Neurology Case Series

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Dear Doctor,

Greetings from Micro Labs Limited.

We are happy to bring you "Neurology case series", which contains latest and interesting cases in the field of Neurology.

This issue contains

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2. **Significance of primary care cognitive evaluation for identifying an atypical presentation of normal pressure hydrocephalus**
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Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

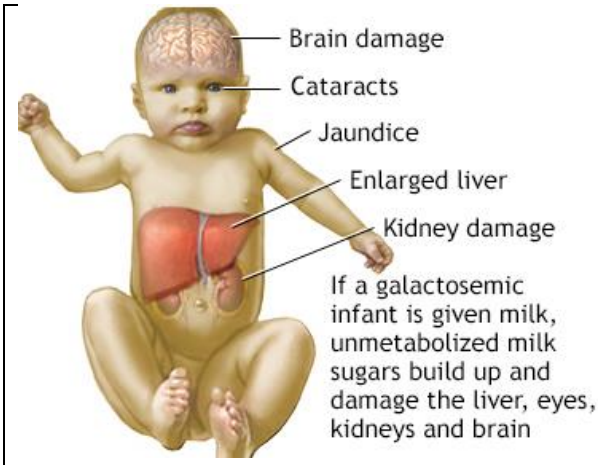
Medical Team,

1. Case report on untreated classic galactosemia caused by progressive cerebellar ataxia

Introduction:

Routine laboratory tests, such as carbohydrate-deficient transferrin (CDT) measurement, can provide valuable diagnostic information about classic galactosemia

Ataxias, which affects balance, coordination, and speech, may also be associated with extrapyramidal movement abnormalities, pyramidal indications, cognitive-affective symptoms, seizures, and peripheral neuropathy. Adult-onset ataxias are challenging to diagnose due to the necessity to investigate both genetic and non-genetic factors.[1] The galactosemias are an uncommon group of inherited galactose metabolism diseases. In type I, classic galactosemia (OMIM 230400), severe GALT deficiency impairs the conversion of α-D-galactose-1-phosphate (Gal-1-P) to α-D-glucose-1-phosphate (Glc-1-P) and uridine diphosphate galactose (UDP-Gal).[2] Consumption of galactose (milk) by babies with galactosemia can cause Gal-1-P accumulation, metabolites, and multi-organ failure. Early intervention with galactose-restricted and lactose-free diets can save lives. Despite dietary galactose limits, many individuals experience long-term problems including cerebellar ataxia, tremor, speech or language difficulties, ovarian failure, and cataracts.[1] This study emphasizes the importance of a systematic approach in treating patients with progressive adult-onset cerebellar ataxia. Minor facts in the history, clinical examination, and readily available laboratory testing can often lead to a reliable diagnosis.



Galactosemia

Case Presentation:

A 39-year-old right-handed woman came to the hospital with a 1.5-year history of poor right arm tremor and coordination. The patient reported limited use of her right hand in daily tasks, forcing her to rely on her left hand. She did not report any issues about walking or falling.

She had learning challenges and was later diagnosed with cataracts in her right eye and secondary amenorrhea. Furthermore, the patient's sister reported being admitted to the hospital a few days after delivery (without any issues) due to vomiting and diarrhea, which improved with strict temporary lactose-free milk consumption (without a formal diagnosis). The neurological examination revealed a persistent postural and intentional tremor of the dominant upper extremity, hypermetria with overshooting upon release, hyperreflexia with bilateral positive Babinski's sign, gait ataxia, slight dysarthria, square-wave jerks, and no other abnormal eye movements. There was no rest tremor noticed. The Montreal Cognitive Assessment exam also found minor abnormalities in visuospatial, executive, and recall memory (21/30 points). The patient's history and physical examination led to assume that the patient had progressive cerebellar ataxia with pyramidal and cognitive impairment that began in adulthood.

