

Cerebral Endoscopy in Hydrocephalus Secondary to Neurocysticercosis

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ABSTRACT

Neurocysticercosis (NCC) is a common parasite affecting the central nervous system, causing over 50,000 fatalities annually in Latin America. Treatment varies depending on the location and prognosis is not good. Treatment often involves anti-parasitic medications and shunt implantation. Meningitis, stroke, and hydrocephalus are common complications. Endoscopy is the primary treatment for ventricular forms, but alternative methods like shunt implantation and microsurgery are considered. Anti-cysticercus medications and shunt implantation are recommended for patients with subarachnoid forms and hydrocephalus.

Endoscopy is a potential treatment for extra-parenchymal NCC due to its potential to reduce inflammation and improve cerebrospinal fluid (CSF) circulation. However, early extraction may reduce the risk of chronic inflammation. Patients without extracorporeal membranes (ETV) have a higher shunt failure rate, potentially due to tolerance to changes in CSF flow. The Karnofsky index, an estimate used to evaluate functional status, suggests that endoscopy as an initial therapy is a viable option. Patients with a history of shunting or chronic illness may benefit from a comprehensive examination of the ventricular system and basal subarachnoid space. Steroid administration is recommended after treatment to prevent parasitic antigen release and immune response.

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INTRODUCTION

Neurocysticercosis, also known as NCC, is the parasite that infects the central nervous system (CNS) the most frequently all over the world due to its prevalence. According to the World Health Organization (WHO), this illness is responsible for more than 50,000 fatalities annually in Latin America alone. There are two primary types: the first is intra-parenchymal, and it is treated with medications that are anti-parasitic. Both the subarachnoid space and the ventricles are involved in the other part of the body, which is extra-parenchymal. The clinical signs and treatment strategy vary depending on the location of the disease; in general, the prognosis is not good. The parasite may or may not be eradicated via the use of anti-cysticercus medications; nevertheless, in most cases, a prolonged and repeated course of treatment is required. Quite frequently, the parasite is responsible for the development of meningitis, which is linked to stroke and hydrocephalus. A low bioavailability of medications in the cerebrospinal fluid (CSF) may not block the proliferation of parasites and may be favorable to the release of antigens, which increases the immune response and frequently results in chronic inflammation. One of the factors

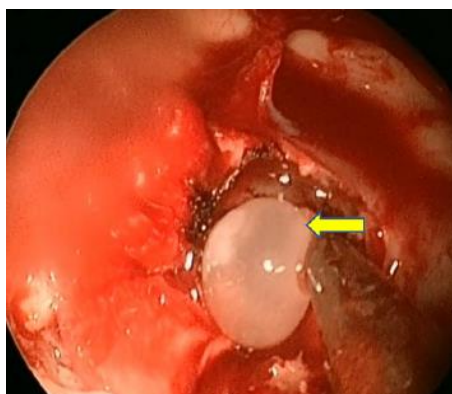
that leads to a persistent inflammatory process is the inadequate clearance of parasite remnants from the subarachnoid region.

In most cases, hydrocephalus caused by NCC has been controlled with the installation of a shunt; nonetheless, failure is a relatively common consequence. Decompressive surgery performed urgently can be helpful in some cases, despite the significant mortality rate associated with the procedure. There have been studies that indicate a positive response following medical therapy for big arachnoid cysts. Additionally, there have been reports that show success following parasite extraction for ventricular forms, particularly using cerebral endoscopy. In the year 2002, there was a general agreement that endoscopy should be the primary method of treatment for ventricular forms. In the event that endoscopy is not accessible, options such as shunt implantation and microsurgery should be considered as alternatives. Anti-cysticercus medications and the implantation of a shunt are recommended for patients with subarachnoid forms who also have hydrocephalus. In the present moment, the evidence that is available is of class IIC and III, which means that further research is necessary.

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Medication	Class	Mechanism of Action	Common Dosage	Side Effects	Comments
Albendazole	Anthelmintic	Inhibits microtubule synthesis in parasitic worms	15 mg/kg/day in two divided doses	Abdominal pain, headache, elevated liver enzymes	Often preferred due to better penetration of cysts in the brain.
Praziquantel	Anthelmintic	Increases cell membrane permeability in worms	50-100 mg/kg/day in three divided doses	Headache, dizziness, abdominal pain	Effective but less commonly used due to side effects and drug interactions.
Corticosteroids	Anti-inflammatory	Reduces inflammation and immune response	Dexamethasone: 6-16 mg/day	Weight gain, hypertension, mood changes	Used to manage inflammation and reduce symptoms caused by dying cysts.
Antiepileptics	Anticonvulsant	Prevents seizures by stabilizing neuronal membranes	Varies by drug (e.g., phenytoin, carbamazepine)	Drowsiness, dizziness, nausea	Used to control seizures associated with neurocysticercosis.
Mannitol	Osmotic diuretic	Reduces intracranial pressure	0.25-2 g/kg over 30-60 minutes	Electrolyte imbalance, dehydration	Used in cases of increased intracranial pressure.

