

Efficacy Observation of Continuous Irrigation and Drainage with Double Cavity Catheter in the Treatment of Brain Abscess: 16 Patients Report

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Abstract

Background: Brain abscesses is of high morbidity and mortality despite medical advances. Today we present a single institution's experience with continuous irrigation and drainage with double cavity catheter in the treatment of brain abscess.

Methods: We retrospectively analyzed 16 cases of brain abscess who underwent continuous irrigation and drainage with double cavity catheter surgical treatment and conjunction with 2 weeks to 4 weeks of intravenous vancomycin and metronidazole in the second hospital affiliated to Nantong university between June 2012 and February 2017. Patients were put in a double cavity tube into the brain abscess cavity. The medical records were analyzed for clinical presentation and outcomes.

Results: Sixteen patients were treated in this group, including 15 were cured and one died of pulmonary infection. Of these patients, 13 were treated and extubated from 6 days to 14 days, 1 patients were 4 days later, 2 patients extubated in 16 days. CT or MRI were reviewed before discharge, 12 cases were fully closed, 4 cases were left with minor residual cavity, and the clinical symptoms of all the patient disappeared. A total of 15 patients were followed up from 3 years to 2 years, and no recurrence of abscess was reported.

Conclusion: Continuous brain abscess cavity irrigation and drainage with double cavity catheter is an effective treatment for brain abscess and gets excellent treatment results. It is easy to operation and reduces the cost and damage to the patient, maybe the optimal choice to treat brain abscess.

Keywords: Brain abscess; Continuous irrigation and drainage; Double cavity catheter

Introduction

Cerebral abscess is caused by the invasion of cerebral parenchyma by the suppurative bacteria, causing the brain tissue to be damaged, forming a lesion containing the abscess and surrounded by fibrous envelope [1,2]. The brain abscess is progressing rapidly, the whole body is poor, the disability rate and the fatality rate are high [3,4]. In our hospital, 16 cases of cerebral abscess were collected from June 2012 to February 2017, and we had a double cavity catheter for drainage. The results are satisfactory and the report is as follows.

MATERIALS AND METHODS

Ethics statement

This research has been approved by the ethics committee of the Second Hospital affiliated to Nantong University. Informed consent has been obtained and this investigation has been conducted according to the principles expressed in the Declaration of Helsinki.

General information: 11 male cases and 5 female cases; the youngest is 19 years, the oldest is 64 years old, and the average age is 37 years old. The course of illness is 15 days to 3 months. There were 7 cases of

craniocerebral injury, 6 cases of otogenic cerebral abscess, 1 case of blood source cerebral abscess, 1 case of post craniocerebral surgery, and 1 case unknown etiology. The Dotian formula calculated the volume of pus 11 cases in 20 ml~40 ml, 2 cases above 50 ml, and 3 cases under 20 ml.

Clinical manifestations: The most common clinical manifestation of increased intracranial pressure are headache, vomiting, papilledema, of headache and dizziness in 12 cases, vomiting in 9 cases, papillary edema in 7 cases, a history of pre-hospital fever in 11 cases, neck stiffness in 9 cases, seizures in 4 cases; there were 9 cases of nervous system localization (7 cases of hemiplegia or hemiplegia, 2 cases of cerebellar signs), 3 cases of consciousness disorder, and 1 case of cerebral hernia.

Imaging examination: All cases were performed CT scanning, and the low-density placeholder, peripheral edema, 9 cases with typical thin-wall, rules, uniform annular enhancement, 10 cases with ventricle compression, 9 cases of midline shift and 3 cm~8 cm in abscess diameter.

Laboratory tests: Blood routine: white blood cell count 10 G/L~15 G/L in 9 cases, >15 G/L in 5 cases, and neutral proportion rising in 11 cases; CSF examination: 12 cases increased white blood cell count (red blood cells: white blood cells >500:1), the turbidity of CSF in 7 cases, 6 cases of purulent CSF, 9 cases with positive results of CSF susceptibility testing. Bacterial culture of pus is 9 positive and 7 negatives, including

5 cases of *Staphylococcus aureus*, 2 cases of *Streptococcus*, 1 case of *E. coli* and 1 case of *Pneumococcus pneumoniae*.

Treatment: CT or MRI should be given after admission. According to head CT positioning, a needle was used to puncture and pump pus, draw out pus, confirmed that the puncture is correct, then double cavity catheter was led into the abscess cavity and flushing the ventricle. Pus specimen was collected from the side tube as far as possible to do bacterial culture and drug sensitive test. In irrigation and drainage, pay attention to every measure to into, then 5 ml~10 ml antibiotics brine was injected after clear liquid drainage (vancomycin preferred based on clinical experience), 2~3 times a day, open drainage each clip pipe after 2 h; According to the results of bacterial culture, adjust the local and systemic antibiotics to the time patients had normal body temperature, symptom remission, drainage of liquid crystal color, cystic cavity disappeared basically by CT reexamination, it can consider pulling out needle. This group will continue to flush the drainage time between 6 days to 14 days, usually about 10 days. The extraction of the tube refers to: (1) the symptoms of systemic poisoning are reduced; body temperature and blood is normal, (2) the drainage liquid is clear, ensuring the same amount of infusion and discharge, (3) no symptom of intracranial pressure increased, and symptom gradually improved, (4) head CT or MRI examination confirmed that the purulent cavity disappeared.

