



Crit Care. 2010; 14(Suppl 1): P297.

Published online 2010 March 1. doi: [10.1186/cc8529](https://doi.org/10.1186/cc8529)

PMCID: PMC2934448

## Diagnosis of carotid and vertebral artery injury in major trauma with head injury

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### Introduction

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The purpose of this study is to describe a single institutional experience in diagnosis and management of patients with blunt cerebrovascular injury (BCVI) after severe traumatic brain injury (TBI).

### Methods

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We considered blunt major trauma patients consecutively admitted from January 2008 to October 2009 to our ICU of a regional referral hospital (Careggi Teaching Hospital, Florence, Italy). Patients were screened on the basis of Memphis criteria to identify risk factors for BCVI: complex cervical spine fractures, neurological conditions not sustained by imaging, Horner's syndrome, LeFort II/III fractures, basilar skull fractures with petrous/neck soft tissue injury. We modified this protocol to investigate all petrous fracture and to consider also cervical spine fractures (subluxation, transverse foramen, upper cervical spine involvement). In all patients judged at risk for BCVI, a 64-slice angio-CT scan (CTA) was performed.

### Results

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During the study period, 266 patients were admitted to the ICU for BMT with an ISS >15; 162 patients (60.9%) presented TBI or cervical spine fracture. According to our proposed modified Memphis criteria, 46 patients showed risk factors for BCVI (17.3% of the total of BMT; 28.4% of TBI), and six of them had carotid injury (2.2% of all BMT; 13.0% of patients with risk factors). No vertebral injury was detected. Anticoagulant therapy within 72 hours was initiated in all patients. No complications occurred and all patients were discharged from the ICU. Clinical examination during the 6-month follow-up showed no neurological deficiency related to previous vascular injury.

### Conclusions

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A higher percentage of BCVI was observed using the proposed modified Memphis criteria if compared with other studies (2.2% vs 1%). The mortality rate was lower than previously reported for patients with BCVI (0% vs 13%) and it could be explained by the early diagnosis and anticoagulant therapy initiation. An extended screening protocol application allows prompt recognition of BCVI. In regard of the higher percentage of BCVI found in our population, an advanced study on protective devices (for example, helmets) is actually in progress with the aim to reduce biomechanical effects of head injury on extracranial vessels.

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