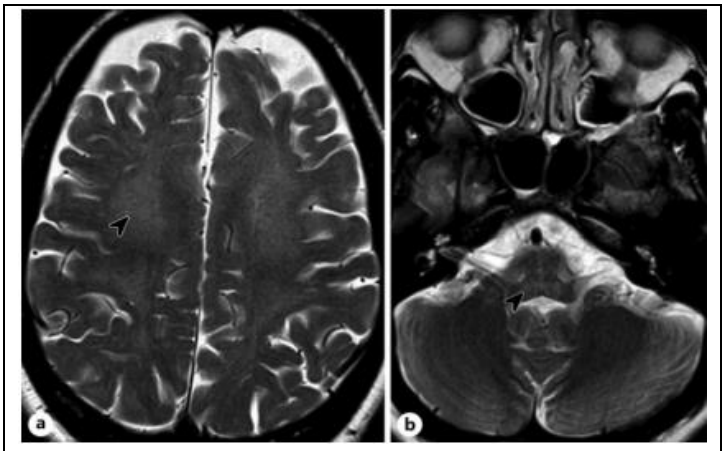


Figure 1: Axial T2w brain MRI images show frontal lobe cortical atrophy and diffuse hyperintense lesions in semiovale and periventricular areas (a), as well as in the pons without cerebellar atrophy (b).

After a three-stage diagnostic evaluation, the patient's symptoms remained unclear. The laboratory tests followed the German Neurological Society's standards for diagnosing and managing ataxias. Brain magnetic resonance imaging revealed modest frontal lobe atrophy and diffuse hyperintense lesions in the semiovale and pons (Figure 1 a, b). CDT levels were significantly higher than normal (disialo-transferrin 5.68 [<1.7] %). However, the patient denied having had any alcohol. The patient's medical history and subsequent CDT rise in untreated carbohydrate metabolism diseases suggests galactosemia as the most likely diagnosis. This was validated by higher erythrocyte Gal-1-P concentration (3.47 [0.18-0.57] mg/dL) and reduced erythrocyte GALT enzyme activity (1.0 [21.3-38.4] µmol/h/g hemoglobin), while plasma galactose levels were 0.01 (<0.27) mmol/L. To confirm classical galactosemia, clinicians can measure GALT enzyme activity in red blood cells (absent or considerably diminished) or analyze the GALT gene, as per the International Clinical Guideline for the Management of Classical Galactosemia. In this evident scenario, genetic testing was not done. The patient and her relatives were thoroughly informed about

the disease. The patient's condition was stable with strict adherence to galactose-restricted and lactose-free diets, regular physiotherapy, and speech therapy. Efforts to suppress her tremor with propranolol, topiramate, and clonazepam were unsuccessful. Dietary therapy reduced Gal-1-P levels by more than 1 mg/dL (1.92 and 2.85 [0.18-0.57] mg/dL), whereas plasma galactose levels decreased to less than 0.1 mmol/L and CDT levels recovered to normal.

Discussion:

This case reported adult-onset cerebellar ataxia along with other motor and cognitive abnormalities. This patient's medical history and secondary changed CDT indicated galactosemia at the age of 39. The higher CDT levels in the absence of other alcohol-associated stigmata were an important finding that assisted in resolving the diagnostic challenge.[1] CDT is a standardized alcohol biomarker because long-term alcohol consumption disrupts the multi-enzymatic process of protein glycosylation, which is essential for proper protein function.[3]

Conclusion:

This case emphasized the significance of evaluating uncommon diseases based on unexplained clinical and laboratory results. Screening newborns for classical galactosemia does not improve long-term outcomes. Only a small number of these patients develop ataxia tremor syndrome.

Reference:

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2. Significance of primary care cognitive evaluation for identifying an atypical presentation of normal pressure hydrocephalus

Introduction:

Normal pressure hydrocephalus (NPH) is a key differential diagnosis for neurodegenerative disorders and can be classified as idiopathic (iNPH) or secondary (sNPH), which affects clinical symptoms, treatment options, and future outcomes.[1] Urinary urgency or incontinence, cognitive impairments, and gradual gait impairment are the characteristics of NPH syndrome. Although the precise cause of idiopathic NPH is unknown, several theories have been proposed, including hyperdynamic cerebrospinal fluid (CSF) flow in the aqueducts, elevated CSF pulse pressure, and even aberrant CSF reabsorption mechanisms. If NPH is not treated, its symptoms could get worse over time and ultimately result in seizures and severe dementia.[2] This case described a 54-year-old man who has a history of alcohol use, no primary care physician, and recently had auditory hallucinations.

