Orbital Metastasis Originating from a Primary Cancer

Introduction

Orbital metastasis is a rare condition in which metastases have developed from a primary cancer. These metastases spread to areas that have a rich vascular blood supply. The orbit is a rare site for metastatic disease, accounting for only 0.1% of total tumor expression and 1-13% of all orbital tumors.[1]

Although tumors can metastasize to the lids, conjunctiva or the orbit, the intraocular contents are by far the most common site. Cancers are typically metastasized to the choroid, most often to the macular or perimacular region. Only rarely do they affect the iris, retina or optic disc.[1]

Choroid metastases are the most common intraocular cancer in adults and usually go undetected. This is because most ocular metastases go undetected unless they affect vision, are visible to the patient or push the eye forward.[2]

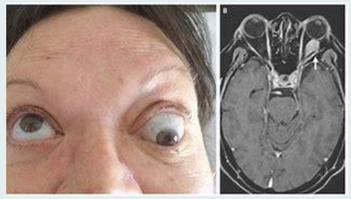
Breast cancer among women is the most common tumor to metastasize to the eye, following lung cancer in men. Other less common sites of origin include the prostate, kidney, thyroid and gastrointestinal tract. Blood cell, such as cancer lymphoma and leukemia can also metastasize into the eye and orbit. In 18% of patients, the primary source of metastasis may be undetectable.[2]

"When breast cancer metastasizes to the eye, it tends to be bilateral and multiple", noted Dr. Shields. "Patients tend to get a shower of metastases up one of the arteries in the brain. Some lodge in the choroid and others lodge in the brain. If you do a brain scan, you'll find about 40 percent of these patients also have brain metastases."[3]

Symptoms

Most patients with choroid metastasis have or show no symptoms, unless the metastases is on the eye or eyelid it may be visible. If the metastases is located behind the eye or in the orbit, the eyeball may be visually displaced or to the side. If the metastasis is within the eye, which is the most common, patients can experience symptoms of flashing lights, floating spots or distortion of their vision.[2]

The most common symptoms for orbital metastases are proptosis and diplopia, as seen in the Figure 1 below.[1]



Many patients with metastases to the eye never make it into the doctor, said Carol L. Shields, MD, associate director of and attending surgeon on the oncology service of Wills Eye Hospital in Philadelphia. That's because a little blurred vision does not seem important when they have so many other problems.[3]

Other symptoms that are less frequently reported include pain, blurred vision, visible or palpable mass, cutaneous flushing, diarrhea, bronchoconstriction, right-sided cardiac valve disease.[1]

Diagnosis/ Imaging

Ocular Ultrasound is important with metastases because they tend to be echogenic, whereas melanoma tends to be echolucent. A fluorescein angiogram is also useful because metastases tend to be hyperfluorescent in the early angiogram and later show diffuse patchy fluorescence with multiple leaks in retinal pigment epithelium. It's those leaks that lead to retinal detachment. Optical coherence tomography will help determine if subretinal fluid is present and is a good way to follow these lesions. Fine needle aspiration biopsy is reserved for patients who have a negative preliminary workup and is necessary for only 1 to 2 percent of patients.[3]

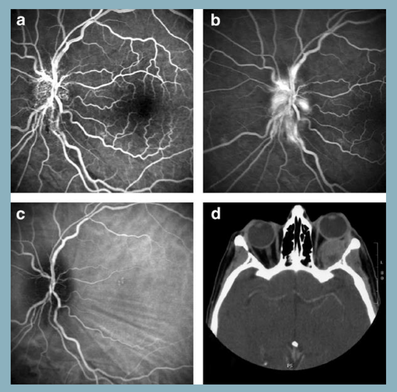


Figure 2: (a) Early fundus fluorescein angiography (FFA) showing swollen optic disc and choroidal folds. (b) Late fundus fluorescein angiography (FFA) showing optic disc swelling. (c) Indocyanine green angiography (ICG) showing swollen optic disc and choroidal folds. (d) Computerized tomography (CT) scan showing the orbital metastasis involving the left orbit

Magnetic resonance imaging is the modality of choice for evaluating the optic nerve pathway, because of its ability to distinguish miniscule contrast differences in tissues with no superimposition of structures. Its uses of multiple slices or 3-D volumes to cover a single area of the body.[3]

Octreoscan nuclear medicine studies are used to locate and treat neuroendocrine tumors. Tumors are detected using an indium 111 pentetreotide, which is injected through an IV. The radiotracer is localized to these tumors through extravasation and chemical bonding to somatostatin receptors. This scan cannot be performed on patients with severely impaired renal function because excretion is almost exclusively renal. A positive octreoscan indicates the presence of a neuroendocrine tumor, making the patient eligible for octreotide therapy.[3]