Results

Sixteen patients were treated in this group, including 15 were cured and one died of pulmonary infection. Of these patients, 13 were treated and extubated from 6 days to 14 days, 1 patients were 4 days later, 2 patients extubated in 16 days. After extubated, the hyper cranial pressure symptoms were relieved, the body temperature was normal, the syndrome was significantly improved, and CSF pressure was normal, but the number of cells in the cerebrospinal fluid returned to normal around 2 weeks after the tube was removed. CT or MRI were reviewed before discharge, 12 cases were fully closed, 4 cases were left with minor residual cavity, and the clinical symptoms of all the patient disappeared. A total of 15 patients were followed up from 3 years to 2 years, and no recurrence of abscess was reported.

Discussion

Brain abscesses is severe intracranial infectious disease, mainly in young men, and the main symptoms are headache, epilepsy and intracranial infection, and the common abscess is temporal lobe and cerebellum caused by otitis media [5]. With the wide application of CT and MRI, the diagnosis accuracy of brain abscess was 92%~100% [6,7].

Currently, the treatment of cerebral abscess is: conservative treatment, cerebral abscess puncture drainage and surgical resection. When the brain abscess is highly suspected, a broad-spectrum antibiotic is applied at admission, so that a case in stage of encephalitis can be cured. The general principle of antimicrobial drug use: early, adequate, full course of treatment, combination if necessary, and application more than 7 weeks at least [8], can affect a radical cure, but the disadvantage is that it not knows what kind of bacterial infection, drugs can only use experience medicine, drug sensitivity is bad, side effect is big, cycle is long. According the traditional surgery treatment for brain abscess, the case fatality rate is higher, the damage to the patient's is bigger, especially to case of the functional areas and deep abscess. At the same time of removal of the abscess, it also damages the normal brain tissue, causing irreparable consequences. For children

with congenital heart disease complicated with cerebral abscess or old age, it is difficult to tolerate the general anesthesia and craniotomy. To treat cerebral abscess with puncture aspiration, there are defects such as not thorough abscess removal or recurrence. Due to brain abscesses pus cavity mainly contains viscosity material such as: cell debris, bacteria, and so on, brain abscesses continuous drainage is not easy to drain out these high viscosity material, we adopt double cavity tube flushing. It not only can adjust the washing speed, make the pus cavity retention of antibiotic solution, also can improve the local concentration, adequate drainage of pus, quickly eliminate the vomica. The advantages of this therapy are: (1) easy to manage after operation, and can be flushed and drainage to ensure smooth drainage, (2) continuous drip and drainage can quickly remove the contents of the purulent cavity and shorten the healing time, (3) the treatment is safe and reliable, simple and easy to operate, and widely applicable to the cerebral hemisphere abscess, cerebellar abscess, functional area abscess, deep abscess, and thick-walled abscess. All the patients in this group have been cured except one case, which means that this method is feasible.

It should also be noted that: (1) the surgeon should have rich clinical experience and can locate accurately according to the CT or MRI of the patient's head, (2) it cannot break the inner wall of the abscess. Before the operation, the drainage tube should be marked in depth, and once the inner wall was broken, the pus will spread to the deep part, and the severe person will break into the ventricle, (3) if the wall of the abscess is thicker, the puncture hole of the wall of the abscess should be expanded by trocar and then the double chamber catheter is inserted, (4) after placing the drainage tube successfully, the drainage tube should be fixed immediately, then the pus will be pumped and washed, so as not to loosen the drainage tube during flushing and break the inner wall of the abscess, (5) the infusion speed is 8 to 10 drops per minute, not too fast, the drainage tube must be unobstructed, and the drainage liquid should be equal to or slightly more than the infusion solution, (6) the extubation should be lightweight and rotate slowly to avoid causing bleeding, (7) for the abscess near the ventricle, special attention should be paid to the postoperative care. Do not move the double-lumen tube, so as not to puncture the ventricular wall, causing the infection to spread and cause ventritis.

There are also contraindications in this therapy: (1) traumatic brain abscess with foreign matter remained. The excision treatment of abscess and foreign matter together is a thorough treatment, (2) acute cerebral abscess, characterized by the no formation of the abscess wall, accompanied by severe cerebral edema around the abscess, (3) simple medicine to treat is the first choice to case, such as: the location of the abscess is deep or in the functional area, the diameter is small (<2.5 cm), the wall is thin [9]. Marnelak et al. proposed to introduce the drainage and antibiotics to the abscess diameter >2.5 cm [10]. Mikihiko et al. suggested that the abscess in the diameter of >2 cm, deep abscess or posterior cranial fossa should be repeatedly punctured to reduce the intracranial pressure and prevent cerebral abscess from entering the ventricle [11]. It is difficult to be effective the drainage of the abscess by only puncture and drainage the abscess. One patient in this group had a placeholder effect before surgery, and the craniotomy combined puncture drainage was performed, at last get cure.

In a word, with the improvement of modern living standards, medical and health conditions, the incidence of brain abscesses is significantly lower, but brain abscess is still a potentially fatal infectious disease to neural systems [2], early accurate diagnosis and timely

accurate treatment are very important for the prognosis of brain abscess patients. We adopt double catheter drainage in the treatment of brain abscesses, it proves its' safe, reliable and consolidate curative effect, but because our operation number is less, limited experience, and need more cases to analyze.

Conclusion

Continuous brain abscess cavity irrigation and drainage with double cavity catheter is an effective treatment for brain abscess and gets excellent treatment results. It is easy to operation and reduces the cost and damage to the patient, maybe the optimal choice to treat brain abscess.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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