

## **Effect of super-early operation on treatment of high-grade ruptured intracranial aneurysm.**

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### **Abstract**

**Objective:** To explore the feasibility and clinic value of super-early operation in treatment of high-grade intracranial aneurysm with ruptured hemorrhage.

**Methods:** From August, 2014 to March, 2016, 46 patients suffering high-grade ruptured intracranial aneurysm were collected. Among them, 23 patients were treated with early operation (operation within 48 or 72 h, group A) while the rest received super-early operation (operation within 24, group B). The differences of effect, post-operation complication, and recovery between groups A and group B were analysed statistically with chi-square test.

**Results:** Compare to the 30.43% aneurysms rupture recurrence rate in patients who received early operation (group A), the recurrence rate of aneurysms rupture in patients receiving super-early operation (group B) is lower to 4.35%. Additionally, the post-operation complication rate of group B (8.69%) is significantly lower than that of group A (39.13%). Consistently, 18 out of 23 patients in group B recovered very well from the operation, while only 10 out of 23 patients in group achieved good recovery.

**Conclusion:** Super-early operation has certain clinical application value in treatment of high-grade ruptured intracranial aneurysm.

**Keywords:** High-grade intracranial aneurysm, Rupture hemorrhage, Super-early operation.

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### **Introduction**

Clinically, the most common symptoms of ruptured intracranial aneurysm include spontaneous Subarachnoid Hemorrhage (SAH), cerebral hernia and brain tumor [1]. Intracranial aneurysm disease is divided into stages I-V based on the pathogenic condition with Hunt-Hess classification method. In Patients at the stages I-III are unanimously treated by early surgery while patients at stages IV and V, are not recommended to receive early surgical treatment due to their serious illness. Instead, the experts advise to conduct CT angiography and digital subtraction angiography on their stable conditions and then determine the next step depending on the results [2]. The disease has sudden and dangerous onset and vital signs, such as respiratory failure, circulatory failure and high mortality rate, in patients at unstable stages, making it necessary to inform the families about operation risk during clinical treatment [3]. The feasibility and effects of super-early operation in treatment of high-grade ruptured intracranial aneurysm are analysed in detail as following.

### **Materials and Methods**

#### **General data**

From August, 2014 to March, 2016, 46 patients with high-grade ruptured intracranial aneurysm were collected. Among them, 23 patients were treated with early operation (operation within 24 or 72 h, group A) while the rest received super-early operation (operation within 24, group B). In group A, there were 13 males and 10 females aged from 34 to 70 y old with an average of  $55.46 \pm 6.84$  y old. In group B, there were 12 males and 11 females aged from 35 to 70 y old with an average of  $54.78 \pm 6.95$  y old.

**Inclusion criteria:** Patients were diagnosed with ruptured intracranial aneurysm and agreed to receive surgery treatment after being divided into stages I-IV with Hunt-Hess classification method.

**Exclusion criteria:** Patients who ignored the doctor's instructions with poorer compliance; patients died during the treatment; patients who were not suitable for surgery.

## Methods

46 patients were treated with Craniocerebral CT test (18 had simple SAH (Subarachnoid Hemorrhage) and others had SAH complicated with cephalophyma). The bleeding sites of patients' include supra sella cistern, ambient cistern, prepontile cistern and sylvian cistern. The craniocerebral CT detection showed there was hematoma in the brain and the midline structure displacement of 14 patients was more than 1 cm. The cerebral CTA examination (within 24 h after the admission to the hospital) turned out that 13 patients had anterior communicating aneurysms, 16 middle cerebral aneurysms and 17 posterior communicating aneurysms.

**Surgery procedures:** 23 patients were treated with super-early surgery and decompress method of frontotemporal improved pterion incision was commonly used during operation. The patients were treated with CTA inspection before the surgery and the patients' optic chiasm cistern, sylvan cistern and carotid cistern were in order separated to effectively determine the location of the aneurysm. For patients with anterior communicating aneurysms, parts of gyrus rectus should be removed to block parent artery and effectively treat the brain hematoma. If the subarachnoid hemorrhage bleeding occurred in many sites, then various cisterns of the patients should be separated and the internal carotid artery bed should be fully exposed to determine the location of arterial aneurysm based on the hematoma sites. Patients in group A were treated with the same surgery procedures as those in group B with mere difference in the period of surgery.

## Observation index

Repeated aneurysms rupture in the condition that aneurysms were completely occluded; complications occurrence (including cerebral vasospasm and delayed ischemic neurological deficits); the recovery of patients in two groups in 3 months after the operation.

**Table 2.** Comparison of complications occurrence rate in two groups.

Group	Delayed ischemic neurological deficits	Cerebral vasospasm	Complications occurrence rate
Group A	3	6	9 (39.13%)
Group B	1	1	2 (8.69%)
chi-square	5.854		
P	0.015		

## Recovery conditions of patients in two groups

The recovery conditions of patients in two groups were detected in 3 months after the operation and the result showed that 18 out of 23 patients in the group B recovered very well, while only 10 out of 23 patients in group B have good recovery (Table 3).

