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Liver Cirrhosis and Neurological Disorder Associated with Liver Disease

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ABSTRACT

Normal brain function is closely and comprehensively related to normal liver function. Not only the liver plays an important role it supplies essential nutrients to the brain, but also to detoxify splanchnic blood. Impaired liver function thus leads to insufficient detoxification allowing neurotoxins (such as ammonia, manganese and other chemicals) to enter the brain. In addition, postosystem short circuits, ie common complications in advanced liver disease, facilitate the free transfer of neurotoxins into the brain. The problem has increased furthermore, due to other variables such as gastrointestinal bleeding, malnutrition and related kidney failure, which are often associated with the liver cirrhosis. Neurological damage in chronic liver disease and cirrhosis of the liver appear to be several major causes like the brain accumulation of ammonia, manganese and lactate, altered permeability of the blood-brain barrier, monocyte recruitment after microglial activation and neuroinflammation i.e. the direct effects of circulating systemic proinflammatory cytokines such as tumor necrosis factor, IL-1β, and IL-6. hepatocerebral degeneration, hepatic myelopathy, cirrhosis-related parkinsonism, cerebral infections, bleeding and osmotic demyelination. In addition, neurological complications can occur exclusively in some diseases, such as Wilson's disease, alcoholism (Wernicke's encephalopathy, alcoholism).cerebellar degeneration, Marchiafava-Bignami disease, etc.). The radiologist should be aware of their various clinical manifestations and radiological manifestations because the diagnosis is not always immediate. Medicaments should be aware of the problems of neurological complications that can occur in liver disease, including hepatic encephalopathy.

KEYWORDS: *Liver cirrhosis; Neurological disorder; Acute liver failure; Hepatic encephalopathy; Hepatitis C; Wilson disease*

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1. INTRODUCTION

Liver is a primary site of drug metabolism. In liver various drug biotransformation reactions occurs which is important for metabolic reactions. Liver cirrhosis is also responsible for the carbohydrates metabolism which is responsible for balancing the blood glucose level. Cirrhosis is the last stage of the liver disorder which occurs after a long progression. Liver cirrhosis is defined as a chronic liver damage from variety of causes leading to scarring and liver failure. This condition cannot be cured but further damage can be limited. Liver cirrhosis is considered end stage of various liver diseases[1]. Liver cirrhosis is characetrised as single fatal chronic condition. There are ways to prevent cirrhosis because the diseases leads to it progress slowly. Mainly hepatocellular carcinoma occurs in cirrhotic liver. Patients with liver cirrhosis have impaired drug handling because of shunting of blood, liver cell necrosis, abnormal drug volume, reduction in drug volume, altered drug volume etc. Study suggests that upto 30% of patiests with liver cirrhosis are clinically diabetic and 96% of patients may be glucose intolerant[2]. The impairment of drug metabolism is associated with liver dysfunction[3,4].

Malnutrition is the commonly occurs in end stage of liver disorder that is liver cirhhosis[5]. Malutrition occurs in all forms of liver dysfunctions[6].The prevalence of malnutrition ranges upto 65-100% depending upon the method used for malnutrition assessment and the severity of liver diseases[7]. At the end stage of liver disorder the only option is remains is liver transplant. Because at this high risk it can lead to death. So, it is duty of primary care physician to diagnose the diseases properly. In the presence of liver disorder metabolic homeostasis is impaired which results in various disorder such as insulin resistance, diabetes and glucose intolerance etc [8]. Liver cirrhosis is associated with liver cancer which is 7th leading cause of death in India. Alcohol also shows impact on liver dysfunction. Liver cirrhosis has been including in standard alcohol a attributable diseases[9,10]. According to the experts opinions most of drugrs can be easily tolerated by patients with liver cirrhosis but the drugs which causes hepatotoxicity are not tolerated by theses patients. Therefore hepatoxins or drugs which produces hepatic toxic materials should be avoided by liver cirrhotic patients[11].