The use of endoscopy in NCC



The treatment of extra-parenchymal types of non-cancerous carcinoma (NCC) continues to be a problem. Anti-cysticercus medications have shown mixed effectiveness, and in most cases, several treatment courses are required. The relationship between anti-parasitic medications and the activation of inflammatory processes has been documented. This association has the potential to raise the likelihood of chronic meningitis and ependymitis. It is possible to accomplish this objective via endoscopy, which causes only a limited amount of damage to the cerebral parenchyma. According to our hypothesis, an early extraction might potentially lessen the antigenic stimulation, which in turn would decrease the likelihood of developing chronic inflammation. On the other hand, people who have installed chronic forms may exhibit a change in the dynamic of the cerebrospinal fluid (CSF). In these cases, an endoscopy may be able to remove old antigens from the CSF, which may subsequently lead to an improvement in the circulation of the CSF by treatments such as extracorporeal membranes (ETV).

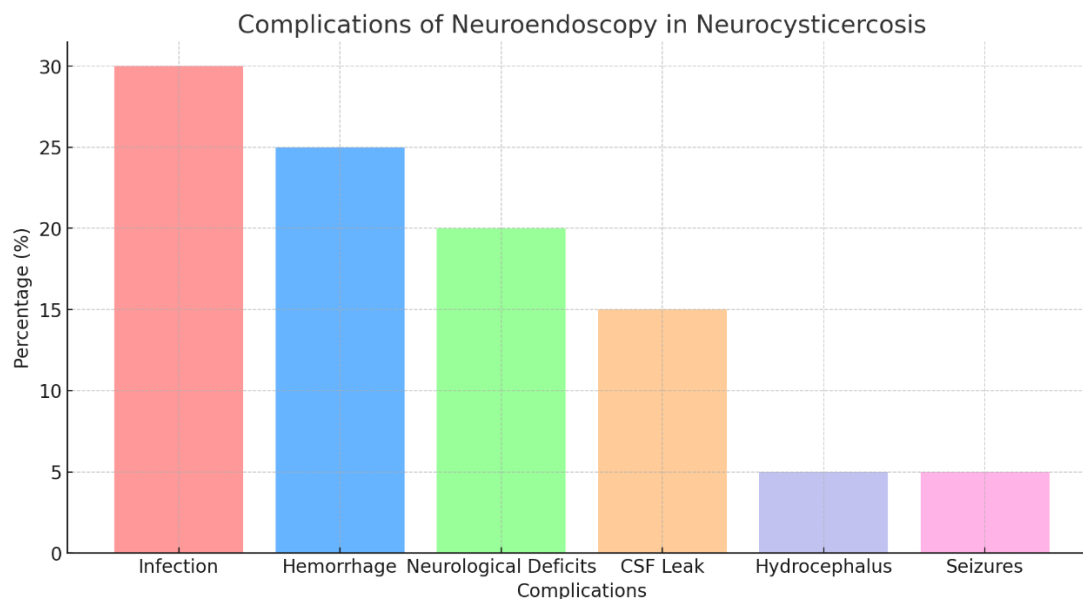
It was shown that patients who did not have ETV had a higher percentage of shunt failure history. It is plausible that people with this condition develop some form of tolerance to changes in CSF flow, which would in turn extend the amount of time it takes for the shunt to become dysfunctional. There is a possibility that the cerebral endoscopy might be the initial choice in the therapy of hydrocephalus caused by NCC in order to achieve a more rapid recovery, particularly in situations when the execution of an ETV treatment is feasible. The identification of a parasite was not achievable in many instances, despite the fact that the probability of the diagnosis being in accordance with the criteria was high. The migration of parasites might be a plausible reason; with the use of endoscopic viewing, anomalies connected to inflammation were able to be identified. The most important factor that contributed to the failure of an ETV was a premammillary membrane that was too tight, which is something that could be taken into consideration due to chronic illness. The inflammatory alterations that we noticed were more pronounced in these individuals. We were able to identify a

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few of the features of the inflammatory abnormalities; nevertheless, as of this moment, there is neither a definition that is commonly recognized nor an agreement over how they should be described.

The Karnofsky index is an estimate that may be used to evaluate the functional state of a patient following therapy. This is a very essential factor in determining the outcome of the treatment. There is a possibility that functional status can be improved, regardless of whether or not ETV has the potential to adjust the shunt failure time or decreasing the chance of failure. Despite the fact that we did not attain statistical significance, we were able to demonstrate that there

was a shift in the proportion of patients who had a reasonable index. It has been observed that there is a higher rate of shunt failure within the first few months following the insertion of the shunt. In comparison to many of the current series, our follow-up period is equivalent or even more comprehensive and longer, and we demonstrated a decreased rate of shunt failure through our findings. Based on this low rate of dysfunction over a large amount of follow-up time and with a significant number of patients in excellent clinical status evaluated after a year, several studies say that endoscopy as initial therapy is a viable effort. This conclusion is based on the Karnofsky index.



CONCLUSION

Patients who have a history of shunting or who have symptoms of chronic illness may benefit from a comprehensive examination of the ventricular system as well as the basal subarachnoid space. Once an integrated evaluation of damage in the brain tissue that was visible by endoscopy has been completed, the possibility of withdrawing the shunt can be discussed. Patients who have experienced their first symptomatic episode of hydrocephalus as a result of NCC may be able to avoid the implantation of a shunt if an acceptable third ventriculostomy is done on them. The administration of steroids following the treatment is recommended due to the fact that the manipulation of the parasites might result in the release of parasitic antigens, which in turn may increase the immune response. Anti-parasitic medications ought to be administered to patients with parenchymal forms, as shown by the evidence. In order to evaluate the validity of its application, this method requires additional assessment by other organizations.

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