

The clinical, histological and immunohistochemical characteristics and nomenclature of meibomian gland ductal cysts (intratarsal keratinous cysts) and eyelid steatocystomas

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Abstract

Purpose Meibomian gland ductal cysts (MGDCs) and steatocystomas are epithelial lined, keratin-containing lesions of the eyelids. MDGCs are variably called tarsal keratinous cysts, intratarsal keratinous cysts of the meibomian glands, intratarsal inclusion cysts, epidermal cysts and epidermoid cysts. Both lesions are poorly described in the literature. We report a series of seven MGDC and steatocystomas, and examine their clinical, pathological and immunohistochemistry features and their management and outcomes.

Patients and methods A retrospective review of case notes and histopathology slides of all MGDCs and steatocystomas identified at one major histopathology service in South Australia between 2013 and 2015.

Results Seven cases were identified, with an average age of 64. The lesions range from 4 to 18 mm diameter and are firm, well-circumscribed and non-tender, and sometimes the keratin-filled cyst protrudes visibly under the tarsal conjunctiva. Two cases were previously misdiagnosed as chalazia but recurred after incision and curettage. Histologically, these lesions are lined by squamous epithelium but lack a well-formed stratum granulosum and can be distinguished by their immunohistochemical staining characteristics. Complete excision, including a wedge of underlying tarsal plate for MDGCs, is curative for with a follow up of 12–36 months.

Conclusions MGDCs and steatocystomas should be included in the differential of

benign eyelid lesions. Diagnosing and differentiating these lesions from chalazia is important for determining the optimal management strategy.

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Introduction

Meibomian gland ductal cysts (MGDC) are squamous epithelial-lined lesions of the eyelids that are variably called tarsal keratinous cysts, intratarsal keratinous cysts of the meibomian glands, intratarsal inclusion cysts, epidermal cysts, and epidermoid cysts.^{1–4} They are poorly described in the literature, with the largest series to date reporting 11 cases, despite probably being relatively common, possibly because they are misdiagnosed as chalazia or epidermal cysts.⁵

Steatocystomas are lesions arising from the pilosebaceous duct junction that are also rarely described in the eyelid.^{6,7} There are no firm diagnostic criteria for these lesions and their variable nomenclature likely impedes awareness of these lesions. We report a series of five MGDC and two steatocystomas, and examine their clinical, histological and immunohistochemical features, and their optimal management strategy.

Materials and methods

The database of a major histopathology service provider for South Australia was searched for all lesions that may represent MGDC or

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steatocystomas examined between 2013 and 2015. The case notes and pathology slides were reviewed of all identified cases.

Results

Clinical features

Seven patients with MGDC or steatocystoma were identified. The average patient age was 64 (range 44–95) and 4/7 (57%) were female. The five MGDC occurred on the upper lid. Two steatocystomas occurred on the lower lid and the medial canthus, respectively. The lesions had been present for between several months and 5 years. Two (29%) of the MGDCs had previously been mistaken for chalazia but recurred after incision and curettage. One MGDC had a BCC excised at a similar site to the MGDC 7 years previously. A further patient had basal cell naevus syndrome, but had had no prior lesions in the region of the TMGC. All patients presented with non-tender, firm, well circumscribed, non-fluctuant, cystic lesion (Figure 1). The lesions protruded to a variable degree anteriorly subdermally and posteriorly subconjunctivally. The lesions ranged in diameter from 4 to 18 mm. The keratin contents of the MGDCs with greater posterior extension could be seen on lid eversion as a white-yellow dome (Figure 1). The visual acuity was unaffected in all patients. The lesion was excised intact in 6/7 (86%) cases and one MGDC ruptured on excision. In 3/5 (43%) MGDC excision procedures, a wedge of tarsal plate was excised with the lesion (Figure 2). In one case, the lesion was

excised intact but without a wedge of tarsal plate, and in three cases the precise operation details are unknown.

Histopathology

In each case, histological examination found a cystic lesion lined by stratified squamous epithelium with an undulating surface eosinophilic cuticle and basal cell palisading, but no formed stratum granulosum. One lesion contained a few sebaceous cells in the epithelium and another associated pericycyst sebaceous glands, confirming them to be steatocystomas. The cysts all contained keratin, which was typically a milky fluid with a lamellated structure microscopically but in one case formed fine flakes.

