Complete Summary

GUIDELINE TITLE

Surgical management of acute subdural hematomas.

BIBLIOGRAPHIC SOURCE(S)

Bullock MR, Chesnut R, Ghajar J, Gordon D, Hartl R, Newell DW, Servadei F, Walters BC, Wilberger JE, Surgical Management of Traumatic Brain Injury Author Group. Surgical management of acute subdural hematomas. Neurosurgery 2006 Mar;58(3 Suppl):S2-16-S2-24. [39 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Acute subdural hematoma (SDH)

GUIDELINE CATEGORY

Management
Treatment

CLINICAL SPECIALTY

Emergency Medicine
Neurological Surgery
Neurology

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

To define the subset of patients who would benefit from surgical evacuation of an acute subdural hematoma

TARGET POPULATION

Patients with an acute subdural hematoma

INTERVENTIONS AND PRACTICES CONSIDERED

1. Surgical evacuation (craniotomy with or without bone flap removal and duraplasty in a comatose patient (GCS <9)
2. Computed tomography (CT) scan
3. Glasgow Coma Scale score
4. Intracranial pressure monitoring
5. Timing of surgery
6. Pupillary exam
7. Neurological monitoring
8. Nonoperative treatment

MAJOR OUTCOMES CONSIDERED

- Mortality rate
- Level of disability/functional recovery
- Efficacy of surgical technique

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A MEDLINE computer search using the following keywords for the years 1975 to 2001 was performed: "traumatic brain injury" or "head injury" and "subdural" or "intradural" and "hematoma" or "hemorrhage." The search was narrowed by including the keywords "surgical treatment" or "surgery" or "operation" or "craniotomy" or "craniectomy" or "craniostomy" or "burr holes" and excluding "chronic" and "spinal." Case reports, publications in books, and publications regarding penetrating brain injuries, or spinal or chronic subdural hematoma (SDH) were not included. Chronic SDH was defined as an SDH occurring or diagnosed more than 14 days after trauma. Articles were excluded if the diagnosis

of SDH was not based on computed tomographic (CT) scanning, or if subgroups of patients who did not undergo CT scanning were not clearly identified. Publications with fewer than 10 patients or publications that did not include information on outcome were excluded.

NUMBER OF SOURCE DOCUMENTS

These searches combined yielded 161 articles. The reference lists of these publications were reviewed and an additional 18 articles were selected for analysis. Of these 179 articles, 21 were selected for analysis.

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

Classification of Evidence

When assessing the value of therapies or interventions, the available data was classified into one of the following three categories according to the following criteria:

Class I: Evidence from one or more well-designed, randomized, controlled clinical trials, including overviews of such trials

Class II: Evidence from one or more well-designed comparative clinical studies, such as nonrandomized cohort studies, case-control studies, and other comparable studies

Class III: Evidence from case series, comparative studies with historical controls, case reports, and expert opinion

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Evaluation and Weighting of the Evidence

The journal articles found have been carefully read and evaluated, including an assessment of the methodology used in the studies. This not only includes the establishment of the clinical question addressed (e.g., therapeutic effectiveness, diagnostic tests, prognostic studies, etc.) and type of study (randomized controlled trial, case-control study, case series, etc.), but also the quality of the study with respect to potential errors in design, execution, or conclusions reached. Therefore, studies that might, on the surface, represent evidence supporting one level of recommendation, may instead be flawed enough to be devalued to support a recommendation of lesser strength. The quality of the literature was

evaluated in this way according to well-established criteria. All articles were cross-reviewed and disagreements were resolved by consensus.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Link Between Evidence and Guidelines

The general concept of relating strength of recommendations to strength of evidence reflecting varying degrees of clinical certainty was formalized into a scheme that has been followed by medical societies, including organized neurosurgery, from the inception of the *Guideline* development process. Despite problems with the strict application of this paradigm (some of which are displayed and discussed in this supplement), the scheme has the benefit of using scientific evidence rather than expert opinion for the substrate of the recommendations, although expert opinion is used to formulate the recommendations themselves, as well as to make judgments regarding the quality of the evidence. The evidence-based scheme used in these and all *Guidelines* regarding therapeutic effectiveness endorsed by the American Association of Neurological Surgeons and the Congress of Neurological Surgeons begins with classification of the literature into three categories of evidence (see "Rating Scheme for the Strength of the Evidence" above).

