Surgical Treatment of Hypertensive Cerebral Hemorrhage

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Abstract: Intracerbral hemorrhage (ICH) refers to primary non-traumatic hemorrhage in the parenchyma, also known as spontaneous cerebral hemorrhage, accounting for 20%-30% of acute cerebrovascular diseases. Every year 2 million to 3 million people in the world suffer from intracerebral hemorrhage, accounting for 10%-15% of all new strokes, and the total incidence of intracerebral hemorrhage in the world is 24.6/ (100,000 · year). In China, the incidence of cerebral hemorrhage is 60-80/ (100,000 · year), which is much higher than that of other Asian countries. Primary intracerebral hemorrhage accounts for 80%-85%, and primary hypertensive intracerebral hemorrhage combined with hypertension accounts for 50%-70% [1]. Hypertensive intracerebral hemorrhage accounts for about 50% of the causes of non-traumatic intracerebral hemorrhage, and its mortality rate takes the first place in non-traumatic intracerebral hemorrhage [2]. Hypertensive intracerebral hemorrhage has rapid onset, high mortality rate and slow recovery, and often leaves various degrees of neurological dysfunction. This paper analyzes the pathological features of hypertensive intracerebral hemorrhage, the clinical features of the bleeding site, the indications, timing, surgical methods and the advantages and disadvantages of surgical treatment, hoping to provide reference for the selection of surgery for clinicians.

Keywords*:* Hypertension Cerebral Hemorrhage; Surgery; Treatment

1. Regional Pathological features of cerebral hemorrhage

Hypertensive intracerebral hemorrhage is caused by the rupture of intracerebral arterioles on the basis of chronic lesions caused by long-term hypertension stimulation. The perforating vessels with a diameter of about 100-200μm directly emanate from the intracranial aorta, including the bean-stripe artery, the thalamic perforating artery and the brainstem perforating branch of the basilar artery. [3]

2. Clinical features of bleeding sites

2.1 Basal ganglia hemorrhage

Basal ganglia is the most common site of hypertensive cerebral hemorrhage, accounting for more than half of all cerebral hemorrhage. Putamen hemorrhage was the best site of hemorrhage, because the hematoma was mainly located outside the inner sac, so it was called lateral type, and the source of bleeding was mostly the lateral group of the bean stripe artery. Bleeding usually begins in the posterior part of the putamen, and may spread in different directions, involving the radiocarpa, occupying the insula, and even extending to the subtemporal cortex. The opposite hematoma located on the medial side of the inner sac (thalamus) is called medial type [4].

2.2 Thalamic hemorrhage

Thalamic hemorrhage accounts for about 10% to 15% of cerebral hemorrhage. The source arteries of thalamic hemorrhage are the perforating arteries supplying the thalamus, mainly the geniculate thalamic artery supplying the lateral thalamic nucleus and the posterior thalamic perforating artery supplying the medial thalamic nucleus. [5].

2.3 Brain stem hemorrhage

The pons are a common site for bleeding from the brain stem. It accounts for more than 10% of cerebral hemorrhage. The source artery is the perforating branch of the basilar artery supplying the brain stem. The clinical manifestations include sudden onset, sudden severe headache and vomiting, immediate disturbance of consciousness, and even rapid fall into a deep coma. Pin-like pupils are usually characteristic changes of pontine hemorrhage, quadriplegia and nuclear facial paralysis, and bilateral pyramidal bundle sign is positive [6].

2.4 Cerebellar hemorrhage

Cerebellar hemorrhage accounts for about 10% of cerebral hemorrhage, mostly located in and near the dentate nucleus of one cerebellar hemisphere. The main bleeding source arteries were superior cerebellar artery, anterior inferior cerebellar artery and posterior inferior cerebellar artery branch. The main symptoms are sudden violent vomiting, occipital headache, dizziness, and falling due to ataxia. Physical examination may include stiffness of the neck, nystagmus and dysarthria. If the amount of blood loss is roughly pressure on the fourth ventricle and the latter hematoma breaks into the ventricle to cause obstructive hydrocephalus, the intracranial pressure can increase rapidly, and even acute forumoccipital hernia, disorder of vital signs, and rapid death can occur in severe cases [7-8].

