The orobasal organ of Ackerknecht in a male body donor: A case report

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SUMMARY

During histological evaluation of the oral cavity of a 61-year-old West-European male body donor, we observed a bizarre epithelial formation at the border between gingiva and oral mucosa, which most likely was an orobasal organ (of Ackerknecht). Although the orobasal organ probably does not have a functional significance, it is of clinical interest, because it must not be confused with a pathological condition like oral precancerous lesions or oral cancer.

Key words: Oral cavity – Gingiva – Oral mucosa – Vestigial organ – Evolutionary anatomy

INTRODUCTION

Vestigial anatomical structures are considered to have lost much or all of their function through evolution. These structures (e.g., leg bones in whales, external ear muscles in humans) can give insights into the phylogenetic history of species, since homologous structures indicate common ancestry. Additionally, vestigial structures can be of clinical importance, since these structures might be involved in pathological conditions (e.g., inflammation of Meckel's diverticulum), or be confused with pathologies. For example, the juxtaoral organ (of Chevitz or Zenker) in the cheek histologically mimics perineural invasion of cancer cells (Danforth and Baughman, 1979; Sancheti et al., 2015). While some of these rudiments are widely known, there are several structures which are widely neglected in medical literature, like the orobasal organ (of Ackerknecht).

The orobasal organ was discovered by and named after the veterinary anatomist Eberhard Ackerknecht in 1912 (Ackerknecht, 1912). He described morphologically highly variable epithelial invaginations (often two) behind the lower medial dentes incisivi in different mammalian species. The orobasal organ is considered to be a rudimentary structure without physiological function. Some authors hypothesize that this organ represents a remnant of the anterior sublingual gland, a salivary gland which is present in reptiles (Keller, 1922), but this interpretation did not go unchallenged. Therefore, the evolutionary history of the orobasal organ remains unknown, so far.

CASE REPORT

In the oral cavity of a 61-year-old West-European male who died of colon cancer, we observed a bizarre epithelial formation at the border between gingiva and oral mucosa, which most likely represents an orobasal organ (of Ackerknecht). This man

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was part of the body donation program of the Anatomical Institutes of the Johannes Gutenberg-University, Mainz, Germany. He donated his body voluntarily for medical education and research in accordance with common donation procedures for anatomical bequests in Germany. The body had been preserved via arterial perfusion with a formaldehyde solution and subsequent formaldehyde immersion within a humidity chamber. For histological examination, oral tissue was dissected and embedded in paraffin. Serial sections were stained with hematoxylin and eosin. No earlier oral pathologies were known in this patient.

In the present case, we observed an approximately 1.5 mm high (from luminal to basal) and 0.6 mm long bell-shaped epithelial body which pierced into the lamina propria at the border between the lingual gingiva (LG) behind the lower medial incisors and the oral mucosa (OM) of the floor of the mouth (Fig. 1). The estimated thickness of the epithelial body in serial sections was 0.5 mm. The epithelial body consisted out of non-keratinized stratified squamous cells. No signs of epithelial cell degeneration, keratinization or secretion were visible. We observed an intact basement membrane around this structure. Serial sections did not show a lumen within this structure, but on the mucosal surface a small pit was formed. Within the lamina propria, we did not observe greater nerve fibers or sensory bodies in direct vicinity of this structure.

COMMENTS

Because of its special morphology and localization, this structure most likely is a case

