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Case Report

PERUSAL OF A REPORT ON NEUROCYSTICERCOSIS (NCC) CASE

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ABSTRACT

Neurocysticercosis (NCC) is one of the common parasitic CNS infection. Undercooked pork, eggs of the tapeworm Taenia solium, entering the body through faeco-oral route is the common source of its infection. Affected person may remain asymptomatic for long time and can present with a variety of neurological manifestations, including focal neurological deficits and generalized seizures Neuroimaging along with serology test and clinical manifestation can aid in its diagnosis. Treatment of Neurocysticercosis may varies from case to case and must always be individualised based on his/her condition for better patient care. Common therapeutic strategies include surgery and treatment with drugs such as antiparasitic agents (Albendazole) and corticosteroids (Hydrocortisone) or apart from other agents which are based on patient presentation. Proper prevention strategy has to be followed to control the spread of infection within and among the individuals. The authors present a case of Neurocysticercosis with respect to its clinical presentation, diagnosis and management in a tertiary care hospital of Hyderabad. The authors reviews the literature and discusses treatment options available for the management

INTRODUCTION

Neurocysticercosis is defined as the most common outcome of helminthic infection of nervous system and leading cause of acquired epilepsy world wide. it is a preventable parasitic infection caused by pork tapeworm taenia solium.Humans are infected after consuming undercooked food; particular pork or water contaminated with tapeworm eggs; or through poor hygiene practices.Taeniasis is the intestinal infection of adult tapeworm in humans and is an initial phase of infection. If left untreated, the parasite can survive inside the body for many years, leading to more hazardous conditions such as cysticercosis which develops when the larvae of T.solium invade in body and develop in the muscles, skin and eyes. If larvae invades the CNS, the infection leads to neurocysticercosis.(1)

Neurocysticercosis is considered as the most frequently preventable cause of epilepsy in the developing world and a growing public health concern. Neurocysticercosis is presented with symptoms of such as headache, blindness, seizures, meningitis and dementia.(2)

Life Cycle of Neurocysticercosis (NCC)

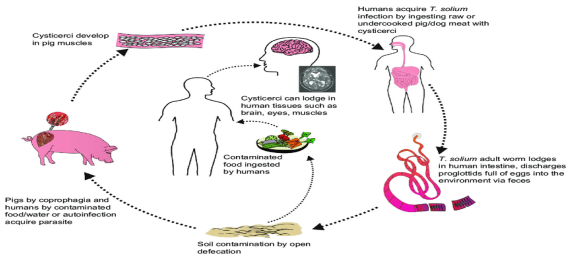

Figure 1 Life Cycle of NCC

The life cycle of Taenia solium (adult tapeworm) involves two hosts: humans and pigs. Humans are the definitive hosts and acquire intestinal infection (Taeniasis) from pigs, the intermediate hosts, by ingestion of undercooked pork infected with live cysticerci (encysted larvae)[5]. Humans acquire cysticercosis via consumption of food or water contaminated with T. solium eggs or by autoinfection. Neurocysticercosis (NCC) results when the larval stages lodge in the brain[3,4].

Epidemiology

Neurocysticercosis is one of the leading health problems in India, Latin America and Southeast Asia countries. As a result

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of increased travel and migration of people from endemic area, Neurocysticercosis has become an important emerging infection in the industrialized world. In most of developing countries, 10% of acute neurological cases are patients with neurocysticercosis. Epilepsy and raised intracranial hypertension are most common clinical forms of Neurocysticercosis. It accounts for 50% patients presenting with partial seizures in some part of India.(6)

Diagnosis

Clinical manifestation of neurocysticercosis is wide in range but the two most common signs and symptoms are seizures and increased intracranial pressure. Diagnosis of Neurocysticercosis includes initial evaluation followed by laboratory interpretation. Initial evaluation include careful history and physical examination in laborer consideration. Studies recommend serologic testing with enzyme linked immunotransfer blot as a confirmatory test in patients with suspected Neurocysticercosis. Neuroimaging studies such as MRI and contrast CT scan are recommended for classifying patient with newly Diagnosis Neurocysticercosis.

Challenges in Management

Management of NCC has been debated around several issues: 1) Effectiveness of the anti-parasitic drugs in killing the cysts and in improving the clinical outcome (defined as fewer seizures, in patients with intraparenchymal NCC), 2) Choice of the optimal cysticidal drug, 3) Use of steroids, and 4) Optimal duration of AED therapy. Understandably, the benefits of antiparasitic regimens are more evident in patients with multiple viable cysts and less evident in patients with degenerating lesions.