The classification of evidence into these three categories leads to the formulation of recommendations called *Standards*, *Guidelines*, and *Options*. *Class I* evidence is used to support treatment recommendations of the strongest type, practice *Standards*, reflecting a *high degree of clinical certainty*. *Class II* evidence is used to support *Guidelines*, reflecting a *moderate degree of clinical certainty*. *Class III* evidence supports practice *Options* reflecting *unclear clinical certainty*. This terminology was developed to indicate, in normal vocabulary, the strength of the recommendations on the basis of strong to weak medical evidence. In neurosurgery, this scheme has been used to formulate *Guidelines*, rather than a scheme that uses letters or numbers that have no grounding in language and are, therefore, more easily misinterpreted. The link between scientific evidence and recommendations has been highlighted in these *Guidelines* by presenting those studies in the scientific foundation that support the stated recommendation in boldface type.

Expert Judgment and Empirical Evidence

There are two ways in which expert judgment comes into *Guideline* development. The most common use of expert opinion is in developing recommendations for practice. This has been a usual method in the past (as well as the present, in the form of textbook chapters), but has more recently given way to more formalized approaches embraced by evidence-based medicine methodology, such as that used in this supplement. However, even in evidence-based methodology, expert opinion is used to evaluate the literature as well as to frame the concepts and wording of the recommendations. In addition, if the evidence is weak and

conflicting, expert opinion is used to derive recommendations. This use is unavoidable, but the expert opinion is guided by the evidence published in the literature, rather than from personal experience alone.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Levels of Recommendations

Standards: Represent accepted principles of patient management that reflect a *high degree of clinical certainty*.

Guidelines: Represent a particular strategy or range of management strategies that reflect a *moderate degree of clinical certainty*.

Options: Are the remaining strategies for patient management for which there is *unclear clinical certainty*.

COST ANALYSIS

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

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

In all Guidelines published under the auspices of the Brain Trauma Foundation and the American Association of Neurological Surgeons, other professional organizations were involved in either developing the Guidelines or reviewed and approved them. In these Surgical Management of Traumatic Brain Injury Guidelines, however, only neurosurgeons were involved. These neurosurgeons represent a wide range of organizations. There were representatives from the American Association of Neurological Surgeons, the Congress of Neurological Surgeons, the European Brain Injury Consortium, the American College of Surgeons (Committee of Trauma) and the World Federation of Neurological Surgeons (Neurotrauma section) involved in the development of these Surgical Management of Traumatic Brain Injury Guidelines.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

"Degrees of Certainty" [Standards, Guidelines, Options] and "Classification of Evidence" [Class I to III] are defined at the end of the "Major Recommendations" field.

Note: All of the following recommendations are at the Option level supported only by Class III scientific evidence.

Recommendations

Indications for Surgery

- An acute subdural hematoma (SDH) with a thickness greater than 10 mm or a midline shift (MLS) greater than 5 mm on computed tomographic (CT) scan should be surgically evacuated, regardless of the patient's Glasgow Coma Scale (GCS) score.
- All patients with acute SDH in coma (GCS score less than 9) should undergo intracranial pressure (ICP) monitoring.
- A comatose patient (GCS score less than 9) with an SDH less than 10-mm thick and a midline shift less than 5 mm should undergo surgical evacuation of the lesion if the GCS score decreased between the time of injury and hospital admission by 2 or more points on the GCS and/or the patient presents with asymmetric or fixed and dilated pupils and/or the ICP exceeds 20 mm Hg.

Timing

- In patients with acute SDH and indications for surgery, surgical evacuation should be performed as soon as possible.