Normal pressure hydrocephalus (NPH) symptoms are reversible, so it's crucial for patients to seek care from their primary care physician (PCP)

Case Presentation:

A 54-year-old man who had no primary care physician and a history of alcohol use arrived at the police station experiencing auditory hallucinations that had just started. Vital signs were normal when the patient arrived at the emergency department. The results of the laboratory tests for toxic, viral, and metabolic causes of encephalopathy were negative. He had a history of consuming two to six beers every day, but he was not clinically intoxicated. His urine toxicology test came out negative, and his blood alcohol content was less than 0.010 g/dL. The patient's head's computed tomography (CT) revealed a noticeable enlargement of the supratentorial and infratentorial ventricles, which is indicative of NPH. He remained alert and sense of time, place, and people throughout his admission. The brain's magnetic resonance imaging (MRI) revealed no signs of acute intracranial abnormalities or aberrant enhancement, which was indicative of NPH (Figure 1). The patient denied having ever experienced incontinence or abnormal gait. Clinical evidence of memory and cognitive function

impairment indicated cognitive impairment. The lumbar puncture results showed no indications of xanthochromia or aberrant

fluid content, although they were notable for opening pressure at 21 cm H_2O. It was concluded that the patient would benefit from shunt implantation by neurosurgery based on these findings and his presentation. The patient was examined at the neurosurgery clinic for shunt insertion two weeks after being discharged from the hospital. He acknowledged a history of imbalance and sporadic incontinence at this time, but he denied any new neurological concerns. The patient experienced unusual auditory hallucinations, including a voice informing him that he was being followed and that he was thus unsafe in his own home. He was assessed for psychiatric health issues, but as the patient lacked the further symptoms needed for a diagnosis, problems including schizophrenia and alcoholic hallucinosis were later ruled out.

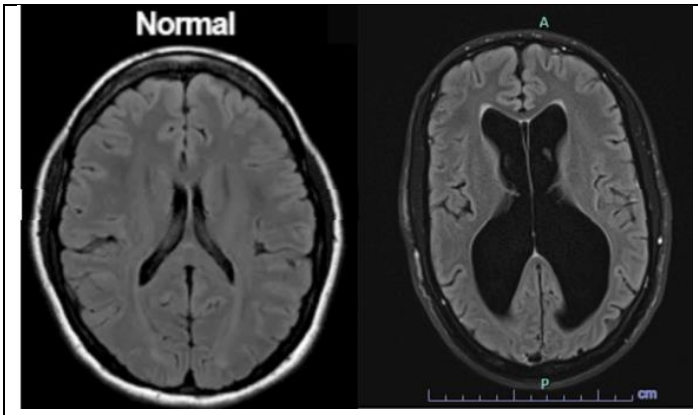

Figure 1: This patient's MRI shows extensive ventricular dilatation, resulting in normal pressure hydrocephalus, in contrast to normal ventricular size.
MRI: magnetic resonance imaging

Discussion:

Evaluating NPH includes excluding metabolic, infectious, intracranial, and cerebrovascular disorders. In this case, NPH presented with auditory hallucinations and delusions.[2] Normal pressure hydrocephalus is characterized by a clinical triad of gradually deteriorating symptoms, which include gait disturbance, urine incontinence, and cognitive impairments. It may occasionally present with severe psychiatric symptoms, delaying early diagnosis and treatment.[3]

Conclusion:

This case of atypical normal pressure hydrocephalus highlights the necessity for cognitive screening in the elderly and highlights the importance of obtaining proper imaging to accurately identify NPH markers. Normal pressure hydrocephalus (NPH) symptoms are

reversible, thus it's crucial for patients to get treatment from their primary care physician (PCP) and providers to recognize the distinct psychological clinical presentations associated with NPH.

References:

1. Skalický P, Mládek A, Vlasák A, De Lacy P, Beneš V, Bradáč O. Normal pressure hydrocephalus-an overview of pathophysiological mechanisms and diagnostic procedures. Neurosurg Rev. 2020 Dec;43(6):1451-1464.
2. Rivkin M, Banerjee S, Guan T, Hendrix C. The Importance of Primary Care Cognitive Evaluation in Detecting an Atypical Presentation of Normal Pressure Hydrocephalus. Cureus. 2024 Jun 11;16(6):e62166.
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3. Case Report on Acute Flaccid Myelitis Caused by Enterovirus D68

Introduction:

Acute flaccid myelitis (AFM) is a spinal cord illness that primarily affects children and causes acute flaccid paralysis in one or more limbs.[1] AFM typically causes respiratory symptoms such as rhinorrhea, cough, pharyngitis, and fever among patients. There are currently no definitive prognostic variables or etiologies identified. EV-D68 may play a role in the pathogenesis of AFM. There are limited treatment options with varying outcomes. Supportive therapy has proven to be the most beneficial.[2] A Recent research demonstrated an association between EV-D68 outbreaks and AFM.[1] This case described the first pediatric case of AFM related to EV-D68, which had the particularity of being combined with an A71 infection.

