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Epibulbar complex cartilaginous choristoma

A distinctive clinicopathological case series and literature review

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Abstract

To newly describe the clinical and histopathological characteristics of epibulbar complex cartilaginous choristoma incidentally observed in a series of pterygium excision patients.

Noncomparative case series with chart review of 8 patients.

During a 4-year period, we identified 8 cases of conventional unilateral nasal subpterygial cartilaginous choristoma in 1799 pterygium patients and analyzed their clinicopathological features. The incidence rate of this entity is 0.44% in pterygium patients. All of the cartilaginous choristomas were buried deep in the caruncle, covered by the pterygium, and embedded in tenon facia tissue. Its clinicopathological characteristics include hyaline cartilaginous tissue that is surrounded by fibrous connective tissue and smooth muscle bundles. S-100 protein-staining specifically revealed chondrocytes embedded within chondroid matrix.

Epibulbar complex cartilaginous choristoma covered by pterygia and predominantly observed in the older population is rare. The lesions were buried deep in the caruncle, covered by the pterygium and embedded in tenon fascia tissue. These findings are inconsistent with those in previous reports.

Abbreviation: ECCC = epibulbar complex cartilaginous choristoma.

Keywords: cartilaginous choristoma, clinicopathological features, epibulbar, pterygium

1. Introduction

Epibulbar choristomas are a group of congenital lesions, a mass of histologically normal tissue in an abnormal location. They are classified as limbal dermoids, dermolipomas, osseous choristomas, and complex choristomas.[1,2] Complex choristomas contain cells from 2 or more different tissue types, such as bone, cartilage, nerve, muscle, sebaceous secretions, dermal appendage, or lacrimal tissues.[3] Choristomas are all very slow-growing and benign.[4] Excision is generally done either for cosmetic purposes or to rule out any possibility of malignancy.[5] Cartilaginous choristoma tissues are found in different locations, including mouth, lip, tongue, gingiva, tonsillar region or pharynx, nasopharynx, neck, orbit, and other reported locations. There are very few reported cases of cartilaginous choristoma in the eye. Only 1 literature about cartilaginous choristoma associated with recurrent pterygium is documented.

We present 8 cases of unilateral cartilaginous choristoma buried deep in the caruncle, covered by the pterygium, and embedded in tenon fascia tissue. They were observed as an incidental finding during pterygium excision. This is the first report with 8 cases describing the clinical manifestations and histopathology of cartilaginous choristoma located in an unusual place. It is also the largest review of epibulbar complex cartilaginous choristoma (ECCC) cases.

2. Methods

Records of 1799 primary pterygia cases who presented to the Eye Hospital of Wenzhou Medical University from January, 2012 to May, 2016 were reviewed. All of the pterygia patients did not have any other palpable masses overlying the ocular surface.

Among these patients, 8 cases were found to have an epibulbar tumor during the pterygium excision. Pertinent clinical findings, histopathology, and treatment outcomes were documented. Each patient was evaluated for age at the time of mass detection, race, sex, and mass features. Each eye was evaluated for signs and which eye was involved. Each mass was evaluated for location, color, largest base dimension in millimeters, wide base dimension in millimeters, thickness in millimeters, and mass attachment to episclera or within sclera. This study was approved by the Institutional Review Committee at the Wenzhou Medical University. The research adhered to the tenets of the Declaration of Helsinki.

3. Results

A solid mass was incidentally palpable and found beneath the tenon fascia tissue in 11 patients after the pterygia was completely

