Differential Diagnosis for a Unidentified OrbitalfrONTAL Lesion in an Early Medieval (XI-XII c.) Cemetery in Giecz, Poland

Hedy M. Justus, MSc, Amanda M. Agnew, MA, and Sam D. Stout, PhD. The Ohio State University

INTRODUCTION

An unidentified lesion on the superomedial left orbitofrontal of a skeleton from early medieval (XI-XII c.) cemetery site Gz 4 in Giecz, Poland is described. In addition, possible evidence for healed blunt force trauma and left frontal sinus absence are also observed. It is unknown if the defects and/or frontal sinus absence are related. Differential diagnosis based on a review of clinical and paleopathological literature and gross and radiographic examination is discussed, including cholesterol granuloma, epidermoid cholesteatoma, and hydatid cyst.

DIFFERENTIAL DIAGNOSIS

Initial observations suggest morphology and position of lesion is consistent with cystic changes. Orbital cysts can be classified according to their relationship to other structures (primary or secondary), by time of onset (congenital or acquired), etiology (traumatic, surgical, inflammatory, idiopathic), or by the type of cells that comprise their walls (cutaneous epithelium, conjunctival epithelium, respiratory epithelium, apocrine gland epithelium, and neuronal cell). The most relevant cysts and granulomas and frontal sinus absence are considered.

Orbitofrontal cholesterol granuloma

Cholesterol granulomas develop when a foreign body reacts around cholesterol crystals. Pathogenesis is unknown, but may occur as trauma-related hemorrhage. It is frequently due to blunt force trauma to the skull, followed by poor venous drainage and delayed drainage. Negative pressure in the air cavity accumulation of air in saccus is due to air drainage disturbance. These events lead to hematoma from unabsorbed mucosal bleeding which secrets to cholesterol crystals and foreign body granuloma formation.

Orbitofrontal cholesterol granuloma has an irregular outer table erosion, including sharply circumscribed lytic lesion in the orbitofrontal superomedial portion with intracranial-extradural and intracranial-extracranial extensions and destruction of the orbital roof, lateral orbital wall, greater sphenoid wing extending into the orbital apex, frontal, anterior aspect of the middle cranial fossa, ethmoid, and sinus.

Hydatid cyst

Hydatid cysts related to parasites have been reported in the archaeological record. They can lead to osseous changes after chronic erosion to the orbital bone space. Today they rarely occur (1% of cases). Parasites can be ingested, especially with the consumption of meat. Echinococcosis tapeworms live in the intestine of dogs, foxes, wolves and jackals. Intermediate hosts include sheep, pigs, cattle, deer, and humans. Their eggs are passed through feces and ingested by humans through consumption of contaminated water or food. Upon ingestion, the eggs continue the life-cycle phase of the worm and develop into cyst structures called hydatid cysts.

Epidermoid cholesteatoma

Epidermoid cholesteatoma is a similar lesion, but contains epithelial elements instead of cholesterol crystals. Trauma can result in epithelial displacement under the skin. When the epithelium continues to grow, a cystic space can form in the bone, filling with keratin material. Respiratory epithelial-lined orbital cysts, most often found in individuals in their 40’s and 50’s, can result from chronic sinus disease and mucocoele formation related to trauma.

Case summary

Grave 82.01 is an adult male with an estimated age of 35-45 years (Fig. 1-4). The left superomedial orbitofrontal exhibits a round lytic pocket with thick, smooth, sclerotic margins (Fig. 2). There is no evidence of active healing at the time of death. The inner walls appear solid and smooth. Upon gross examination, there is no indication that it continues into the inner table. In addition to this defect blunt force trauma is present as an eraser head-sized indentation on the superior left frontal, just lateral of the midline (Fig. 2-3). It is unknown if these lesions are related and it warrants further investigation. A radiograph (Fig. 4) reveals absence of the left frontal sinus that may be associated with the lesions.

Fig. 2: Close-up (anterior-left lateral view) of superorbital lesion on case 82/01. Arrow points to blunt force trauma.

Fig. 3: Anterior-left lateral overview of case 82/01 presenting lesion of left orbitofrontal. Arrow points to blunt force trauma.

Fig. 1: Anterior view of case 82/01 (site Gz 4) presenting orbitofrontal lesion of left orbitalfrONTAL.

DISCUSSION

Initial observations of this defect suggest osseous changes associated with a cyst or granuloma. Cysts reported in paleopathological literature are rare and limited to cases developing calcified structures. A calcified cyst or granuloma is not present in this case, although it may have been destroyed during excavation. Hydatid cysts may be ruled out since they are rarely found in the orbit and usually found in the maxillary cavity, invading the organ.

Orbitofrontal cholesterol granuloma typically occurs in the middle ear or on the lateral portion of the orbital ridge. In case 82/01, the defect occurs on the medial portion, but it has some similar manifestations as described in the literature. There is a lytic space with sclerotic margins, but the destruction to the orbital roof and sides and neighboring bone that you find in cholesterol granulomas has not occurred in this case.

Another possible diagnosis is epidermoid cholesteatoma. Defect morphology is more similar to this type of lesion. The lytic pocket exhibits sclerotic margins with no destruction beyond the lesion. This may have resulted from epithelial elements being forced into bone, sinus, or just under the skin. However, a blunt force defect may be related, however, it is located superior to the orbitofrontal lesion. It is uncertain if this could have manifested on the orbit as epithelial elements invaded the sinus or if it originated from a separate blunt force event.

A radiograph (Fig.4) does reveal absence of the left frontal sinus. Apneaosis of the frontal sinus is reported in 5-10% of modern populations. Reports of sinus agenesis may result from misdiagnosis due to faulty radiographic positioning. Excluding faulty positioning (the right frontal sinus is intact) and the lesion is a cyst in case 82/01 exhibits agenesis or later sinus obliteration promoted by either blunt force trauma or cyst. Further investigation should include additional clearer radiographs and CT scans, which better depict osseous changes from cholesterol granuloma.

Fig. 4: Radiograph (anterior view) of case 82/01 presenting lesion of left orbitofrontal. Note absence of left frontal sinus.

REFERENCES

CITED

Acknowledgements: Teresa Krysztofiak and Dr. Marek Polak, The Slavic Foundation, Hospital of Zoological Park, Poland for providing photography.


