Predictive factors and outcomes in treating shunt malfunctions: A case study of multiloculated hydrocephalus

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Predictive factors and outcomes in treating shunt malfunctions: A case study of multiloculated hydrocephalus

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ABSTRACT

Background: Endoscopic septostomy is a secure and reliable endoscopic for treating multiloculated hydrocephalus. The ventriculoperitoneal (VP) shunt procedure is known as the gold standard. However, shunt malfunction often occurs. The combination of these has been reported to reduce the incidence of recurrent malfunction and reestablish communication between isolated intraventricular compartments making a special ventricular cavity.

Case Presentation: A one-year-old child who had previously communicated hydrocephalus complained of vomiting, appeared agitated, and had difficulty falling asleep. The patient had a history of congenital diseases. The patient had VP shunt Keen dextra and sinistra fitted to manage the hydrocephalus before, but one side of the VP shunt was found to be malfunctioning. Physical examination revealed a sunset eye phenomenon with a head circumference of 48 cm dry and clean ventricular parietal shunt surgery scars. The findings of the multiloculated cystic lesions on the endoscopic, agenesis of the septum pellucidum, and dysgenesis of the corpus callosum.

Discussion: The patient was scheduled for endoscopic cyst fenestrations surgery, endoscopic third ventriculostomy (ETV), VP shunt Kocher dextra low press, and aff VP shunt Keen dextra that was evaluated with preoperative and postoperative CT scans which showed the sulcus and gyrus prominent had improved, slightly open in fissure Sylvie, reduced size in ventricular (the average decrease was 5 cm^3) that decreased intracranial pressure which improved the patient's quality of life.

Conclusion: Endoscopy septostomy and VP shunt are a great combination to treat multiloculated hydrocephalus and VP shunt malfunction.

Keywords: Endoscopic Septostomy, VP Shunt, Multiloculated Hydrocephalus, Shunt Malfunction

1. Introduction

Endoscopic septostomy is the treatment of choice for obstruction of the foramen Monro caused by an intracranial cyst, neoplasm, infections, congenital diseases, and idiopathic occlusion [1,2]. Reports on the surgical method, victory percentage, and complications of endoscopic third ventriculostomy (ETV), as well as different blister fenestrations, are visited [oertel, kim] [1,3]. There is another surgical procedure that has become the gold standard for treating hydrocephalus is the ventriculoperitoneal shunt [3,4]. However, this surgical method also sometimes suffers from malfunctions associated with occlusion of the proximal at the catheter's end [4]. In this article, we reported a severe case of multiloculated hydrocephalus, arachnoid cyst, and malfunction shunt which is managed with endoscopic septostomy and ventriculoperitoneal (VP) shunt.

2. Case Presentation

A one-year-old child with a communicating hydrocephalus. The patient had complaints of vomiting, appeared agitated, and had difficulty falling asleep. The patient also had a history of congenital heart disease, namely moderate L-R secundum ASD, moderate PMO VSD, mild pulmonary regurgitation, and moderate pulmonary hypertension. In 2020 and 2021, the patient had the VP shunt fitted to manage the hydrocephalus (the first shunt, VP shunt Keen dextra, and second VP shunt Keen sinistra), but one side of the VP shunt Keen was found to be malfunctioning (VP shunt Keen dextra). Physical examination showed a sunset eye phenomenon (+/+), dry and clean VP shunt surgery scars, and a head circumference of 48 cm.