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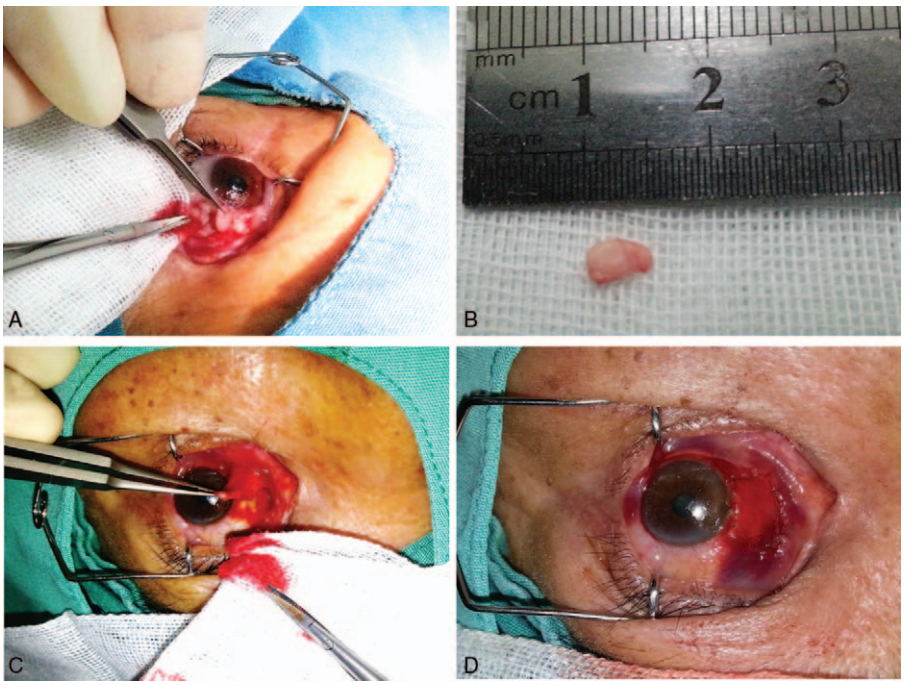

Figure 1. Intraoperative presentation of the pterygium in patients with cartilaginous choristomas. (A) A removable and solitary nodule was found after opening the plica semilunaris (patient 6). (B) The excised lesion has a cartilaginous consistency and 'measures nearly 10 mm (5 × 2 mm, patient 6). (C) The nodule was covered by the fascial tissue (patient 4). (D) The nodule was completely removed, leaving smooth conjunctiva on the ocular surface (patient 6).

removed in 1799 patients. Of these 11 cases, 8 cases met the inclusion criteria and were enrolled in our study, whereas the other 3 cases were complex choristomas without cartilaginous tissue. The incidence was around 0.44% (8/1799) among pterygium patients. The mean (median) patient age of the 8 cases at presentation was 59 (60) years. There were 3 male and 5 female patients, all involving the left eye. There was no evidence of previous ocular trauma, infection, tumor, or systemic calcium metabolic disorder. The patients had signs of the pterygia ranging from 5 to 10 years.

All 8 cases suffered from primary pterygium, and their clinical manifestations were the same as the common pterygia. A solitary and nodular mass buried deep in the caruncle were incidental findings and covered by the tenon fascia tissue after the pterygium was removed. The mass was not attached to the sclera or medial rectus muscle (Fig. 1A). All lesions were small, white, and painless nodules with sharply demarcated margins. They differed in surface covering, shapes, and sizes. The clinical characteristics of the 8 patients are summarized in Table 1. The mean largest basal dimension was 3.6 mm (median 3.5 mm; range 2–5 mm), and mean wide basal dimension was 1.88 mm (median 2 mm; range 1–2 mm) (Fig. 1B). Some nodules were covered by tenon fascia tissue when excised (Fig. 1C). The pterygium excision with conjunctival autograft transplantation surgery was operated after the lesions were completely separated and removed from the nasal sclera (Fig. 1D).

The histopathologic findings are summarized in Table 2. It revealed complex choristomas composed of hyaline cartilaginous tissue, fibrous connective tissue, and smooth muscle bundles (Fig. 2A). The cartilaginous tissues were fully differentiated, with chondrocytes distributed within cartilage matrix. The cartilaginous tissues were surrounded by sequential fibrous tissue named

Table 1

Clinical features of eight pterygium patients with epibulbar complex cartilaginous choristoma.

Patients			Tumor features									
Case	Age, y/race/sex	Eye	Pterygium	Duration, y	Location quadrant	Surface	Shape	Largest base, mm	Wide base, mm	Depth of involvement	Management	Follow-up, mos
1	M/CH/66	OS	Primary	10	Nasal	CFT	L	3	2	Tenon fascia	Excision	6
2	M/CH/71	OS	Primary	8	Nasal	CFT	O	4	2	Tenon fascia	Excision	5
3	M/CH/60	OS	Primary	9	Nasal	CFT	SS	5	2	Tenon fascia	Excision	5
4	F/CH/68	OS	Primary	7	Nasal	CFT	SS	2	2	Tenon fascia	Excision	3
5	F/CH.50	OS	Primary	6	Nasal	S	SS	3	1	Tenon fascia	Excision	6
6	F/CH/50	OS	Primary	8	Nasal	S	O	5	2	Tenon fascia	Excision	4
7	F/CH.46	OS	Primary	5	Nasal	CFT	SS	3	2	Tenon fascia	Excision	6
8	F/CH/60	OS	Primary	7	Nasal	CFT	SS,L	4	2	Tenon fascia	Excision	3

CFT = covered by fascia tissue, CH = Chinese, F = female, L = lobulated, M = male, O = ovoid, S = smooth surface, SS = strip shape.