Diagnosing AFM can be challenging as the virus is typically found in respiratory tract and stool samples rather than CSF.

Case Presentation:

A previously healthy 4-year-old girl experienced abrupt paralysis of her right upper limb. The patient had received all necessary vaccinations, including one against poliomyelitis. The patient initially reported pain in her right arm, followed by weakness and torticollis the next

morning. Clinical findings indicated agitation, weak neck control, and proximal paralysis with areflexia of the right upper limb (MRC score 0/5). No ataxia or cranial nerve dysfunctions were observed. A slight upper respiratory tract illness with fever was observed around 10 days before the episode. The initial head computed tomography scan yielded no notable findings. The blood test revealed mild inflammatory symptoms, including an erythrocyte sedimentation rate (ESR) of 30 mm/h, CRP levels below 0.5 mg/L, and a normal leukocyte count. Serological testing for Borrelia, Epstein-Barr virus, and cytomegalovirus were negative. The cerebral fluid (CSF) contained 28 red blood cells/mm^3, 250 white blood cells/mm^3, 87 mg/dL glucose, and 35 mg/dL protein. Both bacteriology and PCR tests for meningo-encephalitis in CSF yielded negative results. MRI scans of the brain and spinal cord showed increased T2 signal intensity in the central gray matter of the cervical cord from C2 to C7, as well as involvement of the posterior brainstem (Figure 1). The MRI pattern resembled earlier outbreaks of viral myelitis caused by enterovirus A71 (EV-A71), EV-D68, and poliomyelitis. More precisely, the absence of supratentorial lesions and the limitation of signal abnormalities to the central gray matter allowed to rule out other potential diagnoses, such as acute disseminated encephalomyelitis and neuromyelitis optica spectrum disorder (NMOSD). EV-D68 and human-herpes virus 6 were discovered in a nasopharyngeal aspirate, whereas EV-A71 was found in stools via PCR. The optic fundus was normal, eliminating the possibility of NMOSD. AFM diagnosis was confirmed based on clinical and radiographic criteria. Initially, the patient received high-dose corticosteroids (30 mg/kg/day for four days); still, no clinical improvement was observed. Second-line treatment with intravenous immunoglobulins (500 mg/kg/day for 4 days) showed some motor improvement. After 4 days, a medullary MRI revealed a clear reduction of the lesions (Figure 1) and decreased cerebrospinal pleocytosis (41 white-blood cells/mm3, 97% lymphocytes). In parallel, the patient received extensive physiotherapeutic therapy. At 3 months following disease onset, a motor nerve conduction investigation indicated motor involvement in the cubital nerve, and electromyography (EMG) revealed uncommon fibrillation potentials in the deltoid (motor unit action potential was not investigated due to sedation). The sensory nerve conduction testing of the right upper limb was completely normal. The patient was discharged after 8 days of hospitalization and underwent extensive therapy. After partially recovering muscle strength, the patient experienced proximal paresis of the right arm and shoulder muscle atrophy three years later.

