

Mirror movements in children: Case series

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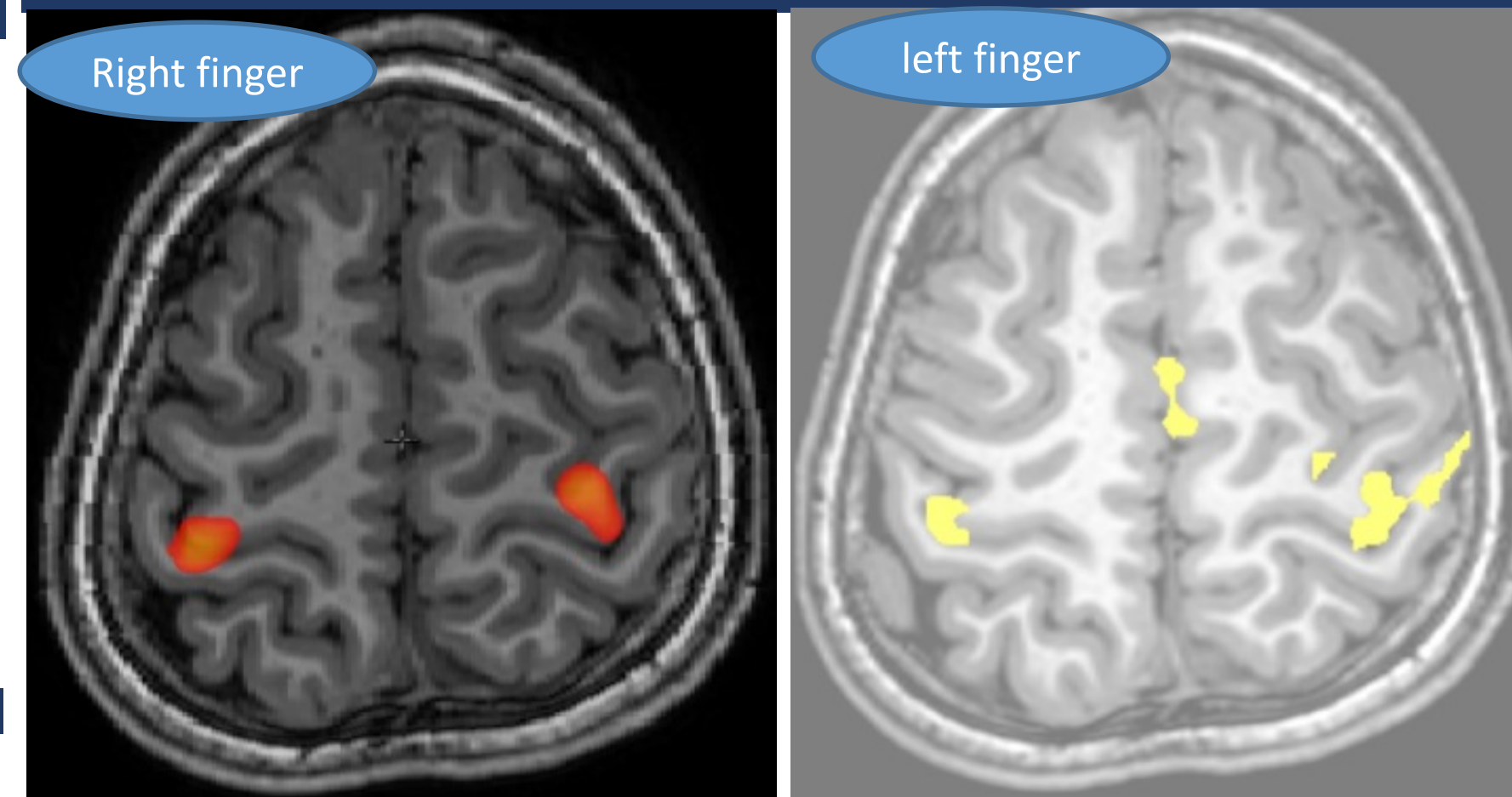
INTRODUCTION

