AS-OCT imaging of conjunctival lymphatics in a patient with lymphatic spread of a breast carcinoma to the conjunctiva

Abstract

Objective: Anterior segment optical coherence tomography (AS-OCT) was done to image the conjunctival lymphatics in a patient with lymphatic spread of a breast carcinoma to the conjunctiva.
Methods: AS-OCT imaging was done in a breast cancer patient presenting with cord-like sub-conjunctival thickenings and chemosis in her right eye.
Results: AS-OCT imaging revealed dilated lymphatic channels with intraluminal masses.
Conclusion: AS-OCT can image dilated lymphatic channels with intraluminal tumor masses.

Keywords: breast cancer, metastasis, lymphatics, conjunctiva, optical coherence tomography

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Introduction

Anterior segment optical coherence tomography (AS-OCT) is a valuable non-invasive tool for evaluating cornea and ocular surface pathologies. It is being increasingly used for ocular surface tumors, especially with the increasing use of medical therapy to treat these cases. AS-OCT is used to image the lymphatics in the conjunctiva [1], [2].
Ocular metastases normally occur hematogenously and therefore the uvea is most commonly affected [3]. The most common primary tumors to metastasise to the eye are from the breast (47%), the lung (21%), and the gastrointestinal tract (4%) [4].
Metastasis to the conjunctiva is rare and represents less than 1% of all conjunctival tumors [5]. It occurs from primary cancers in the breast, lung, skin melanomas, and elsewhere. They reach the conjunctiva by the hematogenous route and are usually associated with widespread metastasis to other organs. A single case of retrograde metastasis of a cutaneous melanoma to the conjunctival lymphatics has been reported [6]. We report a unique case where AS-OCT imaging was done for a retrograde metastasis of a breast carcinoma to the conjunctival lymphatics.

Case description

A 44-year-old female patient was referred for evaluation and possible treatment for a progressive conjunctival lymphatic spread of her breast carcinoma from a tertiary cancer care center. She was a known case of right-sided breast cancer and had been undergoing treatment for 6 years. She had been on chemotherapy and radiotherapy for an invasive ductal carcinoma stage 3 (T2N3M0). Cervical, axillary, and retropharyngeal nodes were involved. She had extensive lymphatic spread and multiple relapses in the lymph nodes despite treatment. She had a history of redness and swelling in her right eye for a month. She had been treated with lubricants and an antibiotic-steroid combination without any improvement. She was diagnosed to have a lymphatic spread to the eye along with involvement of the draining lymph nodes at the cancer center. Due to progressive ocular involvement the patient came to seek further opinion.
On examination of her right eye she had a vision of 20/30 with correction; there was diffuse conjunctival congestion and chemosis with extensive serpentine white cord-like subconjunctival thickenings involving the superior and inferior bulbar conjunctiva (Figure 1A and B). Cornea was clear, anterior chamber was deep and quiet, pupils were round and reacting, lens was clear, vitreous was clear, and dilated retinal examination was within normal limits and showed no metastatic nodules or retinal changes. Intraocular pressure was 14 mmHg on applanation. There was also some thickening and induration of the periocular and facial skin and subcutaneous tissues on the right side (Figure 1C). Left eye slit lamp examination showed a normal anterior segment and on dilatation the posterior segment evaluation was also within normal limits. She also underwent an additional detailed retinal evaluation in both eyes by an inhouse retinal surgeon to look for any tumor metastasis or retinopathy at the first and subsequent visits but this was negative.
A right eye AS-OCT scan was done with the anterior segment 5 line program on a Cirrus spectral-domain OCT (Carl Zeiss Meditec, Dublin, CA, USA). Lymphatics were imaged in transverse sections as large thin walled cystic channels of variable size in the sub-conjunctival space. Some channels were partially empty and appeared