Nutritional intervention in the cirrhotic patient aim to focus on the nutritional develepment and hepatic regeneration and correct the malnutrition which also lead to the liver dysfunctions and correct the complications related to the liver cirrhosis. Experts opinions suggest that by the nutritional intervention corrects the surgical outcomes, improves the survival and liver functioning and overcome the various complications. Chronic disorder have many causes but mainly most frequent reasons for this is alcohlism, infectious expsure to the toxins and non-alcohlic liver diseases and all theses condition leads to the liver fibrosis there are some structural changes which ultimately results in the liver cirrhosis conditions[12]

Neurologist encounter the patients with acute and chronic liver disease and are aware that how this liver disease can affect the nervous system and responsible for neurological disorder. Liver plays a vital role not only to provide nutrients to the brain but also detoxifying the splanchnic blood. As we are aware that liver has main function of detoxification thus do not allow neurotoxins to enter in brain. But when there is not proper functioning of liver thsese neurotoxin easily get enter into the brain and affect the neurological system. The problem is further compounded by additional variables which includes malnutrition, gastrointestinal tract bleeding, renal failure which may often related with the liver cirrhosis. This is true when the patients with alteration in cognition and level of consciouness. The neurological damage in chronic liver disease and in liver cirrhosis seems to be multifactorial which include these factors mainly such as accumulation of ammonia, manganes, increased level of sodium level. It also affects the permeability of blood brain barrier (BBB). There are many disorder occur in brain and affect the whole nervous system from which some are commonly occuring but some are very uncommon. Wilson disease, are uncommon one but are tratable with many neurological and psychiatic synptoms. Neurologic disorder associated with liver disease not only affects the brain but also spinal cord and peripheral nervous system. Earlier the recognition of hepatic encephalopathy can be possible only by using combination of neuropsychological studies and clinical suspicon. So management of hepatic encephalopathy is very important for neurologist from acute liver failure which involved in neurocritical care. But now the next generation genetic testing may aid in the diagnosis of patients who is suspecting of having Wilson disease. The relationship of these neurological finding from the hepatocerebral degeneration and from the viral hepatitis is widely recognized. So this is very important for neurologist to recognize the symptom that occur in those patients who are suufering from acute and chronic liver diseases with wilson disease and viral hepatitis infections.

1.1. The etiology of cirrhosis

Cirrhosis is a mainly of result of exogenous toxic, infectious allergics or toxins, vascular process, autoimmune/immunopathologicals or by metabolism error in inborn. There may be many causes of liver cirrhosis but common cause of liver cirrhosis non alcohlic fatty liver diseases and alcohlic liver diseases and viral hepatitis mainly B and C are common cause for the liver cirrhosis. Among these alcohlic liver diseses are most commmon one. Hepatic liver fibrosis leads to cirrhosis which may be ultimately leads to the hepatic carcinoma. Timely intervention can prevent from the progression to the next stage of the disease. Appropriate treatment can prevent the diseses from the worst condition. Thus also hepatic carcinoma can be prevented. Because even cirrhosis can be regress but hepatic carcinoma cannot.

1.2. Cause of liver cirrhosis

Cirrhosis is a fibrous septa. It comes in macro and micronodular form. This condition is diagnosed by characteristics that is found in clinical trials, reseach results and various in laboratory tests.

In liver cirrhosis it is found that :

- Cutaneous signs
- Firm on liver palpataion.

- Certain risk involves such as metabolic syndrom, exposure of hepatotoxins and heavy alcohal consumption.

1.3. Approches to patients with liver cirrhosis

The clinical presentation of liver cirrhosis is asymptmatic untill the complication appears. Liver cirrhosis presence should be suspected with chronic liver diseases and abnormal alkaline phosphate and aminotransferase. The diagnosis become very easier in those patients with the signs of decomposition namely called jaundice, ascites and asterixis. Additional liver test is done for the proper examination such as albumin and prothrombin time with the bilirubin investigation to know the ability of liver to excrete bilirubin. Imsging studies includes CT scan, ultrasound, magnetic rasonance ect. Advanced chronic liver diseases depend upon the liver biopsy which is the ernd stage chronic diseases. Percutaneous liver biopsy is not neccesary in the presence of decompostion cirrhosis and when the imaging study have been confirmed the presence of cirrhosis. Therefore liver biopsy is reserved only for the selected patients[13.14]. Histology provides information on disease stage, etiology and grade of inflamaton.