Treatment

Patients presenting with untreated diffuse cerebral edema or hydrocephalus studies recommend the management of elevated intracranial pressure alone and not antiparasitic treatment with anti-inflammatory therapy with aid of corticosteroids for me whereas hydrocephalus usually requires a surgical approach. In the absence of intracranial pressure it is recommended to use antiparasitic drug in all patients. For patients presenting with 1-2 viable Parenchymal cysticerci, a monotherapy of Albendazole for 10-14 days is recommended at a regimen of 15mg/kg in two divided doses along with food, where maximum dose of 1200mg/day. Albendazole at 15mg/kg/day for 10-14days is recommended for patients with viable parenchymal cysticerci >2 viable.(7)

REVIEW OF LITERATURE

Case Analysis

A 23 year old male patient with no history of psychiatric illness was brought to tertiary care hospital with the chief complaints of headache and vomiting past 10 days. At the time of presentation the patient was conscious, co-operative with normal speech and other abnormality was found. On taking personal history; it was revealed that the patient was non-alcoholic, non smoker and gutka chewer. Patient has no other relevant co-morbidity. Upon physical examination it was revealed that the patient was conscious, with right sides facial palsy and blood pressure 110/80 mmHg. On cardiac *auscultation* regular heartbeat with no murmur was heard and a heart rate of 88/min was recorded. Respiratory ausculation revealed normal function with normal bronchial airway with a respiratory rate of 20breaths/min. On neurological ausculation revealed power of 5/5 all limbs. His abdomen was soft, regular with normal bowel sound. Initial laboratory investigations showed: 55 U/L of SGOT, 21 U/L of SGPT, 0.2 mg/dl of direct bilirubin, 0.6 mg/dl of total bilirubin, 47 U/L alkaline phosphatase, 6.4 gms/dl of total protein and 4.2 gms/dl of albumin respectively.

Title	Author	Conclusion
Neurocysticercosis: A case report and brief review	SyedA.A.Rizvi Ayman M.Saleh Hanns Frimpong Hussain M.Al Mohiy JasminAhmed Ronda D.Edwards Sultan S.Ahmed	The most effective way to eradicate cysticercal infection will require implementation of strategies to reduce transmission at several stages, such as preventing human tape worm infection due to pork consumption, improving sanitary conditions to prevent transmission of cysticercal infections from humans to pigs and measures to interrupt transmission of eggs between humans.
Neurocysticercosis: A case report and brief review.	RizviSA , Saleh AM , Frimpong H, Al Mohiy HM , Ahmed J, Edwards RD, Ahmed SS	A patient of Asian origin came to our clinic with complaints of dizziness, headaches and episodes seizures for the past twelve years without proper diagnosis. The computed tomography and magnetic resonance imaging scans indicated multilobulated cystic mass in the brain with the suspicion of neurocysticercosis.
An Unusual Presentation of Neurocysticercosis: A Space-Occupying Lesion in the Fourth Ventricle Associated with Progressive Cognitive Decline	Carolin Kurz,* Veronika Schmidt, Holger Poppert, Patricia Wilkins, John Noh, Sven Poppert, Jürgen Schlegel, Claire Ertelt-Delbridge, Clarissa Prazeres da Costa, and Andrea S. Winkler	Surgical and medical management of intraventricular NCC remains nonstandard and varies among institutions because of the lack of systematically conducted trials.
Neurocysticercosis : A Case Report	Rajat Sanker Roy Biswas , Jishu Deb Nath	Neurocysticercosis should always be part of the differential diagnosis of adult onset epilepsy. The disseminated form, although rare, should particularly be kept in mind. The usefulness of a detailed physical examination, serological and radiological examination should be evaluated to get a conclusive diagnosis
A case report on Subarachnoid and Intraventricular neurocysticercosis	*Chen Shang* , *Hong-Zhi Guan* , *Li-Ying Cui* , *Bo Hou* , *Feng Feng*, *Ding-Rong Zhong*	The optimal duration of anti-parasitic treatment for extraparenchymal neurocysticercosis is not known. Further work is required in patients with subarachnoid and ventricular neurocysticercosis to establish the roles of higher doses of albendazole, combined antiparasitic drugs, prolonged drug courses, repeated cycles, surgical interventions, and multidisciplinary collaborative working.
Neurocysticercosis as a first presentation of tonic-clonic seizures: a case report	Matthew J BookerEmail author,Catherine Snelson andLouise Dodd	This case highlights that, with ever increasing worldwide migration, the diagnosis of neurocysticercosis is likely to become more common , and should be considered in patients presenting with seizures in whom social history is commensurate and initial imaging non-diagnostic.

Other investigations revealed blood urea of 23mg/dl, serum creatinine of 0.7 mg/dl, serum uric acid of 4.5 mg/dl and electrolytes value of 139 mmol/l -Sodium, 3.9 mmol/l -Potassium and 104 mmol/l -Chloride was recorded. MRI report which was done on day 1 showed the signs of neurocysticercosis evidenced by multiple well defined thin walled T2 hyperintene areas with eccentic hypotensive specks and few showing perifocal edema in bilateral cerebellar and cerebral hemispheres, numerous small parenchymal calcifications few to them showing mild perlesional edema noted in bilateral cerebral and bilateral cerebellar hemispheres largest measuring(9mm)- s/o calcified granulomas. Multiple small well defined cystic lesions noted involving bilateral cerebral hemispheres largest measuring(15mm) few of the cystic lesions show small specks of calcium with in it (scolex). Three small cystic lesion noted in the right cerebellar hemispheres largest measuring (7mm).Rest of brain parenchymal attenuation values appear normal. Mucosal Polyp noted in the right maxillary sinuses.

