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EDITORIAL

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"Round the clock": Surgical access to the orbital apex pathologies

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Background

Orbital apex disorders commonly involve three groups of disorders: orbital apex syndrome, superior orbital fissure syndrome and cavernous sinus syndrome. The three disorders share similar causative causes, diagnostic evaluation and management strategies. These could ultimately result from various etiologies which include, trauma, neoplastic, infectious, inflammatory, developmental as well as vascular causes. Due to overlapping anatomical positions, the patients might present with the ophthalmoplegia due to impairment of III, IV, and VI nerve; ptosis from impairment of cranial nerve III; proptosis caused by the loss of extraocular muscle tension on the globe, retrobulbar swelling and venous congestion; impaired parasympathetic innervation from III cranial nerve results in mydriasis, and involvement of nasociliary nerve results in loss of corneal reflex. This imaging review highlights the pertinent anatomy of the orbital apex and illustrates representative pathological processes that may affect this region. CEMR can show local invasion of the orbital soft tissue or cavernous sinus involvement as well as intracranial extension better than CT. MRI is more sensitive for depicting marrow placement especially in neoplastic disorders [1-5].

Neuroimaging of the common orbital apex pathologies

A retrospective search for the cases of histologically proven Orbital Apex Tumors was done from our prospectively maintained databased and MRI features were reviewed. MRI Protocol Axial, Sagittal and Coronal T1-Post contrast images of the brain were recruited from our electronic medical record. These images were analyzed to determine the exact location of the tumor and impact on the surrounding neurovascular structures.

Meningioma

The meningioma rends to arise from the floor of the middle cranial fossa and tends to grow anteriorly towards the orbital apex, medially into the sella turcica, posterior into the Meckel's cave, and inferiorly along the V3 into the foramen ovale and masticator space. On CT scan, it appears 75% hyperdense and 25% at least partially calcified, may cause hyperostosis of the underlying bone, and shows homogenous enhancement. On MRI, these are hypo- to isointense to gray matter on T1WI and T2WI and show homogenous enhancement.

Fibrous Dysplasia

Fibrous dysplasia (FD) is a benign, slowly growing progressive disorder of the bone, where normal cancellous bone is replaced by fibrous tissue and immature woven bone. It presents in childhood or early adolescent, typically arresting at puberty. It is usually sporadic and is usually associated with Mc Cune-Albright Syndrome and Mazabraud Syndrome.

Radiographically it appears as smooth and homogenous ground-glass matrix with endosteal scalloping and cortical thinning. CT demonstrates an expansile marrow lesion with variable attenuation. Sclerotic FD: ground-glass matrix, pagetoid FD: mixed lucent and sclerotic areas, cystic FD: central lucency with thin sclerotic borders. Post-contrast MR images show variable enhancement. Expansion of bone causes narrowing of adjacent neural foramina, venous and arterial canals.

Tolosa-Hunt Syndrome

Tolosa-Hunt Syndrome is a rare disorder characterized by severe and unilateral headaches with orbital pain, along with weakness and paralysis (ophthalmoplegia) of certain eye muscles (extraocular palsies). It is a painful ophthalmoplegia caused by nonspecific inflammation of the cavernous sinus or superior orbital fissure.

Radiographic features show inflammatory changes in the region of the cavernous sinus on the affected side ± contrast enhancement.

Conclusion

With the development of the MRI techniques, the possible orbital apex etiologies could be easily identified on the radiographs and hence the surgical technique could be easily delineated.

Therefore, in the light of patient's clinical data and radiographic details can help in narrowing down the differential diagnosis related to orbital apex pathologies.

Learning Objectives

1. To elucidate the applied anatomy of the orbital apex.
2. To correlate the radiological features with the clinical cues with regards to various orbital apex pathologies.
3. To interpret the radiological features of the orbital apex pathologies and correlate with the histopathological counterparts.

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