In Vivo Human Lacrimal Gland Imaging Using an Ultrasound Biomicroscopy

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Running title: In vivo human lacrimal gland imaging using a UBM
ABSTRACT

Purpose: In the present study, we introduce human lacrimal gland imaging using an ultrasound biomicroscopy (UBM) with a soft cover and show their findings.

Methods: The representative UBM findings of palpebral lobes in seven subjects (4 with non-Sjögren dry eye syndrome, 1 with Sjögren syndrome, and 2 healthy subjects) were described in this study. To prolapse the palpebral lobe, the examiner pulled the temporal part of the upper eyelid in the superotemporal direction and directed the subject to look in the inferonasal direction. We scanned the palpebral lobes longitudinally and transversely using UBM. We used an Aviso UBM (Quantel Medical, Clermont-Ferrand, France) with a 50 MHz linear probe and ClearScan.

Results: In UBM of two healthy subjects, the echogenicity of the lacrimal gland was lower than that of the sclera and homogeneous. But, the parenchyma of a patient with Sjögren dry eye syndrome was quite inhomogeneous compared to the healthy subjects. In two patients with dry eye syndrome, we were able to observe some lobules in the parenchyma. We could find excretory ducts running parallel at the surface of the longitudinal section in some subjects. In the longitudinal UBM scan of a subject, we observed a tubular structure at a depth of 1500 µm that was considered a blood vessel. It ran from the superonasal to the inferotemporal direction. In a subject, we observed a large cyst beneath the conjunctiva.

Conclusions: Lacrimal gland imaging using UBM has both advantages of OCT and sonography, and could be useful for evaluating dry eye syndrome.

Key words: Lacrimal gland, Ultrasound biomicroscopy, Parenchyma, Lobules, Excretory ducts.
INTRODUCTION

Lacrimal glands are crucial glands in the pathogenesis of dry eye syndrome. Current imaging technologies available for observing this gland, however, are not adequate. Images of lacrimal glands can be obtained by computed tomography (CT) or magnetic resonance imaging (MRI) [1], but these techniques are only used when lacrimal gland tumors are suspected. Use of CT and MRI is not recommended for diagnosing dry eye, however, due to their costs and radiation exposure (CT).

Recently, we succeeded in scanning a prolapsed palpebral lobe of a human lacrimal gland in vivo using optical coherence tomography (OCT) [2]. We were able to detect the excretory ducts, blood vessels, parenchyma, acini, interlobular ducts, and intralobular ducts. OCT revealed these inner structures of the lacrimal gland in detail. The penetration depth of the OCT, however, was only ~300 μm, and thus we could not observe the deeper structures. To overcome this disadvantage, we scanned the lacrimal gland using ultrasound biomicroscopy (UBM), which is used for imaging the anterior segment of the eye. Here we describe UBM findings of prolapsed palpebral lobes in healthy subjects, and in patients with non-Sjögren dry eye syndrome or Sjögren dry eye syndrome.

MATERIALS AND METHODS

This study followed the principles of the Declaration of Helsinki and informed consent was obtained from the subjects after explanation of the nature and possible consequences of the study. This study was approved by the Institutional Review Board of our Hospital. The representative UBM findings of prolapsed palpebral lobes in seven subjects (4 with non-Sjögren dry eye syndrome, 1 with Sjögren syndrome, and 2 healthy subjects) were described in this study. The inclusion criteria for the dry-eye group were symptoms typical for this syndrome (i.e., dryness, itching, foreign body sensation) with a low tear-film break-up time (tBUT; 5 s), low Schirmer I score (< 10 mm per 5 min without anesthesia), and corneal punctate fluorescein staining (Oxford staining score [3] of > 1) in either eye. Exclusion criteria included a history of ocular injury, infection, non-dry eye-related ocular inflammation, trauma, or surgery within the previous 6 months, and uncontrolled systemic disease. For healthy subjects, inclusion criteria were no dry-eye syndrome (no typical dry eye syndrome symptoms, tBUT > 5 s, Schirmer I score > 10 mm, and Oxford staining score < 1), and exclusion criteria were the same as for the dry-eye group.