- ✓ **Objective:** To describe children with mirror movements (MMs) and insights from functional MRI
- ✓ MMs : involuntary movements of one side of the body that mirror the intentional movement of the contralateral homologous body part.
- ✓ In syndromic children (Kallman, Klippel feil syndrome, posterior fossa malformations) as well as hemiplegic cerebral palsy.
- ✓ Non syndromic and nonstructural cases may be genetic such as DCC and RAD51 mutations.
- ✓ We describe 2 cases with mirror movements:
 - ✓ Case 1 Developmentally normal girl / Normal MRI
 - ✓ Case 2 Global devpt delay with cerebellar features and MRI showing Molar tooth sign

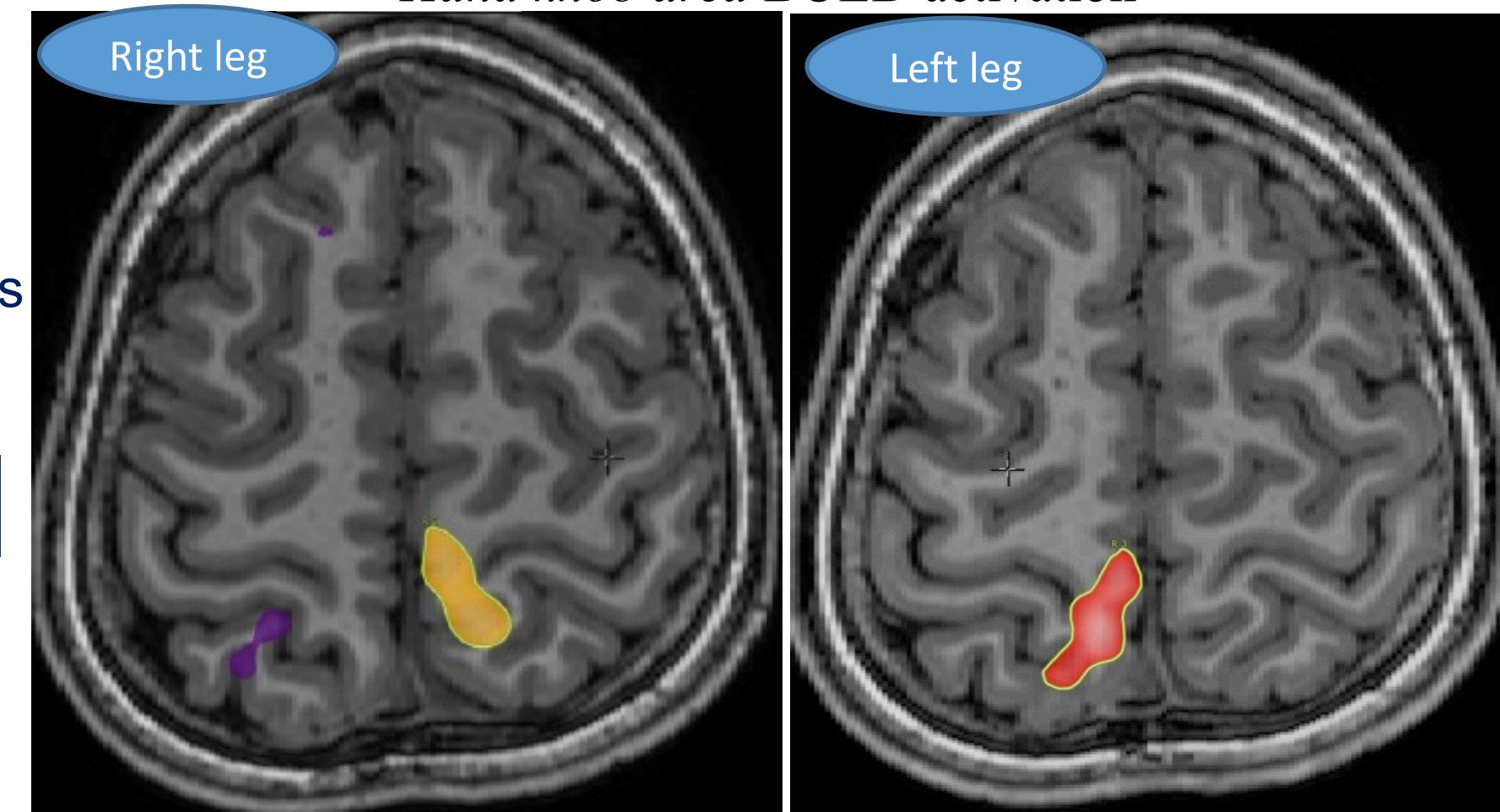
CASE 1

- ✓ A 9 yr developmentally normal girl
- ✓ unintentional hand movements of the other hand when she uses one hand leading to embarrassment in school while writing,