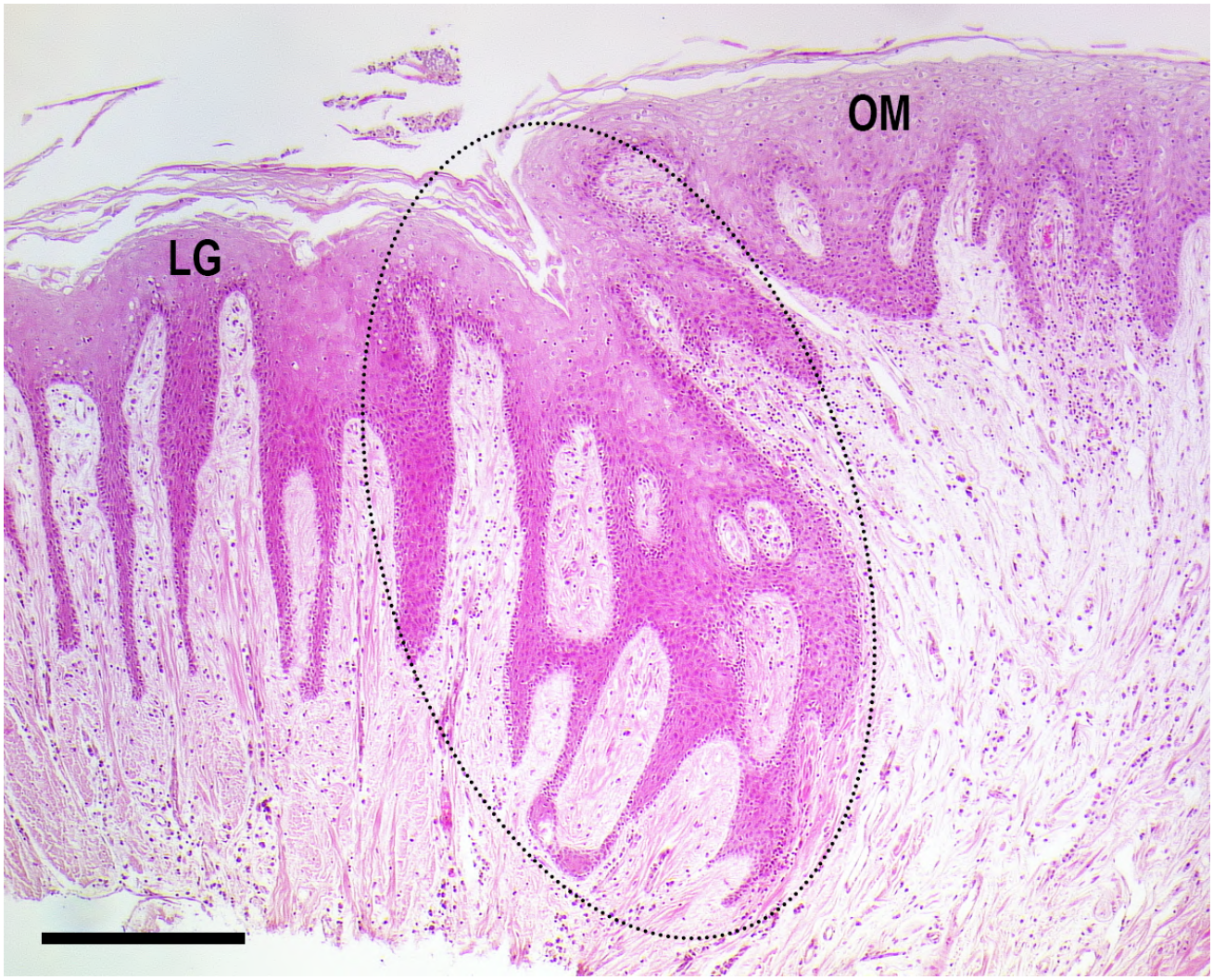

Fig. 1.- Hematoxylin-eosin-stained section of the putative orobasal organ (of Ackerknecht) (within the ellipse) at the border between the lingual gingiva (LG) and the oral mucosa (OM). Bar = 250 µm.

of an orobasal organ, also known as the organ of Ackerknecht, a highly neglected structure in anatomical literature. The existence of the orobasal organ in human embryos, fetuses and children was shown in multiple studies (Eberle, 1925-26; Schückher, 1937; Zorzoli, 1954; Kagawa, 1956), but, to our knowledge, until now there is only one publication which proves the existence of the orobasal organ in human adults (De Risky, 1954). In this publication, De Risky histologically identified 13 orobasal organs in a dissection case series of 15 adult humans. In contrast to other oral or perioral structures like the juxtaoral organ or oral neuroepithelial bodies (Cheng et al., 2016), the histological features of the orobasal organ do not give any hints to a secretory or receptor function of this structure (Malinovsky et al., 1996). Due to its location at the border between gingiva and oral mucosa, mechanical stress of this region might influence the development of this organ. Ungerecht (1951) hypothesized that the orobasal organ might be involved in the development of oral dermoid cysts but experimental or clinical data are missing.

Although the orobasal organ most likely does not have a functional significance, it is of clinical interest, because it must not be confused with a pathological condition like oral precancerous lesions or oral cancer. We hope that this report will increase awareness of this obscure but obviously physiological anatomical structure, and thereby decrease the chance of a misdiagnosis and unnecessary therapeutic intervention. Additionally, further investigation in comparative anatomy of this structure both in human and animals might give new insights into the evolution of oral structures.

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