We first applied Schirmer’s test I to both eyes without anesthesia. To prolapse the palpebral lobe of the lacrimal gland, the examiner pulled the temporal part of the upper eyelid in the superotemporal direction and directed the subject to look in the inferonasal direction. Photographs of the prolapsed palpebral lobes were obtained using a
biomicroscope and camera system (magnification: 6.3x). Fig. 1A shows the scan direction of the prolapsed palpebral lobe. A longitudinal scan was defined as a scan parallel to the prolapsed gland axis. A transverse scan was defined as a scan perpendicular to the prolapsed gland axis. We scanned the palpebral lobes longitudinally and transversely using OCT [2]. OCT scanning was performed using the Heidelberg OCT (Spectralis, Heidelberg, Germany) with an anterior segment module. The following settings were used for the B-scans: sclera mode, enhanced depth imaging, high-resolution mode, scan length 15°, with a mean of 60 scans. The B-scans were repeated more than five times. The same procedures were repeated for the other eye.

Finally, we scanned the palpebral lobe longitudinally and transversely using UBM. We used an Aviso UBM (Quantel Medical, Clermont-Ferrand, France) with a 50 MHz linear probe and ClearScan. First, we filled the clear cover with normal saline. We covered the probe by placing it in the cover, while attempting to remove all the air bubbles from the saline. We applied topical anesthesia with Alcain (Alcon, Fort Worth, TX) to both eyes. The subject sat in a chair and the examiner pulled the upper eyelids and prolapsed the palpebral lobes. The examiner positioned the probe at the surface of the lacrimal gland and scanned the gland both longitudinally and transversely (Fig. 1B). For the longitudinal scan, the examiner positioned the probe so that the scanning axis was parallel to the prolapsed lacrimal gland axis. The examiner found the sclera and then moved the probe slowly in the superotemporal direction to image the lacrimal gland (Video 1). Similarly, for the transverse scan, the examiner positioned the probe so that the scanning axis was perpendicular to the prolapsed lacrimal gland. The examiner found the sclera and then moved the probe slowly in the superotemporal direction to image the lacrimal gland (Video 1). An experienced ophthalmologist performed the OCT and UBM scanning. We described qualitatively UBM findings of prolapsed palpebral lobes in healthy subjects, and in patients with non-Sjögren dry eye syndrome or Sjögren dry eye syndrome and compared them.

RESULTS

1. Parenchyma

Fig. 2 shows a slit-lamp photograph, and OCT and UBM scans of the left eye (Schirmer I test: 18 mm) of a healthy subject (subject A, a 44-year-old man). In the slit-lamp photograph, beneath the conjunctiva, we observed a palpebral lobe of a lacrimal gland. In the OCT scan, beneath the conjunctiva with high signal intensity, we observed the parenchyma of the lacrimal gland with low and homogeneous signal intensity. Between the conjunctiva and the parenchyma, we observed an excretory duct. The penetration depth of the OCT was
approximately 300–400 µm. With UBM, between the upper and lower lids, we observed the cross section of the lacrimal gland in a longitudinal section (Video 2). The echogenicity of the lacrimal gland is similar or lower than that of the sclera. The conjunctiva was not defined as clearly as in OCT. We could not observe a distinct capsule of the lacrimal gland. The echogenicity of parenchyma was rather homogeneous. The penetration depth of the UBM was approximately 3,000 µm. Fig. 3 shows a slit-lamp photograph, and OCT and UBM scans of the right eye (Schirmer I test: 15 mm) of a healthy subject (subject B, a 25-year-old woman). Similar to subject A, in the UBM, the parenchyma was rather homogenous in both the longitudinal and transverse sections (Video 3).

Fig. 4 shows a slit-lamp photograph, and OCT and UBM scans of the left eye (Schirmer I test < 5 mm) of a patient C (a 59-year-old woman) with Sjögren dry eye syndrome. The slit-lamp photograph and OCT revealed no specific findings in this patient compared to the healthy subjects. In UBM, however, the parenchyma was quite inhomogeneous in the longitudinal section (Video 4). In the shallow parenchyma, we observed some tubular structures with indefinite walls running perpendicular to the scan plane. In the deep parenchyma, we observed another tubular structure with a thick wall that was hyperechoic and ran parallel to the scan plane.

