Anatomy of Cerebellar Mutism: Reduced Fractional Anisotropy in the Superior Cerebellar Peduncle

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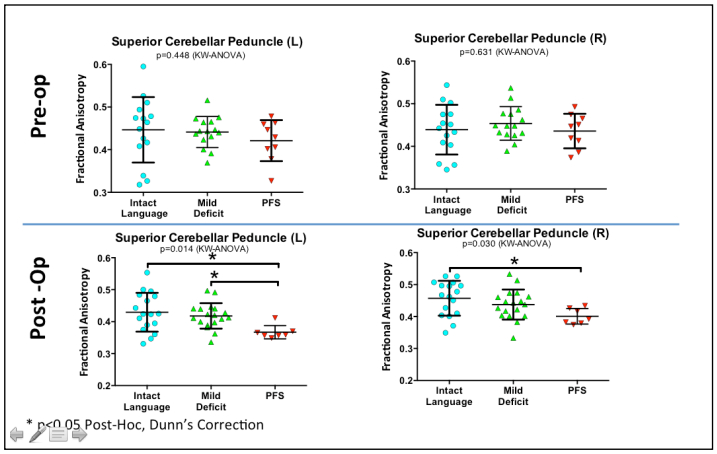
Introduction

Cerebellar mutism is a common finding after resection of cerebellar tumors, especially in children. It has been reported to occur in up to 39% of posterior fossa tumor resections. Once thought to be a transient finding, a growing body of evidence has associated it with long-term neurological sequela. The pathophysiology and anatomy of this phenomenon remains controversial.

Methods

All patients with cerebellar tumors undergoing resection at Seattle Children's Hospital from June of 2010 to June of 2015 were retrospectively reviewed. Each patient underwent a DTI sequenced MRI of the brain as part of their post-resection imaging. Cerebellar mutism was defined in patients who where awake and without focal deficit but unable to produce more than single words and eventually recovered fluent speech. Patients suffering cerebellar mutism were compared to post resection patients who had fluent speech with no language deficit and patients who had fluent speech with mild language deficit.



Results

Seven patients (17%) met criteria for postoperative cerebellar mutism. 18 patients (43%) had fluent speech with mild language deficit, and 17 patients (40%) had fluent speech with no language deficit. Fractional anisotropy (FA) was markedly reduced in the superior cerebellar peduncle (SCP) (p=.01) of patients suffering from cerebellar mutism compared to both groups of verbally fluent patients. No changes where seen in mean diffusivity (MD), radial diffusivity (RD), or axial diffusivity (AD) of the SCP. No changes where seen in FA, MD, RD, or AD in the middle cerebellar peduncle, inferior cerebellar peduncle, or the white matter of the cerebellum.

Conclusions

Patients suffering from cerebellar mutism showed marked changes in the FA of the SCP. No changes where seen elsewhere in the cerebellum. These changes may not be seen with conventional MRI techniques that do not employ DTI sequences.

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