



Complete Summary

GUIDELINE TITLE

Blunt cerebrovascular injury practice management guidelines.

BIBLIOGRAPHIC SOURCE(S)

Bromberg WJ, Collier B, Diebel L, Dwyer K, Holevar M, Jacobs D, Kurek S, Schreiber M, Shapiro M, Vogel T. Blunt cerebrovascular injury: practice management guidelines. Chicago (IL): Eastern Association for the Surgery of Trauma (EAST); 2007. 49 p. [75 references]

GUIDELINE STATUS

This is the current release of the guideline.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory information has been released.

- [February 28, 2008, Heparin Sodium Injection](#): The U.S. Food and Drug Administration (FDA) informed the public that Baxter Healthcare Corporation has voluntarily recalled all of their multi-dose and single-use vials of heparin sodium for injection and their heparin lock flush solutions. Alternate heparin manufacturers are expected to be able to increase heparin products sufficiently to supply the U.S. market. There have been reports of serious adverse events including allergic or hypersensitivity-type reactions, with symptoms of oral swelling, nausea, vomiting, sweating, shortness of breath, and cases of severe hypotension.

COMPLETE SUMMARY CONTENT

** REGULATORY ALERT **

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INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

SCOPE

DISEASE/CONDITION(S)

Blunt cerebrovascular injury

GUIDELINE CATEGORY

Management
Treatment

CLINICAL SPECIALTY

Critical Care
Emergency Medicine
Neurological Surgery
Neurology
Pulmonary Medicine
Surgery
Thoracic Surgery

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To provide guidelines on the management and treatment of blunt cerebrovascular injury

TARGET POPULATION

Patients with blunt cerebrovascular injury

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Assessment

1. Screening of patients for blunt cerebrovascular injury (BCVI)
2. Four vessel cerebral angiography (FVCA)
3. Computed tomography angiography (CTA) with a 8 (or greater)-slice multidetector
4. Grading of BCVI

Management/Treatment

1. Surgery
2. Angio-interventional therapy
3. Antithrombotic agents (aspirin, heparin, warfarin)
4. Aggressive management of intracranial hypertension (in children)
5. Monitoring (follow-up angiography)

Note: Duplex ultrasound and computed tomography angiography (CTA) with a 4 (or less)-slice multidetector array were considered but not recommended.

MAJOR OUTCOMES CONSIDERED

- Cerebrovascular accident
- Mortality and morbidity rates

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A computerized search of the National Library of Medicine/National Institute of Health, Medline database was performed utilizing citations from 1965 to 2005 inclusive. The search terms "cerebrovascular trauma," or "carotid artery" or "vertebral artery" AND wounds and injuries (mesh heading), AND "blunt" limited to the English language returned approximately 1500 citations. Titles and abstracts were reviewed to determine relevance and isolated case reports, small case series, editorials, letters to the editor, and review articles were eliminated. The bibliographies of the resulting full text articles were searched for other relevant citations and these were obtained when appropriate.

NUMBER OF SOURCE DOCUMENTS

One hundred sixty two articles were selected for review and of these 60 met criteria for inclusion and are excerpted in the attached evidentiary table (of the original guideline document). There were 23 Class II studies and 37 Class III studies identified (see "Rating Scheme for the Strength of the Evidence" below).

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Class I: Prospective, randomized, controlled trial

Class II: Clinical studies in which the data was collected prospectively, and retrospective analyses which were based on clearly reliable data. Types of studies so classified include: observational studies, cohort studies, prevalence studies, and case control studies.

Class III: Studies based on retrospectively collected data. Evidence used in this class includes clinical series, database or registry reviews, large series of case reviews, and expert opinion.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

A committee consisting of 10 trauma surgeons was convened to review the data and establish these recommendations.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. This recommendation is usually based on Class I data, however strong Class II evidence may form the basis for a Level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, low quality or contradictory Class I data may not be able to support a Level 1 recommendation.

Level 2: The recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert opinion. This recommendation is usually supported by Class II data or a preponderance of Class III evidence.

Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Not stated

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not applicable

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The levels of recommendation (1-3) and classes of evidence (I-III) are defined at the end of the "Major Recommendations" field.

What patients should be screened for blunt cerebrovascular injury (BCVI)?

Level 1

No Level 1 recommendations can be made.

Level 2

1. Patients presenting with any neurologic abnormality that is unexplained by a diagnosed injury should be evaluated for BCVI.
2. Blunt trauma patients presenting with epistaxis from a suspected arterial source following trauma should be evaluated for BCVI.

Level 3

1. Asymptomatic patients with significant blunt head trauma as defined below are at significantly increased risk for BCVI and screening should be considered.

Risk factors:

- Glasgow Coma Scale (GCS) ≤ 8
- Petrous bone fracture
- Diffuse axonal injury
- Cervical spine fracture
- Fracture through the foramen transversum
- Lefort II or III facial fractures

2. Pediatric trauma patients should be evaluated using the same criteria as the adult population.

Question addressed: What is the appropriate modality for the screening and diagnosis of BCVI?

Level 1

No Level 1 recommendations can be made.

Level 2

1. Diagnostic four vessel cerebral angiography (FVCA) remains the gold standard for the diagnosis of BCVI.
2. Duplex ultrasound is not adequate for screening for BCVI.
3. Computed tomography angiography (CTA) with a 4 (or less)-slice multidetector array is neither sensitive nor specific enough for screening for BCVI.

