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Effect of Ventriculoperitoneal Shunt on the Recovery of Brain Function in Children with Hydrocephalus

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Abstract: *Objective:* To analyze the effect of ventriculoperitoneal shunt on the recovery of brain function in children with hydrocephalus. *Methods:* The clinical data of 40 children with hydrocephalus were retrospectively analyzed. Ventriculoperitoneal shunt was performed with 9003 shunt tube and P.S. Shunt tube, B.C.E. shunt tube. Electroencephalogram (EEG), and brain CT/MRI were performed before and after surgery, and postoperative follow-up was carried out to observe the therapeutic effect. *Results:* In this study, there were seven cases of intracranial injury, seven cases of congenital hydrocephalus, 11 cases of ventricular end obstruction, three cases of abdominal end obstruction, nine cases complicated with bacterial infection, and 3 cases of shunt entering the scrotum. The prognosis of all the children was good, and there were no significant changes in eight cases. *Conclusion:* Ventriculoperitoneal shunt is effective in the treatment of children with hydrocephalus.

Keywords: Ventriculoperitoneal shunt; Hydrocephalus; Brain function recovery

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1. Introduction

There are many types of hydrocephalus in children, and this condition is treated with the use of ventriculoperitoneal shunt, which can significantly improve the secondary damage of brain tissues in children [1]. A total of 40 children with hydrocephalus were included in this study to analyze the effect of ventriculoperitoneal shunt on the recovery of brain function in children with hydrocephalus.

2. Materials and methods

2.1. Materials

A total of 40 children with hydrocephalus were included in this study, and their clinical data were retrospectively analyzed. The diagnosis and treatment period was from January to December 2019. There were 29 males and 11 females, age ranging from 51 days to 13 years, with an average age of 4.5 ± 1.2 years; there were 24 cases of communicating hydrocephalus, seven cases of hydrocephalus after intracranial hemorrhage, and nine cases of hydrocephalus after infection. The head circumference of most children began to increase within a few weeks after birth, and after 3-5 months, the issue was detected, whereas some children already had large head circumference at birth. The increase of intracranial pressure leads to the abnormal increase of head circumference. Compared with the child's physical development, it is disproportionate and uncoordinated. It can be seen that those with this condition tend to have repeated

vomiting, brain development disorder, brain degeneration, and quadriplegia, which are often accompanied by development disorders and intellectual changes. They also have thin scalps, clearly visible scalp veins, full anterior fontanelle, increased head circumference, and atrophy of the optic nerve, resulting in blindness. In addition, nystagmus, frequent convulsions, and malformations in other parts of the body can occur. Imaging tests, including magnetic resonance imaging (MRI) and cranial computed tomography (CT), were performed on the children. It was confirmed that the children had different degrees of ventricular expansion. The anterior horn of the lateral ventricle was significant in the children. Eight children developed symptoms within 2 weeks, 20 at 2 to 6 weeks, and 12 at 6 to 7 months.

2.2. Methods

Ventriculoperitoneal shunt was used as the treatment for the patients. General anesthesia was carried out based on individual differences, and the shunt tube was reasonably selected to effectively meet the treatment needs of each child. Puncture was performed from the anterior corner of the lateral ventricle, mainly on the right side, and the skull drilling point was 2 cm away from the right side of the child's hairline; a small crack was made at the hole point, and the puncture needle was inserted vertically. The depth of the tube at the end of the ventricle was 6-8 cm, and the shunt tube was fixed in the clamping tube. Abnormal cerebrospinal fluid pressure was observed during the surgery, which was significantly higher than that of the normal population. The shunt tube was then introduced into the abdomen from the top right, in which a 3-4 cm incision at the 3 cm position was made on the right side of the child's umbilicus. A small opening was made to enter the child's abdominal cavity, the drainage valve was pressed and properly restarted, the incision was sutured, and anti-infectives were administered for about 7 days.

2.3. Effect

The development quotient (DQ) test was used in this study. The borderline range is from 75 to 85, the normal range is above 85, the mild range is from 55 to 75, the moderate range is from 40 to 55, the severe range is from 25 to 40, and the very severe range is below 25.

3. Results

The follow-up time was controlled from half-a-year to two years. On the 14th day after the surgery, a CT reexamination of the head was performed, and hydrocephalus was noted to be alleviated; 23 cases significantly improved, 9 cases improved, but 8 cases did not improve.

4. Discussion

Comparing adults and children, the two groups have the same amount and process of cerebrospinal fluid formation, with an average of 20 ml per hour. In view of the differences in the clinical characteristics of hydrocephalus, for children with hydrocephalus, the causes are more likely to be inflammatory lesions and congenital lesions [2], with malformations seen occasionally. Analyzing the experimental data of this group, the cause of the condition has not been identified in several cases, in which it can be attributed to congenital hydrocephalus. In terms of anatomy, if any part of the cerebrospinal fluid pathway is blocked or narrowed [3-5], it will lead to hydrocephalus. In terms of physiological function, hydrocephalus can occur due to problems in cerebrospinal fluid absorption. The imbalance in cerebrospinal fluid absorption and formation will increase cerebrospinal fluid. In turn, it will increase intracranial pressure, change the morphological structure of the brain tissue, increase the ventricular wall pressure, and lead to progressive ventricular enlargement [6,7]. Upon studying the causes of acquired hydrocephalus in children, it can be concluded that if a child has high-risk causes, it is important to pay attention to whether the child has hydrocephalus. If the condition is detected and treated early, the brain function of the affected child can be effectively restored.