Table 2

Histopathologic features of epibulbar complex cartilaginous choristoma in 8 surgically resected cases.

Case	Mature bone	Cartilage type (compact or spongy)	Cartilage matrix (woven or lamellar)	Haversion canals	Cartilage	Surrounded by perichondrium	Fibrous connective tissue	Inflammation	Hemorrhage	Other tissue elements
1	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	No
2	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	Yes*
3	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	No
4	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	No
5	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	Yes*
6	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	No
7	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	Yes*
8	MIC,IMIP	Compact	Lamellar	No	Yes	Yes	Yes	No	No	No

IMAP = immature at the periphery, MIC = mature in the center.
* Smooth muscle.

perichondrium. In the central cartilage, hematoxylin-stained chondrocytes were completely mature, and at the periphery, eosin-stained chondrocytes were relatively immature (Fig. 2B). Clustered smooth muscle bundles were also seen in some fibrous connective tissues (Fig. 2B). Isogenous groups were formed by single, nearly circular, and mature chondrocytes in the perichondrium. Circular nuclei and lipid droplets can be seen in the cytoplasm of chondrocytes (Fig. 2C). S-100 staining was positive in the chondrocytes and negative in the chondroid matrix (Fig. 2D), similar to normal cartilage,[6] leading to the diagnosis of an ECCC.

Follow-ups ranged from 12 to 18 months after the first operation. Both the patients and the surgeon reported improvement and cosmetic satisfaction. No recurrence was noted during the follow-up period.

4. Discussion

Choristomas are the most common type of epibulbar and orbital tumor in the pediatric age group, and are most often located in the epibulbar region, ocular adnexa, or choroid.[3] They originate from ectopic multipotent cells, which can differentiate into either a complex growth consisting of several elements (lacrimal and other glands, adipose tissue, cartilage, bone, teeth, smooth muscle, nerve bundles, and brain) or lesions containing predominantly a single tissue.[7] Epibulbar choristomas contain

