• Letter to the Editor •

Pilomatrixoma of the upper eyelid in a 10-month-old baby

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Dear Editor,

I am Dr. Jungyul Park from the Division of Oculoplasty, Department of Ophthalmology, Pusan National University Hospital, Busan, Korea. I am writing to present a case of pilomatrixoma of the upper eyelid in a 10-month-old baby that first appeared when the baby was 3 months old. To our knowledge this is the youngest reported case of this tumor type. The authors obtained informed consent in person and adhered to the tenets of the Declaration of Helsinki.

Pilomatrixoma ("benign calcifying epithelioma of Malherbe"; pilomatricoma) is a rare benign adnexal tumor arising from the matrix cells at the base of a hair[1]. It was first described by Malherbe[2] in 1880 as a "calcifying epithelioma" and was thought to be derived from the sebaceous gland. The exact pathogenesis is still unknown but has been linked to molecular genetic mutations in the Wnt signaling pathway in basophilic and shadow cells[3]. Downregulation of the adenomatous polyposis coli (APC) gene in Gardner syndrome contributes to the Wnt signaling, with overexpression of beta-catenin[4-5] described in some literature. Additional gene interactions associated with Turner syndrome and myotonic dystrophy have also been reported[6-7].

In the discipline of ophthalmology, Ashton[8] reported 3 cases of epithelioma of Malherbe on the eyelids of female patients, and Forbis and Helwig[9] later suggested the currently accepted name "pilomatrixoma". This tumor type typically presents a solitary, superficial, slow-growing, irregularly shaped, nodular and non-tender mass which is easily movable over the subcutaneous tissue[10]. It is usually located near the lateral aspect of the eyebrow or upper eyelid, and is frequently first diagnosed as a dermoid cyst. Pilomatrixoma occasionally exhibits rapid growth and may resemble a keratoacanthoma, and can rarely undergo malignant transformation into a pilomatrix carcinoma[11-13]. It is more common in the first 2 decades of life, and has tendency to affect young females[14-16]. Among case reports and case series' of periocular pilomatrixoma worldwide, the youngest patient of whom we are aware was a 1-year-old female[17]. In this case report, we report an upper eyelid pilomatrixoma in a 10-month-old female, with the first symptoms and mass presenting at 3 months of age. To our knowledge, this is the youngest such case reported.

The 10-month-old female baby presented at the hospital with a slowly growing mass in the subciliary area of the right upper eyelid that had first appeared at 3mo. It was first localized in the right upper eyelid as a small, nodular and bluish colored lesion (Figure 1). Her parents described the mass as a bruise, but she had no history of trauma. The bluish mass later gradually enlarged and changed color to mixed red and blue. On palpation, it was fairly well circumscribed, movable, firm and round in shape rather than ulcerated. Physical examination and interviews with the parents indicated no birth or infection history, family history or other history which might be associated with a tumor or mass lesion. On examination, the patient's light-reflex, relative afferent pupillary defect, and ocular motility examinations were all normal. The mass was located on the central to lateral aspect of the right upper eyelid, involving nearly the entire eyelid vertically but not the eyelid margin and causing mechanical ptosis. It showed non-tender characteristics and did not cause pain. The eyelid eversion test showed a normal palpebral conjunctiva. Magnetic resonance imaging (MRI) with contrast of the orbit showed a 1.7×1.3×1.1-cm well-circumscribed nodular mass. It showed high signal intensity on T1-weighted images and minimal enhancement, and isometric signal intensity with adjacent muscle on T2-weighted MRI. It contained internal calcification (Figure 2). Differential diagnoses based on MRI findings were pilomatrixoma and ossifying hematoma. When the patient was approximately 1 years old, we performed a total excisional biopsy using a sub-brow line incision approach. There were no specific complications. Fortunately, the mass was not infiltrative to adjacent tissues and was totally removed. The

gross resected mass was 1.3 g, and was light brown with central calcification. No hemorrhagic or ulcerative patterns in the adjacent tissues were noted. Histopathological examination showed relatively abundant tumor cells comprising mainly basophilic and shadow (ghost) cells. The mass contained some lobes which were encapsulated with delicate loose fibrillar stroma (Figure 3). Together these findings yielded a diagnosis of pilomatrixoma. One week after tumor excision, the palpebral height was symmetrical on both sides with only mild yellowish edema on the upper eyelid. After 6mo the incision scar had faded and was almost invisible. Over the course of a 6-year follow up, no relapse or complication has been observed (Figure 4).

