Chinese Medical Journal®

Chinese multidisciplinary guideline for management of hypertensive intracerebral hemorrhage

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Hypertensive intracerebral hemorrhage (HICH) refers to the sudden onset of hemorrhage within cerebral parenchyma or ventricles of patients with a history of hypertension. Secondary intracerebral hemorrhage (ICH) with an underlying causative pathology, such as trauma, structural blood vessel abnormalities, coagulation or hematological disorder(s), systemic diseases, or neoplasms, should be excluded to make the diagnosis of HICH. HICH is characterized by high incidence, disability, mortality, and recurrence rates. In 2015, experts from the Chinese Medical Association branch of Neurosurgery, Chinese Medical Doctor Association branch of the Emergency Physician and Stroke Screening, and Prevention and Treatment Committee of the National Health Commission of the People's Republic of China gathered to formulate and draft the Chinese Multidisciplinary Experts Consensus on the Management of Spontaneous Intracerebral Hemorrhage.[1] This consensus has played an important role in guiding and standardizing the management of spontaneous ICH in China. With significant progress in multidisciplinary research and the publication of new evidence in this field within the past 5 years, upgrading the former consensus statement to a guideline would facilitate better decision-making during clinical practice at all levels in medical institutions in China. The present guideline mainly addresses HICH, which is the most common type of spontaneous ICH.[2,3]

Level of evidence and recommendation strength

Level of evidence standard

The recommendations in this guideline refer to the evidence level following the criteria of the Oxford center for evidence-based medicine. The levels of evidence were as follows: Level A, data derived from multicenter or multiple randomized clinical trials or meta-analyses; Level B, data derived from a single randomized trial or multiple nonrandomized studies; and Level C, experts' opinions or case studies.

Recommendation strength standard

The classification of recommendations is as follows: Class I, should be followed; Class IIa, reasonable, appropriate in most situations; Class IIb, optional, may be considered; and Class III, not effective, sometimes harmful.

Recommendation strength review committee

There were 85 voting committee members for this guideline, including 59 neurosurgeons (69.4%), ten neurologists (11.8%), four neurointensivists (4.7%), nine emergency physicians (10.6%), one radiologist (1.2%), one rehabilitation physician (1.2%), and one medical administrator (1.2%).

Target audience

Clinicians specializing in cerebrovascular diseases in China.

Recommendations

Recommendations for surgical treatment	Level of evidence	Strength of recommendation
Supratentorial HICH	A	I
Stereotactic aspiration	A	IIa
Neuroendoscopic surgery	B	IIa
Decompressive craniectomy	B	IIa
External ventricular drainage	B	IIa
Intraventricular hemorrhage	B	IIb
Cerebellar hemorrhage	B	IIa

Access this article online

Quick Response Code:

Website: www.cmj.org

DOI: 10.1097/CM9.0000000000001976

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Chinese Medical Journal 2022;135(19)
Received: 01-11-2021; **Online:** 31-10-2022 **Edited by:** Yuanyuan Ji

(continued).

Recommendations for surgical treatment	Level of evidence	Strength of recommendation
Brainstem hemorrhage	B	I
Early hematoma evacuation	B	I

HICH: Hypertensive intracerebral hemorrhage. The other recommendations of this guideline are shown in the online appendix, http://links.lww.com/CM9/B336.

Discussion

HICH is the most frequent pattern of spontaneous ICH in China. This guideline aims to provide comprehensive recommendations for the diagnosis and treatment of HICH. After an extensive literature search of the PubMed and domestic databases, members of the writing committee discussed the recommendations in person or via teleconferences. This guideline provides evidence-based information in terms of emergency care, diagnosis, medical and surgical management, rehabilitation, and prevention. The expert panel agreed that recommendations from this guideline can improve the standardized treatment of HICH in medical institutions at all levels in China.