- ✓ Noticed since 2 years of age.
- ✓ No significant worsening/increase in the intensity of these movements
- ✓ No involvement of lower limbs.
- ✓ No history of other involuntary movements
- ✓ Neurological examination essentially normal except the bimanual synkinesis on asking to perform hand tasks including writing.
- ✓ The amplitude and extent of limb of MMs was lesser vis a vis limb performing voluntary task and were partially suppressible.
- ✓ MRI Brain : normal

FUNCTIONAL MRI MOTOR CORTEX : CASE 1



Finger tapping task: **Bilateral** precentral gyri :
Hand knob area BOLD activation



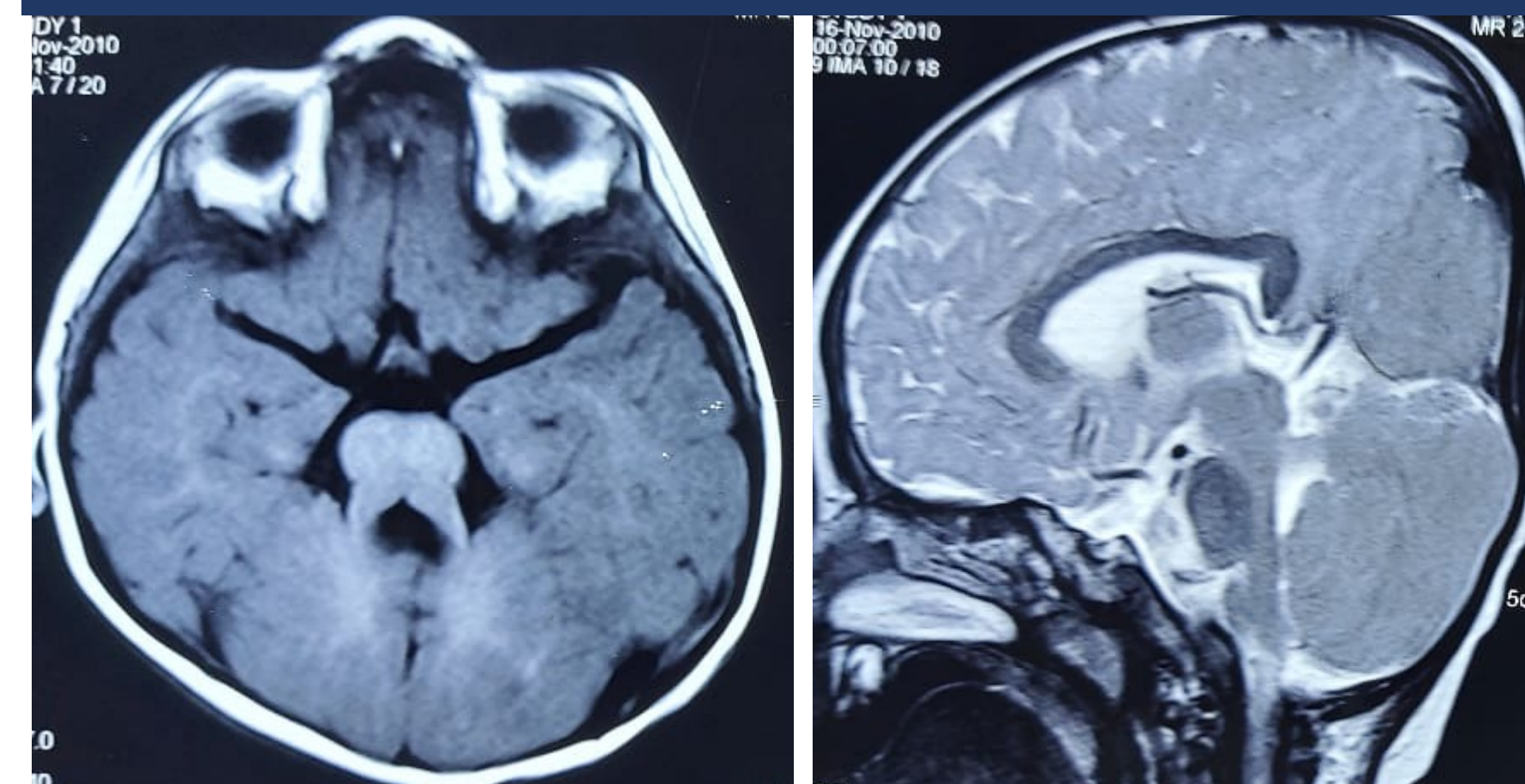
Leg inversion/eversion task: **Contralateral** BOLD activation of foot motor area , parafalcine cortex in precentral and postcentral gyri/paracentral lobule

