

## **Observation on clinical effects of minimally invasive puncture and borehole drainage for the treatment of chronic subdural hematoma.**

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### **Abstract**

**Objective:** To observe the clinical effects of minimally invasive puncture and borehole drainage for the treatment of chronic subdural hematoma.

**Methods:** 100 chronic subdural hematoma patients were randomly divided into the control group and the observation group. The observation group was given minimally invasive puncture. The control group was given borehole drainage. Indexes and total effective rate of patients in two groups were observed. Surgical time, bleeding during surgery, residue liquid after surgery, recovery time after surgery and incidence rate of complications after surgery were compared and analyzed. They were given borehole drainage and borehole minimally invasive puncture.

**Results:** Total effective rate in the observation group after treatment was 88.18%. The control group was 69.93%. The observation group obviously better than the control group, there were significant differences between two groups ( $P<0.05$ ); surgical time and recovery time after surgery of patients in the observation obviously shorter than the control group, there were significant differences between two groups ( $P<0.05$ ); bleeding volume and residue liquid volume of patients during surgery in the observation group less than the control group, there were significant differences between two groups ( $P<0.05$ ); incidence rate of adverse reactions in the observation group significantly lower than the control group, there were significant differences between two groups ( $P<0.05$ ).

**Conclusion:** The effects of minimally invasive puncture and borehole drainage for the treatment of patients with chronic subdural hematoma are significant and more safe.

**Keywords:** Subdural hematoma, Minimally invasive puncture, Borehole drainage.

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### **Introduction**

Chronic subdural hematoma (CSDH) is a common disease in neurosurgery. The clinical symptoms have large hematoma and low onset. Patients with CSDH usually caused by craniocerebral trauma in clinic. There are capsular hematoma in arachnoid endocranium in three weeks after injury [1]. Clinical symptoms of CSDH have high intracranial pressure, mental dysfunction, aphasia and hemiplegia etc., which make life quality worse. The development process of CSDH is extremely slow. If patients can be diagnosed and treated promptly, the disability rate and the death rate can be lowered effectively. Main treatment methods in clinic is surgery, also borehole drainage, craniotomy accompanied by cranioplasty and minimally invasive puncture etc. [2]. This paper is aimed at methods above. Clinical effects of minimally invasive puncture in treating CSDH were analyzed retrospectively. Now it reported as follows.

### **General Data and Methods**

#### **General data**

A 100 CSDH patients in our hospital from March, 2014 to June, 2016 were recruited. They were divided into the control group and the observation group according to random number methods a average, each 50 cases. The control group, consisting of 33 males and 17 females. Ages were from 33 to 77 years. Mean age was  $52.4 \pm 5.8$  years. Mean hematoma was  $76.2 \pm 2.5$  ml. The observation group, consisting of 30 males and 20 females. Ages were from 32 to 78 years. Mean age was  $52.5 \pm 5.2$  years. Mean hematoma was  $76.5 \pm 2.4$  ml. There were no statistical differences of general data of patients in two groups after statistical analysis ( $P>0.05$ ).

### Inclusive criteria

Inclusive criteria [3] concerned clinical symptoms had chronic headache, unstable walking, aphasia, emesis and coma etc. The cranial CT showed intracranial low density and equidensite lesion, adjacent brain structure compression etc.

