



SUPERNUMERARY LOWER LID LACRIMAL PUNCTUM: A DETAILED CASE PRESENTATION AND REVIEW

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ABSTRACT

Background: Lacrimal drainage apparatus produces and drains tears, the balance of which is important for the maintenance of the ocular surface. Congenital anomalies, although rare, are capable of disrupting the dynamics of tears and may lead to clinical conditions like epiphora or dry eye, e.g. supernumerary lacrimal puncta. Such cases, albeit rarely documented, need to be clinically reported for aiding diagnosis and management.

Objective : This study aims to document the clinical findings of a patient with a supernumerary lower lid lacrimal punctum and, with the help of the literature, to synthesize its clinical importance, diagnosis, and subsequent effect on the patient's ocular anatomy and physiology.

Methods: The patient was a 56 year old male who was screened for cataract surgery at Al Shifa Trust Eye Hospital, Rawalpindi. He was subject to a host of clinical evaluations, as extensive as slit lamp biomicroscopy and as simple as TBUT. Each finding was analyzed for its association with previously documented cases, following which a narrative literature review was conducted.

Findings: The patient presented with two extradistinct puncta on the right lower eyelid: a medial round punctum (0.6 mm) and a lateral slit-like accessory punctum. Probing confirmed separate anatomical openings, while syringing and unable to epilate the punctum yielded punctal regurgitation, altered contused pliability regurgitation. TBUT reduced (7 sec R, 9 sec L) although lubricative symptoms in broth occurred. Review Literature (n=52) patients suggest right lower eyelid dominant, with presentations both asymptomatic and symptomatic with tears, dry eye, canaliculitis or conjunctivitis.

Conclusion: Supernumerary lacrimal puncta arise from the fusion of the excretory ducts of the lacrimal glands or from the breakdown of a primitive continuum. Resulting drainage abnormalities are often of little clinical consequence, and symptoms are rare. Even in the absence of epiphora, the puncta may be clinically significant and warrant differentiation from anatomical variations of prolapse of the amniotic sac. Comprehensive clinical assessment is fundamental, including the nook and corner parts of the conjunctiva. Dacryocystography might enhance understanding of the anatomy of classified or suspected structural changes. Confirming anatomy helps separate diagnosis from the essential walls of burden and pathology to be overshadowed or complex in epiphora and dry eye to facilitate action.

INTRODUCTION

The lacrimal drainage system plays a part in maintaining ocular surface health by producing and draining tears (1). Tears are produced by the lacrimal glands which are then distributed across the eye surface and are drained via the puncta, located on the medial aspect of each eyelid. The tears then drain into the nasal cavity through the canaliculi, lacrimal sac, and nasolacrimal duct (2).

Normal anatomy of the human lacrimal system includes the puncta lacimalia, lacrimal canaliculi, nasolacrimal ducts, sac, and lacrimal glands. The location of the lacrimal lower punctum is typically 6 mm lateral to the medial canthal edge and has an average diameter of 0.3 mm. Dimensions of the lacrimal puncta vary with them being presented in various shapes. Puncta are closed, slit-shaped, oval, or round, with the round/pinpoint shape being the most common (3). The lower punctum is typically larger than the upper punctum (4). The outer punctal diameter ranges from 0.2-0.5mm, and the depth of a punctum is around $545.8 \pm 270.1 \mu\text{m}$ (5). In about 90% of individuals, the lower and upper canaliculi join proximal to the lacrimal sac, forming a common canaliculus of 3 to 5 mm in length. The common canaliculus drains into the lacrimal sac, which is 12 to 15 mm long, 2 to 3 mm wide, and 4 to 6 mm deep (6). Any anomaly in this delicately balanced system can disrupt tear film dynamics, leading to conditions like epiphora (excessive tearing) (7).

Supernumerary lacrimal puncta, while relatively uncommon, represent one such congenital anomaly that can significantly impact tear drainage (8). Its exact incidence needs to be mentioned in the literature and is termed rare as very few cases have been reported. The accessory puncta could present with a separate canaliculus or share the same canaliculus. In 2020, Al Saleh et al. reported 4

cases with supernumerary puncta, 2 of which had the same canaliculus (9). In 2010, Satchi and McNab outlined an incidence of <1% of patients seen over 20 years at their institution with double lower lid punctum (10).

