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The Radiological Changes Found in Hypertrophic Olivary Degeneration

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Abstract

The triangle of Guillain and Mollaret, also known as the dentatorubro-olivar pathway is divided into nuclei, these being the red, inferior olivary and contralateral dentate nuclei. In general, among the most common diseases associated with this triangle, there are three types of important changes. Hypertrophic olivar degeneration, contralateral cerebellar atrophy and Holmes tremor. Degenerative Olivary Hypertrophy (DOH) is a rare entity, reported at any age and affecting both sexes. This study is a literature review carried out in September and October 2022, by means of an electronic search in the following databases: PubMed, SciELO and Periódicos CAPES. The descriptors used were Triangle of Guillain, hypertrophic olivary degeneration and radiological changes. Scientific articles from the last 7 years with the main radiological findings of this pathology were searched. The radiological finding of DOH is characterized as a T2-hyperintense lesion in the anterolateral portion of the bulb, in the region of the oliva, associated with increased volume of this structure, which does not present contrast uptake. Therefore, in view of the reports of radiological manifestations related to hypertrophic olivary degeneration, it is important to recognize the characteristic radiological signs of this pathology and encourage further studies to elucidate the subject under consideration.

Keywords: Triangle of guillain • Hypertrophic olivary degeneration • Radiological changes

Introduction

The triangle of Guillain and Mollaret, also known as the dentatorubro-olivar pathway is divided into nuclei, these being the red, inferior olivary and contralateral dentate nuclei. The rubro-olivar fibres descend from the parvocellular division of each rubro nucleus along the central tegmental tracts to reach the capsule of the ipsilateral inferior olivary nucleus (ION). From the ION, olivocerebellar fibres cross the contralateral inferior cerebellar peduncle to reach the cerebellar cortex, then pass from the cerebellar cortex to the contralateral dentate nucleus. The dentatorrhubral fibres then ascend through the contralateral superior cerebellar peduncle, decussate in the mesencephalon and return to the original nucleus rubro [1].

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The Guillain-Mollaret triangle comprises the ipsilateral red nucleus in the mesencephalon, the inferior olive in the medulla and the contralateral dentate nucleus in the cerebellum: together they form the dentate-red-olive pathway. Pathology in this triangle disinhibits and promotes an activation of the inferior olivary nucleus. Consequently,the olivary nucleus increases in size, that is, it generates hypertrophy and its rhythmic discharges may manifest clinically as oculopalatal tremor [2].

In general, among the diseases most commonly associated with this triangle, there are three types of important alterations. Hypertrophic olivary degeneration, manifested as palatal myoclonus contralateral to lesions of the superior cerebellar peduncle ipsilateral to lesions of the central tegmental tract, cerebellar atrophy contralateral to lesions of the olivocerebellar fibers and Holmes tremor dual lesions in both the dentatorrubral- olivary system and the nigro-striatal dopaminergic system, highlighted by Raina [3].

Degenerative Olivary Hypertrophy (DOH), Hypertrophic Olivary Degeneration or Pseudohypertrophy of the Lower Olivary Nucleus (ION) is a rare entity, reported at any age and affecting both sexes. It consists of a secondary degeneration of the ILN, usually caused by primary lesions in the Dento-Rubro-Olivary pathway or in the Guillain-Mollaret Anatomical Triangle [4].

Trans-synaptic differentiation of the inferior olivary nucleus results in the clinical manifestations of this syndrome, including palatal myoclonus (both oropharyngeal and uvula muscles) associated or not with other brainstem nucleus-dependent myoclonus, such as dentatorrubral eye tremor and ocular myoclonus, since the involvement of the central tegmental tract results in an absence of inhibitory control in these nuclei [5].

Results and Discussion

The study in question is a literature review conducted in September and October 2022, through electronic search in the databases U.S National Library of Medicine (PubMed), Scientific Eletronic Library Online (SciELO) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES Periodicals). The keywords used for the search were, respectively: Triangle of Guillain and hypertrophic olivary degeneration and radiological changes. Scientific articles referring to the last 7 years on the main radiological findings described in this pathology were searched.

The radiological finding of DOH is characterized as a lesion with hypersignal on T2 in the anterolateral portion of the bulb, in the region of the olive, associated with increased volume of this structure, which does not present contrast uptake. In addition, the volumetric reduction of the cerebellar hemisphere contralateral to the olivary alteration corroborates the diagnosis [5].

BLANCO ULLA, 2015 reveals that in most case studies of patients with Degenerative Olivary Hypertrophy, hyperintensity in the inferior olivary nuclei on FLAIR and T2 weighted sequences were found as radiological findings. No signal change was observed on T1-weighted sequences and no increase was

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observed after intravenous injection of contrast material. In cases studied by diffusion-weighted imaging, no significant changes were observed on these sequences. Olivary hypertrophy was observed in all but one patient, in whom presumably insufficient time had elapsed for hypertrophy to occur.

Conclusion

The alterations may occur both bilaterally and unilaterally, configuring within the typical clinical manifestations has been stressing the importance of imaging studies in the improvement of the diagnosis of nervous system diseases. Therefore, considering the reports of radiological manifestations related to hypertrophic olivary degeneration, it is important to recognize the characteristic radiological signs of this pathology and encourage further studies to elucidate the present theme.

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