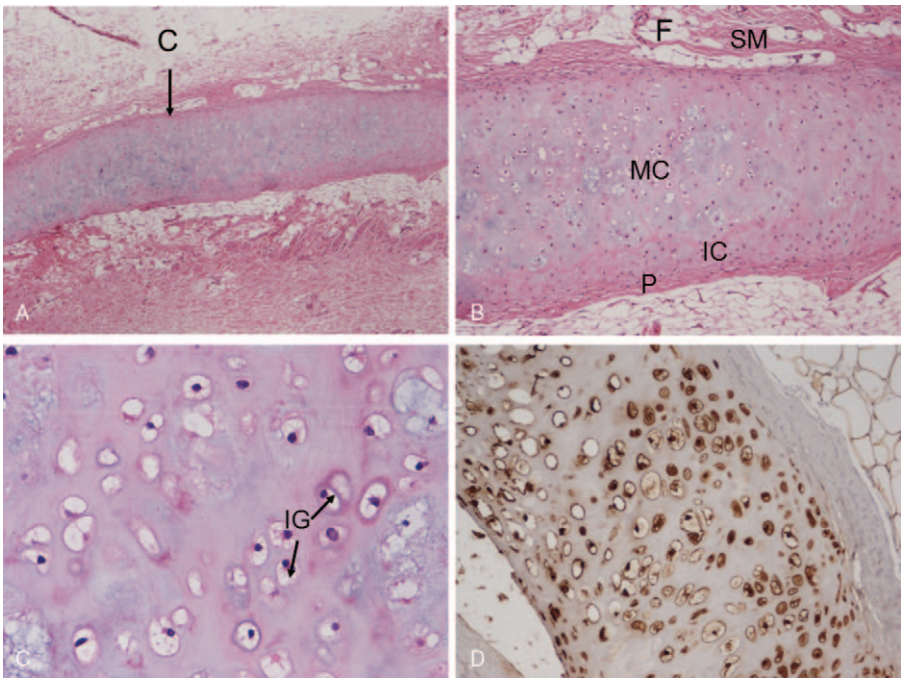

Figure 2. Histopathological studies of cartilaginous choristoma cases. (A) The excised lesion composed of hematoxylin-eosin-stained cartilaginous tissue (C), surrounded by fibrous connective tissue and smooth muscle (×40 original magnification). (B) Cartilaginous component of the mass showing chondrocytes distributed within the cartilage lacunae and surrounded by perichondrium (P). At the periphery of the cartilage, eosin-stained, small, oblate, and immature chondrocytes (IC) can be seen. In the middle region of the cartilage, hematoxylin-stained, nearly circular and mature chondrocytes (MC) can be seen. Smooth muscle (SM) disarray among the fibrous connective tissues (F) (×100 original magnification). (C) Isogenous groups (IGs) can be seen, which are formed by division of chondrocytes within the cartilage capsule (×400 original magnification). (D) S-100 staining of cartilaginous choristoma cases. S-100 protein appearing as brown particles, which are mainly accumulated in the cartilage lacuna or cartilage capsule of the chondrocytes, and are absent in the cartilage matrix (×100 original magnification).

Table 3

Case reports of epibulbar cartilaginous choristoma within the literature.

Author	Year reported	Age (y, mos, wks, d)/sex	Eye	Quadrant	Management	Complex cartilaginous choristoma	Underlying attachment	Diagnosis
Grob et al[8]	2015	2 y, F	Right	Temporal	Excision	Yes	Cornea	Lacrimal gland choristoma
Pittke et al[9]	1983	Young, F	Right	Nasal	Excision	No	Sclera	Cartilage choristoma
Bialasiewicz et al[10]	1998	24 y, M	Left	Nasal	Excision	No	Conjunctiva	Pterygium
Herwig et al[11]	2011	22 wks, M	Left	Temporal	Excision	Yes	Choroid	Goldenhar syndrome
Pinna et al[12]	2015	3 wks, M	Right	Temporal hemicornea	Excision	Yes	Episcleral tissue and the cornea	Limbal choristomas
Alyahya et al[13]	2011	15 y, M	Left	Medial epibulbar part	Excision	No	subconjunctival	Cartilaginous choristoma
Ojha et al[14]	2017	34 y, M	Left	Palpebral conjunctiva	Excision	No	Conjunctiva	Chalazion
Diaz-Perez and Barajas-Gamboa[15]	2012	34 y, M	Right	Caruncle	Excision	Yes	Collagenized connective tissue	Lacrimal caruncle complex choristoma
Kruse et al[16]	1998	42 y, M	Left	Superior temporal	Excision	Yes	Lacrimal gland	Nevus of Jadassohn
Duncan et al[17]	1998	27 mos, M	Right	Superotemporal and inferotemporal limbal	Excision	Yes	Limbal	Linear nevus sebaceous syndrome
Hayasaka et al[18]	1989	4 wks, M	Right	Temporal	Excision	Yes	Conjunctiva and cornea	Complex choristoma
Pe'er and Ilsar[19]	1995	Infant	Left	Superotemporal	Excision	Yes	Anterior sclera and limbus	Nevus sebaceus of Jadassohn
Wilkes et al[20]	1981	13 y, M	Left	Intrascleral	Excision	Yes	Sclera	Ipsilateral facial nevus of Jadassohn
Pokorny et al[7]	1987	16 y, M	Right	Temporal	Excision	No	lacrimal and cornea	Epibulbar Choristomas
		13 y, F	Right	Superior	Excision	No	Conjunctiva	Epibulbar Choristomas
Gogi et al[21]	1978	5 y, F	Left	Upper fornix	Excision	No	Conjunctiva	Cartilagenous Choristoma
Sangwan et al[22]	2003	3 mos, F	Left	Temporal	Excision	Yes	Conjunctiva	Dermoids
		3 y, F	Right	Temporal	Excision	Yes	Cornea and fornix	Dermoids
Greiner et al[23]	2002	54 y, F	Left	Anterior lens capsule	Excision	No	Anterior Capsule	Cartilage
Kraus et al[24]	2010	10 D, M	Ocular	Lateral canthus and fundus	Excision	No	Cutaneous and fundus	Organoid nevus syndrome

lacrimal tissue. There is a clinical distinction from dermoids, and have histologic evidence originating from the palpebral lobe. In our cases, the ECCCs are asymptomatic lesions buried deep in the lacrimal caruncle and covered by pterygia. They do not come to clinical attention until after pterygium excision.