Among all predictors of clinical outcomes in HICH, hematoma volume is the strongest. An increased hematoma volume is always associated with a significant mass effect, which inevitably leads to the accumulation of cytotoxic substances in the hematoma and causes further extensive secondary brain injury. Therefore, surgical evacuation of the hematoma remains an effective treatment modality for patients with HICH. The goal of hematoma evacuation is to save lives by relieving the mass effect, reducing intracranial hypertension, and immediately alleviating brain herniation. Ideally, these measures could also minimize secondary brain injury and improve postoperative outcomes to the maximum extent. Currently, the role of surgical treatment in HICH remains controversial despite several ongoing randomized controlled trials. In the Surgical Trial in Lobar Intracerebral Hemorrhage (STICH) studies, surgery failed to improve the outcome of patients with ICH; however, the STICH studies also had several notable limitations.[4,5] The Minimally Invasive Surgery Plus Recombinant Tissue Plasminogen Activator for Intracerebral Hemorrhage Evacuation Phase III Clinical Trial (MISTIE III) showed that image-guided, minimally invasive surgery did not significantly improve functional outcomes at 365 days. However, subgroup analysis indicated that surgical patients exhibiting a residual hematoma volume $\leq$15 mL experienced a better functional outcome at 365 days, suggesting that residual hematoma would be an alternative clinical endpoint in future clinical trials.[6] The incidence of HICH in China is significantly higher than that in Western countries, which enables us to gain rich experience in surgical treatment. Currently, in China, surgery is routinely performed for patients with HICH with deep intracranial hematomas involving the basal ganglia and thalamus, who present with severe intracranial hypertension or even brain herniation. We concede there is still a lack of high-level evidence supporting its extensive application in treating all patients with HICH. However, the role of surgical treatment as a life-saving measure should be acknowledged.

The surgical indications for HICH should be carefully considered. For example, surgical indications for supratentorial hemorrhage include the following[7]: presence of brain herniation; signs of significantly elevated intracranial pressure (ICP) on neuroimaging, defined as a midline shift $>$5 mm, or $>$50% compression of the ipsilateral lateral ventricle, or blurry or completely disappearing ipsilateral cisterns or sulci on neuroimaging; and ICP $>$25 mmHg. For patients who fulfill any one of these three indications, emergency surgical treatment should be undertaken as soon as possible to reduce ICP and prevent the occurrence of brain herniation. For intraventricular, cerebellar, and brainstem hemorrhage, this guideline also provides the corresponding surgical indications based on current research and treatment experience.

Common surgical procedures include conventional bone-flap craniotomy, small bony window craniotomy, minimally invasive neuroendoscopy, and stereotactic puncture. Each procedure has its own merits, and neurosurgeons should individualize the procedure according to the patient's clinical condition and the surgeon's specialty. It is worth noting that minimally invasive surgery should be considered more a "philosophy" rather than a specific procedure or technique. Any procedure should be defined as minimally invasive surgery if the lesion is eradicated, with normal brain tissue, blood vessels, and cranial nerves maximally protected using the best available equipment and techniques. Hence, all surgeries should be designed and performed using this concept.

Regardless of the type of HICH or operative approach, it is necessary to avoid or minimize new damage to brain tissue during the operation. The following tips or caveats should be noted.[7] Try to operate as finely as possible under a microscope. Attention should be devoted to protecting the Sylvian vein, middle cerebral artery and its branches, and non-bleeding lenticulostriate artery. Use dynamic rather than persistent brain traction. Precise suction and coagulation should be performed, and manipulation should be maintained within the hematoma cavity. If the ICP remains high due to brain edema after hematoma removal, the bone window should be sufficiently expanded to perform decompressive craniectomy.

In conclusion, HICH remains a serious issue in China requiring a standardized treatment approach in both tertiary stroke centers and rural primary medical hospitals.

This guideline provides practical recommendations for the medical and surgical management of HICH, which can improve the prognosis of HICH in China.

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Funding

This work was supported by grants from the National Natural Scientific Foundation of China (No. 81701292), Postdoctoral Research and Development Programs of Sichuan University (No. 2021SCU12025), and Applied Basic Research Programs of Sichuan Province (No. 2021YJ0464).

Conflicts of interest

None.

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How to cite this article: Yu Z, Tao C, Xiao A, Wu C, Fu M, Dong W, Liu M, Yu X, You C. Chinese multidisciplinary guideline for management of hypertensive intracerebral hemorrhage. Chin Med J 2022;135:2269–2271. doi: 10.1097/CM9.0000000000001976