

Radiological Signs: The Key to Clinical Diagnosis

Gerardo Villegas López¹, Viridiana Perez Correa², Nabile Andrea Covarrubias², Ma del Pilar Gonzalez², Luz Gisela Cárdenas², Ana Luisa Zapata², Rolando Torres², Juan Alberto Garay², Jose Álvaro Zuluaga², Sergio Ernesto Miranda², Alberto Conrado Beltran², Froylán Mendoza², Jorge Luis Ramirez² and Jorge Alexis Zuñiga²

¹Pediatric Neuroradiologist, Deputy Regional Medical Director Northern Border, Poplar Medical Laboratory, Mexico

²Radiologist Physician, Chopo Medical Laboratory, Mexico

Correspondence

Gerardo Villegas López

Pediatric Neuroradiologist, Deputy Regional Medical Director Northern Border, Poplar Medical Laboratory, Mexico

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Abstract

Since the first years of university medical education, it was difficult to remember the names of diseases, eponyms, pathways, gyral tracts, convolutions and other neuroanatomical structures.

Semiology is the branch of medicine that studies, interprets and arranges the signs and symptoms of diseases in order to arrive at a diagnosis.

Radiological semiology is the art and science of diagnosis by means of images, thanks to which we can reach a presumptive diagnosis.

In radiology, to perform a correct semiology, it is necessary to have knowledge of different areas such as anatomy, physiology, pathology, if the patient has been previously treated or if the study is performed after a surgical approach.

Introduction

DHippocrates (500 years B.C.) practiced physical examination with inspection and palpation [1].

Leopold Auerbrugger (18th century) introduced percussion, reproducing what was done at that time to recognize the amount of liquid contained in wine barrels.

Corvisart (19th century), Napoleon's physician, performed direct auscultation by applying the ear to the patient's body.

René Theophile Jacinto Laennec, (1819) a student of Corvisart, developed the first stethoscope allowing indirect auscultation.

Nine years later, Piorry invented indirect percussion using a pleximeter, which was a metal instrument, and later the technique was implemented to be performed with the hands only.

In medicine, signs and symptoms are alterations of normality, relative to a potential pathological situation.

The difference between the two lies in the fact that symptoms are subjective sensations reported by the patient and signs are observations objectified by the physician.

Subjects and methods

Review article, To prepare this Article, We use, for educational proposes, images of our own clinical cases, some courtesy of the academic Bernardo Boleaga and some from

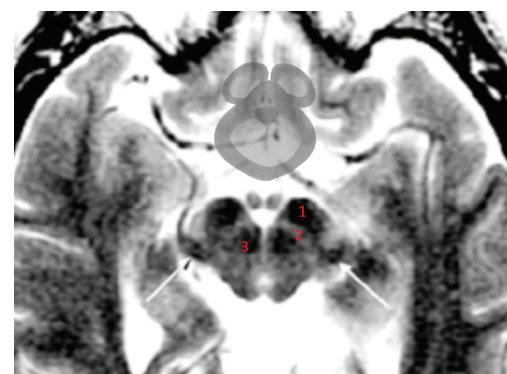
the literature to examemplify the pathologies and characteristic findings of neuro radiological signs.

Radiological signs

Some findings call them signs, and some of these have a name such as candle sign, silhouette sign, Rigler's sign etc. [2].

The dictionary of the Real Academia de la Lengua describes sign as an indication, sign of something.

Radiological sign, from a medical perspective, could be any objective abnormal observation in a radiological study,



The mesencephalic bear image 1. [3] courtesy Bernardo Boleaga in the axial image at the level of the midbrain that resembles the face of a "BEAR"

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The mesencephalic bear

The ears of the bear represent the mesencephalic peduncles and the pyramidal pathway 1, The eyebrow is the substantia nigra 2; The bear's eyes represent the red nuclei 3; The mouth is the cerebral aqueduct.

In this image there are several anatomical structures to remember, if the cut is obtained at the level of the inferior colliculi we will have the periaqueductal gray substance which is the real origin of the III nerve and its parasympathetic accessory nucleus also called Edinger westphal nucleus.

The damage of the III nerve will result in lesions of the levator muscle of the eyelid, the superior rectus muscle, the medial rectus muscle, the inferior rectus muscle and the inferior oblique muscle, there is also damage of the constrictor muscles of the pupil.

If the cut is in the superior colliculi then the IV nerve is observed, which is the only nerve of apparent origin that emerges by the posterior face towards the quadrigeminal lamina to decussate and go around the midbrain in adjacent path the quadrigeminal cistern, crural and ambiens to pass through the posterior perforated space to enter the cavernous sinus.

in case of involvement of the dorsal midbrain we will have as a result Parinaud's syndrome, which corresponds to a group of alterations of both extrinsic and intrinsic ocular motility.

