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Optimizing Neurocysticercosis Care: Pharmacotherapy, Surgery, and Monitoring

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ABSTRACT

Neurocysticercosis, caused by Taenia solium larval invasion of the central nervous system, demands a nuanced approach. Treatment involves corticosteroids (dexamethasone, prednisolone, prednisone) and antiparasitic agents (albendazole, praziquantel), tailored to lesion characteristics. Surgical interventions may be necessary. Pregnancy requires anthelmintic therapy deferment. Vigilant monitoring, weaning off antiepileptics, and managing corticosteroid side effects are crucial. This concise overview navigates the intricate landscape of neurocysticercosis management for optimal patient outcomes.

KEYWORDS: Neurocysticercosis, Taenia solium, anthelmintic therapy, corticosteroids, surgical interventions, pregnancy considerations, monitoring, antiepileptic management.

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INTRODUCTION

Cysticercosis is an infection caused by the larval stage of Taenia solium, commonly known as the pork tapeworm. The most severe manifestations occur when cysticerci invade the central nervous system, leading to a condition known as neurocysticercosis. The symptoms and severity of the disease depend on various factors, including the number, location, size, and stage of the cysts, as well as the host's inflammatory response. The incubation period can range from months to years [1].

Symptomatic disease often arises from intracerebral lesions, causing seizures or mass effect, intraventricular cysts leading to hydrocephalus, subarachnoid lesions causing chronic arachnoiditis, and spinal cord lesions resulting in cord compression. The prevalence of cysticercosis is higher in areas with poor sanitation where free-roaming pigs and humans coexist, such as in Latin America, Asia, India, and sub-Saharan Africa [2].

The transmission to humans occurs through the ingestion of poorly cooked, contaminated pork, leading to adult intestinal tapeworm infestation (taeniasis). Ingestion of Taenia solium eggs, excreted in the feces of infected individuals, can result in cysticercosis [1,2].

Diagnosis involves neuroimaging (MRI and CT) and serologic testing. Treatment is individualized, primarily focusing on symptom control, such as treating seizures and hydrocephalus. The pharmacotherapeutic regimen typically involves albendazole for a limited number of intraparenchymal viable cysts and a combination of albendazole and praziquantel for cases with more than two viable cysts. Concomitant use of corticosteroids is recommended during anthelmintic treatment [3].

It's crucial to note that eating undercooked pork does not cause cysticercosis; instead, ingestion of infected pork leads to taeniasis, and later, fecal-oral autoinoculation of eggs may result in both human cysticercosis and taeniasis in the same patient. Treatment with cysticidal drugs should be approached with caution, considering the full characterization of the infection and avoiding empiric treatment without definitive neuroimaging. Additionally, initiating corticosteroids before cysticidal pharmacotherapy is advisable to manage potential inflammatory responses [4].

TREATMENT

Efficiently managing neurocysticercosis entails alleviating symptoms, treating the parasitic infection, and mitigating inflammation. The primary objectives are to enhance patient well-being and minimize potential complications associated with the condition [5].

Disposition:

Admission criteria, especially for intensive care unit (ICU) admission, hinge on factors such as increased intracranial pressure, status epilepticus, paralysis, giant cysts, and encephalitis. Collaborative efforts with specialists—neurologists, neurosurgeons, and infectious diseases or tropical medicine experts—are recommended for

comprehensive management. A crucial step is a formal ophthalmologic examination at the time of diagnosis to rule out intraocular cysticercosis. Notification of local public health authorities about cysticercosis and taeniasis diagnoses is pivotal, as these conditions may be reportable in specific regions [6].

Treatment Options:

Referring to established guidelines from the Infectious Diseases Society of America and American Society of Tropical Medicine and Hygiene is imperative for devising an effective treatment plan. Individualized approaches should consider factors such as the number of cysts, their locations in the central nervous system, the stage of cyst degeneration, and the host's immune response. Initial steps involve addressing presenting symptoms, including pain and seizures, through standard analgesics and antiepileptic drugs. Control of intracranial hypertension may necessitate steroids, acetazolamide, mannitol, and surgical interventions in consultation with a neurosurgeon [7].

Anti-inflammatory Treatment:

Corticosteroid treatment is pivotal in patients undergoing antiparasitic (cysticidal) therapy. Inflammation often accompanies cyst degeneration and may be exacerbated by anthelmintic pharmacotherapy. Initiating corticosteroids before cysticidal treatment helps manage potential inflammatory reactions, and their duration is individualized based on the site of the lesion and degree of inflammation. Tapering corticosteroid doses is recommended to prevent rebound inflammation [8].

