Endoscopic Third Ventriculostomy in the Pediatric Population: Case Series Report

Terceiro ventriculostomia endoscópica na população pediátrica: Relato de série de casos

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Abstract

Objective Hydrocephalus is characterized by multi- or uniloculated ventricular dilatation, and there are differences between the etiology and therapeutic response of each type. Endoscopic third ventriculostomy (ETV) is indicated for the treatment of obstructive hydrocephalus, with a reported efficacy between 50% and 76%. Reduced efficacy of the procedure has been demonstrated in communicating hydrocephalus due to multifactorial pathogenesis, and, in patients with myelomeningocele, its efficacy ranges from 15% to 20% at birth. The present study aims to compare the efficacy of ETV in the treatment of congenital obstructive hydrocephalus (COH) and acquired obstructive hydrocephalus (AOH) in the pediatric population.

Methods A retrospective study of 169 endoscopic surgeries performed by the senior author in two institutions, one public (Hospital João XXIII, Belo Horizonte, Minas Gerais) and another private (Hospital Felício Rocho, Belo Horizonte, Minas Gerais), in the period from 2003 to 2020. From the selection of 169 patients, only 77 cases fit the age profile ≤ 12 years of the present study. Of these, 46 were male, and the age range ranged from 10 days to 12 years. The study included multiple etiologies, which were divided into 2 groups, 34 related to COH, and 43 to AOH.

Results Regarding the cases of COH, 22 were submitted to ETV as the main treatment, with 14 (63.63%) effective and 8 (36.36%) ineffective procedures. As for
Introduction

Hydrocephalus is a disease that can be characterized by multi- or uniloculated ventricular dilatation, and there are significant differences between the etiology and therapeutic response of each type. Endoscopic third ventriculostomy (ETV) is indicated for the treatment of hydrocephalus related to obstructive mechanisms, with a reported efficacy ranging from 50% to 76%. Reduced efficacy has been shown in communicating hydrocephalus due to multifactorial pathogenesis, and, in patients with myelomeningocele, its efficacy is de 15% to 20% at birth. The present study aims to compare the efficacy of ETV in the treatment of congenital obstructive hydrocephalus (COH) and acquired obstructive hydrocephalus (AOH) in the pediatric population.

Methodology

We conducted a retrospective study of 169 endoscopic surgeries performed by the senior author in two institutions, one public (Hospital João XXIII, Belo Horizonte, Minas Gerais, Brazil) and one private (Hospital Felício Rocho, Belo Horizonte, Minas Gerais, Brazil), from 2003 to 2020. Patients aged ≤ 12 years were selected. We excluded cases of communicating hydrocephalus, or those in which, besides the ETV, additional procedures were performed, such as septostomies or tumor biopsies. Thus, only 77 cases were selected for research analysis.

Results

Out of the 77 cases found, 34 were of COH, and 43 were of AOH. Regarding the cases of COH, 22 underwent ETV as the main treatment, with 14 (63.63%) effective and 8 (36.36%) ineffective procedures. As for the cases of AOH, 13 patients were submitted to ETV, and 8 (61.53%) procedures were effective and 5 (38.46%), ineffective. Through the calculation of the p-value of 0.49, we concluded that it cannot be stated that the efficacy of ETV is greater in COH than in AOH.

Discussion

An analysis of 158 children under the age of 2 was performed by The International Infant Hydrocephalus Study, and the authors found that the shunt was more successful than ETV.
To assess the efficacy of the surgery, an evaluation of the need to place a valve a posteriori is required. Therefore, for the evaluation of the patient, we suggest requesting a magnetic resonance imaging (MRI) scan of the brain after three months of longitudinal follow-up. The MRI enables the analysis of the dimensions of the third ventricle, and this is an important test for the definition of the concept of effectiveness. It should be emphasized that the follow-up is individual, using the particularities of the patient’s condition to adjust the frequency of consultations. Furthermore, in case of ineffective surgery, the patient must be submitted to placement of the shunt drainage valve.3,4

To better elucidate the concepts of efficacy or inefficacy according to the proposed therapy, we provide a brief description of two cases managed by the supervisor of the present work. The first case involved a 5-year-old child with symptoms of intracranial hypertension (headache, vomiting, and papilledema). A computed tomography (CT) scan revealed a triventricular hydrocephalus (3rd and 4th ventricles and the lateral ventricles) due to a possible congenital obstruction of the aqueduct. A third ventriculostomy was performed, which was effective, and implantation of a drain valve was not required.

The other case involved a 10-month-old infant with COH and an arachnoid cyst, resulting in a significant increase in cranial perimeter and bulging fontanel. On endoscopy, an arachnoid cyst was observed obstructing the interventricular foramen, and a septostomy and third ventriculostomy were performed. The cyst was opened, with the possibility of accessing the third ventricle, and the third ventriculostomy procedure could be performed. The procedure was efficient, uneventful, and there was no need for re-admission for valve placement. The procedure was efficient, uneventful, and there was no need for re-admission for valve placement.

**Conclusion**

The study aimed to select 77 individuals from the pediatric range ≤ 12 years, evaluating success rate of third ventriculostomy as an innovative procedure for the treatment of hydrocephalus obstructive congenital and acquired obstructive hydrocephalus. With this, the p-value calculation was performed and resulted in 0.49, concluding that it is not possible to state that the effectiveness of TVE is higher in COHs than in AOHs.

**Conflict of Interests**

The authors have no conflict of interests to declare.

**References**