The III nerve with apparent origin in the internal face of the mesencephalic peduncle, passes between the posterior cerebral arteries (PCA) and the superior cerebellar artery (SCA) towards the cavernous sinus.

Another aspect of the midbrain is that the ascending activating system runs around the cerebral aqueduct.

The red nucleus which on magnetic resonance imaging is more hypointense due to the red color in fresh anatomical preparations, as it contains a high concentration of iron.

It presents multiple afferent and efferent connections with the control of shoulder, arm and hand muscles.

The pyramidal pathway of the mesencephalic peduncles.

The hypothalamic jacket Bernardo Boleaga (3)

This image highlights the hypothalamic region, just posterior to the optic chiasm.

Continues with the visual pathway shirt sleeves

Chest the hypothalamus

In the shirt lower part of the chest overhangs the mammillary tubercles of the shirt lower part of the shirt

The shirt tie is related to the III ventricle and the shirt tie to the anterior recess of the III ventricle.

Some anatomical structures to remember

The optic chiasm is formed only by the representation of the nasal retinas, since the fibers of the temporal retina are ipsilateral.

The mammillary tubercles are important structures that are part of the limbic system, relevant functions of memory and evocation of memories among others.

The III ventricle is the diencephalic conduit of cerebrospinal fluid.

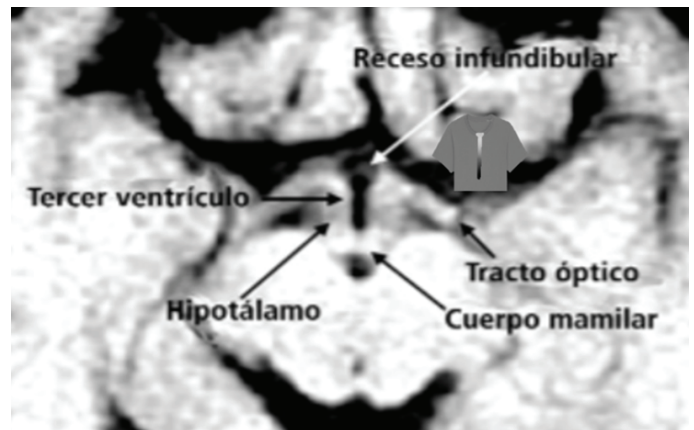


Figure 2: The hypothalamic shirt courtesy Bernardo Boleaga

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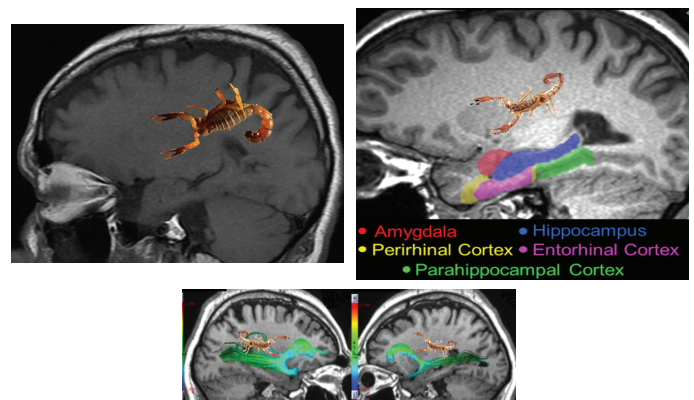


Figure 3: a, b and c The scorpion

The image of the scorpion

These images are observed in the sagittal plane T1 and T2 when the cuts are located for sagittal at the level of the temporal lobe, simulating a scorpion's pincer.

Correspond with the hippocampus, the hippocampus is part of the limbic system, it is also known as horn of ammonis solar Egyptian God with fleshy face and spiral-shaped horns so it has been assigned several regions CA1, CA2 and CA3, body of ammonis 1,2 and 3 for the center of long-term memory and the extraction of experiences from the frontal lobe.

Plays an important role in associative learning.