Approximately 2500 years ago this was the first time when there is a association between liver disease and cerebral dysfunction and suggested in literature. Later there came out new theories arrived and give more description about the clinical features of hepatic encephalopathy which is linked with the liver cirrhosis[15]. These new theories have been presented with regard to the neurological complications of acute liver failure. With this the liver diseases are responsible for neurological disorder. As it affect neurological system very much by showing major effect on brain. There are vaious factor which are responsible for this [16].

As liver is a main part that help in the detoxifiaction but when there is not proper functioning of liver it affects brain. The neurotoxins get enter into the brain and cause disturbance in nervous system. And also cause many neurological disorders. The clinical presentation of acute liver failure and hepatic encephalopathy in the patients with cirrhosis are significantly diiferent[17]. The most severe complication of acute liver failure is development of brain oedema. Thus the intracranial pressure monitoring is very much important for the patient. Brain oedema is menifested by hypoxia, seizure and hypoglycemia which are the general condition occure in acute liver failure. So thses are some important parameters which should be properly monitored. With this there are several causes of liver dysfunctioning but one of the major known cause is alcoholism including infections and exposure of toxic materails[18,19].

2. Neurological disorder associated with liver disease

Globally liver cirrhosis and chronic liver diseases is a main cause of a morbidity and mortality which attributes a wide prevalence of hepatitis, alcohalism and fatty liver diseases[20,21]. Chronic injury to the liver result in the fibrous formation, liver distortion ultimately leads to the liver cirrhosis. Now a day liver cirrhosis become 12th leading cause of death in United State of America[22]. Patients with liver cirrhosis and chronic liver diaeses have very wide range of neurological complications. Neurological complaints can range fron neuropschiatric symptoms such as behavioral change, abnormality in movement, heaptic disorder also contibite to the formation of biopolar, substance abuse, suicidal tendency, phrenia. Neurological diseases associated with the liver dysfuncyion is mainly devided into two category which are neurological complication and other one is related to nervous system related to the specific etiology of liver diseases such as wilson diseases, alcohlism, hepatitis C.

Nuerological syndroms occur more in those patients who have liver disorder. A neurological syndrom which is associated with liver diseases may be a complication of disease which may be induced by factor that contributes to the disease. For example alcohal it may or may not contribute to the liver disease[23]. The neurological disorder which is associated with liver disease may affect the CNS, peripheral nervous system or both. There is a relationship between functional status of liver and that of brain. The most known aspects of relationship is a hepatocellular failure that may be complicated by hepatic encephalopathy in which the neurotransmiiter of brain gets altered[24,25]. But recently it has been suggested two other complication of liver disease arrises due to the pruritus in cholestatic patients[26,27].

Chronic liver disease with neurologic manifestations

Direct effects of cirrhosis on the nervous system	Neurologic complications specific to
Hepatic encephalopathy	Osmotic Demyelination Syndromes
Acquired hepatocerebral degeneration	Wernicke encephalopathy
Cirrhosis-related parkinsonism	Marchiafava-Bignami disease
Cirrhotic myelopathy	Alcohol Withdrawal Syndrome
Intracranial hemorrhage	Cerebral atrophy Alcoholic cerebellar degeneration
Infections	Wilson disease
Diffuse cerebral edema	HCV-related CNS complications

There are various disease of neurology which are associated with liver disease or liver dysfunctioning and are as follow:

2.1. Hepatic Encephalopathy

Hepatic encephalopathy is defined as the brain dysfunction which is caused by the liver insufficiency. It is menifested as the wide range of abnormalities which as associated with brain and phychiatric problems ranging from the subclinical alteration to coma. This problem may generated from the acute liver failure or by chronic liver diseases[28]. To determine the stage of hepatic encephalopathy is west Haven criteria which devide this disease into four subclass. EEG is used to diagonos the heaptic encephalopathy of different etiology.

