Hypertrophic Olivary Degeneration
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Section: Neuroradiology
Area of Interest: Neuroradiology brain
Procedure: Diagnostic procedure
Imaging Technique: MR
Imaging Technique: CT
Special Focus: Biological effects Haemorrhage Case
Type: Clinical Cases
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Patient: 56 years, female

Clinical History:
A 56-year-old female patient presented with dizziness and a history of pontine haemorrhage (1 year ago), due to an episode of hypertension.

Imaging Findings:
Figure 1: axial T2 (a) and FLAIR (b) showed an increase in the size and contour bulge of the left side of the medulla (site of inferior olivary nucleus) indicating hypertrophy, associated high signal on T2 and FLAIR images is noted.
Figure 2: the more superior cuts, axial T2 (a) revealed ipsilateral pontine irregular area of reduced volume and mixed low T1 and high T2 signal representing chronic haemorrhage. Axial DWI (b) show signal drop by hemosiderin.
Figure 3: sagittal T2 images showing pontine chronic haemorrhage and medullary high signal.
Figure 4: old CT images of the same patient, 1 year earlier show acute pontine haemorrhage.

Discussion:
Hypertrophic Olivary Degeneration (HOD) is trans neuronal degeneration secondary to a pathology interrupting the dento-rubral-olivary neuronal pathway. The dentate nucleus of the cerebellum on one side with the red nucleus (brain stem) and inferior olivary nucleus (medulla oblangata) on the contralateral side constitute the triangle of Guillain and Mollaret. The red nucleus and ipsilateral inferior olivary nucleus are connected through the central tegmental tract. The red nucleus is connected to the contralateral dentate nucleus through the superior cerebellar peduncle. The inferior olivary nucleus is connected to the contra lateral dentate nucleus through the inferior cerebellar peduncle. [1, 2].

The HOD occurs on the same side of a pathology affecting the central tegmental tract and on the contra lateral side of a pathology affecting the dentate nucleus or superior cerebellar peduncle. The HOD may be bilateral in a case of pathology affecting both the central tegmental tract and superior cerebellar peduncle[1, 2].

Clinically, patients present with palatal tremors [1, 2].

The diagnosis is established by MRI. The diagnostic imaging pearls are high T2 signal and size changes of the inferior olivary nucleus. The presence of a lesion along the dento-rubral-olivary confirms the diagnosis [1-3].

The pathophysiological changes of HOD and the corresponding imaging findings vary through time. Within the first 6 months: high T2 signal of inferior olivary nucleus which persists for a long time. From 6 months and up to 3-4 years:
hypertrophy of the inferior olivary nucleus. After 3-4 years: inferior olivary nucleus atrophy and decrease in size [3].

HOD is a unique neurodegenerative disorder, presenting with palatal tremors. It occurs secondary to pathology interrupting the dento-rubral-olivary pathway. The diagnosis is made by MRI. The findings are: inferior olivary nucleus high T2 signal and size changes [1-3].

**Differential Diagnosis List:** Hypertrophic Olivary degeneration secondary to ipsilateral pontine hemorrhage., Multiple Sclerosis, Wallerian Degeneration, Medulla Infarction

**Final Diagnosis:** Hypertrophic Olivary degeneration secondary to ipsilateral pontine hemorrhage.

**References:**


Figure 1

a

Description: Left inferior olivary nucleus: enlarged and of high T2 signal
Origin: Zeitoun R., Faculty of Medicine, Cairo University

b

Description: Left inferior olivary nucleus: enlarged and of high FLAIR signal
Origin: Zeitoun R., Faculty of Medicine, Cairo University
Figure 2

a
Description: Ipsilateral old pontine haemorrhage  
Origin: Zeitoun R., Faculty of Medicine, Cairo University

b
Description: Ipsilateral old pontine haemorrhage, diffusion weighted image showing (hemosiderin) signal drop  
Origin: Zeitoun R., Faculty of Medicine, Cairo University
Figure 3

Description: Sagittal T2 image: pontine old haemorrhage and ipsilateral inferior olivary hypertrophy and high T2 signal

Origin: Zeitoun R., Faculty of Medicine, Cairo University
Description: Old CT image showing pontine acute haemorrhage
Origin: Zeitoun R., Faculty of Medicine, Cairo University
Description: Coronal T2 image:
Blue circle represents the red nucleus. Orange circle represents the inferior olivary nucleus. Yellow circle represents the contra lateral dentate nucleus. Origin: Zeitoun R., Faculty of Medicine, Cairo University