

Effect of Sensory Reeducation Training on Upper Limb in Sensory Brain Calcification Syndrome; A Case Report

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Case Summary

Brain calcification is a neurodegenerative disease in which calcium deposits in various parts of the brain causing a wide variety of impairments in the affected patient. In the current study, a female patient presented with brain calcification in right parietal region. She has disturbing sensory lag and anosognosia along with changes in other combined cortical sensations. Patient received sensory discrimination training and sensory reeducation training for about 10-15 minutes a day up to 6 weeks. Data was collected at baseline, after 2 and 6 weeks of intervention. Sensory grading scale system was used, and hand mapping was done for tactile localization. Marked improvements were noted in sensory modalities. Thus, it can be concluded that sensory discrimination and sensory reeducation training both are an effective adjunct in treating patients with sensory impairments associated with brain calcifications.

Key words: Brain calcification, sensory discriminative training, sensory reeducation

Introduction

Brain Calcification is a neurodegenerative condition characterized by abnormal deposits of calcium/ hydroxyapatite in different areas within the brain. The most common sites include the pineal gland, habenula, choroid plexus, basal ganglia, falx, tentorium, petroclinoid ligaments and sagittal sinus. Rarely parietal cortex of brain is also involved causing sensory impairments.^{1,2}

The commonly occurring motor symptoms includes body weakness, clumsiness, fatigue, slow or slurred speech, dysphagia, spastic paralysis and in some patients twisting movements of the hands and feet. Additionally, muscle cramping and uncontrollable spasmodic irregular movements may also occur. The Sensory symptoms include changes like; proprioceptive impairment, anosognosia, changes in two point discrimination, abarognosis, sensory over responsiveness, as well as headaches and urinary incontinence. Psychotic symptoms include mood swings, lack of concentration and dementia.³

Most of the times brain calcification occurs with age related changes but in some cases it has tendency to be inherited from parents. The other causes of calcium build up in brain

includes: infection, Parathyroid dysfunction or associated with tumors etc.⁴

Case Presentation

A 26 years old unmarried female, presented with complaints of sudden onset of weakness on left side of body along with facial numbness. She was also having facial muscle spasm which was associated with exposure to cold environment. The patient was having speech difficulties for the last few days after the onset of symptoms. She was having no history of diabetes or hypertension and there was none neurological illness history among the family.

On assessment, her blood pressure was 80/50mmHg, SpO2 96% and GCS was 15/15 at time of presentation in the ER. Her physical examination at baseline showed muscular strength as 3+/5 in left Upper and lower extremity on Manual muscle testing and there were impairments in her sensory modalities i.e. touch, tactile localization barognosis and two point discrimination. She was presenting sensory over responsiveness for touch sensation i.e. she felt sensation of

touch even after removing the stimulus for few seconds termed as sensory lag.

Her psychiatric evaluation described her with low mood low energy, decreased appetite, loss of concentration and pseudodementia. Her Computed tomography (CT) of brain showed an extra dural focus of interrupted calcification in Right High Parietal region. A focus of calcification was also found along with falx cerebri, which is usually a rare presentation in clinical settings. ⁴

Along with medications prescribed by general physician, sensory re education training program and sensory discriminative training were added in treatment protocol for sensory impairments of upper limb mainly hand; that were most severely affected. Before inclusion in the study, informed consent was taken from the patient herself. Sensory retraining programme included training for tactile localization, barognosis, and touch (over-responsively) for upper extremity to restore brain's ability to interpret senses. All of the exercises involved touch stimulation to encourage brain to rewire itself. Following

Table I: Sensory Over Responsively Disorder (SOR)

Region affected	Sensory lag		
	Baseline Mean of all points (sec. msec)	After 2 weeks Mean of all points (sec. msec)	After 6 weeks Mean of all points (sec. msec)
Thumb	3.25	2.13	0.39
Index finger	3.22	1.68	0.00
Middle finger	3.45	2.29	0.00
Ring finger	3.57	1.58	0.00
Little finger	3.58	1.88	0.00
Palm	3.34	1.74	0.16

Total points: Thumb: 6, Index finger: 6, Middle finger: 6, Ring Finger: 6, Little Finger: 6, Palm: 9

exercises were included in the treatment protocol: tabletop touch therapy, texture handling, temperature differentiation, sensory locating, sensory correct responsive training and mirror training.

