



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

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INTRODUCTION

An unidentified lesion on the superomedial left orbitofrontal of a skeleton from early medieval (XI-XIIIth 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.



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

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 neural cells)¹. 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 crystals². Pathogenesis is unknown, but may occur as trauma-related hemorrhage. It is frequently due to blunt force trauma to the skull, followed by poor ventilation and impaired drainage. Negative pressure in the air cavity and absorption of air into mucosa is due to air drainage disturbance. These events lead to hematoma from unabsorbed mucosal bleeding which converts to cholesterol crystals and foreign body granuloma formation³.

It often originates in the middle-ear cavity, particularly the mastoid air cell tympanic cavity⁴ and is rare in the superotemporal orbital ridge within the frontal diploid space. Granulomas are associated with irregular outer table erosion, including sharply circumscribed lytic lesion in the orbitofrontal superolateral portion with intracranial-extradural and intraorbital-extraconal 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^{5,6}. Although severe erosion is common, sclerotic margins are found on the lytic lesion margins⁶.

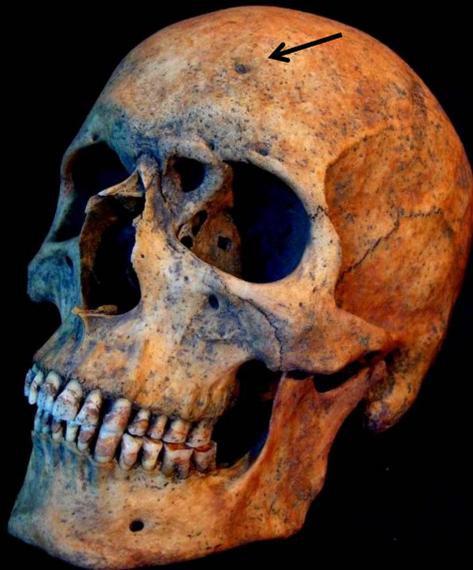


Fig. 3: Anterior-left lateral overview of case 82/01 presenting lesion of left orbitofrontal. Arrow points to blunt force trauma.

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 discarded during excavation. Hydatid cysts may be ruled out since they are rarely found in the orbit and usually found in the thoracic cavity, inhabiting the organs.

Orbitofrontal cholesterol granuloma typically occurs in the middle ear⁴ or on the lateral portion of the orbital ridge⁵. 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 granuloma 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 through blunt force trauma. The small 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 occurred from a separate blunt force event.

A radiograph (Fig.4) does reveal absence of the left frontal sinus. Agnesis of the frontal sinus is reported in 5-15% of modern populations¹⁴. Reports of sinus agneses may result from misdiagnosis due to faulty radiographic positioning¹⁵. Excluding faulty positioning (the right frontal sinus is clearly visible), it is unknown if case 82/01 exhibits agnesis 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.

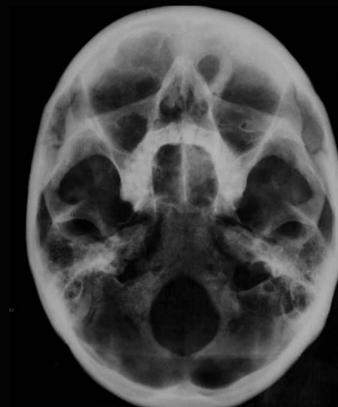


Fig. 4: Radiograph (inferior view) of case 82/01 presenting lesion of left orbitofrontal. Note absence of left frontal sinus.



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

Epidermoid cholesteatoma

Cholesteatoma is a lesion containing cholesterol crystals³. Epidermoid cholesteatoma is a similar lesion, but contains epithelial elements instead of cholesterol crystals⁷. Trauma can result in epithelium displacement under the skin. When the epithelium continues to grow, a cystic space can form in the bone, filling with keratin material⁸. Respiratory epithelial-lined orbital cysts, most often found in individuals in their 40's and 50's, can result from chronic sinus disease and mucocele formation related to trauma⁹.

Congenital epidermal inclusion cysts, rare in the archaeological record, occur in the calvarium. During embryonic development ectodermal skin can become trapped in developing cranial vault bone. Epithelium proliferation may lead to cystic development. The lesion is usually small, round or anteroposteriorly elongated, confined to the diploe and filled with keratin. When cysts are larger (>10cm) in diameter, overlying tables bulge, more on the inner than outer table. Epidermal cyst linings may exhibit various skin appendages, such as hair follicles, sebaceous glands, or sweat glands. This particularly occurs near the orbit⁸.

Hydatid cyst

Hydatid cysts related to parasites have been reported in the archaeological record¹⁰. They can lead to osseous changes after cystic adhesion to the orbital bone tissue¹¹. Today they rarely occur (1% of cases)¹². Parasites can be ingested, especially with the consumption of meat¹³. *Echinococcus* tapeworms live in the intestine of dogs, foxes, wolves and jackals. Intermediate hosts include sheep, pigs, cattle, deer and humans. Its eggs are passed through feces and ingested by humans through consumption of contaminated water or food. Upon ingestion, the eggs commence the life-cycle phase of the worm and develop into cyst structures called hydatid cysts. Hydatid cysts, rarely found in the orbit, often inhabit organs, such as liver or lungs, where they calcify, growing slowly^{11,12}.

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