Level 3

1. Multi-slice (8 or greater) multidetector CTA has the same rate of detection for BCVI when compared to historic control rates of diagnosis with FVCA and should be considered as a screening modality in place of FVCA.

How should BCVI be treated? This references a grading scheme proposed by Biffi et al., 1999.

Grading scale

Grade I – Intimal irregularity with <25% narrowing

Grade II – Dissection or intramural hematoma with >25% narrowing

Grade III – Pseudoaneurysm

Grade IV – Occlusion

Grade V – Transection with extravasation

Level 1

No Level 1 recommendations can be made.

Level 2

1. Barring contraindications, Grade I and II injuries should be treated with antithrombotic agents such as aspirin or heparin.

Level 3

1. Either heparin or antiplatelet therapy can be used with seemingly equivalent results. A number of authors still recommend heparinization if there is no contraindication, reserving anti-platelet agents for those patients with relative contraindications to heparinization.

2. If heparin is selected for treatment, the infusion should be started without a bolus and titrated to an activated partial thromboplastin time (*aPTT*) of 50 to 60 sec.
3. In patients in whom anticoagulant therapy is chosen conversion to warfarin titrated to a Prothrombin Time, International Normalized Ratio (PT INR) of 2 to 3 for 3 to 6 months is recommended.
4. Grade III injuries (pseudoaneurysm) rarely resolve with observation or heparinization and invasive therapy (surgery or angio-interventional) should be considered. N.B. carotid stents placed without subsequent anti-platelet therapy have been noted to have a high rate of thrombosis in this population. (Cothren et al, 2005)
5. In patients with an early neurologic deficit and an accessible carotid lesion operative or interventional repair should be considered to restore flow.
6. In children who have suffered an ischemic neurologic event, aggressive management of resulting intracranial hypertension up to and including resection of ischemic brain tissue has improved outcome as compared to adults and should be considered for supportive management.

For how long should antithrombotic therapy be administered?

No recommendations can be made for this question.

How should one monitor the response to therapy?

Level 1

No Level 1 recommendation can be made.

Level 2

1. Follow-up angiography is recommended in Grade I-III injuries. In order to reduce the incidence of angiography-related complications this should be performed after 7 days post injury.

Level 3

There are no Level 3 guidelines for this question.

Definitions:

Classes of Evidence

Class I: Prospective, randomized, controlled trial

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Class III: Studies based on retrospectively collected data. Evidence used in this class includes clinical series, database or registry reviews, large series of case reviews, and expert opinion.

Levels of Recommendations

Level 1: The recommendation is convincingly justifiable based on the available scientific information alone. This recommendation is usually based on Class I data, however strong Class II evidence may form the basis for a Level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, low quality or contradictory Class I data may not be able to support a Level 1 recommendation.

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Level 3: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate management and treatment of patients with blunt cerebrovascular injury (BCVI)

POTENTIAL HARMS

Complications related to management/treatment

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- The Eastern Association for the Surgery of Trauma (EAST) is a multi-disciplinary professional society committed to improving the care of injured patients. The Ad hoc Committee for Practice Management Guideline Development of EAST develops and disseminates evidence-based information to increase the scientific knowledge needed to enhance patient and clinical decision-making, improve health care quality, and promote efficiency in the organization of public and private systems of health care delivery. Unless specifically stated otherwise, the opinions expressed and statements made in this publication reflect the authors' personal observations and do not imply endorsement by nor official policy of the Eastern Association for the Surgery of Trauma.
- "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."* These guidelines are not fixed protocols that must be followed, but are intended for health care professionals and providers to consider. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider. Individual patients may require different treatments from those specified in a given guideline. Guidelines are not entirely inclusive or exclusive of all methods of reasonable care that can obtain/produce the same results. While guidelines can be written that take into account variations in clinical settings, resources, or common patient characteristics, they cannot address the unique needs of each patient nor the combination of resources available to a particular community or health care professional or provider. Deviations from clinical practice guidelines may be justified by individual circumstances. Thus, guidelines must be applied based on individual patient needs using professional judgment.

*Institute of Medicine. Clinical practice guidelines: directions for a new program. MJ Field and KN Lohr (eds) Washington, DC: National Academy Press. 1990: pg 39.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2007

GUIDELINE DEVELOPER(S)

Eastern Association for the Surgery of Trauma - Professional Association

SOURCE(S) OF FUNDING

Eastern Association for the Surgery of Trauma (EAST)

GUIDELINE COMMITTEE

EAST Practice Management Guidelines Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Committee Members: William J. Bromberg, MD (*Chair*); Bryan Collier, DO (*Vice-Chair*); Larry Diebel, MD; Kevin Dwyer, MD; Michelle Holevar, MD; David Jacobs, MD; Stanley Kurek, DO; Martin Schreiber, MD; Mark Shapiro, MD; Todd Vogel, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [Eastern Association for the Surgery of Trauma \(EAST\) Web site](#).

Print copies: Available from the Eastern Association for the Surgery of Trauma Guidelines, c/o William J. Bromberg, MD, FACS, Memorial Health University Medical Center, Savannah Surgical Group, Inc., 4700 Waters Avenue, Savannah, GA 31404; Phone: (912) 350-7412; Email: guidelines@east.org

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Utilizing evidence based outcome measures to develop practice management guidelines: a primer. 18 p. 2000. Available in Portable Document Format (PDF) from the [Eastern Association for the Surgery of Trauma \(EAST\) Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

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