All these exercises were initially performed with eyes closed but when patient didn't point to the correct area then she

Table II: Sensory Discrimination Disorder (SDD):

Region affected	Tactile localization Points								
	Unable to localize			False localization			True localization		
	Baseline	2 weeks	6 weeks	Baseline	2 weeks	6 weeks	Baseline	2 weeks	6 weeks
Thumb	0	0	0	4	2	0	2	4	6
Index finger	0	1	0	3	1	0	3	4	6
Middle finger	1	0	0	3	4	0	2	2	6
Ring finger	0	0	0	4	2	0	2	4	6
Little finger	0	0	0	3	2	0	3	4	6
Palm	0	0	0	8	4	2	1	5	7

was asked to open her eyes to visually absorb the information. Each exercise was done for at least 10 repetitions and practiced for about 10-15 minutes a day up to 6 weeks.

Her second reading was taken after 2 weeks and there were significant improvements in all impaired sensory modalities. Then third and last reading was taken after 6 weeks and there was significant recovery in her sensory impairments (Table II). For detailed description of sensory atognosia and lag, hand mapping was done at baseline, after 2 weeks and after 6 weeks of intervention (figure 1). Future studies are recommended on large sample size and with different other conservative treatments.

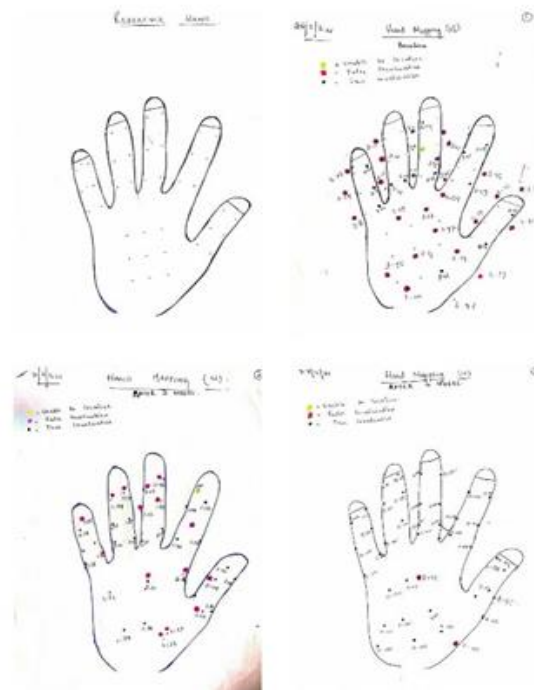


Figure 1. Hand Mapping showing sensory atognosia and lag at baseline, after 2 weeks and 6 weeks of intervention

Discussion

Sensory retraining programme for tactile discrimination including specific graded discrimination tasks,

attentive exploration of stimuli with vision occluded, deliberate anticipation, and quantitative feedback causes significant improvement in tactile discrimination and proprioception.⁵ Sensory Retraining can be performed in 2 stages. Stage 1 implemented after complete re-innervation and includes home based sensory retraining including identification of different objects and localization of crude touch with both eyes open and closed. Second stage targeted more on training for two point discrimination and stereognosis with eyes open and closed. There were significant sensory improvements in locognosia when the application of treatment according to above mentioned protocol.⁶ Sensory re education and sensory discrimination training for 30 min both with eyes open and eyes closed imparted improvement in tactile acuity and reduction in pain threshold especially if the training was performed in front of mirror in patients presenting with phantom limb pain, CRPS and other neurological conditions such as stroke.⁷ Sensory reeducation program showed significant improvements in object recognition with long term effects on body image and ADLs in a patient with insensitive hand when provided in customized tailored pattern.⁸

Conclusion

It is concluded that sensory re education and sensory discriminative training improves tactile localization and sensory lag of upper limb in patients presenting with brain calcification.

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