The American Journal of Surgery (2014) 208, 806-810

The American Journal of Surgery®

Clinical Science

Can trauma surgeons manage mild traumatic brain injuries?

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KEYWORDS:
Mild traumatic brain injury;
Neurosurgical management;
Neurosurgeon consultation;
Policy implementation;
Mild TBI management

Abstract

BACKGROUND: Current practices suggest that patients with mild traumatic brain injuries (MTBI) receive neurosurgical consultations, while less than 1% require neurosurgical intervention. We implemented a policy of selective neurosurgical consultation with the hypothesis that trauma surgeons alone may manage such patients with no impact on patient outcomes.

METHODS: Data from a level I trauma registry were analyzed. Patients with MTBI resulting in an intracranial hemorrhage of 1 cm or less and a Glasgow Coma Score of 13 or greater were included. Patients with additional intracranial injuries were excluded. Multivariate regression was used to determine the relationship between neurosurgical management and good neurologic outcomes, while controlling for injury severity, demographics, and comorbidities.

RESULTS: Implementation of the neurosurgical policy significantly reduced the number of such consults (94% before vs 65% after, $P < .002$). Multivariate analysis revealed that neurosurgical consultation was not associated with neurologic outcomes of patients.

CONCLUSIONS: Implementation of a selective neurosurgical consultation policy for patients with MTBI reduced neurosurgical consultations without any impact on patient outcomes, suggesting that trauma surgeons can effectively manage these patients.

Published by Elsevier Inc.

Traumatic brain injury (TBI) is an important public health concern and a leading cause of morbidity and mortality.[1] The vast majority of TBI are considered mild (70% to 85%)[1,2] and are defined as Glasgow Coma Scale (GCS) score of 13 to 15 and a temporary disruption of brain function after a traumatic injury.[3–6] Controversy surrounds the most appropriate management of mild TBI (MTBI).[7] The American College of Surgeons recommend neurosurgical evaluation of any patient with a GCS score less than 15 at 2 hours after injury and patients greater than 65 years of age[4] even though less than 1% of patients with MTBI require neurosurgical intervention.[8,9] This requirement creates a burden on scarce neurosurgical resources, which is likely to become worse with shortage of neurosurgeons and aging of the population.[10] In fact, there is emerging evidence that patients with intracranial bleeds can be safely managed in trauma centers without neurosurgical services, except in the case of moderate to severe TBI.[11,12]

To study this issue, we implemented a protocol of selective neurosurgical consultation in 2008 that enabled

There were no relevant financial relationships or any sources of support in the form of grants, equipment, or drugs.

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Manuscript received September 13, 2013; revised manuscript January 29, 2014

0002-9610/$ - see front matter Published by Elsevier Inc.
http://dx.doi.org/10.1016/j.amjsurg.2014.02.012

Table 1 Neurosurgical consultations before and after protocol implementation

Variable	Before implementation (n = 31)	After implementation (n = 140)
No neurosurgical consultation	2 (6%)	49 (35%)
Neurosurgical consultation	29 (94%)	91 (65%)
Age (year, median, IQR)	42 (24, 72)	50.5 (31.5, 69.8)
Sex (% male)	23 (74%)	95 (68%)
Race/ethnicity (% white, non-Hispanic)	21 (68%)	86 (61%)
ISS (median, IQR)*	16 (16, 20)	17 (16, 24)
First ED systolic blood pressure	137 (122, 159)	134 (120.5, 154)
GCS		
13	1 (3%)	9 (6%)
14	5 (16%)	28 (20%)
15	25 (81%)	103 (74%)
GCS motor (median, IQR)	6 (6, 6)	6 (6, 6)

ED = emergency department; GCS = Glasgow Coma Scale; IQR = interquartile range; ISS = Injury Severity Scale.
*Significant difference between groups, $P < .05$.

trauma surgeons to manage patients with MTBI without neurosurgical consultations. This study reports our initial experience with the management of MTBI by trauma surgeons alone. We hypothesize that patients with MTBI managed by trauma surgeons will be the same as outcomes for patients managed by neurosurgeons.

Methods

This is a retrospective analysis of patients treated at a major urban level 1 trauma center at a public institution over a period of 7 years (January 2006 to June 2012). Patients were monitored before (2006 to 2008) and after (2008 to 2012) the implementation of the protocol mentioned above. The inclusion criteria consisted of patients with MTBI defined as an intracranial hemorrhage of 1 cm or less and a GCS score of 13 or greater at the time of arrival. Exclusion criteria consisted of patients with additional intracranial injuries (ie, intraparenchymal hemorrhages, diffuse axonal injuries with white matter shearing) and patients transferred to another acute care facility or those who left against medical advice. Based on these criteria, 171 patients were included in the study. Patients were divided into 2 groups: those managed by trauma surgeons alone (n = 51, 30%) and those who were managed by neurosurgeons (n = 120, 70%). Management by a trauma surgeon was defined by whether or not a neurosurgeon was consulted. Neurosurgical consultations could occur at any point during the patients' admission, so patients with a shift and neurosurgical consultation after initial examination were included in the neurosurgical

Table 2 Patient demographics and injury severity

Variable	Trauma surgeon (n = 51)	Neurosurgeon (n = 120)
Age (year, median, IQR)	48 (34, 64)	49 (29, 71)
Sex (% male)	71%	68%
Race/ethnicity (% white, non-Hispanic)	58%	65%
ISS (median, IQR)	17 (16, 25)	17 (16, 21)
First ED systolic blood pressure (mm Hg, median, IQR)	132 (122,154)	134 (120,156)
GCS (%)*		
13	6%	6%
14	31%	14%
15	63%	80%
GCS motor (median, IQR)	6 (6, 6)	6 (6, 6)
Mechanism of injury		
Fall	42%	48%
Motor vehicle	31%	23%
Assault	15%	13%
Motorcycle	10%	4%
Auto-pedestrian	0%	3%
Other	2%	8%

ED = emergency department; GCS = Glasgow Coma Scale; IQR = interquartile range; ISS = Injury Severity Scale.
*Significant difference between groups, $P < .05$.