2.5 Cerebral lobe hemorrhage

Cerebral protein and subcortical hemorrhage account for about 10% of all cerebral hemorrhage. It can occur in the frontal, temporal, parietal and occipital lobes. Most of the bleeding source arteries were amyloidosis arterioles in cerebral cortex and pia meninges. Different cerebral hemorrhage manifestations: frontal lobe, higher neural activity disorder, mental abnormality, convulsive attack, contralateral hemiplegia, dominant hemispheric hemorrhage with aphasia; Temporal lobe, partial hemiblindness, seizures and sensory aphasia; Parietal lobe, partial body sensory disorder, aphasia, apraxia; Occipital lobe, hemiblindness in the opposite visual field [9].

3. Surgical Treatment

3.1 Surgical indications

The patient's general condition, age, state of consciousness, hematoma volume, bleeding site, and whether there was hydrocephalus were comprehensively evaluated. Conscious patients with small amounts of bleeding do not need surgery. But deep coma, dilated pupil and even unstable vital signs, the operation effect is not good. Cerebral lobe and basal ganglia hemorrhage, feasible craniotomy to remove hematoma; The surgical treatment of thalamic hemorrhage should be more cautious, and ventricular trepanation and drainage are feasible for patients with ventricular rupture. The main treatment of brain stem hemorrhage is medical treatment. The treatment of cerebellar hemorrhage should be more active, such as hematoma more than 10ml or compression of the fourth ventricle to form hydrocephalus, supratentorial bleeding more than 30ml, midline displacement more than 10mm, the medical conservative is not effective, the disease continues to worsen, the patients without absolute contraindication of surgery can be operated.

3.2 Timing of Surgery

The indications for surgery are clear and should be performed as soon as possible. Surgery within 6 hours after bleeding, or even earlier, to remove the hematoma before irreversible damage to the surrounding brain tissue, promises to better save nerve function.

3.3 Surgical Methods

(1) The surgical approach was designed according to the site of the hematoma, the hematoma was removed under the direct view of craniotomy, and the decompression was full (if necessary, the bone flap was removed); (2) Neuroendoscopy-assisted removal of intracerebral hematoma is to introduce the endoscope into the hematoma cavity under the guidance of stereotactic, and aspirate the hematoma through repeated flushing. It can effectively stop bleeding and biopsy suspicious tissues [10]. (3) In case of emergency or can not tolerate general anaesthesia, the fluid components of the hematoma can be drilled and drained. Local use of thrombolytic agents such as urokinase or streptokinase to promote hematoma dissolution for drainage, secondary decompression is not complete; (4) Ventricular puncture and drainage are feasible for patients with obstructive hydrocephalus caused by intraventricular hemorrhage or posterior fossa hemorrhage [11].

4. Summary

Open surgery for hypertensive intracerebral hemorrhage includes conventional craniotomy and small window craniotomy [12]. Compared with small bone window craniotomy, craniotomy has greater damage to the scalp and skull, but can completely remove hematoma under direct vision, reliable hemostasis, rapid decompression, and can also be feasible when necessary, craniotomy decompression is the most commonly used and classic craniotomy approach for hypertensive cerebral hemorrhage. Small bone window craniotomy has little damage to scalp and skull, relatively simple operation, rapid removal of hematoma, and hemostatic leaves are satisfactory under direct vision. With the continuous maturity of neuroendoscopy technology, small bone window craniotomy is used in neuroendoscopy-assisted hematoma removal. Due to the rapid postoperative recovery, patients generally extubation with sobriety the next day. It is considered to be the most valuable surgical procedure due to its low trauma, short operation time, satisfactory removal of hematoma, minimal secondary brain injury, and satisfactory postoperative recovery of patients [13]. However, surgical treatment of hypertensive intracerebral hemorrhage is controversial and should be based on the patient's systemic condition and hematoma site. The size and the evolution of the disease were analyzed in detail.

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