Pilomatrixoma is a relatively rare periocular tumor[16]. Eyelid pilomatrixoma is usually solitary although it presents as multifocal in 5% of cases. Approximately 40% of cases occur in the first decade of life and an additional 20% in the second[18-20]. Over 75% of cases were reported to occur in patients 13 years old or younger[20]. A bimodal distribution of occurrence for eyelid pilomatrixoma has been suggested, with a second peak in the fifth to seventh decades of life[21]. Actually, in the ophthalmic literature, only a few case reports or series were reported and according to the report published until now, the youngest age was 1 year-old female baby[17,20,22]. A racial study revealed that most cases presented in Caucasians and relatively few in Asians[23]. We report an onset age of 3mo that is the youngest published thus far. Ophthalmologists are often unfamiliar with pilomatrixoma, and if the patient is too young for a delicate examination, such as in this case, determination of management strategies is difficult. It is therefore important to know the clinical characteristics of each tumor lesions.

Zloto *et al*[17] recently suggested that only 16% of pilomatrixoma cases are correctly diagnosed preoperatively. Other studies also reported low diagnostic accuracies of 12.5% and 23.07%[20], attributable to a lack of awareness about this type of tumor. Pilomatrixoma generally presents as a subcutaneous red to blue mass that is well circumscribed, mobile, and firm or gritty to palpation[1]. Its appearance and characteristic location on the lateral aspect of the eyebrow frequently suggests alternative diagnoses such as dermoid cyst, sebaceous cyst, trichoepithelioma, eyelid cyst, retention cyst, and abscess[24]. Histopathologically, the memorable features of pilomatrixoma are a proliferation of viable basaloid cells, shadow cells, foci of calcification, and occasionally ossification. The tumor contains sheets of bland, uniform, basophilic hair matrix cells that readily undergo necrosis forming eosinophilic shadow cells with ghostly nuclei[20]. In the case we report here, initial alternative diagnoses were a dermoid cyst, a tumor derived from vascular origin, or pilomatrixoma because of the reddish vascularitic, bluish and central necrotic appearance.

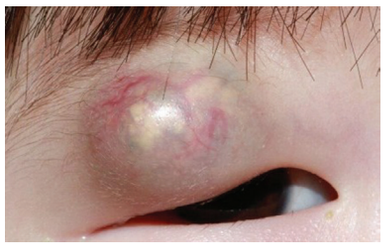

Figure 1 Preoperative right upper eyelid photograph It demonstrates mixed red to blue colors with central yellowish lipid like deposit, 1.7×1.5 cm^2 well margined mass causes mechanical ptosis.

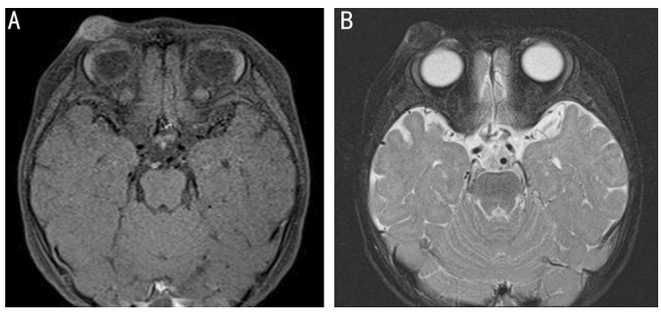

Figure 2 MRI of the orbit A: T-1 weighted image; B: T-2 weighted image. It showed high signal intensity on T1-weighted images and minimal enhancement, and isometric signal intensity with adjacent muscle on T2-weighted MRI. It contained internal calcification.