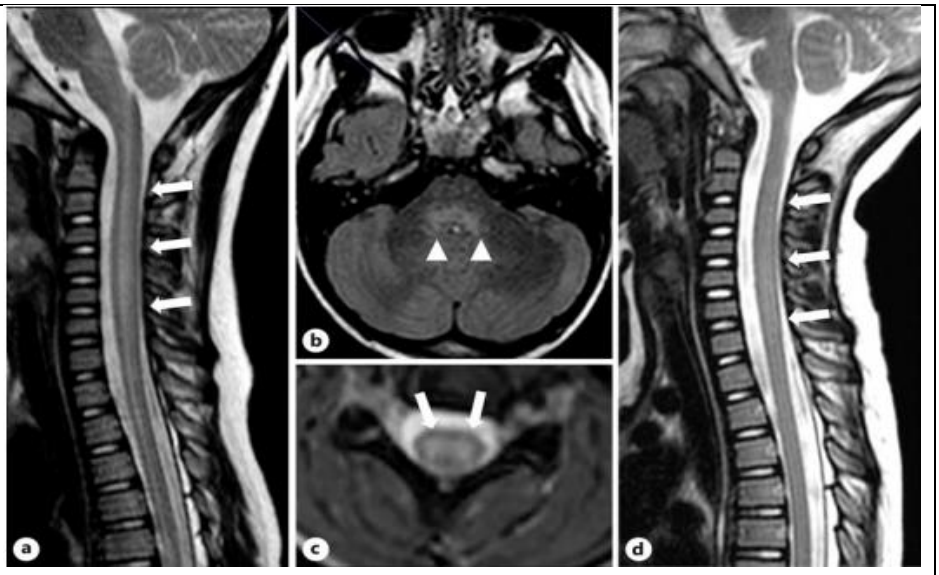

Figure 1. Admission (a–c) and follow-up (d) MRI results. a) Sagittal T2-weighted scan reveals widespread elevated signal intensity and significant edema of the cervical spinal cord (arrows). b) An axial T2 FLAIR-weighted picture reveals increased signal strength in the dorsal pons (arrows). c) The axial gradient-recalled echo (GRE) T2-weighted picture at the C4 level shows increased signal intensity in the core gray matter, but not in the peripheral white matter (arrows). d) MRI of the spinal cord after 4 days of therapy indicates a nearly full reduction of signal abnormalities (arrows).

Discussion:

This was an AFM case involving a 4-year-old girl who tested positive for EV-D68. Intensive care with cardiorespiratory monitoring is necessary due to the potential for bulbar lesions and respiratory failure.[1] Approximately 44% of patients in the US require mechanical ventilation. There are no specific treatments, vaccines, or recommendations for the acute phase, therefore treatment was primarily supportive.[3]

Conclusion:

This was the first reported case of EV-D68-related AFM, with a severe clinical presentation similar to poliomyelitis. Accurate detection and documentation of AFM is crucial to prevent under- or misdiagnosis. Diagnosing this severe condition can be challenging as the virus is typically found in the respiratory tract and stool samples rather than CSF.

References:

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4. Case report on changes in corticospinal tract consistency following dry needling in a stroke patient

Introduction:

Stroke is an acute neurological impairment caused by vascular injury (infarction or hemorrhage) in the central nervous system. Stroke is the second greatest cause of mortality and disability globally. Hypertension is the leading modifiable risk factor for stroke, with varying contributions among subtypes. The majority of strokes (85%) are ischemic, caused by small vessel arteriolosclerosis, cardioembolism, and large artery atherothromboembolism. Approximately 15% of strokes worldwide are caused by intracerebral hemorrhage, which can be deep (basal ganglia, brainstem), cerebellar, or lobar.[1] Spasticity after a stroke is a frequent motor disorder that can lead to functional disability and lower quality of life. Spasticity impairs active movement by increasing the excitability of the stretch reflex. The corticospinal tract (CST) is a crucial channel for voluntary movements that might be damaged after a stroke. There is a significant association between CST remodeling post-stroke and spasticity decrease. Dry needling (DN) is an option for managing muscle spasticity. Previous studies showed that DN can enhance muscle spasticity, active movement, motor neuron excitability, and brain activity in stroke patients. This case study was the first work to evaluate the impact of DN on CST consistency using diffusion tensor imaging (DTI) in a stroke patient.[2] In this case, a patient with stroke and spasticity reported changes in CST consistency after DN intervention using DTI.

In a patient with chronic stroke, three Dry needling (DN) sessions improved hand dexterity, wrist flexor spasticity, wrist active and passive extension, and CST connection.

Case Presentation:

