Clinical Efficacy of Ventriculoperitoneal Shunt Combined with Simultaneous Cranioplasty in the Treatment of Traumatic Brain Injury Combined with Hydrocephalus

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Abstract: Objective to explore the clinical value of ventriculoperitoneal shunt combined with simultaneous cranioplasty in the treatment of traumatic brain injury combined with hydrocephalus. Method: Select a total of 100 patients who suffered from traumatic brain with hydrocephalus and admitted to our hospital from January 2018 to February 2020. They were randomly divided into observation group (ventriculoperitoneal shunt combined with simultaneous cranioplasty) and control group (ventriculoperitoneal shunt combined with selective cranioplasty) with 50 patients each. The treatment of the two groups was compared. Results: Compared with the control group (78%), the total effective rate of the observation group (94%) was higher ($P < 0.05$); after treatment, the Fugl-Meyer score (20.75 ± 2.56) and Barthel index score (63.18 ± 6.38) of the observation group were higher than those of the control group ($P < 0.05$); meanwhile, compared with the control group (18%), the complication rate of the observation group (8%) was lower ($P < 0.05$). Conclusion: Ventriculoperitoneal shunt combined with simultaneous cranioplasty can enhance the therapeutic effect, improve the upper limb motor function and daily life ability of patients with brain trauma and hydrocephalus, and reduce the occurrence of complications, which has high effectiveness and safety.

1. Introduction

Craniocerebral injury is a very common traumatic disease. Severe cases will be accompanied by hydrocephalus, which has a high rate of disability and death [1]. At present, cranioplasty and ventriculoperitoneal shunt are the main methods to treat this type of disease. However, the appropriate interval between the two methods is not clear yet [2]. The purpose of this study is to explore the clinical value of ventriculoperitoneal shunt combined with simultaneous cranioplasty in the treatment of brain trauma combined with hydrocephalus.

2. Data and Methods

2.1 General Information

A total of 100 patients who got traumatic brain with hydrocephalus and admitted to our hospital from January 2018 to February 2020 were randomly divided into observation group and control group, with 50 in each group. In the observation group, there were 26 males and 24 females, with an average age of (51.34 ± 8.01) years; in the control group, there were 23 males and 27 females, with an average age of (52.39 ± 7.18) years. There was no difference between the two groups' general information ($P > 0.05$), so it can be compared.

2.2 Methods

The observation group was treated with ventriculoperitoneal shunt combined with simultaneous cranioplasty. Methods: Assist the patient to take the horizontal recumbent position. Perform general anesthesia for the patient after tracheal intubation. After successful anesthesia, the cervical gear will be placed under the neck of the patient to keep the neck straight. Cut the scalp and take the occipital angle for ventricles puncture then drill the skull. After cauterizing the dura, crosscut it. At the end of

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the shunt, the ventriculoperitoneal shunt with a core was inserted into the triangular part of the lateral ventricles, with a depth of about 6cm. After outflow of cerebrospinal fluid, doctors should continue inserting the shunt about 1 to 2cm and fix it properly; Cut the skin, anterior sheath of rectus abdominis and peritoneum in turn under the xiphoid process of abdomen. Put the abdominal end of the shunt into the pelvic part and use the connection pump to connect the body part of the shunt with the end of the ventricles and ensure that the shunt is unobstructed. After hemostasis treatment, the abdominal incision and head incision should be properly sutured.

The control group was treated with ventriculoperitoneal shunt and selective cranioplasty. Methods: Three to six months after the ventriculoperitoneal shunt, when the meningocele of the bone window was eliminated, choose the first stage incision to start surgery to make the bone window fully exposed and separate the flap muscle. If the dura mater injury occurs during operation, it is necessary to repair immediately. Choose the right size of cranioplasty materials, fix the cranioplasty materials, and then suture the scalp layer by layer.

2.3 Observation Target

(1) Compare the therapeutic effect of the two groups; (2) Compare the motor function and daily living ability of upper limbs between the two groups. Among them, Fugl-Meyer score [3] was used to evaluate the motor function. Barthel index [4] was used to evaluate the ability of daily living; (3) Compare the complications of the two groups.