Fusion software programs can be alternative to PET-CT and PET-MRI scanners. The Radiologist completes the process after collecting all raw data from the CT or MRI scan and fuse it with the raw data from the PET scanner.[3]

Case Report: Orbital Metastasis of a Scapular Bone Osteosarcoma

A 55-year-old man was referred to the Oculoplastic Clinic at Farabi Eye Hospital in Tehran, Iran with acute onset painful decrease of vision and proptosis of the left eye. He had undergone a surgical excision of the original tumor and received chemotherapy 4 months before. Imaging studies and incisional biopsy were performed for the orbital lesion. A histopathological examination of the tumor revealed a malignant spindle cells with osteoid formation and mineralization which confirmed the diagnosis of metastatic osteosarcoma.[4]

The patient was then referred to his oncologist for palliative chemotherapy and further intervention; however, the patient passed away two months later due to sepsis in the context of immunosuppression.[4]

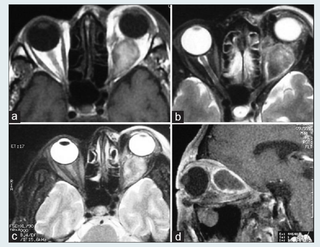


Figure 3: Orbital MRI showed an intraconal mass that was heterogeneous to hyperintense on T1 images (a) and heterogeneous to hyperintense on T2 images (b and c) with gadolinium enhancement at the rim of the lesion on T1 images (d). In some sections, the mass seems to be hyperintense on T1 images (a) and in some others, hypointense (d). The same finding can be seen on T2 images (b and c)

Case Report: Rare Orbital Metastasis Originating from a Neuroendocrine Tumor

An 86-year-old man presented with right eye proptosis, secondary to a right retro-orbital mass. His medical record revealed the presence of a long-term, slow-growing orbital tumor localized in the same orbit. His medical history indicated a calcified ileal carcinoid tumor localized to the mesentery and previous diagnoses of prostate, skin and colon cancers.[1]

Imaging for the patient included an MRI of the orbits, a CT of the orbits, chest, abdomen and pelvis, and an octreoscan in the Nuclear Medicine department. The MRI confirmed the right eye proptosis as well as a well-circumscribed mass without aggressive features. After the MRI study, a superior orbitotomy biopsy was performed which revealed a low-grade neuroendocrine tumor. Data that was reconstructed from the octreoscan showed evidence of a metastatic carcinoid tumor in the right orbit, with lesser indications of a pancreatic and hepatorenal fossa mass. The radiologist who interpreted the images, fused the MRI and octreoscan images together to show intense focal increased uptake corresponding to the right orbital mass and confirmed the presence of metastatic neuroendocrine tumor. The patient declined surgery to remove the right orbit and opted for octreotide therapy.[1]

Treatment

The typical treatment for orbital metastases includes a diagnostic biopsy, systemic chemotherapy and local radiation therapy.[1]

Biopsies are used to obtain an accurate diagnosis of the tumor. The two most definitive techniques are fine-needle aspiration and open biopsies. These procedures should be performed exclusively on patients in whom the orbit is the only site of metastasis and there is no known previous history of cancer.[1]

Chemotherapy can be used if the specific orbital tumor is chemo sensitive. The treatment is more beneficial when it is used in conjunction with radiation therapy.[1]

Radiation therapy is used to control tumor growth and reduce proptosis. It alleviates symptoms in up to 80% of cases and might resolve vision.[1]

Asymptomatic patients may simply be watched for the onset of symptoms. If their systemic disease is out of control, these patients will be treated by their general oncologist. Dr. Timothy Murray, MD, of professor of ophthalmology and radiation oncology at the University of Miami, stated that they use external beam radiation if there is multifocal involvement in one or both eye. He also said that if there is only one tumor, the alternative is to do plaque radiotherapy.[3]

Dr. Shields uses a plaque whenever possible because it takes only two days to complete, compared with daily radiation for four weeks with external beam radiation. This is especially important for patients who may have only a few months to live. Most patients treated with radiation maintain a good vision.[3] The figure below shows a patient receiving radiation therapy treatment for orbital metastases. Figure 4.

Resources

1. New York Eye Cancer Center. Choroidal Metastasis. Available at: https://eyecancer.com/eye-cancer/conditions/choroidal-tumors/choroidal-metastasis/. Accessed December 20, 2020.
2. American Academy of Ophthalmology. How to Spot Ocular Metastases. Available at: https://www.aao.org/eyenet/article/how-to-spot-ocular-metastases. Accessed December 20, 2020.
3. National Center for Biotechnology Information. Orbital metastasis: A rare manifestation of scapular bone osteosarcoma. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4329716/. Accessed December 20, 2020.
4. Street Beam A, Moore KG, Palmer Stevens C, et al. Rare Orbital Metastasis Originating From a Neuroendocrine Tumor. *Radiological Technology.* 2019. 91. 112-118.