2. Lobules

Fig. 5 is a slit-lamp photograph, and OCT and UBM transverse scans of the left eye (Schirmer I test: 7 mm) in a patient with dry eye syndrome (patient D, a 52-year-old woman). In the OCT scan, we observed no lobular structure in the parenchyma. In UBM, however, we were able to observe some lobules in the parenchyma (Video 5). The periphery of the lobule was hyperechoic and the inside the lobule was inhomogeneous and hypoechoic compared to the periphery. The diameter of the lobule was 700-800 µm. Video 6 shows the lobules in the parenchyma of the left eye (Schirmer I test: 6 mm) of another patient with dry eye syndrome (patient E, a 59-year-old woman). Inside the lobules, we observed hyperechoic compartment lines.

3. Excretory ducts

Fig. 6 shows the left eye (Schirmer I test: 8 mm) of a patient with dry eye syndrome (patient F, a 58-year-old woman). In the OCT scan, we observed an excretory duct beneath the conjunctiva in the longitudinal section. In the UBM longitudinal section, we observed 3-4 excretory ducts with a diameter of ~200 µm running parallel at the surface of the longitudinal section (Video 7). The lumen of the duct was hypoechoic and the wall was not distinguishable or hypoechoic. Video 8 shows two excretory ducts at the surface of the parenchyma of the right eye (Schirmer I test: 5 mm) in a patient with dry eye syndrome patient (patient D, a 52-year-old woman).
4. Blood vessels

Fig. 7 shows a slit-lamp photograph, and OCT and UBM scans of the right eye (Schirmer I test: 7 mm) of a patient with dry eye syndrome (patient G, a 42-year-old woman). In the OCT scan, we observed no blood vessels. In the longitudinal UBM scan, however, we observed a tubular structure at a depth of 1500 µm that was considered a blood vessel (Video 9). It ran from the superonasal to the inferotemporal direction and had a diameter of ~300 µm. The lumen was hypoechoic and the wall was thick and hyperechoic.

5. Cysts

Fig. 8 shows a slit-lamp photograph, and OCT and UBM scans of the left eye (Schirmer I test: 5 mm) of a patient with non-Sjögren dry eye syndrome (patient F, a 58-year-old woman). In the transverse OCT and UBM scans, we observed a large cyst beneath the conjunctiva. The inside of the cyst was very hypoechoic (Video 10).

During examination, the subjects reported feeling no pain or discomfort. There were no complications following the examination.

Table 1 shows demographics of subjects included in this study and their ultrasound biomicroscopy findings in lacrimal glands.

DISCUSSION

In the present study, we scanned the palpebral lobe of lacrimal glands in healthy subjects and in patients with non-Sjögren dry eye syndrome or Sjögren dry eye syndrome using UBM, which is often used for imaging the anterior segment of the eye. We could observe the parenchyma of the palpebral lobe, lobule, excretory duct, blood vessels, and a cyst. As far as we know, this is the first study that scanned the lacrimal gland directly using a new UBM probe with soft cover. The purpose of the study is to introduce an UBM of human lacrimal gland using this new probe and suggest a potential usefulness of this technique. A larger series of subjects would be required to verify findings and repeatability in later study.

While OCT allows for imaging the fine structures of the lacrimal glands [2], the penetration depth of OCT is too shallow. Therefore, we used ultrasound in attempt to overcome this disadvantage of OCT. Giovagnorio et al applied sonography to scan the lacrimal glands using the eyeball as a window in patients with Sjögren dry eye syndrome [4]. However, this technique has some disadvantages. First, it is technically difficult to obtain a good
view. The lacrimal glands were visualized bilaterally in only 6 of 15 patients with Sjögren syndrome (12 of 30 glands). Second, because the eyeball was used as a window, the relatively long distance from the probe to the lacrimal gland resulted in poor resolution of the lacrimal gland. Third, the frequency of the sonographic signal is lower (7-13 MHz) than that of UBM (50 MHz), which also decreased the resolution relative to that obtained with UBM.

We attempted to scan the lacrimal glands directly by placing the sonography probe on the prolapsed lacrimal gland instead of using the eyeball as a window, but in standard sonography for the eye, the near field around the probe cannot be viewed. For these reasons, we selected UBM instead of sonography. In the past, however, a scleral shell was necessary for UBM scanning. We had to fill the scleral shell with saline, and then immerse the UBM probe in the saline to scan the anterior segment of eye. This is not problematic for corneal or anterior chamber imaging, but we could not use this technique for imaging a structure with an uneven surface such as the palpebral lobe. Recently, a new UBM probe with a soft cover (single-use conical-shaped probe cover) filled with normal saline was developed and thus the uneven surface of the lacrimal gland can be imaged. Firm contact between the palpebral lobe of the lacrimal gland can be achieved with the new probe.

