Analysis of factors influencing surgical indication and clinical prognosis of elderly patients with cerebral contusion

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Abstract: Objective To explore the surgical indications and clinical prognostic factors of elderly patients with cerebral contusion. **Method** A series of clinical symptoms and imaging indexes of 40 elderly patients with cerebral contusion were retrospectively analyzed, and the influencing factors closely related to surgical indication and clinical prognosis were mainly investigated. **Results** The results showed that the intracranial hematoma volume, CT midline deviation or basal cistern compression at admission, and CT midline deviation or basal cistern compression aggravation during hospitalization combined with clinical symptom aggravation could better indicate the existence of surgical indications. **Conclusion** It is helpful for neurosurgeons to make reasonable surgical indications and clinical prognosis judgment for elderly patients with cerebral contusion.

With the aging of the population, the proportion of brain contusion is increasing. For the elderly's natural protection and defense ability is poor, also the adaptive protection function is very low, the vulnerability to trauma is increased. The brain tissue of the elderly tends to degenerate, the subarachnoid space enlarges, and the mobility of brain tissue increases during trauma. In addition, the elasticity of cerebral arteriosclerosis is poor, and it is easy to damage and bleed. These symptoms are difficult to stop by themselves. Therefore, cerebral contusion and laceration combined with intracranial hematoma, especially intracerebral hematoma and contradictory subdural hematoma are more common. Although the violence directly on the head is small, but the injury is not trivial. As the compensatory ability of old people is very poor, that's the reason why the eldly patient recovers very slowly, and the sequelae of long-term coma, dementia and various neurological disorders are also more common. In addition, there are often a variety of senile diseases before injury, so complications are more likely to occur after injury. Once complications occur, they affect the recovery of the brain in turns and form a vicious circle, which is also the reason for poor prognosis and high mortality rate of brain contusion in the elderly. 40 elderly patients with cerebral contusion were admitted and treated in our hospital from July 2014 to February 2017. Factors that may affect the surgical indications and clinical prognosis were analyzed and followed up for 5 months to 3 years.

1. Materials and methods

1.1 Patient selecting

Retrospective analysis was performed to select clinical neurosurgical patients in our hospital from July 2014 to February 2017. Specific inclusion criteria included 1) the age is more than 65 years old; 2) brain contusion as the main clinical diagnosis after trauma; 3) the volume of cerebral contusion hemorrhage is greater than or equal to 1ml; 4) during the stay in hospital to complete at least 4 dynamic observation of changes in brain contusion head CT examination (which must have the head CT examination at the time of admission), with more complete clinical symptomatic data. According to the above inclusion criteria, 51 patients who met the criteria were preliminarily selected. In the subsequent analysis and follow-up, 11 patients have lost follow-up (8 cases) or follow-up data less than 6 months (3 cases), which were excluded. A total of 40 patients met the study criteria.

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1.2 Clinical data collection

Among the patients in this group, there were 27 males and 13 females, aged 65~88 years old with an average of 74.8 years. There were 25 cases of falling injury, 12 cases of traffic accident injury and 3 cases of blow injury. All patients were hospitalized within 24 hours after the injury. At the time of admission, GCS score was around 13~15, for 9 ~12 points in 23 cases, 6~8 points in 8 cases, and 5 points in 9 cases. There were 9 cases of important patients with injury, including 4 cases of limb fracture, 1 case of trunk fracture, 2 cases of lung injury, and 2 cases of abdominal injury. There were 12 cases of chronic senile diseases before injury, including 4 cases of hypertension, 2 cases of coronary heart disease, 3 cases of diabetes, 2 cases of chronic bronchitis emphysema, and 1 case of chronic renal insufficiency. Patients with the following conditions are defined as worsening neurological symptoms, that is, decreased GCS by at least 2 points or abnormal pupil appeared.

1.3 Imaging data collection

The study conforms to the standards for each patient, collected, including head CT on admission, at least four head CT imaging data, mainly investigate indicators are as follows. Number of cerebral contusion (single or multiple), brain contusion, intracranial hematoma volume, midline shift, compression of basal cistern is. The hematoma volume was estimated using the following formula [3]: volume = length * width * thickness /2 (cm3). The deviation degree of the center line is 5mm as the dividing line.

1.4 Evaluation of clinical results

GOSE method was used to evaluate the clinical results of discharge and follow-up points of each patient, among which the evaluation methods of follow-up points mainly included back to the hospital follow-up records and telephone follow-up. The above clinical results were divided into two categories, that is, good outcome (GOSE score 5-8) or poor outcome (GOSE score 1-4).

1.5 Statistical methods

Factor analysis related to surgical indication (whether or not to operate) and clinical prognosis (GOSE after discharge and follow-up) was mainly investigated. Binary logistic regression model was mainly adopted, and statistical difference was considered to exist when the P value of the variable was < 0.05.