A hippocampal lesion may eventually condition amnesia in the production and evocation of memories

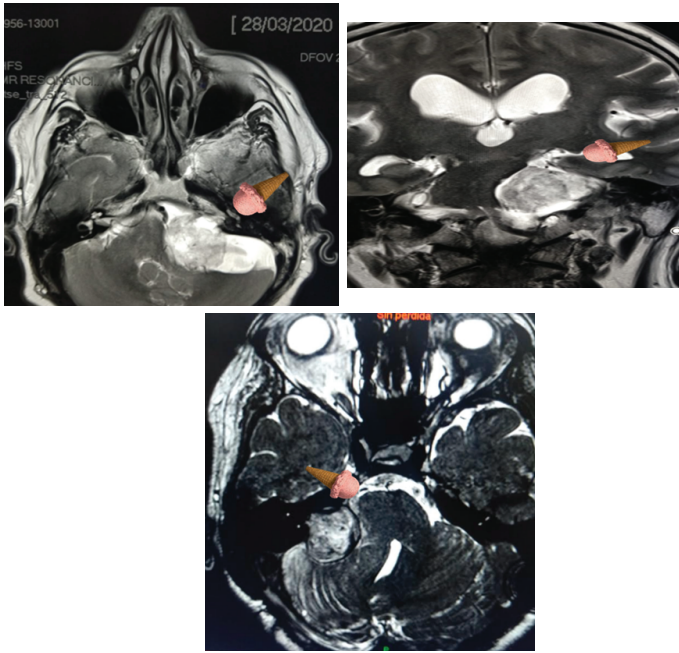


Figure 4: Ice cream cone

Ice cream cone

Patient with acoustic neurinoma in MRI with gadolinium, showing cystic area and solity of the tumor with canalicular component.

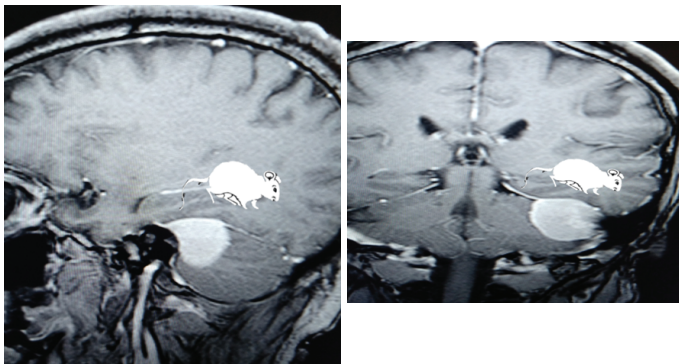


Figure 5: Dural tail.

Dural tail

Patient with left meningioma cerebellum tent with typical enhancement and presence of dural tail.

Dural tail is the enhancement of the meninx adjacent to the tumor, it is present in more than 58% of the cases.

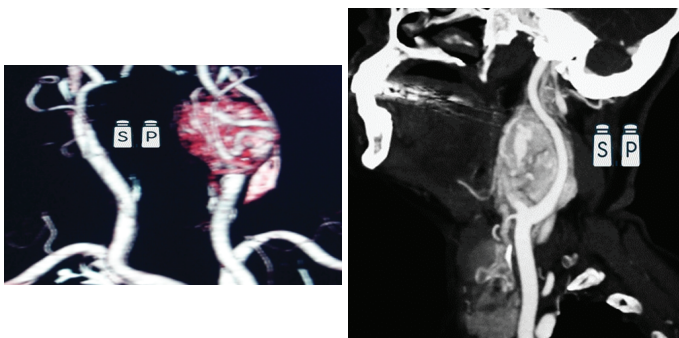


Figure 6: salt and pepper courtesy of Bernardo Boleaga MD

Salt and Pepper

Carotid glomus carotid mass of intermediate signal in typical salt and pepper with foci of signal enhancement due to hemorrhage and signal void due to intratumoral vessels since these are highly vascularized tumors.

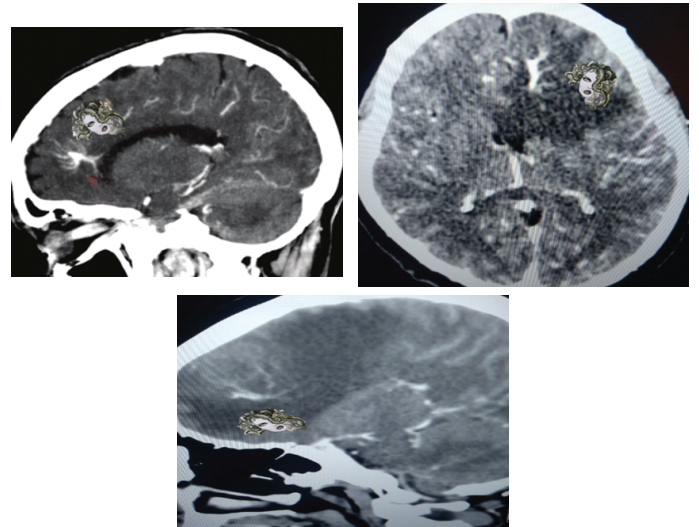


Figure 7: Jellyfish head

Jellyfish head

Characteristic image of venous malformation with drainage into a central vein.