### Methods

Patients in the control group were given borehole drainage. According to the hematoma location showed by CT, borehole drainage was conducted. Patients given routine double borehole for brain after local anesthesia like cross incision hole. NO 8 to 10 urinary catheter were placed into hematoma cavity. Normal saline was used to wash it repeatedly, then brought into drainage bag. Then it given drainage catheter method after surgery. Patients given symptomatic treatment such as routine anti-infection treatment after surgery. Patients in the observation group given detail examination before surgery, minimally invasive borehole drainage and disposable intracranial hematoma smash puncture by YL-1 type puncture needle. Patients given local anesthesia and borehole puncture in the selection of large area of hematoma [4] according to results of Craniocerebral puncture. The specific operations were to cut a 0.4 cm incision in scalp, hemostatic forceps was used to do separation. Electric drill was used to drill through skull and endocranium. Scalp and vessels in endocranium should be avoided during operation [5,6]. Guide wire in hole was used for the placement of drainage catheter into hematoma cavity. Urokinase was injected into cavity through drainage catheter, it dissolved and discharged hematoma. Hematoma was drained slowly through connecting with three-way valve. Normal saline was used to wash hematoma cavity repeatedly until discharged liquid and washing fluid became clear. Guiding patients prostration for maintaining respiratory smooth after surgery and observing changes of conditions and vital signs closely. Patients given CT reexamination of patients had not exudation from drainage catheter from 40 to 72 h after surgery. Hematoma disappeared partly or completely, the drainage catheter can be pulled out. Then wound given suture.

### Observation indexes and effects evaluation

Surgical time, bleeding during surgery, residue liquid volume after surgery, recovery time after surgery and incidence rate of complications after surgery were recorded in detail. Effects of patients in three months after surgery were evaluated. Treatment condition was evaluated according to the effects of CSDH [5]. Complete recovery: clinical symptoms such as headache, vomiting and decreased memory disappeared. Vital signs were stable. Intracranial hematoma disappeared completely. Life ability recovered completely; Obvious effects: clinical symptoms such as headache, vomiting etc disappeared slightly. Bleeding volume decreased slightly. Vital signs of patients tended to be stable. Life ability cannot recovered completely; Invalidity: the clinical symptoms above not improved obviously. Intracranial hematoma not disappeared. Vital signs were not stable even had the trend of aggravation.

Total effective rate of treatment was sum of complete recovery and obvious effects.

### Statistical methods

SPSS 20.0 software was used to do analysis for data and done with t test. Enumeration data were done with  $\chi^2$  test. Statistical significance was assumed at  $P < 0.05$ .

### Results

The total effective rate in the observation group after treatment was 88.18%. The control group was 70.05%. The observation group obviously better than the control group, there were significant differences between two groups ( $P < 0.05$ ). It is shown in the Table 1.

**Table 1.** Comparison of clinical effects of patients in two groups ( $P < 0.05$ ).

Group	Recovery	Validity	Invalidity	Total effective rate
The control group	20 (40.12%)	15 (29.81%)	15 (30.07%)	69.93%
The observation group	28 (56.21%)	16 (31.97%)	6 (11.82%)	88.18%

Surgical time and recovery time after surgery of patients in the observation group shorter than the control group, bleeding volume and residue liquid after surgery of patients in the observation group less than the control group, there were significant differences between two groups ( $P > 0.05$ ) (Table 2).

**Table 2.** Comparison of surgical indexes of patients in two groups ( $P < 0.05$ ).

Group	Surgical time (h)	Bleeding volume in surgery (ml)	Residue liquid after surgery (ml)	Recovery time after surgery (d)
The control group	45 ± 4.32	53.21 ± 10.32	51 ± 10.01	26 ± 3.12
The observation group	17.91 ± 4.21	28 ± 8.12	15 ± 9.87	14 ± 3.21

Total of 100 patients were given 6 to 12 months following-up after surgery. During this period, there were 2 cases with subdural bleeding and one case with intracranial pneumatosis in the observation group. The adverse reaction rate in the observation group after surgery was 6.10%. During this period, there were 2 cases with wound infection, 3 cases with intracranial bleeding and 9 cases with intracranial pneumatosis in the control group. The adverse reaction rate in the control group after surgery was 28.32%. The adverse reaction rate in the observation group lower than the control group, there were significant differences between two groups, it had statistical significance ( $P < 0.05$ ).