Immunohistochemistry

On immunohistochemistry, all seven cases stained strongly positive for CK5, CK17. However CK17 stained the full thickness of the MGDC wall in all cases, but only superficially in the steatocystomas (Table 1). There was strong CEA staining of the contents, cuticle, and superficial epithelial layers of all the MGDCs but not of any component of the steatocystomas. There was also strong EMA staining of the contents and cuticle, and mild-to-moderate staining of the superficial epithelial layers of the MGDCs but no staining of the cyst lining of the steatocystomas. Similarly, CK19 stained most parts of the MGDCs but there was no

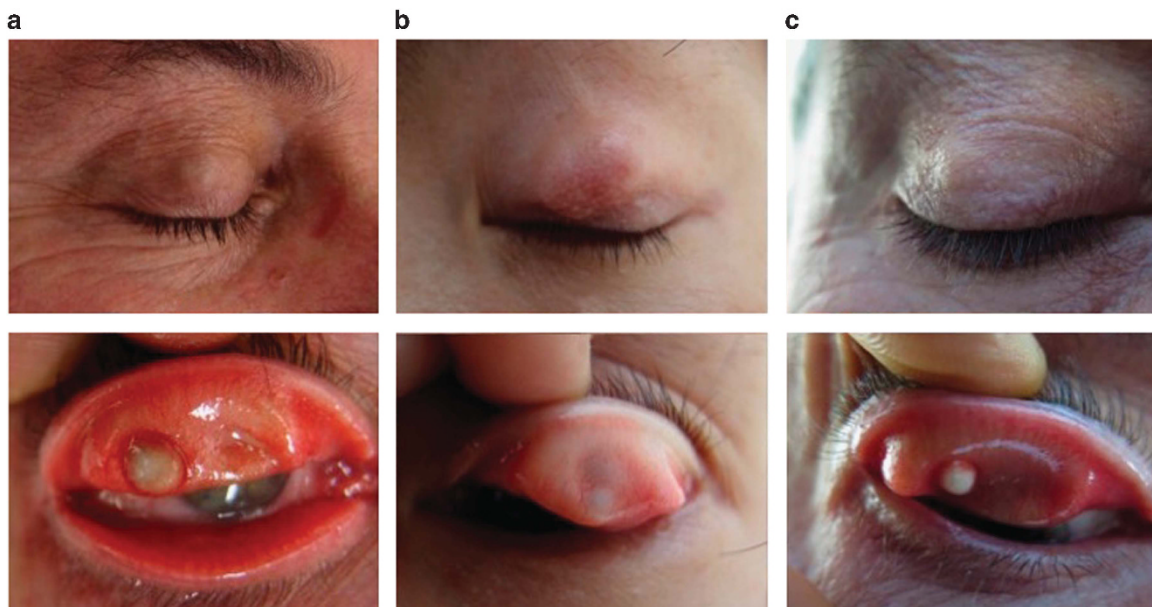


Figure 1 External and conjunctival appearances of three meibomian gland ductal cysts (MGDC).