Clinical practice has confirmed that the treatment of children with hydrocephalus with ventriculoperitoneal shunt is safe, reliable, and effective, in which it can significantly improve the cure rate and the quality of life of children [8]. During treatment, the following points should be noted: (1) the pressure should be measured before surgery, and a shunt tube with appropriate pressure should be selected; (2) when driving down the subcutaneous tunnel, ensure that it is a one-time passage and it is not too thin; (3) during surgery, ensure that the shunt tube is unobstructed, avoid sludged blood and brain tissue from entering the shunt tube, as well as prevent the shunt tube from being embedded in the brain parenchyma; (4) the shunt tube at the abdominal end should be kept long enough to meet the needs of growth and development; (5) attention should be paid to strict aseptic procedures to avoid infection [9], as it may lead to various complications, which will have serious impact on the curative effect. It is of great significance to strengthen the observation of the patients after surgery, so as to prevent and actively deal with various complications.

In the growth and development stage of children, the occurrence of hydrocephalus should be found in time. Surgery should be performed as soon as possible to restore their condition. Most children have good prognosis [10]. During brain development, the brain tissues can continue to develop normally after surgery, with the improvement of intraventricular hydrocephalus and pressure reduction. If they are diagnosed and have surgical indications, surgery should be performed as soon as possible to obtain the ideal clinical treatment effect.

This study showed that there were seven cases of intracranial injury, seven cases of congenital hydrocephalus, 11 cases of ventricular end obstruction, three cases of abdominal end obstruction, nine cases complicated with bacterial infection, and three cases of shunt entering the scrotum. The prognosis was good for all the children, and there were no significant changes in eight cases.

In conclusion, the treatment effect of ventriculoperitoneal shunt in children with hydrocephalus is significant, which can significantly promote the recovery of brain function. Most children have good prognosis; thus, it is worthy of clinical promotion.

Disclosure statement

The author declares no conflict of interest.

References

[1] Zhang D, Ma Y, Han Z, et al., 2020, Clinical Efficacy Analysis of Ventriculoperitoneal Shunt with Different Surgical Routes in Children with Hydrocephalus. Journal of Regional Anatomy and Operative Surgery, 29(04): 34-37.

[2] Lin Y, Yang J, Shen W, 2019, Analysis on the Effect of Early Skull Repair Combined with Ventriculoperitoneal Shunt in the Treatment of Postoperative Hydrocephalus after Severe Brain Injury. China Medical Innovation, 16(3): 134-137.

[3] Chen J, Fang Z, Song J, et al., 2021, Clinical Analysis of Ventriculoperitoneal Shunt in the Treatment of 38 Cases of Hydrocephalus in Children. Journal of Putian University, 2021(2013-2): 35-37.

[4] Yi L, Yi C, 2019, Observation on Curative Effect of Laparoscopic Ventriculoperitoneal Shunt on Treating Hydrocephalus. Medical Aesthetics and Beauty, 028(020): 28-29.

[5] Shu L, Zhao W, Wang Y, et al., 2019, Clinical Analysis of Ventriculoperitoneal Shunt in the Treatment of Secondary Normal Pressure Hydrocephalus. Chinese Journal of Neurosurgery, 35(2): 144-148.

[6] Zhang C, Deng Z, Deng G, et al., 2021, Analysis of Curative Effect and Complications of Ventriculoperitoneal Shunt in the Treatment of 136 Cases of Hydrocephalus in Children. Modern Hospital, 2021(2017-7): 1040-1043.

[7] Yan F, Qin H, Liu H, 2020, Observation on the Effect of Simultaneous Ventriculoperitoneal Shunt and Skull Repair in the Treatment of Postoperative Hydrocephalus after Brain Trauma. Henan Journal of Surgery, 26(02): 95-97.

[8] Gan W, Zhou D, Zhan S, et al., 2019, 53 Cases of Ventriculoatrial Shunt in the Treatment of Ventriculoperitoneal Shunt Failed Hydrocephalus Curative Effect Analysis. Chinese Journal of Minimally Invasive Neurosurgery, 24(9): 405-408.

[9] Zhu C, Fang B, 2020, Clinical Effect of Ventriculoperitoneal Shunt on Hydrocephalus in Adults. Clinical Research and Practice, 5(33): 87-89.

[10] Wang K, 2020, Discussion on Clinical Effect of Laparoscopic Assisted Ventriculoperitoneal Shunt in the Treatment of Hydrocephalus. World Journal of Complex Medicine, 6(07): 22-24.