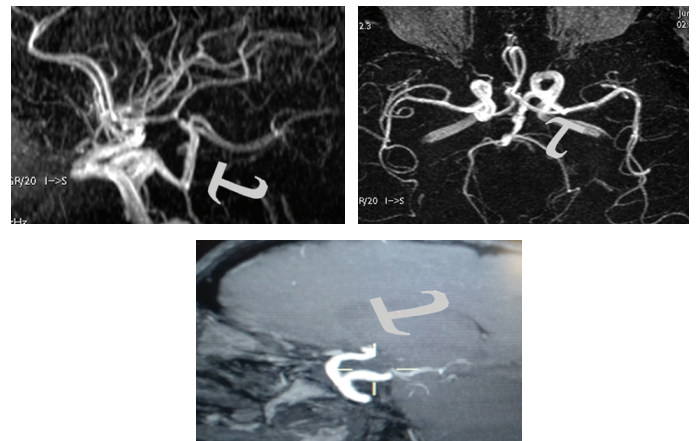


Figure 8: Tau letter sign

Tau letter sign

Visual image formed by the carotid artery and the persistent primitive trigeminal artery sign.

Hyperdense middle cerebral artery

Hyperdense middle cerebral artery
Signs of acute middle cerebral artery thrombosis of segments M1 and M2

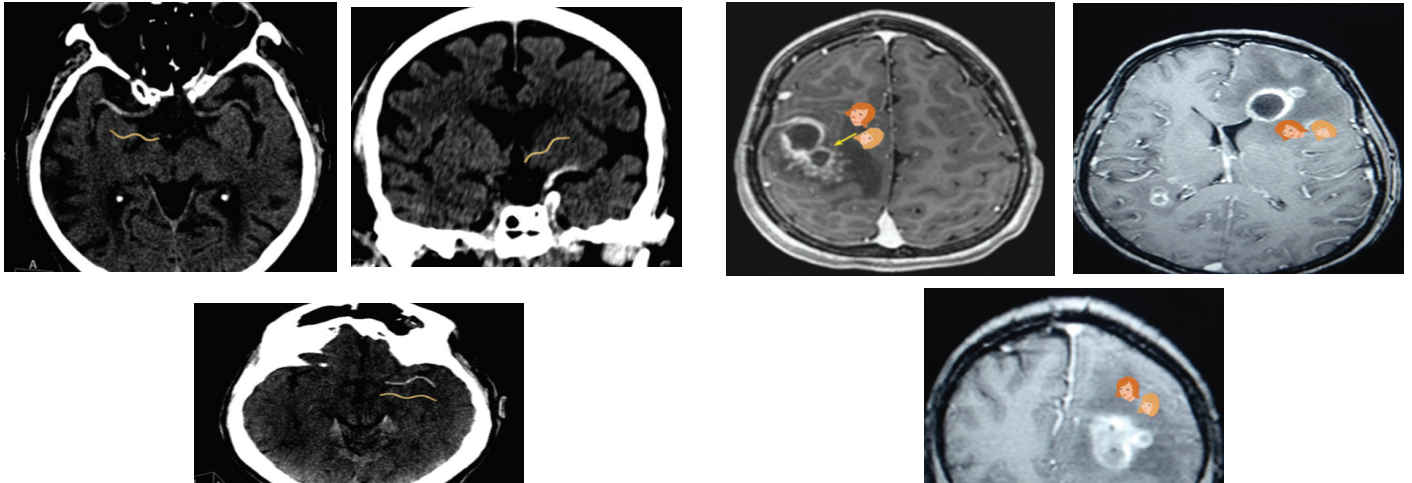


Figure 9: Hyperdense middle cerebral artery

Butterfly wing sign

Bilateral peripheral frontal mass extending through the corpus callosum.