2.2. Acquired Non-Wilsonian Hepatocerebral Degeneration

Acquired non-wilsonian hepatocerebral degeneration may occure in patients with chronic liver failure. This condition of liver disease come to know in 1914 by Van Woerkem and later described by Victor and Adams in 1965 [29]. Clinical symptom of this disorder is numerous but but patientsmay show signs and symptoms thatcan include parkinsonism, cognitive decline, ataxia, apathy, somnolence, myelopathy, dystonia, cranial dyskinesias and chorea[30.31,32].

Acquired non-wilsonian hepatocerebral degeneration is linked with the T1 weighted hypertensities which is caused by the manganese deposition in the basal ganglia and atrophic changes in the cerebellum, cerebral cortex, basal ganglia on MRI. However it should be noted that theses symptoms may be recorded in the patients with chronic liver diseases with or without acquired non-wilsonian hepatocerebral degeneration. The deficiency of mangneses may be found in MRI and in pathogenic condition of this disease. The toxic level of mangnese or mangnese toxicity is main reason for the acquired non-wilsonian hepatocerebral degeneration.

2.3. Hepatic Myelopathy

Another menifestation of neurological diseases associated with chronic liver diseases is hepatic myelopathy which is typically linked with the portosystemic shunts that may occure spontaneously or may be surgically created [33]. The clinical symptom of spastic paraparesis generate slowly with slow progressive weakness. Patients may left wheelchair dependent with the growth of paraparesis progress. The involvement of sensory ograns are generally absent. On the examination of neurologial conditions patients show evidence of spasticity, bilateral extensor plantar responses, hyperreflexia [34]. Hepatic myelopathy is generally seems to related with portosystemic shunting of blood which allow ammonia and other nitrogenous product which breakdown to bypass the liver and cause spinal cord damange.

2.4. Acute Liver Failure

Fulminant hepatic failure is known as severe liver injury which is reversible in nature. And which causes the onset hepatic encepholopathy within the 8 week with reference to the first symptoms occures in the absence of previously any liver diseases[35,36]. This type of liver failure results in the abnormal liver function tests and the eldevation of serum liver level. As the level of ammonia elevated this indicates the high risk of encephlopathy and also development of cerebral edema[37]. Acute liver failure is also responsible for the coagolopathy and multiorgan failure. Acute failure is most commonly occure in developing country where the hepatitis A, B and E commonly causes. It is also known that due to the toxicity of some drugs especially acetaminophen are responsible for acute liver failure.

2.5. Wilson Disease

Wilson disease is a rare disease which was first described in 1912 by Kinnear Wilson [38] This is hereditory diseases which is related to both neurologic and hepatic symptom is is very important for the neurologists because its early treatment and diagnosis can lead to further treatment and prevention of disease what may become progressive degenerative disorder. Wilson describes the neuropathology of this disease in detail including the degeneration of the putamen and globus pallidus. He recognises various symptoms that affect the involvement of extra pyramidal system these symptoms include tremor,

dystonia, pathologic laughter, sialorrhea, changes in cognitive functioning.

Wilson also stated that this disease appeared to be familial but it did not believe it was hereditary. He blamed this condition may also occure due to the toxic agents. But Wilson dis not describe the ocular findings which is known as Kayser Fleischer ring today. Further this findings was reported by Benhard Kayser in 1902 [39] and Bruno Fleischer in 1903 [40] who thought this disease is caused because deposition of silver. Further the association of abnormal copper metabolism and Wilson disease was first described by Cumings in 1948 [41]. Following all this treatment of Wilson disease using the chelating agents penicillamine and dimercaprol were performed successfully. But today cause of Wilson disease has been found. This disease is autosomal recessive condition caused by the mutation in the ATP7B gene on the chromosome.