CASE 2

- ✓ A 10 year old boy
- ✓ Abnormal eye movements
- ✓ History of funny hand movements of contralateral hand whenever he attempts from one hand.
- ✓ The course has been static
- ✓ No involvement of lower limbs.
- ✓ There is history of developmental delay in all spheres and no other involuntary movements.
- ✓ On exam he had cerebellar signs with nystagmus.

- ✓ Bimanual synkinesis on asking to perform hand tasks including writing was demonstrated.
- ✓ Moderate intellectual disability : IQ testing
- ✓ MRI Brain : Molar Tooth Sign s/o Joubert Syndrome Related Disorder
- ✓ Fundus, Renal eval :essentially normal and child noncooperative for Functional MRI due to ID.

NEUROIMAGING : CASE 2



- Molar tooth sign on T1 Axial sequence & thick elongated superior cerebellar peduncles, 4th ventricle pointed anteriorly, midline vermian cleft

DISCUSSION:

- ✓ Mirror movements are involuntary movements activated by voluntary movements of the contralateral limb
- ✓ MMs : Soft Neurological Sign
- ✓ Mirror movements occur exclusively or predominantly in hands especially fingers
- ✓ Generally of lesser amplitude than the contralateral voluntary activity
- ✓ Can be seen in healthy children exclusively/ predominantly in hands, they tend to typically disappear and intensity decrease with age, with the myelination/maturation of motor pathways.
- ✓ Can be partially suppressed

- ✓ Persistent movements warrant further investigations
- ✓ Functional MRI : giving exciting inputs for developing treatment modalities like mirror therapy
- ✓ A subset of affected individuals with a heterozygous pathogenic variant in *DCC* may have MM with abnormalities of the corpus callosum & concomitant cognitive and/or neuropsychiatric issues

VIDEOS CASE 1 & 2 ATTACHED OF MIRROR MOVEMENTS

CONCLUSIONS

- ✓ Mirror movements can also be seen in normally developing children
- ✓ However persistence /or reappearance of involuntary synkinetic mirroring movements is usually considered pathological.
- ✓ Management of children :special accommodations
 - ✓ Provision of decreased writing work and extra time for exams
 - ✓ Need for sensitizing the doctors/society.
- ✓ Later in life professions requiring precision and hand coordination/repetitive hand activity may be avoided to limit discomfort and embarrassment.

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