Case Report

A 56-year-old male with no known systemic diseases presented to Alshifa Trust Eye Hospital in Rawalpindi, Pakistan, for a routine cataract screening. His primary complaint was persistent dry eyes. The patient's medical history was unremarkable, with no prior ocular trauma, surgeries, or lacrimal system probing.

A thorough ophthalmic examination revealed an unusual anatomical variation: two distinct puncta on the right lower eyelid. The primary puncta appeared round in shape, measuring 0.6mm, while the accessor punctum, situated laterally, had a slit-like configuration. On the left side, puncta on both the upper and lower side of the eyelids were normal, appearing round (0.6mm).



Figure 1: Clinical photograph of the right lower eyelid showing the primary round

punctum (medial) and the slit-like accessory punctum (lateral).

Figure 1 shows that there are Two different puncta on the right lower eye lid. The medial punctum is round and of normal morphology whereas lateral accessory one is slit like. This difference is a congenital malformation that corresponds with excessive puncta. The distinct nature of each punctum affirms the clinical data that the twice puncta are distinct anatomical openings and not an aberration of a single punctum. A fluorescence dye disappearance test revealed values of 3 minutes in both eyes. Tear Break Up Time (TBUT) was 7 seconds in the right and 9 seconds in the left eye. Dilation of the double puncta was performed, and further evaluation of the lacrimal outflow system was done through syringing and probing of the right lower lid puncta yielded the following findings:

Syringing: Saline injected through either two lower lid puncta and the one upper lid punctum was perceptible in the patient's throat. However, some regurgitation through the other lower lid punctum was also observed.

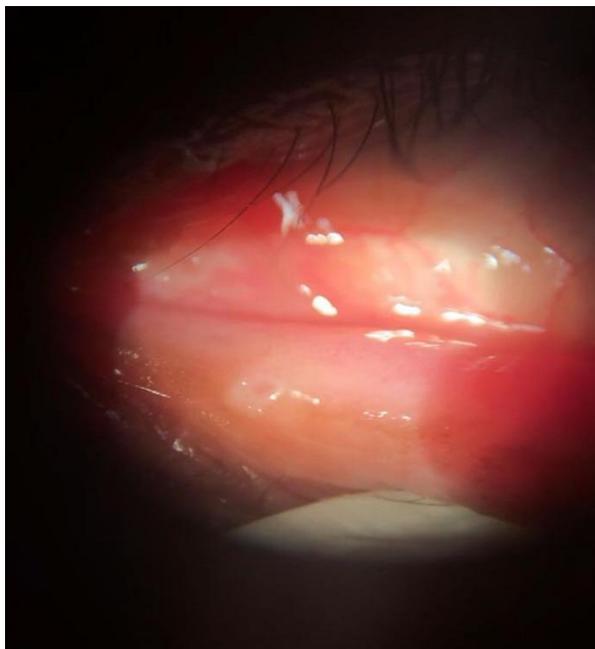


Figure 2: shows close-up of lower lid punctum of the left side which is normal.

Probing: Probing the primary and accessory lower puncta confirmed the typical vertical followed by horizontal canalicular course followed by a hard stop. Probing for both the left lower lid puncta revealed a hard stop, and syringing resulted in no regurgitation of saline fluid, with the patient feeling the injected fluid in his throat.

Due to the lack of available diagnostic imaging techniques, such as dacryocystography, it was not possible to obtain definitive anatomical details of the lacrimal pathway.

Discussion

Congenital anomalies of the lacrimal drainage system, including supernumerary puncta and canaliculi, occur infrequently but warrant clinical attention. These anomalies are more commonly found on the lower eyelid (11). Supernumerary puncta can exhibit varying functionality; they may drain into the normal canalicular system or possess an independent canaliculus (12). Associated anomalies of the lacrimal system (e.g., nasolacrimal duct obstruction, fistula) and systemic conditions (e.g., Down syndrome) have also been reported (10).

The embryological development of the lacrimal system offers insights into the origins of such anomalies. The entire nasolacrimal system develops from surface ectoderm that unfolds in the medial eyelids and in the groove between the maxillary and frontonasal processes. Supernumerary puncta or canaliculi likely arise from incomplete separation or abnormal out-budding of the epithelial cord (13).