2.6. Viral Hepatitis

Hepatitis A, B, C and E viruses are associated with the various neurologic and psychiatric symtoms. Hepatitis A has been linked with the Guillan-Barre syndrome. Meningoencephalitis, acute disseminated encephalomyelitis, and acute myelitis have been associated with hepatitis A. The similar neurological problem is rarely oocur with the patients suffering from the hepatitis B infection[31]. Chronic infection of hepatitis C has been reported with the number of neurologic problem. Hepatitis C is a common infection which occur globally affecting 185 million people estimated prevalence of 2.8% worldwide [42]. This virus primarly affect the liver. It is also known to involve the other organs and thus considered as systemic disease. This chronic hepatis c infection causes the hepatis and systemic inflammation[43]. Acute and chronic cerebrovascular events occur more in those patients suffers from hepatitis C infection than in a general population.

2.7. The pruritus of cholestatis

Pruritus is a one of the common complication of extrahepatic and intrahepatic cholestatis disorder. The etiology of this disease has been not established whereas conventional treatment of disease tends to be empirical. This pruritus of cholestatis may lead to the severe sleep, deprivation and even suicidal thoughts. The new hypothesis of pathogenesis of pruritus of cholestatis shows that this starts in the form of pruritus which is generated from the CNS rather than peripheral system. Three lines supports this hypothesis which are as follow:

- opioid agonists for example, morphine induce pruritus by a CNS.
- central opioidergic tone is increased in cholestasis
- opiate antagonists ameliorate the pruritus of cholestasis.

The central opioidergic tone increases in the patients with the chronic cholestatis liver disease which is illustrated by the striking opioid withdrawal syndrom that can be induced in patients by the oral administration of potent opiate antagonist [44].

2.8. Cirrhosis related Parkinsonism

Cirrhosis related parkinsonism is related to the rapidly progressive parkinsonism which show dystonia, rigidity, bradykinesia which are unresponsive to the treatment of hepatic encephalopathy. The mechamism behind this is mainly due to the increased deposition of manganese in basal ganglia. Another theory related to that is alteration of presynaptic and postsynaptic striatal dopaminergic neurotransmitter system[45,46]. Cirrhosis related parkinsonism is a separate and distinct entity from the common parkinsonism disease. But clinically cirrhosis related parkinsonism present by balance dysfunction and early gait in which tremor is relatively absent and the elevation of serum manganese level. Manganese deposition produces the pallidal degeneration with contrast to parkinsonism disease which damage dopaminergic neurons [45,47].

2.9. Intracranial Hemorrhage

Intracrabial hemorrhage is a well-known complication occur in cirrhosis as theses patients always suffer from hematologic complication especially coagulation and thrombocytopenia. This result in the deficiency of vitamin K which decrease the production of coagulation and inhibitor factor as this is responsible for the synthesis of abnormal clotting factor[48,49]. Haung and his fellow find in thei work that intracerebral bleed in much more in young male with mild to moderate alcoholic cirrhosis. This incidence is more in alcoholic related group as compare to the virus related group. As alcoholic related group contain about 1.9% whereas virus related group was 0.3% incidence. This incidence further increased to the 3% in combined group with patient of both alcohol related cirrhosis and virus related cirrhosis. So Haung and his fellow advise that patients should undergo radiologic workup when a new neurologic sign are seen.

2.10. Osmotic Demyelination Syndrome

The main or we can say exact etiopathogenesis of osmotic demyelination syndrome (ODS) in the alcoholic is a contentious. Otherwise change in the sodium serum level are responsible for the ODS. The systemic vasodilation is considered to lead the activation of anti-diuretic hormone and promoting the water retention which lead to reduce the sodium

serum level. Alcoholic patients are generally deficient in the organic osmolytes and there addition put them into a high risk of developing ODS. And the other possible factor may be toxic effect of alcohol. Osmotic demyelination syndrome is a progressive disorder with some clinical features ranging from a mild tremor to the progressive quadriparesis. And MRI is much more sensitive than CT scan. Ths disease mainly affect the cerebellum but sometime may also affect the parts of cerebrum [50.51,52]