Methods

- If surgical evacuation of an acute SDH in a comatose patient (GCS < 9) is indicated, it should be performed using a craniotomy with or without bone flap removal and duraplasty.

Summary

In patients with an acute SDH, clot thickness or volume and the MLS on the preoperative CT correlate with outcome. In studies analyzing CT parameters that may be predictive for delayed surgery in patients undergoing initial nonoperative management, an MLS greater than 5 mm or a clot thickness greater than 10 mm on the initial CT scan emerged as significant prognostic factors (see Appendices in the original guideline document for measurement techniques). Therefore, patients with SDH presenting with a clot thickness greater than 10 mm or an MLS greater than 5 mm should undergo surgical evacuation, regardless of their GCS. Patients who present in a coma (GCS < 9) but with an SDH with a thickness less than 10 mm and an MLS less than 5 mm can be treated nonoperatively, providing that they undergo ICP monitoring, they are neurologically stable since the injury, they have no pupillary abnormalities, and they have no intracranial hypertension (ICP >20 mm Hg). Because of the frequent association of SDH with parenchymal injury, surgical management decisions should take into consideration the recommendations for both lesion types.

Definitions:

Degrees of Certainty

Standards: Represent accepted principles of patient management that reflect a *high degree of clinical certainty*.

Guidelines: Represent a particular strategy or range of management strategies that reflect a *moderate degree of clinical certainty*.

Options: Are the remaining strategies for patient management for which there is *unclear clinical certainty*.

Classification of Evidence on Therapeutic Effectiveness

Class I: Evidence from one or more well-designed, randomized, controlled clinical trials, including overviews of such trials

Class II: Evidence from one or more well-designed comparative clinical studies, such as nonrandomized cohort studies, case-control studies, and other comparable studies

Class III: Evidence from case series, comparative studies with historical controls, case reports, and expert opinion

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are all at the Option level, supported only by Class III scientific evidence (e.g., evidence from case series, comparative studies with historical controls, case reports, and expert opinion)

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate surgical management of subdural hematoma (SDH) to improve clinical outcomes and reduce morbidity and mortality

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

As in all other areas of evidence-based medicine, these Guidelines have been formulated strictly in accordance with externally imposed constraints. Only clinical human-based literature has been reviewed. Only literature from 1975 through 2001 has been reviewed. Mainly literature in English, with far fewer articles in other languages, was reviewed. For these reasons, the reader must clearly understand that the scope and level of magnitude of the recommendations made here are distilled from the available literature and interpreted according to the rules of evidence-based medicine.

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
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Bullock MR, Chesnut R, Ghajar J, Gordon D, Hartl R, Newell DW, Servadei F, Walters BC, Wilberger JE, Surgical Management of Traumatic Brain Injury Author Group. Surgical management of acute subdural hematomas. Neurosurgery 2006 Mar;58(3 Suppl):S2-16-S2-24. [39 references] PubMed

ADAPTATION

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

DATE RELEASED

2006 Mar

GUIDELINE DEVELOPER(S)

Brain Trauma Foundation - Disease Specific Society

SOURCE(S) OF FUNDING

Brain Trauma Foundation
Integra NeuroSciences

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

ENDORSER(S)

Congress of Neurological Surgeons - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format from the Brain Trauma Foundation Web site.

Print copies: Available from Jamshid Ghajar, MD, PhD, Brain Trauma Foundation, 708 Third Avenue, Suite 1810, New York, NY 10017, Email: ghajar@braintrauma.org

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Introduction. Neurosurgery 2006 Mar;58(3 Suppl):S2-1-S2-3.
- Methodology. Neurosurgery 2006 Mar;58(3 Suppl):S2-4-S2-6.

Electronic copies: Available in Portable Document Format (PDF) from the Brain Trauma Foundation Web site.

Print copies: Available from Jamshid Ghajar, MD, PhD, Brain Trauma Foundation, 708 Third Avenue, Suite 1810, New York, NY 10017, Email: ghajar@braintrauma.org

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on August 15, 2006. The information was verified by the guideline developer on August 18, 2006.

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