2.4 Efficacy Evaluation Criteria [5]

Conspicuity means clinical symptoms and signs are eliminated and laboratory indicators are basically recovered; Validity means the symptoms and signs are significantly improved. Compared with the pre-treatment, the improvement of laboratory indicators in the range from 10% to 30%; Invalidity means that the improvement of laboratory indexes is less than 10% compared with that before treatment, and there is no significant improvement of relevant symptoms.

2.5 Statistical Analysis

Using SPSS22.0 statistical software, using "($\bar{x} \pm s$)", [n (%)] to indicate, "t", "x^2" to test. $P < 0.05$ means the difference has a statistical significance.

3. Results

3.1 Treatment Effect Comparison: the Observation Group is Higher Than the Control Group (P < 0.05), See Table 1.

Table 1 Comparison of Total Effective Rate of Treatment [n (%)]

Group	Number of Cases	Conspicuity	Validity	Invalidity	Total efficiency
Observation Group	50	21	26	3	94%(47/50)
Control Group	50	15	24	11	78%(39/50)
x^2					14.124
P					<0.05

3.2 Comparison of Fugl-Meyer and Barthel Index Scores of the Two Groups: after Treatment, the Observation Group Was Higher Than the Control Group (P < 0.05), as Shown in Table 2.

Table 2 Comparison of Fugl-Meyer and Barthel Index Scores ($\bar{x} \pm s$)

Inspection Index		Observation Group(n=50)	Control Group(n=50)	t	P
Fugl-Meyer	Before Treatment	13.35±2.25	12.75±2.02	0.841	<0.05
	After Treatment	20.75±2.56	16.22±2.30	11.121	<0.05
Barthel Index	Before Treatment	31.58±5.75	30.15±6.22	0.941	<0.05
	After Treatment	63.18±6.38	54.18±6.18	15.241	<0.05

3.3 Compare Complications: the Observation Group Was Lower Than the Control Group (P < 0.05), See Table 3.

Table 3 Comparison of Complications [n (%)]

Group	Number of Cases	Excessive Shunt	Cerebrospinal Fluid Leakage	Infected	Total Incidence
Observation Group	50	2	1	1	8% (4/50)
Control Group	50	3	4	2	18% (9/50)
x^2					13.910
P					<0.05

4. Conclusion

Ventriculoperitoneal shunt mainly uses drainage tube to direct cerebrospinal fluid from ventricles into abdominal cavity and absorb it in abdominal cavity. It is mainly used to treat different types of hydrocephalus. In various skull defects or injuries caused by craniotomy and brain trauma, cranioplasty is mainly used. The purpose of treatment is to fully understand the circulatory disorders of cerebrospinal fluid and the blood supply in the defect area. The advantages of ventriculoperitoneal shunt combined with cranioplasty in brain trauma combined with hydrocephalus are as follows: (1) The combination of ventriculoperitoneal shunt and simultaneous cranioplasty can produce synergistic effect and reduce the incidence of complications. At the same time, because the completion of cranioplasty and ventriculoperitoneal shunt is mainly under general anesthesia, the combined treatment will reduce the dosage and times of anesthesia, which is conducive to the reduction of the incidence of general complications and anesthesia risk, and promote the rapid recovery of patients' diseases [6].

This paper explores the clinical value of ventriculoperitoneal shunt combined with cranioplasty in patients with brain trauma and hydrocephalus. The results showed that the total effective rate of the observation group (94%) was higher than that of the control group (78%) (P < 0.05), and the scores of Fugl-Meyer and Barthel Index in the observation group were higher than that of the control group (P < 0.05). The results show that ventriculoperitoneal shunt combined with cranioplasty can improve the upper limb motor function and daily life ability of patients and obtain more significant therapeutic effect. At the same time, the incidence of complications in the observation group (8%) was lower than that in the control group (18%) (P < 0.05), indicating that the usage of ventriculoperitoneal shunt combined with simultaneous cranioplasty can reduce the incidence of complications, and has a high safety of treatment. To sum up, ventriculoperitoneal shunt combined with simultaneous cranioplasty can enhance the therapeutic effect, improve the upper limb motor function and daily life ability of patients with brain trauma and hydrocephalus, and at the same time, reduce the occurrence of complications, which shows that the treatment method has high safety and reliability.

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