In 1993, Molgat et al. reported UBM scanning for two abnormally prolapsed lacrimal glands and three lacrimal duct cysts [5]. Although they did not indicate that they used a scleral shell, they must not have used a UBM probe with a soft cover because the ClearScan type UBM was only recently developed. Molgat et al. reported the absence of a distinct capsule overlying the mass and the presence of multiple small cystic spaces in the prolapsed lacrimal gland. But, the presence of multiple small cystic spaces is not consistent with our results. And, the resolution of their system is lower than ours. We scanned not only the lacrimal gland of healthy subjects but also that of patients with non-Sjögren dry eye syndrome and Sjögren syndrome. Using UBM, we observed lobules, excretory ducts, blood vessels, and cysts.

UBM allowed us view the lacrimal gland from the surface to a depth of approximately 3,000 µm (3 mm). The thickness of the palpebral gland is 3 mm [6], so theoretically the entire thickness of the palpebral gland can be viewed. OCT allows a viewing depth of only about 300 µm, i.e., 10 % of the thickness of the palpebral gland. With UBM, we could observe lobules that were 700-800 µm in diameter and a blood vessel located at a depth of 1500 µm. These structures could not be observed with OCT. The resolution of UBM, however, was much lower than that of OCT. In OCT, we could observe acini with diameter of 70 µm, but we could not observe them with UBM. This disadvantage of UBM is a trade-off for the increased penetration depth. To obtain a better UBM image, a skilled technician is needed. In particular, motion artifact must be minimized for better results. In this study, only
the exposed part of the palpebral lobe was imaged, not the entire lacrimal gland. Therefore, it is not possible to know the transverse and longitudinal lengths of the lacrimal gland like a CT scan.

In this study, the parenchyma was somewhat homogeneous in the UBM scans of the two healthy subjects, but inhomogeneous in patients with Sjögren syndrome compared to the healthy subjects. In the two non-Sjögren dry eye syndrome patients, we could observe the lobules. In healthy young subjects without focal or lobular atrophy and fibrosis, B-scan sonography images may be homogeneous. In contrast, fibrosis may be present in older subjects or in patients with dry eye syndrome with focal or lobular atrophy [7], and in these cases, B-scan sonography images may appear inhomogeneous. In a previous report in which sonography was used to view the lacrimal glands in patients with Sjögren syndrome, an irregular hyperechoic patch was visible centrally in 3 of 6 patients (6 of 30 glands), probably indicating fat deposition [4]. In 2 of 15 patients, the presence of a particularly irregular echotexture with multiple small cystlike lesions was considered an indication for biopsy, revealing lymphoma.

Histology of the lacrimal glands of patients with Sjögren syndrome reveals extensive lymphocyte infiltration [8]. We believe that this might be the reason for the inhomogeneous echogeneity of the lacrimal glands in Sjögren patients. Further investigation with a larger sample is required, however, to test this hypothesis. In a previous OCT study [2], we were unable to identify focal, lobular atrophy and fibrosis, but in the present study using UBM, we were able to observe these structures. The shallow scan depth of OCT might prevent the observation of homogenous and inhomogeneous signals.

Although the number of subjects in this study was too small, it is thought that gender and especially age may have an effect on the anatomical change of lacrimal glands. In particular, regarding age, lobular atrophy with lobular fibrosis (74-year-old man) and acinar atrophy and periductal fibrosis (87-year-old woman) were observed in the histology of lacrimal gland in old age subjects in Obata study.[6] In the next study, we will include the old subjects to see whether similar findings are observed in UBM or not.

In some subjects, we observed lobules in the parenchyma of the lacrimal gland with a diameter was 700-800 µm, a hyperechoic periphery, and an inhomogeneous and hypoechoic center compared to the periphery. Inside the lobules, we observed hyperechoic compartment lines. The hyperechoic periphery and compartment lines are thought to be interlobular and intralobular fibroconnective tissue, respectively.