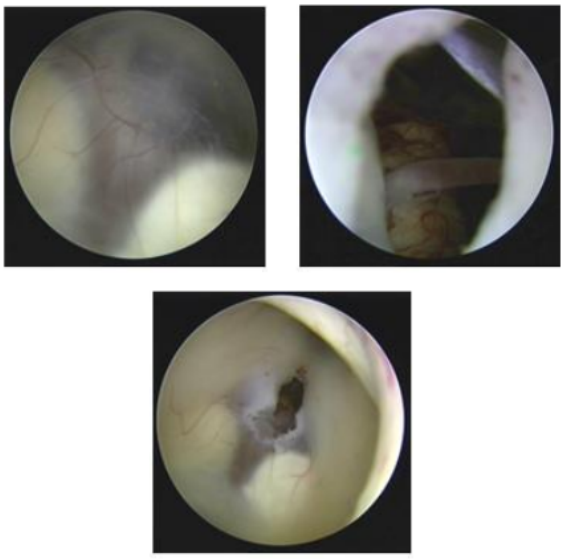

Figure 1. In the III and IV intraventricular regions, there was a multiloculated cyctic lesion that appeared as an arachnoid cyst. Additionally, the septum pellucidum exhibits agenesis and the corpus callosum exhibits dysgenesis.

The results of the endoscopic are multiloculated cystic lesions in the III and IV intraventricular, suspected intraventricular arachnoid cyst causing severe obstructive hydrocephalus at the level of the third ventricle on VP shunt and agenesis of the septum pellucidum, dysgenesis of the corpus callosum (figure 1).

The diagnosis for this patient is multiloculated hydrocephalus and cerebellar arachnoid cysts with shunt malfunction. The patient was programmed for endoscopic cyst fenestrations surgery, ETV, VP shunt Kocher dextra low press, and aff VP shunt Keen dextra.

3. Discussion

We reported this patient with multiloculated hydrocephalus who had previously been fitted with the VP shunt Keen dextra and sinistra, but experienced malfunction in one side of the VP shunt Keen (dextra). We think that this is a severe case that requires special handling. However, we have conducted an initial examination and supporting examination which then we determine the treatment for this patient with aff VP shunt Keen dextra endoscopic cyst fenestrations surgery, ETV, and VP shunt Kocher dextra low press. We chose this based on existing literature guidelines.

Endoscopic septostomy and EVT are efficient for the treatment of hydrocephalus in children often caused by intracranial cysts [3,5]. Kim *et al*. [6] reported patients who showed evidence of isolated lateral ventricles (trapped trigone region and trapped fourth ventricle) received endoscopic septostomy in conjunction with endoscopic fenestration to make sections for entrapment. After endoscopic operation, none of them required extra shunt revision and complications. In addition, Kim *et al*. also reported ETV results after VP shunt malfunction features a victory percentage of 42–84% [3].

Malfunctions of the VP shunt are a complication that is often found in, the improvements in the rate of VP shunt complications over the last decades, with ventricular catheter displacement, infection, and obstruction still being the most frequently described [7]. Song *et al,* said that almost half of the VP shunt obstacles are caused by the ventricular terminal blockage [7]. Several studies have reported that diminishing the frequency of VP shunt complications can be

done in combination to manage hydrocephalus. In a review of numerous considerations, endoscopic septostomy and ventriculoperitoneal shunt were related with a great outcome in 86.2% of cases [8]. According to, Piyachon *et al* [9], endoscopic fenestration and endoscopic-assisted VP shunt addition are valuable in reducing shunt complications. Song *et al*, performed 255 VP shunt operations on 209 patients with combined neuro endoscopy to ensure that the catheter is precisely set at the desired location at the ventricular end, whereas laparoscopy allows minimally invasive application of both techniques improves the success rate of the surgery, decrease surgical injury and complications [7].