He was managed with injection Dexamethasone 8mg iv BD, Antiparasitic drug like Albendazole 400mg BD along with other medication such as injection pan 40mg OD, injection Ondansetron 8mg BD, tablet Naxd 250mg TID and Midazolam 2mg(SOS). On day 2 seizures was reported in patients which was managed with injection Levipil 500mg IV BD. On day 4 headche was subsided. On day 5 he was discharged with following medication: tablet Albendazole 400mg BD, tablet Pantoprazole 40mg OD, tablet naxdom 250mg(SOS), tablet levipil 500mg BD.

DISCUSSION

Neurocysticercosis is a most common cause of preventable epilepsy and is reported to be caused by Cysticercus cellulosae, the larvae form of Taenia solium commonly known as tapeworm. Events of human cysticercus occurs via either endogenous route i.e autoinfection in tapeworm carriers or through exogenous route i.e by ingesting eggs of T.solium after faecal-oral contamination.(8)It is uncommon manifestation of the common infection. Generalized promulgation of the larvae can Emanate in involvement of almost any organ in the body.(9)The Hallmark of neurocysticercosis is it's heterogeneity, where as clinical manifestation depends on the number, localization and evolutional stage of the parasites as well as the intensity of inflammation. Neurocysticercosis patients may be asymptomatic, or may be presented with whole variety of symptoms.(10) The main presentation of neurocysticercosis include dementia, headache, epilepsy and increased intracranial pressure or focal neurological signs based on the localization and amount of cysts. Diagnosed is usually based on neuroimaging abnormalities which invloves CT scan or MRI in which differential diagnosis of cysticerci cerebral lesion includes tubercle, abscess, metastasis and glioblastoma. Secondly by serology in which techniques can vary depending on activity of cyst and the number of lesion with major drawback that negative result of it will not rule out neurocysticercosis. Finally through clinical presentation.(11) Postmortem studies have shown that 80% of the cases with neurocysticercosis remain asymptomatic.(12)

Therapeutic intervention should be individualized, particularly for patients with mixed form of neurocysticercosis. As extraparenchymal neurocysticercosis involves poorer prognosis, there was a consensus towards more aggressive management.(13)

Management is cysticidal, surgical i.e removal of cysts and ventriculoperitoneal shunt and symptomatic i.e antiepileptics and steroids. Albendazole and/or Praziquantel are commonly used but their role is controversial because these drugs hasten the death of the drugs that may also be seen in the absence of such treatment. Neurocysticercosis is an life threatening complication and those with active cysts remain at the risk of serious complication. Beside treatment/therapy cysticidal syndrome, characterized by features of raised intracranial tension; may occur in 50% of the cases.(14)Efficiency of treatment should be monitored by repeating CT scan. This case was presented with symptoms of headache associated with vomiting past 10days with no history of seizures and latter developed it, and was diagnosed with the help of MRI, CT scan and serology and treatment provided was levetriacetam, albendazole and domperidone, naproxen.

Future Prospects

In order to improve the knowledge of NCC, it is important to develop validated criteria for diagnosis, since the current available diagnostic criteria have not been validated so far[15]. Newer insights into the immune mechanisms underlying symptomatic human cysticercosis and helminth induced immune suppression are being obtained through recent studies[16]. Toll-like receptor-4 and soluble intercellular adhesion molecule1 K469E polymorphisms have been suggested to predispose to symptomatic infection. The role of genetic susceptibility to NCC is also being evaluated and preliminary work has reported positive association of HLA-DRBII-13 with SSECTL(s)[17]. Prospective cohort studies about epileptogenicity of NCC are needed to assess the association of different evolutionary phases of the parasite, in the development of seizures and epilepsy.

The understanding of these immune and genetic mechanisms will help develop newer drugs such as tamoxifen and newer drug delivery systems such as lactic acid conjugated solid lipid nanoparticles bearing albendazole and prednisolone, for effective management of NCC. Results of preclinical animal studies on the pharmacokinetics, safety, and toxicology of oxfendazole for humans have been encouraging. Development of effective antiparasitic drugs for treatment of swine cysticercosis is also a potential area of research, especially combination therapy[18].

CONCLUSION

NCC is an important acquired cause of epilepsy and other neurological manifestations especially in endemic areas[19]. Because of its pleomorphic presentation, NCC should be considered in the differential diagnosis of a number of neurological conditions. The accurate diagnosis with proper symptomatic assessment followed by a well designed therapeutic intervention underlight of profound knowledge of health care provider contribute significantly to the morbidity and mortality of the neurocysticercosis. Treatment with cysticidal therapy leads to reduction in seizure frequency and a faster resolution of lesions. A single Antiepileptic drugs(AED) usually carbamazepine or phenytoin, is sufficient to control

seizures due to single-lesion NCC. Prevention of NCC is important and is feasible. Public sanitation and hygiene awareness are of utmost importance to prevention of this disease. Development of newer cysticidal drugs and drug delivery systems for both human and swine population are the potential areas of research[20]. Well structured prevention strategy also plays an important role in controlling the incidences of neurocysticercosis.

Conflict of Interest: Authors declared to have no conflict of interest.

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