## **Discussion**

CSDH is a common disease in senile group. However, the specific onset mechanism is still unclear. Some patients caused by trauma [7,8]. The clinical symptoms have large hematoma and low onset. Patients with CSDH usually caused by craniocerebral trauma in clinic. There are capsular hematoma in arachnoid endocranium in three weeks after injury [9,10]. Clinical symptoms of CSDH have high intracranial pressure, mental dysfunction, aphasia and hemiplegia etc., which make life quality worse. The development process of CSDH is extremely slow. If patients can be diagnosed and treated promptly, the disability rate and the death rate can be lowered effectively. The clinical symptoms of patients with CSDH are not obvious, it is easily to have error diagnosis in clinic. Once intracranial hematoma increases, it oppresses brain, thus producing clinical symptoms such as vertigo, headache, nausea, vomiting, degeneration of memory, intelligence dysfunction etc. Main treatment methods in clinic is surgery, also borehole drainage, craniotomy accompanied by cranioplasty and minimally invasive puncture etc., of which, borehole drainage is the main surgery in clinic. But conditions of patients health often influences results of surgery. The risk of general anesthesia is relatively large. The incision of minimally puncture closed drainage surgery is small, and it has a little injury on patients. For patients in old age and severe conditions, they are more, fit for using minimally invasive borehole drainage. The whole process of surgery is conducted in aseptic condition, thus lowering infection effectively. In addition, minimally invasive needle and canal impermeability of drainage catheter in minimally invasive borehole drainage surgery are good, it can lower the risk of intracranial pneumatosis and bleeding. Results of this study show that, the total effective rate in the observation group higher than the control group. Surgical time and recovery time after surgery of patients in the observation group shorter than the control group. Bleeding volume and residue liquid after surgery of patients in the observation group less than the control group. 100 patients are given 6 to 12 months following-up after surgery. During this period, there are 2 cases with subdural bleeding and one case with intracranial pneumatosis in the observation group. The adverse reaction rate the observation group after surgery is 6.10%. During this period, there are 2 cases with wound infection, 3 cases with intracranial bleeding and 9 cases with intracranial pneumatosis in the control group. The adverse reaction rate in the control group after surgery is 28.32%. The adverse reaction rate in the observation group lower than the control group, there are significant differences between two groups, it has statistical significance ( $P < 0.05$ ). So

we can see the effects of minimally invasive puncture and borehole drainage for the treatment of patients with chronic subdural hematoma are significant and more safe.

## **References**

1. Li M, Ren ZD, Li M. Observation on effects of borehole tube-placement subperiosteal drainage in treating CSDH. *Chinese J Stereotactic Functional Neurosurg* 2016; 29: 181-184.
2. Liu JH, Chen QX, Zhang R. Effects meta-analysis of comparison of minimally invasive puncture and traditional borehole in treating CSDH. *J Int Neurol Neurosurg* 2015; 42: 216-222.
3. Li ZK, Song XK, Zhang W. Curative effect and prognosis of 100 cases with chronic subdural hematoma. *China Foreign Med Treat* 2016; 35: 57-59.
4. Liu F. Clinical observation for minimally invasive drainage drilling in the treatment of chronic subdural hematoma. *China Health Standard Manage* 2016; 7: 56-57.
5. Zhang ZH. Effect observation of chronic subdural hematoma by minimally invasive drilling and drainage. *China Continuing Med Edu* 2015; 7: 142-143.
6. Jian-Kang LI. Comparison study of drilling drainage and drilling of minimally invasive puncture in the treatment of chronic subdural hematoma. *Clin Res Practice* 2017.
7. Zhang B. Comparison analysis of minimally invasive puncture and borehole drainage in treating CSDH. *China Pract Med* 2016; 9: 106-108.
8. Li J. An analysis of curative effect of minimally invasive soft channel puncture and drainage on hypertensive intracerebral hemorrhage in basal ganglia. *J Math Med* 2016.
9. Liu GS. Clinical effect of minimally invasive puncture drainage for chronic sub-dural hematoma. *China Foreign Med Treat* 2016; 12: 88-90.
10. Hu JL, Zhang C, Li JM. Curative effect of minimally invasive puncture and drainage assisted with alteplase on treatment of acute intracerebral hemorrhage. *J Acute Dis* 2017; 6: 28-32.

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