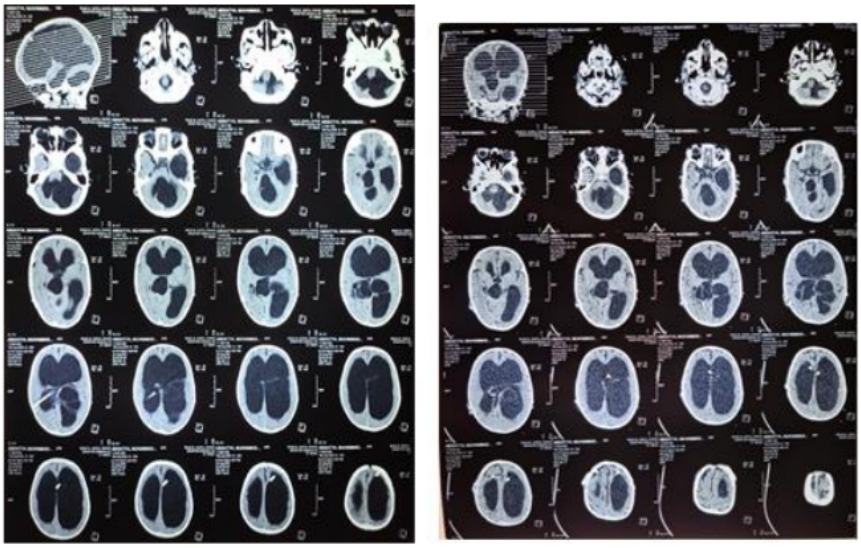

Figure 2. Case 1 of CT scan representation. (A) preoperative CT scan, (B) postoperative CT scan

Hence, we chose to combine the treatment endoscopy, ETV, and VP Kocher dextra low-pressure shunt for this case. The combination of VP with a low-pressure shunt system did not find a significant increase in the ICP as measured during surgery, likely due to the related parenchymal damage and fibrosis *Venkataramana et al* reported [10]. We evaluated comparison pre and post-operation with CT scan. That is exceptionally valuable in the determination of this illness. It indicates the number, size, area, and distribution of loculi separated from hydrocephalus and the degree of parenchymal damage [10].

The results of the CT scan from this case both preoperative and postoperative are different (figure 2) and showed multiloculated cystic lesions of ±7-9 HU density in

intraventricular III, IV accompanied by protrusion through foramen Luschka and Magendi, the largest size ±3.3 x 3 x 4.5 cm (preoperation or old size ±3.2 x 3.5 x 4.5 cm) in intraventricular III and size ±4 x 4.5 x 3.7 (preoperation or old size ±4.5 x 4.1 x 4) in intraventricular IV. The average decrease in ventricular size was 5 cm^3 from 50.4 to 44.55 cm^3 in intraventricular III and from 73.8 to 66.6 cm^3 in intraventricular IV, respectively. Left right lateral ventricle dilated with rounded anterior cornu and open temporal cornu VSI ± 47% (old: 68%) with septa (+) in D/S lateral ventricle. The sulcus and gyrus prominent had improved, slightly open in fissure Sylvie which was followed by good symptoms in the patient.

There is a meta-analysis that clarified great adequacy (change in indications and lessening in size), in terms of safety, the most excellent results were with neuro endoscopy, both in terms of short- and long-term complications and complications generally according to Chen et al in *Torres et al* research [11].

The CT scan results showed a reduction in the degree of hydrocephalus. This data proved endoscopy septostomy can be used to manage multiloculated hydrocephalus for this patient.

Conclusion

A 1-year-old child with a history of communicating hydrocephalus shunt came with complaints of vomiting, seemed restless, and had trouble sleeping. The patient had the VP shunt fitted to manage the hydrocephalus (the first shunt, VP shunt Keen dextra, and second VP shunt Keen sinistra), but one side of the VP shunt Keen was found to be malfunctioning (VP shunt Keen dextra). Physical examination revealed a sunset eye phenomenon (+/+) with a head circumference of 48 cm, and dry and clean VP shunt surgery scars. The results of the endoscopic are multiloculated cystic, agenesis of the septum pellucidum and dysgenesis of the corpus callosum.

The diagnosis for this patient is multiloculated hydrocephalus and cerebellar arachnoid cysts with shunt malfunction. The patient was programmed for endoscopic cyst fenestrations surgery, ETV, VP shunt Kocher dextra low press, and aff VP shunt Keen dextra.

This case is interesting because the combination of endoscopy and ventricular parietal shunt can be proved to manage severe obstruction caused by multiloculated hydrocephalus and malfunctioning shunt.