Cysticidal Treatment:

Anthelmintic treatment is recommended for specific cases, such as subarachnoid extraparenchymal cysts and most viable parenchymal cysts. Albendazole is the drug of choice, with praziquantel as a second-line option or used in combination with albendazole. Contraindications include untreated increased intracranial pressure, hydrocephalus, diffuse disease, ocular cysticercosis, and the presence of only nonviable, calcified lesions. The treatment strategy may vary based on the location of the disease, with parenchymal disease often treated with corticosteroids and anthelmintics, subarachnoid disease managed through hydrocephalus management and prolonged corticosteroids and anthelmintics, and intraventricular disease preferably treated by cyst removal [9].

Drug Therapy [8, 9]:

Corticosteroids:

Dexamethasone:

For Children and Adolescents: Administer 0.1 to 0.2 mg/kg/dose PO daily in oral solution.

For Adults: Prescribe 6 to 8 mg PO divided into 3 daily doses using oral tablets.

Prednisolone:

In Children and Adolescents: Recommend 1 to 2 mg/kg/dose PO daily through oral solution.

In Adults: Suggest 1 to 2 mg/kg/dose PO daily with oral tablets.

Prednisone:

Children and Adolescents: Prescribe 1 to 2 mg/kg/dose PO daily using oral solution.

Adults: Administer 1 to 2 mg/kg/dose PO daily through oral tablets.

Antiparasitics:

Albendazole:

Cysticercosis:

In Children and Adolescents: Administer 15 mg/kg/day PO in 2 divided doses.

For Adults: Prescribe 15 mg/kg/day PO in 2 divided doses using oral tablets.

Neurocysticercosis:

1 or 2 parenchymal cysts: Albendazole with corticosteroids.

More than 2 parenchymal cysts: Albendazole with praziquantel and corticosteroids.

Single enhancing lesion: Albendazole with corticosteroids.

Subarachnoid extraparenchymal cysts: Albendazole with praziquantel and corticosteroids.

Praziquantel:

Cysticercosis:

In Children and Adolescents: Administer 50 mg/kg/day PO in 3 divided doses.

For Adults: Prescribe 50 mg/kg/day PO in 3 divided doses using oral tablets.

Neurocysticercosis:

More than 2 parenchymal cysts: Praziquantel with albendazole and corticosteroids.

Subarachnoid extraparenchymal cysts: Praziquantel with albendazole and corticosteroids.

Taeniasis without cysticercosis: A single dose of praziquantel.

Surgical Procedures:

Neurosurgical interventions, including fenestration of the anterior wall of the third ventricle, ventriculoperitoneal shunt placement, and excision of large lesions, may be necessary for managing hydrocephalus. The preferred approach for the removal of intraventricular cysts is endoscopic [10].

Special Populations:

Pregnant Patients:

Check for pregnancy and postpone anthelmintic therapy until after pregnancy. Albendazole is contraindicated during pregnancy [11].

Monitoring:

Regular clinical monitoring during antiparasitic therapy is essential due to the common occurrence of increased neurologic symptoms. Specific monitoring parameters are location-dependent [8,9].

Patients on prolonged albendazole treatment should be monitored for hepatotoxicity and leukopenia. Those on anticonvulsants may undergo weaning off after a seizure-free period. Chronic corticosteroid users should be monitored for known adverse effects, with blood glucose levels checked when used for over 2 weeks.

Routine prophylaxis for pneumocystis infection, gastritis, and osteoporosis may be considered based on the duration and dose of corticosteroids.

CONCLUSION

In conclusion, the management of neurocysticercosis involves a multifaceted approach encompassing drug therapy, surgical interventions, and specialized considerations for specific patient populations. The use of corticosteroids, such as dexamethasone, prednisolone, and prednisone, alongside antiparasitic medications like albendazole and praziquantel, is crucial in treating various manifestations of the disease. Surgical procedures, particularly neurosurgical interventions, play a significant role in addressing hydrocephalus and removing large lesions.

For special populations, such as pregnant patients, careful considerations and monitoring are paramount. Regular clinical monitoring during antiparasitic therapy is essential, with specific parameters based on the location of the disease. Additionally, the weaning off of antiepileptic medications and monitoring for adverse effects in chronic corticosteroid users are integral aspects of comprehensive patient care. This holistic This approach aims to ensure effective treatment, minimize complications, and optimize outcomes for individuals affected by neurocysticercosis.

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