## Statistical analysis

Count data was described as percentage (n, %) and chi-square test was applied. The difference will be regarded as significant when  $P < 0.05$ . Statistical software: SPSS 17.0 and Microsoft office excel.

## Results

### Comparison of repeated aneurysms rupture and occluded aneurysms

Compare to the 30.43% aneurysms rupture recurrence rate in patients who received early operation (group A), the recurrence rate of aneurysms rupture in patients receiving super-early operation (group B) is lower to 4.35% (Table 1).

**Table 1.** Comparison of repeated aneurysms ruptures and occluded aneurysms in two groups.

Group	Case	Occluded aneurysms	Repeated aneurysms rupture
Group A	23	14 (60.87%)	7 (30.43%)
Group B	23	21 (91.31%)	1 (4.35%)
chi-square		5.447	
P		0.009	

### Complications occurrence in two groups

After the operation, 9 patients in group A have complications with 3 patients suffered delayed ischemic neurological deficits and 6 patients reported cerebral vasospasm. In group B, just 2 patients got complications with one had delayed ischemic neurological deficits and another one got cerebral vasospasm (Table 2).

**Table 3.** Comparison of recovery conditions of patients in two groups.

Group	Cases	Good recovery	Bad recovery
Group A	23	10	13
Group B	23	18	5
chi-square		5.841	
P		0.013	

## **Discussion**

Fragmentary dilated expansion of intracranial arterial lumen and cerebrovascular anomalies may lead to intracranial aneurysm, which is frequently and effectively treated by surgery in the clinical medical treatment [4-6]. According to related researches and clinical experience, intracranial aneurysms often result in spontaneous subarachnoid hemorrhage and rupture hemorrhage will seriously affect the life safety of patients. The disease may occur among patients at any age and there is a min age of 30 and a max age of 70 in age of onset. And it generally occurs suddenly without the patients' self-awareness and it is when the spontaneous rupture results in subarachnoid hemorrhage that the patients realize the occurrence of the disease. In recent years the incidence of the disease rises year by year and the disability rate ranks third in cerebrovascular accidents, and clinicians have recently paid more attention to the treatment of the disease [7-11]. The invasion sites of the disease generally are located in the intracranial artery bifurcation or the trunk and the rupture hemorrhage will give patients severe pain and at this time the patients may suffer more or less disturbance of consciousness or disorders of nervous functions [12]. In terms of subarachnoid hemorrhage, the bloods in great quantities can damage brain tissues of the patients, often inducing cerebral arterial spasm and the long-time spasticity of cerebral arteries will affect the living health of patients. During surgery indwelling catheter was set within the blood vessels of patients for a moderately long time. All these will stimulate the patients' brain tissues, prone to cause cerebral vasospasm complications, and the super early surgical operation can shorten the staying time of indwelling catheter in the patient's body [13].

The study results reveal that there were 14 cases of occluded aneurysms in the group A while 21 in the group B, showing the super early surgical operation can effectively increase the probability of occluded aneurysms and help with the recovery. After the surgery, there were 7 cases of repeated aneurysms rupture in the group A while only 1 in the group B, proving the super early surgical operation treatment can effectively reduce the occurrence of repeated aneurysms rupture.

Digital subtraction angiography inhibition is a standard for clinical diagnosis of intracranial aneurysms, but it is time-consuming with complicated operation in the process of clinical examination [14-17]. CT angiography has the advantages in safety, rapidity, non-invasion yet with high clinical misdiagnosis rate, especially for patients with posterior communicating aneurysms its development needs further improvement, which demands the specialized operation personnel of a high technical level and careful observation [18]. The patients should be advised to receive CT angiography test within 24 h if the situation permits and keep timely communication with the surgeon to know the location of the aneurysm and then study how to do surgical operation with a

better undersigning of peripheral vascular conditions, which plays a positive role in clinical surgery [19,20].

In this study, we found that operation should be conducted as soon as possible to promote survival rate and then reduce the repeated aneurysm bleeding. Parts of spontaneous subarachnoid hemorrhage should be removed with exposure of the patients' various cisterns and alleviating the increasing intracranial pressure, thus effectively reducing the occurrence of brain ischemia.

## **Conclusion**

Collectively, the implement of super-early operation in treatment of high-grade ruptured intracranial aneurysm effectively decreases the complications rate and the occurrence of repeated intracranial aneurysm bleeding. The survey results about the patients' recovery status in 3 months after the surgery show that the super-early operation has better clinical therapeutic effects, proving the advantage of super-early operation to improve quality of patients' life. Thus, super-early operation worth clinical application in treatment of high-grade ruptured intracranial aneurysm.

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