this study the loss of consciousness was

Table 1. Types of Trauma Associated with Loss of Consciousness

Type of Trauma	Loss of Consciousness	Without Loss of Consciousness	Total	p-Value	Relative Risk (95% Confidence Interval)
car crash	35	54	89	0,001	1.5 (1.1-2.1)
motorbike accident	12	33	45	0.9143	0.9 (0.5-1.5)
vehicle-pedestrian collision	13	8	21	0.0017	2.3 (1.5-3.4)
Fall	19	54	73	0.3964	0.8 (0.5-1.3)
bicycle accident	9	13	22	0.2233	1.4 (0.8-2.5)
gunshot	6	12	18	0.6039	1.1 (0.5 to 2.3)
stabbing	2	38	40	0.0001	0.1 (0.04-0.6)
fight	2	19	21	0.0762	0.3 (0.08-1.2)
others	2	11	13	0.3635	0.5 (0.1-1.9)
Total	103	257	360		

identified at the scene of the accident and so data of the pre-hospital treatment are important and should be considered.

Posttraumatic stress disorder (PTSD) is known to develop in a significant proportion of individuals following exposure to a traumatic event [1, 2]. Amnesia after mild head injury is associated with a high incidence of early regional cerebral perfusion abnormalities. Amnesia lasting more than half an hour is associated with bilateral cerebral hypoperfusion [2]. Although it has been established that acute stress disorder (ASD) and posttraumatic stress disorder occur after mild TBI the qualitative differences in symptom presentation between injury survivors with and without a mild TBI have not been explored in depth [3].

Oral diadochokinesis of alternating motion rates and velocity of narrative speech were significantly reduced in TBI. Both parameters correlated very significantly with each other and correlated with the severity of brain injury described by the duration of post-traumatic amnesia [4]. Amnesia is a common sequela following TBI, for which there is no current treatment [5]. Thus the orthopedist should be aware of these complications and neurological care must be monitored. Another warning is when these patients have other types of associated trauma, as for instance, chest injuries; in these cases the death rate is higher. These data are not part of the current study but one question arose; if we evaluated this with other types of associated lesions and loss of consciousness would we have statistically different death rates. And so this is another warning for orthopedists treating these patients.

One limitation of this study is related to the fact that the data were collected using a comprehensive care protocol and thus other factors may have been involved in the cause of death in these patients. Hence future studies should consider this possibility.

CONCLUSION

Without considering other types of injury such as chest trauma, loss of consciousness investigated at the scene of an accident in patients with orthopedic injuries of the extremities is associated with a higher mortality rate.

AUTHORS' CONTRIBUTIONS

Arantes SJE participated and contributed to all phases of the study.

Godoy JMP participated and contributed to all phases of the study.

Baitello AL participated and contributed to all phases of the study.

Gomes Chueire A participated and contributed to all phases of the study.

COMPETING INTERESTS

The authors declare that they have no competing interests (political, personal, religious, ideological, academic, intellectual, commercial or any other) in relation to this manuscript.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

[1] Orient-López F, Sevilla-Hernández E, Guevara-Espinosa D, Terré-Boliart R, Ramón-Rona S, Bernabeu-Guitart M. Functional outcome at discharge of patients with severe traumatic brain injury admitted to a brain damage unit. Rev Neurol 2004; 39(10): 901-6.

[2] Kosakevitch-Ricbourg L. Clinical scoring scales for brain injury. Rev Stomatol Chir Maxillofac 2006; 107(4): 211-7.

[3] Harrison M, Williams M. The diagnosis and management of transient global amnesia in the emergency department. Emerg Med J 2007; 24(6): 444-5.

[4] Brown AW, Malec JF, McClelland RL, Diehl NN, Englander J, Cifu DX. Clinical elements that predict outcome after traumatic brain injury: a prospective multicenter recursive partitioning (decision-tree) analysis. J Neurotrauma 2005; 22(10): 1040-51.

[5] af Geijerstam JL, Britton M. Mild head injury - mortality and complication rate: meta-analysis of findings in a systematic literature review. Acta Neurochir (Wien) 2003; 145(10): 843-50.

[6] Baitello AL, de Assis Cury F, Espada PC, Morioka RY, de Godoy JM. Mortality in patients with loss of consciousness at the scene of trauma. Int J Emerg Med 2010; 3(2): 91-5.

[7] Sanches JE, Pereira de Godoy JM, Baitello AL, Chueire AG. Mortality associated with extremity injuries compared with other types of trauma. Int J Gen Med 2011; 4: 273-5.

[8] Alberdi F, Azaldegui F, Zabarte M, *et al*. Epidemiological profile of late mortality in severe polytraumatisms. Med Intensiva 2012; pii: S0210-5691(12)00230-6.

[9] Kauvar DS, Sarfati MR, Kraiss LW. National trauma databank analysis of mortality and limb loss in isolated lower extremity vascular trauma. J Vasc Surg 2011; 53(6): 1598-603.

[10] Phalkey R, Reinhardt JD, Marx M. Injury epidemiology after the 2001 Gujarat earthquake in India: a retrospective analysis of injuries treated at a rural hospital in the Kutch district immediately after the disaster. Glob Health Action 2011; 4: 7196.

Received: August 18, 2012 Revised: October 28, 2012 Accepted: November 7, 2012