2. Results

2.1 Basic information of the patients

Statistics showed that most of the 40 elderly patients with brain contusion were in mild and moderate consciousness disorder (57% and 33%) when admitted to hospital, and only 4 patients (10%) had severe consciousness disorder when admitted. All 4 patients had multiple brain contusions. In addition, in terms of treatment regimen, only 10 of the 40 patients chose surgical treatment, including 9 patients with mild to moderate consciousness disorder at admission, and the rest of the patients were conservative non-surgical treatment. In terms of clinical outcomes, the vast majority of patients (73.6%) achieved good outcomes at discharge. Statistics showed that although these elderly patients with brain contusion had intracranial hemorrhage and hematoma of different degrees at the time of admission, the overall proportion of the patients who had middle line deviation or basal cistern compression at the time of admission was still a small number (13% and 21% respectively).

2.2 Analysis of factors influencing surgical indication

Among the 40 elderly patients with cerebral contusion included, 12 received surgical treatment during hospitalization, while the remaining 28 received conservative non-surgical treatment during hospitalization. Among the many correlative factors that may affect surgical indication, the volume of intracranial hematoma at admission, the deviation of CT midline and the compression of CT

basal cistern at admission can all indicate the existence of surgical indication. However, the patient's GCS score on admission did not significantly affect the judgment of surgical indications. Whether the brain contusion is multiple does not affect the judgment of surgical indication. The analysis results of the factors related to the changes of patients' conditions during hospitalization showed that the aggravation of neurological symptoms during hospitalization, the deviation of the midline shown by CT or the aggravation of basilar cistern pressure could significantly affect the grasp of surgical indications.

2.3 Analysis of factors influencing clinical prognosis

All patients were evaluated by GOSE twice at discharge and follow-up, and the evaluation results can reflect clinical prognosis to a certain extent. Among the many related factors that may affect the clinical prognosis of admission status, similar to the factors that may affect the surgical indication, the volume of intracranial hematoma at admission, the deviation of the CT midline at admission and the compression of the CT basal cistern at admission can all affect the clinical and prognosis. However, patients with low GCS score (3-8 points) on admission can significantly indicate poor clinical prognosis. Whether the brain contusion is multiple does not affect the outcome of clinical prognosis. Based on the analysis of the factors influencing the surgical indication and clinical prognosis of elderly patients with cerebral contusion, it was found that the volume of intracranial hematoma, CT midline deviation or basal cistern compression at admission, and CT midline deviation or basal cistern compression during hospitalizrn combined with clinical symptomatic aggravation could better indicate the existence of surgical indication. Low GCS score at admission, intracranial hematoma volume, CT midline deviation or basal cistern compression, and increased CT basal cistern compression during hospitalization can better predict poor clinical prognosis.

3. Discussion

Cerebral contusion is a relatively common manifestation of craniocerebral injury. Different from young patients, elderly patients with cerebral contusion are often associated with brain atrophy of different degrees, resulting in no significant increase in intracranial pressure under the same amount of cerebral hemorrhage and relatively mild clinical symptoms. In addition, elderly patients with cerebral contusion are affected by factors of high age and a series of chronic diseases such as hypertension, diabetes and heart disease, etc. In clinical practice, patients and their families are often not active in adopting surgical treatment, so it is necessary to further analyze this group of patients. According to the statistical results of the clinical data of 40 elderly patients with cerebral contusion reviewed, the influencing factors of surgical indications in elderly patients with cerebral contusion were analyzed. The volume of intracranial hematoma (> 25ml), the deviation of the midline shown by CT on admission or the compression of the basal cistern could all affect the grasp of surgical indications. More importantly, the aggravation of neurological symptoms during hospitalization combined with the deviation of midline in CT imaging indexes or the aggravation of basal cistern compression can better indicate the surgical indications. In terms of the factors affecting the clinical prognosis of elderly patients with cerebral contusion, patients with low GCS score (3-8 points) at admission are often suggested to be discharged from hospital and have poor prognosis due to their severe basic conditions at admission, as well as their weak ability to absorb intracranial hematoma, cerebral edema regression, anti-infection and recovery. Unlike the indication of operation, the deterioration of clinical symptoms does not necessarily indicate poor prognosis. The possible reason is that the deterioration of clinical symptoms may only indicate that the patients during a certain period of hospitalization may suffer from increased intracranial pressure or lesion itself caused by hematoma, edema and other factors, and ultimately lead to neurological symptoms change, and most of these patients are given active surgical treatment. Surgery can alleviate the above critical factors to a certain extent, so that patients eventually become stable.

The results showed that during the hospitalization, CT indicated that the aggravation of basal cistern compression could reflect the clinical prognosis of the patients. For elderly patients with

cerebral contusion, CT suggested that the aggravation of midline deviation was not a significant factor indicating poor clinical prognosis. In this paper, it argues that the possible reasons are related to the relationship between midline deviation caused by different degrees of brain atrophy and increased intracranial pressure in elderly patients and the difference between young patients.

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