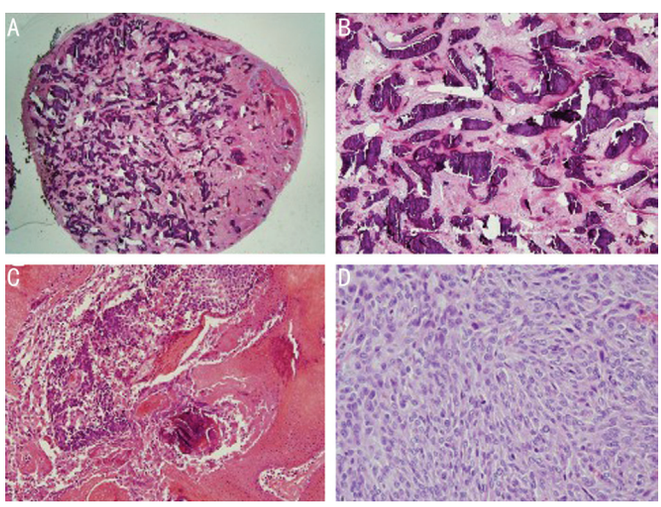

Figure 3 Pilomatrixoma histopathology A: Well capsulated circumscribed mass was observed (H&E 1.25×); B: Many calcifications were observed inside the mass (H&E 4×); C, D: Many basophilic cells and anucleated "shadow or ghost" cells were composed solid nest which undergoing trichilemmal-type keratinization (H&E 40×, 400×).

Figure 4 Over the course of a 6-year follow up picture of patient, no relapse or complication has been observed, and the scar is almost faded.

Ultrasound is most commonly reported modality used to identify the pilomatrixoma, which shows well-defined, ovoid, hypoechoic heterogenous masses with posterior shadowing and echogenic internal foci[25]. Hoffmann *et al*[26] first suggested that MRI may be diagnostic for pilomatrixoma. Recently, pilomatrixoma has been described as a well-defined mass with intermediate homogeneous signal intensity on T1-weighted images and high signal intensity on T2-weighted images[27-30]. In our case study, MRI showed a nodular well-circumscribed mass with central calcification. The tumor showed high signal intensity on T1-weighted images, and isometric signal intensity with adjacent muscle and minimal enhancement on T2-weighted images. The difference between the T2-weighted images we obtained and those from other studies made our definite diagnosis as a pilomatrixoma somewhat difficult.

Complete resection with clear margins is agreed to be the definitive treatment and diagnostic method for pilomatrixoma[3]. Some studies[31-32] suggest that a fine needle aspiration may be used for preoperative diagnosis, but this technique is not useful in 0- to 1-year-old babies. Spontaneous regression of pilomatrixoma has never been reported or observed. Incomplete resection leads to high recurrence rates[33], so achievement of complete excision is important. Forbis and Helwig[9] report relapse rates of 2%-6% but Guinot-Moya *et al*[34] found a significantly lower recurrence of 0.48%. We report no relapse, complications or cosmetic problems over the course of a 6-year follow up.

Currently, pilomatrixomas are believed to associated with mutation of the Wnt pathway, which is not well described in the ophthalmologic literature. This tumor type is often initially misdiagnosed, particularly at the preoperative stage. However, with better understanding of the tumor and lesion, it is treatable without unnecessary management or pre- and postoperative complications. Even in patients younger than 1y, we should be able to diagnose this tumor type and perform complete surgical removal for diagnostic confirmation and treatment.

We hope that our report of the successful surgical removal of an upper eyelid pilomatrixoma first presented at 3mo and treated at approximately 1y without relapse or cosmetic complication over a 6-year follow-up will help ophthalmologists with early diagnoses and surgical removal of this tumor type even in baby patients.

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