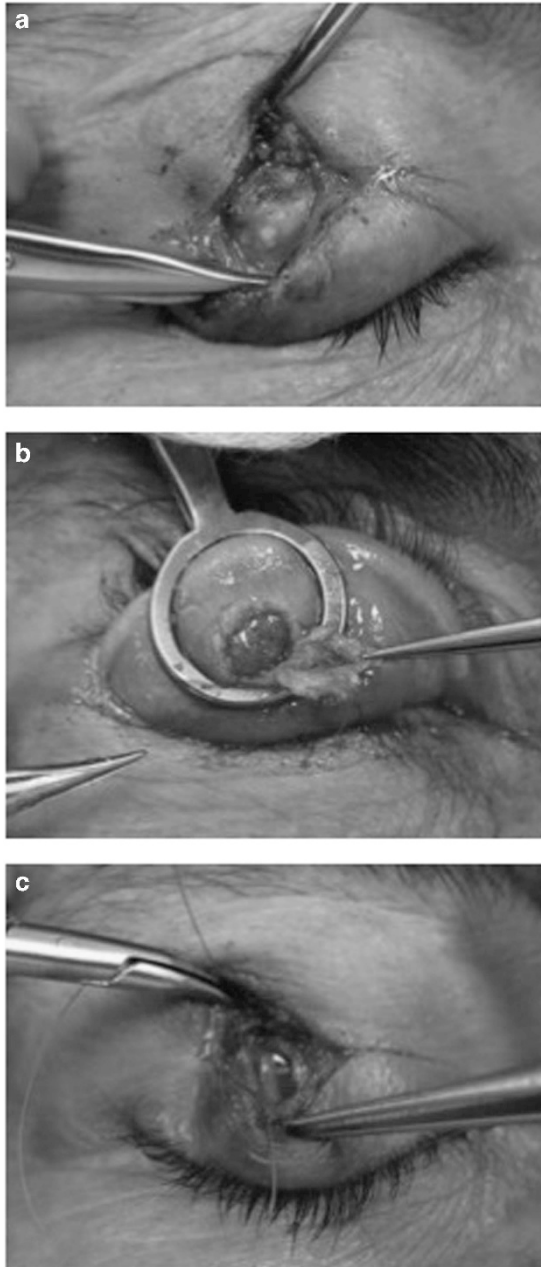


Figure 2 Surgical excision of a MGDC. (a) A skin crease incision exposes the intact keratin-filled cyst, (b) The entire cyst is excised with a wedge of underlying tarsal plate, (c) the full thickness excision is seen from the skin side.

staining in one steatocystoma and just stained the basal epithelial layer in the other.

Outcomes

All lesions were followed-up for 12–36 months, and one lesion, in which a tarsal plate wedge was not excised recurred and underwent repeat surgery with the additional excision of underlying tarsal plate.

Table 1 Immunohistochemistry of MGDCs and steatocystomas

Patient number	CEA	CK19	CK7	EMA	CK17	CK5	DIAGNOSIS
1	3+ C,C and SEL	2+ C,C and SEL. Patchy in BEL	0	3+ C,C 1+ SEL (patchy) 2+ contents	3+ FET	3+ C,C and FET	Intratarsal keratinous cyst
2	0	1+ BEL and adjacent basal layer of sebaceous glands	1+ basal layer of attached sebaceous glands	3+ sebaceous glands Cyst lining negative	3+ with some basal layer sparing	3+ C,C and FET	Surrounding sebaceous glands (steatocystoma)
3	3+ C,C and SEL	2+ C,C and FET. Patchy with often neg BEL	1+ contents. Rare	3+ C,C. 1+ SEL (patchy)	3+ FET	3+ C,C and FET	Intratarsal keratinous cyst
4	0	0	2+ BEL	0 but no sebaceous cells in lining on IHC section	3+ SEL	3+ C,C and FET	Sparse sebaceous cells in cyst lining epithelium (steatocystoma)
5	3+ C,C and SEL	2+ C,C and FET. Patchy in BEL	0	2+ C,C. Cyst lining negative	3+ FET	3+ C,C and FET	Intratarsal keratinous cyst
6	3+ C,C and SEL	2+ C,C and FET. Patchy with often neg BEL	0	3+ C,C. 2+ SEL (patchy)	3+ FET	3+ C,C and FET	Intratarsal keratinous cyst
7	3+ C,C and SEL	2+ C,C and FET. Patchy in BEL	0	2+ C,C. 1+ SEL (patchy)	3+ FET	3+ C,C and FET	Intratarsal keratinous cyst
Key:							
0							
Negative		1+	1+ and/or weak	2+	2+ and/or moderate	3+	3+ and/or strong
		<25%	<25% and/or weak	25-75%	25-75% and/or moderate	>75%	>75% and/or strong

Abbreviations: BEL, basal epithelial layer; C,C, contents cuticle; FET, full epithelial thickness; SEL, superficial epithelial layers.

Discussion

Eyelid MGDCs and steatocystomas may be more common than the rare reports as the literature suggests. However, they are likely to be mistakenly diagnosed and treated as chalazia with their true identity only becoming clear, if they are excised intact and histopathological assessment conducted by an experienced pathologist.

MGDCs are referred to by several different names in the literature: intratarsal keratinaceous cysts of the meibomian glands, epidermoid cysts, epidermal cysts, and tarsal inclusion cysts.¹⁻⁵ However, MGDCs lack the well-formed underlying stratum granulosum that is present in epidermoid cysts and there is no evidence that these cysts derive from either sequestration during embryogenesis or traumatic/surgical implantation of epidermal cells. While intratarsal keratinaceous cysts of the meibomian glands is histologically accurate, we prefer the name meibomian gland ductal cyst as it is easier to remember and the presence of keratin is not usually noted in a lesion's name.