In the OCT scan, the wall of excretory duct appeared thick and the signal intensity inside the lumen was very low [2]. In contrast, the blood vessel walls appeared thin and the signal intensity of the lumen was high compared to the excretory ducts. In UBM, however, we were unable to distinguish excretory ducts and blood vessels. Excretory ducts usually run in the superotemporal to inferonasal direction and run parallel to each other. Therefore,
cross sections of tubes that run parallel to each other in a longitudinal scan are likely to be excretory ducts. In addition, the lumen was hypoechoic, the wall was not definite. It is difficult to confirm the observations of blood vessels because they do not travel in a specific direction. A tube running in the superonasal to inferotemporal direction, however, was considered to be a blood vessel rather than an excretory duct. We observed a typical blood vessel in a subject. Because it was running in the superonasal to inferotemporal direction, we were able to observe a longitudinal section of the tube in the longitudinal B-scan. The blood vessel lumen was hypoechoic, which is the same as the excretory duct lumen. The blood vessel wall was hyperechoic compared to the excretory duct wall. Because blood vessel wall thickness varies with the blood vessel diameter, the wall thickness cannot be generalized.

The use of Doppler UBM would allow us to definitely distinguish blood vessels from excretory ducts.

This technique has some disadvantages. First, because the probe contacts the conjunctiva on the lacrimal gland, patients may experience discomfort and there is a risk of infection. Second, because there is a space filled with saline between the probe and palpebral lobe, it is difficult to determine the exact location during scanning. The probe should be moved from the sclera to the lacrimal gland because it is very easy to detect the sclera in UBM. Longitudinal UBM scanning is easier than transverse scanning to detect lacrimal glands. During a transverse scan, the lid may be mistaken for a lacrimal gland. Third, this technique cannot be used to scan the orbital lobe. The pathology of the orbital lobe, however, would be assumed to be similar to that in the palpebral lobe.

This study has some limitations. First, there is a selection bias in this study. We attempted to show representative UBM findings in non-Sjögren dry eye syndrome, subjects with Sjögren syndrome, and healthy subjects. Among these subjects, patients were included in which the palpebral lobe of lacrimal gland was sufficiently exposed (or prolapsed) to allow good UBM imaging, which may have acted as a selection bias. In order to avoid this selection bias, we will include all patients regardless of palpebral lobe exposure in the next study. Second, the number of subjects in the group is too small to compare the UBM findings. In order to compare the three groups (non-Sjögren dry eye syndrome, subject with Sjögren syndrome, healthy subjects), it would be ideal to include a sufficiently large number of patients in each group and a similar number of patients.

In this first report about UBM imaging of human lacrimal glands, we showed representative UBM findings in non-Sjögren dry eye syndrome, subjects with Sjögren syndrome, and healthy subjects. In the future studies, we will develop the UBM imaging techniques further and include a sufficiently large number of patients in each group, and a similar number of patients to compare the UBM finding between the groups. To evaluate the function of the lacrimal gland in patients with dry eye syndrome, the Schirmer test or measurement of tear meniscus is performed. However, UBM shows the anatomical structure of the lacrimal gland directly. If we can find abnormalities such
as atrophy of the lacrimal gland, it will be helpful to determine the type of dry eye (evaporative type dry eye or aqueous deficient type) and the treatment options. Of course, in case of lacrimal gland tumor, UBM may be useful before invasive biopsy.

In conclusion, we scanned the palpebral lobe of the lacrimal gland in healthy subjects as well as in patients with non-Sjögren dry eye syndrome or Sjögren dry eye syndrome using UBM, which is commonly used for imaging the anterior segment. We were able to observe the palpebral lobe parenchyma, lobules, excretory ducts, blood vessels, and cysts. Lacrimal gland imaging using UBM has both advantages of OCT and sonography, and could be useful for evaluating dry eye syndrome.

**Competing interest**

None
REFERENCES


Fig. 1 Ultrasound biomicroscopy (UBM) scanning of the lacrimal gland. A: The scan direction of the prolapsed palpebral lobe. A longitudinal scan was defined as a scan parallel to the prolapsed gland axis. A transverse scan was defined as a scan perpendicular to the prolapsed gland axis; B: UBM scanning of the palpebral lobe. We used an Aviso UBM (Quantel Medical, Clermont-Ferrand, France) with a 50MHz linear probe and ClearScan. The examiner positioned the probe at the surface of the lacrimal gland and scanned the gland both longitudinally and transversely.