2.11. Marchiafava Bignami Disease

Marchiafava Bignami disease is also one of the rare disorder which is associated with chronic alcoholism which is characterized by progressive demyelination of the corpus callosum. Previously this syndrome was thought to be associated with the consumption of red wine. Deficiency of chronic vitamin and malnutrition are also responsible for the marchiafava bignami disease. Clinically this disease is found in two forms one is acute form and other is chronic form. Acute form presenting as a severe impairment of seizures, conciousness and muscle rigidity which often resulting in death whereas chronic form presents the mental confusion, gait impairment and dementia. On CT scan diffuse hypodensity is seen in periventricular region, genu and splenium of the corpus callosum. But on the other hand on MRI theses changes are seen as the high T2 and FLAIR intensity signal changes [53]

2.12. Alcohol Withdrawal Syndrome

Alcohol withdrawal syndrome is a set of symptom that may occur when an individual either stop the intake of alcohol or significantly reduce the consumption of alcohol after a substantial use. As alcohol is a neurodepressant so sudden stopage of this can lead to the nervous system disturbance. Withdrawal symptom can range from seizures to hallucinations and the severe state of delirium tremens which is a hyperadrenergic state which is characterized by tremors, impaired attention, disorientation, diaphoresis with visual and auditory hallucinations.

In most of cases, neuroradiologic examinations in these patients who are suffering from withdrawal syndrome are noncontributory. During the acute phase of this disease edema in temporal region, cytotoxicity and hippocampus region in has been described in MRI. Patients with chronic alcoholism with history of withdrawal seizures can also present the significant volume and there is a decrease in the temporal cortical gray and white matter including the anterior hippocampus. This reversible edema may present in cerebellum, cortical and subcortical region ad white matter is also described in the clinical setting of posterior reversible encephalopathy syndrome complicating the alcohol withdrawal.

2.13. Alcoholic Cognitive Decline and Cerebral Atrophy

Cerebral atropy in patients is not common at all. It is believed to be neurotoxic effect of ethanol [54,55,56]. It is also believed that ethanol causes upregulation N-methyl-D-aspartate receptor which are secondry to homocystein catabolism and cause increased susceptibility to cytotoxic effect and excitatory effect of glutamate. Generally receptor N-methyl-D-aspartate inhibit the function of cell membrane which resulting in the reduction of intracellular Na^+ and Cl^- level and thus contribute to the brain volume. It has also proposed that the binding of acetaldehyde and related products of lipid peroxidation of the brain tissues initiates an immune mediated response which result in the loss of white and gray [57,58]. Dorsolateral frontal cortex shows the most pronounced atropic changes which is followed by the relatively less pronounced changes involving in temporal cortex and cerebellum. Clinically patients can menifested neuropsychological impairment in the form of disinhibition, abnormalities in planning, reasoning, judgements, lack of insight, problem solving, organization and atropy in frontal lobes.

2.14. Alcoholic Cerebellar Degeneration

Cerebellar degeneration or cerebellar atropy is also a uncommon in the chronic alcoholic with history of 10 or more years of the substantial alcoholic abuse. Alcoholic cerebellar degeration occur in purkinje cell in the cerebellar cortex and is responsible for the development of chronic cerebellar syndrome. The midline cerebellar structure especially the superior and anterior vermis are generally affected. This is also accompanied by prominence of cerebellar fissures without any association with pontine atrophy.

2.15. Hepatitis C Virus (HCV) – Related Central Nervous System Complication

The chronic infection with the hepatitis C virus is a growing major health problem which currently affected about 170 million people worlswide. The HCV- related central nervous system complication is promote acute cerebrovascular event which includes mainly ischemic stroke, transient ischemic attacks, lacunar syndromes, or rarely hemorrhages. On MRI occlusive vasculopathy, acute cerebral encephalopathy, vasculitis can be seen as a small focal lesions in the subcortical and periventricular white matter [59,60,61,62]. The proposed pathophysiology of this neurologic menifestation includes the exaggerated host immune response leading to production of autoantibodies, immune complexes, and cryoglobulins leading to lymphocytic

or necrotizing vasculitis. But the other proposed mechanism includes the replication of HCV in cerebral tissue which shows its eFfect on circulating inflammatory cytokines and the chemokines and which are believed that are responsible for acute disseminated encephalomyelitis polyradiculitis or meningoradiculitis and myelitis. The neurologic lesions in HCV- central nervous system related small vessel disease tend to be increased with the passasge of time.