Various clinical features help differentiate MGDC and steatocystomas from chalazia and epidermoid (epidermal) cysts. MGDC and steatocystomas are subdermal, with MGDCs arising from the tarsal plate and steatocystomas probably from pilosebaceous glands, distinguishing them from epidermoid cysts of the eyelid skin. MGDCs and steatocystomas may clinically resemble chalazia but¹ they generally occur in middle age while chalazia typically affect younger patients,² they have an epithelial lining and therefore form well-circumscribed cystic lesion unlike the more less-discrete, nonepithelial-lined chalazia³ The keratin contents of MGDCs and steatocystomas may be visible pre-operatively, if they have posterior extension (see Figure 1) or intra-operatively (see Figure 2) as a white-to-yellow bulge.⁴ Lesions with anterior extension may have a slight blue hue to them, perhaps from the Tyndall effect,⁵ the contents of an MGDC are elegantly described by Kim *et al*⁵ as having the consistency of tofu residue rather than the very variable constancy of the inspissated sebum and inflammatory material of a chalazion.

The location of the cyst may help to distinguish MGDCs and steatocystomas. In common with previous series, all the MGDCs in the present series arose from upper lid tarsal plate, while the steatocystomas were found at the medial canthus and lower lid. It is perhaps surprising that lower lid MGDCs have not been reported, given the presence of Meibomian glands. However, they would perhaps be even more likely to be mistakenly diagnosed as chalazia than those in the upper lid.

Histologically, MGDCs and steatocystomas are very similar. They can be distinguished by the presence of sebaceous glands in the epithelial lining and/or surrounding

sebaceous glands. Additionally, the keratin may be of a slightly different consistency, typically lamellated and like 'milky fluid' in MGDCs and thicker, yellow keratinaceous contents of a steatocystoma. Immunohistochemistry can differentiate MGDCs and steatocystomas, and also shows both these lesions to be entirely different entities to chalazia as they are frequently mistaken clinically. A cyst that expresses CEA and has full epithelial thickness CK17 staining (confirming the presence of type 1 keratin), EMA (a high molecular weight transmembrane protein that can be used to identify some tissues and tumours of glandular origin) staining and CK19 (confirming the presence of human keratin 19) staining is indicative of a MGDC. The absence of CEA and EMA staining, with weak or absent CK19 staining and CK17 staining of the superficial cyst lining only indicates the lesion to be a steatocystoma CK5 stains type II intermediate filament proteins that are present in the stratified squamous epithelial lining of both lesions, but would not be present in a chalazion. CK7 stains intermediate filaments that are present in glandular and transitional but not stratified squamous epithelium and therefore does not strongly stain in either MGDCs and steatocystomas. Interestingly, CEA staining, which is found in MGDCs but not steatocystomas, is typically associated with adenocarcinoma and not thought to stain benign glands, although there is no suggestion that MGDCs are malignant. EMA is a MGDCs and chalazia require different management strategies; conservative measures or incision and curettage (I&C) are usually effective for chalazia. However, MGDC do not appear to resolve without intervention and I&C has a high recurrence rate with 8/18 reported cases (including present series) recurring after previous I&C. Complete excision, with an underlying strip of tarsal plate that includes the Meibomian gland, from which the cysts derives appears to be curative.^{1,2} Moreover, the present series shows that recurrence may occur after complete excision of an intact lesion but without the underlying tarsal plate. Steatocystomas probably do not require excision of adjacent tissue.

A limitation of this study is that the prevalence of these lesions cannot be determined. Most eyelid cystic lesions are not sent for histopathological assessment as they are presumed to be chalazia and cysts of Moll or Zeiss. However, the presence of seven lesions in one regional pathology service indicates they may be more common than the few reported cases as the literature suggests.

The findings of this study enable improved definitions of MGDC and steatocystomas. An MGDC is a keratin-containing cystic lesion lined by stratified squamous epithelium with an undulating surface eosinophilic cuticle and basal cell palisading, and no formed stratum granulosum with positive IHC staining for CK5, CK17, CEA, EMA, and CK19. A steatocystoma has the same

histological appearance, but shows positive IHC staining for CK5, superficial CK17 staining but no CEA or EMA staining.

MGDCs and steatocystomas should be included in the differential diagnosis of cystic upper or lower eyelid lesions. They should be suspected in cases when presumed chalazia have an atypical appearance, age of presentation or recur after surgery, and should be completely excised with a strip of underlying tarsal plate.

Summary

What was known before

- A few small case series and reports have addressed meibomian gland ductal cysts and steatocystomas of the eyelid. The clinical features and surgical management have been described.

What this study adds

- Further information about the clinical features, management, and outcome. New information about the histopathological features and immunohistochemistry that differentiates meibomian gland ductal cysts and steatocystomas.

Conflict of interest

The authors declare no conflict of interest.

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