Fig. 2 Lacrimal gland of a healthy subject (subject A, a 44-year-old man). In the optical coherence tomography scan, beneath the conjunctiva with high signal intensity, we observed the parenchyma of the lacrimal gland with low and homogeneous signal intensity. With ultrasound biomicroscopy, between the upper and lower lids, we observed the cross section of the lacrimal gland in a longitudinal section. The echogenicity of the lacrimal gland is similar or lower than that of the sclera. The echogenicity of parenchyma was rather homogeneous (A: slit-lamp photograph, B: Optical coherence tomography, C:Ultrasound biomicroscopy) (The arrow indicates scan direction).

Fig. 3 Lacrimal gland of a healthy subject (subject B, a 25-year-old woman). In ultrasound biomicroscopy, the parenchyma was rather homogenous in both the longitudinal and transverse sections (A: slit-lamp photograph, B: Optical coherence tomography, C:Ultrasound biomicroscopy) (The arrow indicates scan direction).

Fig. 4 Lacrimal gland of a patient (patient C, a 59-year-old woman) with Sjögren dry eye syndrome. The slit-lamp photograph and optical coherence tomography revealed no specific findings in this patient compared to the healthy subjects. In ultrasound biomicroscopy, however, the parenchyma was quite inhomogeneous in the longitudinal section (A: slit-lamp photograph, B: Optical coherence tomography, C:Ultrasound biomicroscopy) (The arrow indicates scan direction).

Fig. 5 Lobular structure in the lacrimal gland of a patient with dry eye syndrome (patient D, a 52-year-old woman). In the optical coherence tomography scan, we observed no lobular structure in the parenchyma. In ultrasound biomicroscopy, however, we were able to observe some lobules in the parenchyma. The periphery of the lobule was hyperechoic and the inside lobule was inhomogeneous and hypoechoic compared to the periphery. The diameter of the lobule was 700-800 µm (A: slit-lamp photograph, B: Optical coherence tomography, C:Ultrasound biomicroscopy) (The arrow indicates scan direction, the arrow heads indicate lobules).
Fig. 6 Excretory ducts in lacrimal gland of a patient with dry eye syndrome (patient F, a 58-year-old woman). In the optical coherence tomography scan, we observed an excretory duct beneath the conjunctiva in the longitudinal section. In the ultrasound biomicroscopy longitudinal section, we observed 3-4 excretory ducts with a diameter of ~200 µm running parallel at the surface of the longitudinal section. The lumen of the duct was hypoechoic and the wall was not distinguishable or hypoechoic (A: slit-lamp photograph, B: Optical coherence tomography, C: Ultrasound biomicroscopy) (The arrow indicates scan direction, the asterisk indicates an excretory duct in optical coherence tomography, the arrow heads indicate excretory ducts in ultrasound biomicroscopy).

Fig. 7 A blood vessel in lacrimal gland of a patient with dry eye syndrome (patient G, a 42-year-old woman). In the optical coherence tomography scan, we observed no blood vessels. In the longitudinal ultrasound biomicroscopy scan, however, we observed a tubular structure at a depth of 1500 µm that was considered a blood vessel. It ran from the superonasal to the inferotemporal direction and had a diameter of ~300 µm. The lumen was hypoechoic and the wall was thick and hyperechoic (A: slit-lamp photograph, B: Optical coherence tomography, C: Ultrasound biomicroscopy) (The arrow indicates scan direction, the arrow heads indicate a blood vessel).

Fig. 8 A cyst in the lacrimal gland a patient with non-Sjögren dry eye syndrome (patient F, a 58-year-old woman). In the transverse optical coherence tomography and ultrasound biomicroscopy scans, we observed a large cyst beneath the conjunctiva. The inside of the cyst was very hypoechoic (A: slit-lamp photograph, B: Optical coherence tomography, C: Ultrasound biomicroscopy) (Red arrow indicates scan direction) (The arrow indicates scan direction, the red asterisk indicates a cyst in optical coherence tomography, the arrow heads indicate a cyst in ultrasound biomicroscopy).

Video 1 – Video 10 are submitted as supplemental materials.
Table 1. Demographics of subjects included in this study and their ultrasound biomicroscopy findings in their lacrimal glands

<table>
<thead>
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<th>Subject</th>
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<th>UBM findings</th>
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OD: Oculus dexter, OS: Oculus sinister, UBM: Ultrasound Biomicroscopy