2.16. Wernicke Encephalopathy

Wernicke encephalopathy is a neurologic emergency caused by thiamine deficiency in chronic alcoholics, with a reported incidence of 0.8% to 2%. (based on autopsy series). [50,51]

Although the syndrome is distinguished by a clinical triad of ataxia, global confusion, and ophthalmoplegia, all of the symptoms are not always present, and the patient may exhibit clinically nonspecific mental status changes.[50,51,52] On MRI, symmetrical areas of increased T2- and FLAIR signal intensity surround the periaqueductal grey matter, periventricular region, tectal plate, medial thalamic nuclei, third ventricular floor, massa intermedia, and mamillary bodies. In up to 50% to 80% of patients, postcontrast T1-weighted images may show enhancement of mamillary bodies and periaqueductal grey matter. MRS may show a lactate peak as well as a decreased N-acetylaspartate (N-NAA)/creatine (Cr) ratio in the affected regions.[50,52] DWI during the acute phase demonstrates diffusion restriction in the a fore mentioned cytotoxic edoema sites.Chronic disease causes brain atrophy, as well as diffuse signal intensity changes in the cerebral white matter, which accompany signal changes in the typically affected areas.

2.17. Marchiafava-Bignami Disease

Marchiafava-Bignami disease is a rare condition associated with chronic alcoholism that causes progressive demyelination of the corpus callosum. This syndrome was previously thought to be associated with red wine consumption and was seen in malnourished Italian men. Malnutrition and chronic vitamin deficiency have also been proposed as contributing factors.

Clinically, the disease manifests in two forms: acute and chronic. The acute form manifests as severe impairment of consciousness, seizures, and muscle weakness. The acute form of rigidity often results in death, while the chronic form manifests as varying degrees of mental confusion, dementia, and gait impairment.[50,51] On CT, the periventricular region, genu, and splenium of the corpus callosum show diffuse hypodensity. Although these changes are seen on MRI as high T2 or FLAIR signal intensity changes involving the corpus callosum, genu, splenium, and adjacent white matter, these areas may show diffusion restriction and peripheral contrast enhancement following intravenous contrast administration during the acute phase.[52]The chronic form of the disease is characterised by cystic changes and corpus callosum atrophy. MRS shows a progressive decrease in the NAA: Cr ratio and a normalisation of the choline: Cr ratio, which was initially slightly increased. The subacute phase is distinguished by the rigidity, which frequently results in death, and the chronic form, which manifests as vasculitis. Subacute phase is distinguished by the presence of a lactate peak, which is quickly replaced by lipids.

Conclusion

The diagonis of neurological symptoms which is associated with liver disease is depending upon vaious factors. And the liver dysfunction can also associated with the diverse menifestation. This article reviews the association of liver disease including nervous system and will provide new information regarding the therapeutic approaches and diagnostic findings for the evaluation of patients with liver disease. There are various factors which involved for the formation of liver disease that may be acute liver disease and lead to the chronic liver disease and ultimately tend to liver cirrhosis. Wilson disease and chronic alcohol consumption may lead to the neurologic involvement and can also lead to the spectrum of neurological changes. It is important to be aware of diagnostic purpose and frequently multidisciplinary approaches is necessary to get a accurate diagnosis. A radiologist play a important role in leading the neurologists and the hepatologist to execute a therapeutic planning. The treatment is possible by combining the knowledege gained from the accurate history, by taking proper neurologic examination, improved imaging, by improved genetic testing, proper laboratory testing and make these diagnosis early. Beacause early diagnosis is key to make proper treatment and diagnosis.

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