Epibulbar choristomas are relatively rare, with reported prevalence rates of 1/10,000 to 1/30,000, and represent 36% of epibulbar lesions found in the first decade of life.[3,25] The PubMed database was searched to identify all the previously reported cases of ECCC (using key words cartilaginous choristomas, and eye). Review of the literature identified 20 patients with cartilaginous choristomas (Table 3). All the reports in the literature are sporadic cases, but we report 8 cases that are from primary pterygium.

One of the reported patients demonstrated histopathologic findings similar to the 8 cases reported here. Bialasiewicz et al[10] reported a 24-year-old patient who had a pterygium recur 6 times over 15 years, and epibulbar cartilage was found in an unusual location during the excision of the pterygium. In both Bialasiewicz et al's study and our report, the choristoma is found under the pterygium. The biopsy of the resected tumor revealed cartilage histologically after the sixth excision of the recurrent pterygium reported by Bialasiewicz et al, whereas our patients found cartilage choristoma during the primary pterygium excision. There is still insufficient evidence that indicates whether the pterygium is a risk factor in the formation of the cartilage choristoma.

Most of the literature reports young patients (less than 10 years old) with cartilaginous choristoma, and most of the choristomas occur as isolated congenital lesions. The reported adults with cartilaginous choristoma did not specify whether they were congenital or acquired. The presence of cartilaginous choristomas has also been associated with several types of syndromes, including Goldenhar syndrome, nevus sebaceous of Jadassohn, organoid nevus syndrome, and linear nevus sebaceous syndrome. Cartilaginous choristomas are also related to chalazion and dermoids. The 8 cases reported here are cartilaginous choristomas found under the lacrimal caruncle, covered by the pterygium and completely embedded in the connective tissue.

According to the review of the literature, cartilaginous choristomas have been detected in many areas of the eye, typically in the cornea, limbus, subconjunctival space, subpterygial space, and even in the fundus. They vary in appearance, ranging from small, flat lesions to large masses that fill most of the epibulbar region. There is no reported case detailing fast growth in cartilaginous choristomas regardless of the site. According to the published literature, they appear to be either extremely slow-growing or not growing at all. The cases we are reporting also do not show history of appreciable growth over time.

These solid tumors can have a smooth or rough surface, ranging from creamy yellow to pink in color, and vary in size from a flat lesion measuring a few millimeters to large mass filling most of the epibulbar region. There may be isolated or multiple lesions, and most are located inferotemporally.[25] The histopathology of the mass typically demonstrated a well-circumscribed lesion composed of complete hyaline cartilaginous tissue distributed within a chondroid matrix. The soft tissue was composed of fibrous connective tissue, smooth muscle bundles, and adipose tissue. These unilateral eye lesions are complex choristomas and can range in size.[26–28]

The cartilaginous choristomas differ from hamartoma, which is an excessive proliferation of normal tissue at the normal site.

They also differ from teratoma, which is a neoplasm comprising of tissues from all three germ layers.[3] Choristomas are commonly seen in the head and neck region.[3,29] They usually consist of smooth muscle fibers interspersed with adipose and connective tissue, which sometimes includes some specialized components. The other differential diagnoses include epibulbar dermoid, limbal dermoid, epithelial inclusion cyst, prolapsed orbital fat, papilloma, osseous choristoma, and dermolipoma. In older patients, the differential diagnoses should also include age-related calcifications involving the insertion of the lateral recti muscles or the presence of an intraorbital foreign body.[30,31]

Our report shows different features compared to those in the general literature. All patients were older, with a mean age of 59 years, and all lesions were found under the lacrimal caruncle, covered by the pterygium, and completely embedded in the connective tissue. Most masses have been reported without growth of size among young patients. We believe that the small cartilaginous nodule most commonly formed at a young age, but due to its asymptomatic and stationary nature, is often undetected until pterygium surgery in elderly patients. Therefore, we speculate that cartilaginous choristoma is unassociated with the pterygium.

Subpterygial cartilaginous choristoma is predominantly seen in the older population, and is a rare, sporadic condition that can originate from beneath the tenon tissue in the affected eye. These findings are inconsistent with previous reports regarding the age of onset, site, and size of lesion. The signs and symptoms of cartilaginous choristomas in the pterygium patients are often masked by the overlying pterygium. This study augments our understanding of the ECCC and contributes to the clinical and pathological data regarding this entity.

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