The corpus callosum usually serves as a barrier to the spread of disease, except in aggressive lesions such as glioblastoma multiforme (GBM), CNS lymphoma, and multiple sclerosis (5)

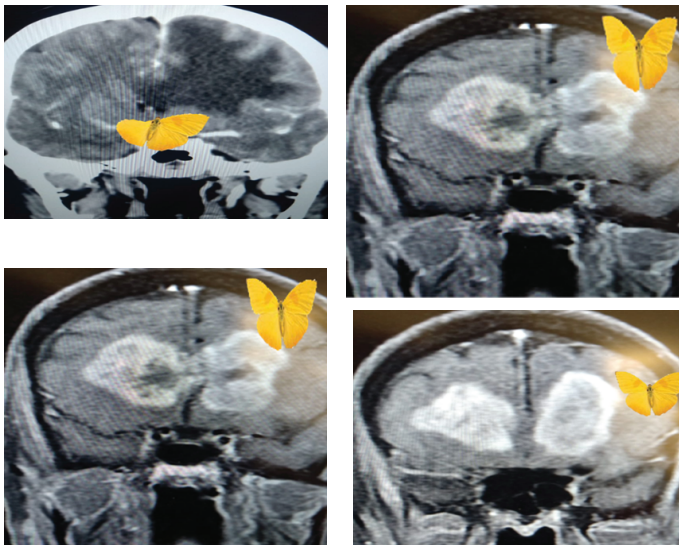


Figure 10: Butterfly wing sign

Sign of the son

This sign is presented by several nodules with inflammatory enhancement after contrast injection in abscesses and/or metastases.

Brain abscesses may be the result of penetrating trauma, surgery, direct spread of adjacent infections or hematogenous spread.

Various bacterial, fungal and/or parasitic pathogens have been described.

Four stages of image evolution are known: early cerebritis with an evolution of 1-3 days, late cerebritis 4-7 days, early

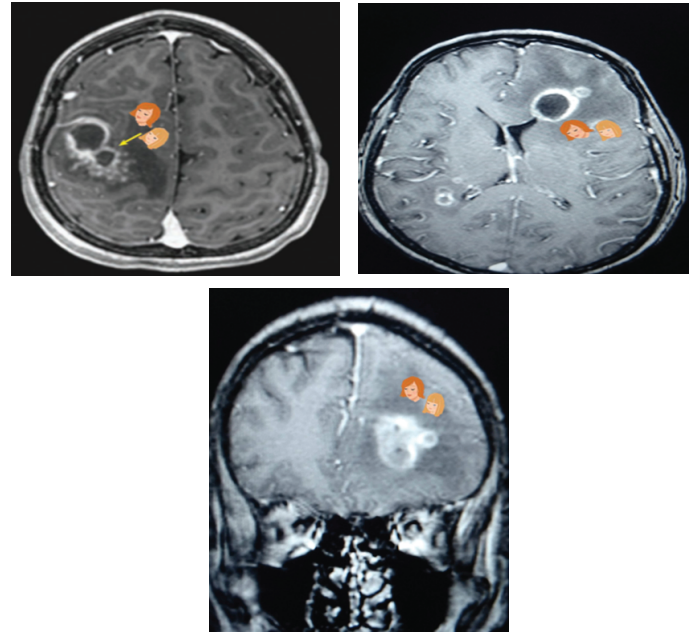


Figure 11: Sign of the son

capsule 10-14 days and late capsule more than 14 days.

Streetcar track sign

Phacomatosis, known as patch and tumor, the term refers to disorders with cutaneous representation and brain lesion.

Sturge Weber Syndrome known as encephalotrigeminal angiomas with a port-wine stain lesion of a facial cutaneous nevus in trigeminal topography, sometimes affecting the choroid and there may be mental retardation.

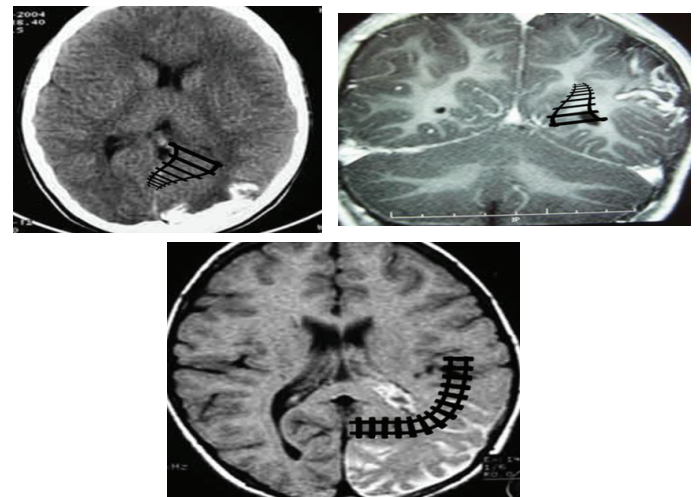


Figure 12: Streetcar track sign

The characteristic sign, first described by Sturge in 1879 and by Weber 1920, lesion of the embryonic ectoderm, there can be seizures refractory to treatment, the diagnosis is evident since the patient presents the facial stain usually ipsilateral to the port wine leptomeningial angioma (8)1.

Declaration

The authors have no conflict of interest

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