Children with supernumerary puncta may present with congenital lacrimal anomalies, such as nasolacrimal duct obstruction, lacrimal fistula, or canalicular agenesis, which directly contribute to epiphora. In adults, supernumerary puncta may predispose to

acquired nasolacrimal duct obstruction or indicate pre-existing canalicular dysfunction. Such patients may become symptomatic with even mild nasolacrimal duct stenosis. Further diagnostic imaging, such as dacryocystography, could be valuable in detecting the precise anatomical configuration of the lacrimal system and planning further management strategies.

Reduced tear break-up time (TBUT) in our patient correlates to his primary complaint of dry eyes. It suggests its possible multifactorial origin rather than being solely attributable to the presence of accessory punctum. Dry eye syndrome is a complex condition that can arise from altered tear composition, eyelid margin abnormalities, environmental conditions, and systemic diseases. (14) Interestingly, follow-up visits revealed significant improvement in his dry eye symptoms and TBUT using lubricating eye drops. This positive response further supports the idea that the supernumerary punctum may

not have been the primary driver of his dry eye condition.

In Table 1, we analyzed data from 52 patients identified with additional lacrimal puncta, including the one described in our case report. Among these, 28 were female (53.8%) and 24 were male (46.2%). Regarding symptom presentation, 18 patients (34.6%) were asymptomatic, while the majority, 30 patients (57.6%), experienced epiphora. Additionally, 3 patients, including ours (5.76%), presented with dry eye, another 2 (3.84%) with canaliculitis, and 1 patient (1.92%) each with conjunctivitis and stage IV trachoma accompanied by chronic infection. The symptom percentages exceed 100% because some individuals display multiple symptoms, possibly related to their double puncta. According to findings from other relevant studies, the right lower eyelid was the most commonly affected site, with 40 out of the 52 patients (76.9%) presenting with supernumerary puncta in this location.

Table 1: Overview of Reported Cases of Supernumerary Lacrimal Puncta

Study	Patient Count (M/F)	Average Age	Affected Eyelid(s)	Symptomatology	Noted Associations	Treatment Approaches
Our case report	1 (M)	56	RLL	Persistent Dry Eyes	None	Topical Lubricants
Solyman, Omar Mahmoud et al.(15)	4 (1 M, 2 F)	52	Mostly RLL, one LLL+LUL	1 asymptomatic, 3 with tearing	None	Observations and varying interventions
Satchi et al.	23 (11 M, 12 F)	54	All RLL	5 asymptomatic, 18 with tearing	Various, including partial NLDO and genetic conditions	Primarily, DCR and observation
Bair et al.(16)	1 (F)	60	RUL	Dry eye	None	Punctal plug insertion
Chignell et al.(17)	6 (5 M, 1 F)	38	Mainly RLL, one RUL	Mostly asymptomatic, one with conjunctivitis	Chronic infection indications	None performed

Galindo-Ferreiro et al.(18)	1 (F)	60	RLL	Dry eye	None	Punctal plug insertion
Yong et al.(12)	1 (M)	59	ALL	Canaliculitis	None	Oral antibiotics
Timlin et al.(19)	5 (2 M, 3 F)	51	Mostly L, one RLL	All with tearing	None	Various, including DCR and probing
Lacroix and Bitton(20)	1 (F)	29	RLL	Asymptomatic	None	None performed
Chun and Yang(21)	1 (F)	45	Multiple (bilateral)	Bilateral tearing	None	Bilateral CDCR
Azam et al.(22)	1 (F)	18	ALL	Intermittent tearing	None	None performed
Opara et al.(15)	1 (F)	19	RLL	Intermittent tearing	None	Surgical removal
Ucar and Karadag(8)	2 (2 F)	52	Both RLL and L	1 asymptomatic, 1 with tearing	None	DCR
Al Saleh et al.(9)	4 (2 M, 2 F)	47	Both RLL and L	All asymptomatic	Double punctum phenomena	None performed

CONCLUSION

The nasolacrimal system is a well-delineated route for draining tears. A routine clinic case with an unusual finding of a supernumerary lower lid lacrimal punctum underscores that the lacrimal apparatus should be examined meticulously, even during routine clinical examination. This is also significant as congenital anomalies can sometimes lead to ocular surface pathology.

While the patient did not exhibit classic signs of epiphora, the additional punctum and the findings of syringing and probing suggest altered tear drainage dynamics. In many cases where the patient's lacrimal anatomy could not be entirely confirmed, diagnostic imaging such as dacryocystography is the best course of action to gain insight into the given structures and choose the appropriate management if necessary.

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