A 57-year-old man had a persistent ischemic stroke, resulting in right hemiplegia and spasticity lasting 9 months. He was able to walk alone. He had no comorbidities like heart disease, diabetes, or hypertension. Before starting DN therapy, he had already completed rehabilitation programs and received medications. The Persian version of the Modified Modified Ashworth Scale (MMAS) was used to assess wrist flexor spasticity on the affected side. The scale ranges from "0" (no increase in muscle tone) to "4" (affected part inflexible in flexion or extension). A conventional goniometer was used to measure the active and passive range of motion (ROM) of the wrist extension. Hand dexterity was evaluated using the box and block test (BBT). Diffusion Tensor Imaging (DTI) is an MRI technique used to assess CST consistency. The Constrained Spherical Deconvolution (CSD) approach was applied to CST tractography. The fractional anisotropy (FA) of molecular mobility in white matter was measured in three regions of interest (ROIs): pyramids, cerebral peduncles, and posterior limbs of the internal capsule, as well as throughout the CST. Following the baseline assessment, the affected side's flexor carpi radialis (FCR) and flexor carpi ulnaris (FCU) were dry-needled for three sessions with a 48-hour interval using a sterile, stainless, and disposable needle (0.25 × 0.30; DongBangAcuPrime Ltd., Korea). Muscles were needled for 1 minute utilizing a fast-in and fast-out approach. The motor points of the muscles were needled. After DN intervention, the MMAS score for wrist flexors decreased from "3" to "1". After DN, both active and passive wrist extension range of motion (ROM) improved by 12° and 16°, respectively. The BBT resulted in improved hand dexterity, from a pre-DN score of "12" to "24" (Table 1). The baseline FA values in the three ROIs and ipsilateral CST were significantly lower compared to the contralateral side. After DN therapy, both ipsilesional and contralateral sides had higher FA values after DTI. After DN therapy, the average FA of ipsilesional CST increased from 0.35 at baseline to 0.39. After applying DN, the baseline FA asymmetry decreased from 0.18 to 0.13. The pre-DN rFA was 0.69, which increased to 0.76 after DN intervention. Furthermore, the FA value at the pyramid location increased from 0.26

Variables	Pre	Post
MMAS score	3	1
Wrist active extension ROM (degree)	28	40
Wrist passive extension ROM (degree)	49	65
Box and Block Test (number)	12	24

Table 1: Clinical outcomes before and after dry needling treatment.

MMAS**, Modifed Modifed Ashworth Scale;** ROM**, range of motion.**

at baseline to 0.28 following DN therapy. Figure 1 shows the improvement in CST connection following DN.

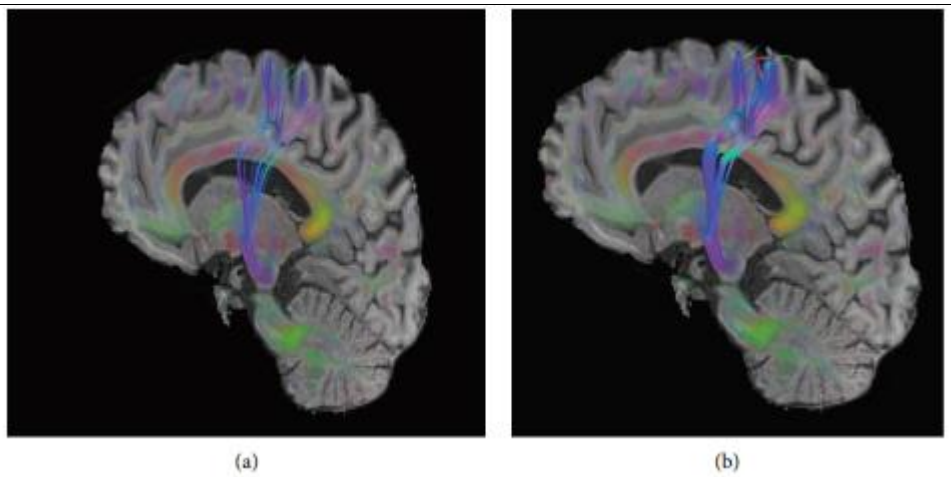

Figure 1: Sagittal views of the ipsilesional corticospinal tract (CST) before and after dry needling (DN). After DN, there was an increase in fractional anisotropy, which indicates CST connection (blue color).

Discussion:

This case study found that three DN sessions resulted in significant improvements in CST consistency, wrist flexor spasticity, active and passive wrist extension ROM, and manual dexterity assessed by the BBT hand dexterity test. In this case, the MMAS score for wrist flexors improved from "3" to "1" after DN intervention.[2] A previous case found minimum clinically important changes (MCIC) of 0.48 and 0.76 for upper extremity muscles (elbow, wrist, and finger).[3] The reduction in MMAS grade and improvements in both passive and active wrist extension indicate improvements in spasticity.[4] Reducing muscle stiffness and improving CST consistency can lead to better wrist active and passive extension.[2]

Conclusion:

Three sessions of DN improved CST connection, wrist spasticity, wrist extension, and hand dexterity in a chronic stroke patient. DN can effectively decrease muscular stiffness in stroke patients due to its low cost, ease of use, and remodeling effects on CST.

References:

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