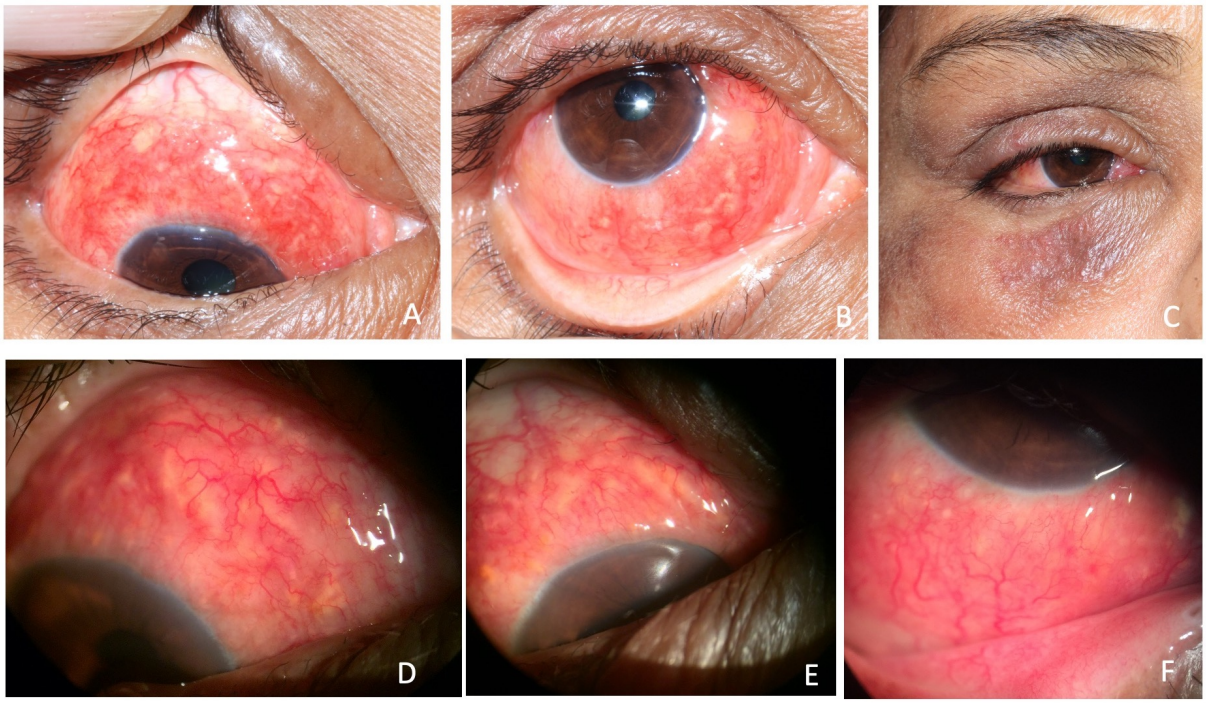


Figure 1: A: External eye photograph showing superior bulbar conjunctival congestion with pale appearing cord-like thickenings. B: External eye photograph showing inferior bulbar conjunctival congestion with pale appearing cord-like thickenings inferonasally. C: External photography showing thickening and induration of the periocular skin. D, E, F: Slit lamp photographs showing increased conjunctival congestion and edema with thick lymphatic cords

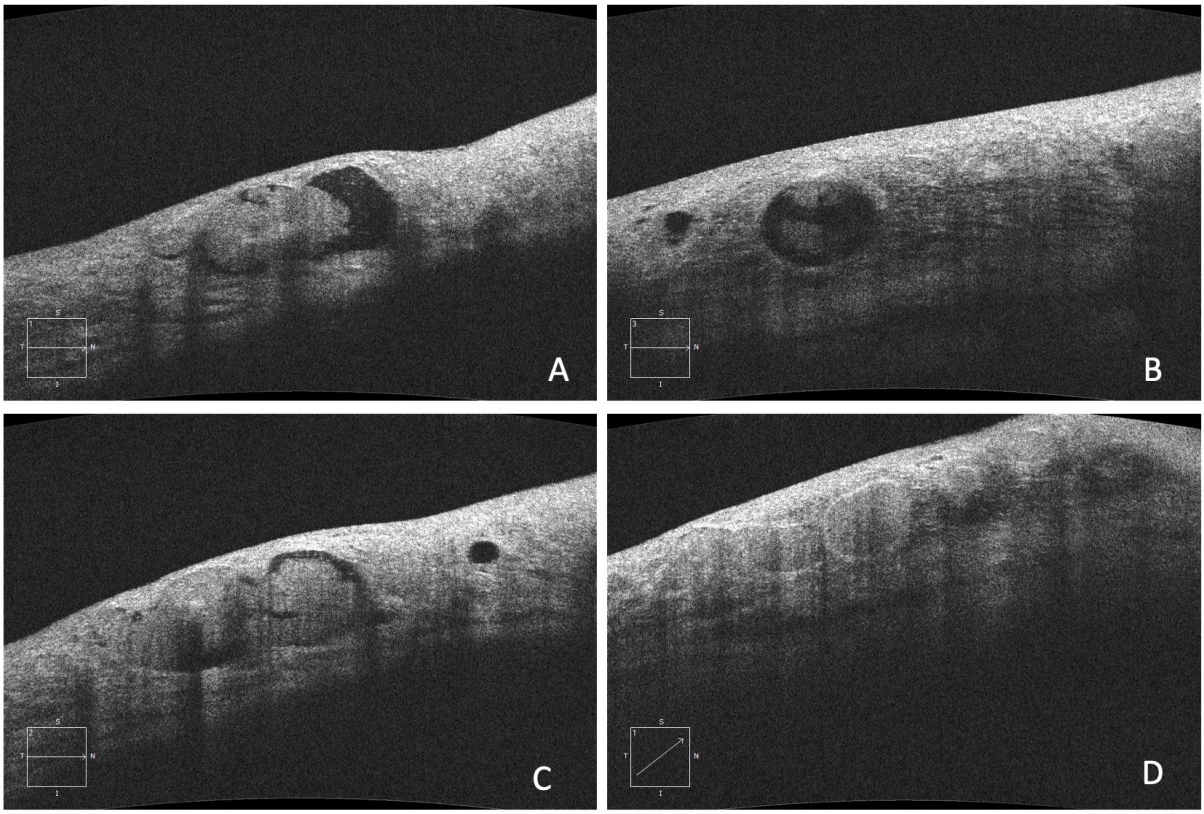


Figure 2: A, B, C: AS-OCT showing a large hyporeflective cavity suggestive of a dilated lymphatic channel with hyperreflective intraluminal masses. D: AS-OCT showing a longitudinal section of a dilated lymphatic channel with hyperreflective shadows suggestive of an intraluminal mass

hyporeflective (dark) while others had variable filling with hyperreflective intraluminal masses (white) (Figure 2A, B and C). In longitudinal sections the lymphatics with intraluminal masses appeared like sausage-shaped dilated channels (Figure 2D).
After 2 months the patient came again for a review when the conjunctival involvement had markedly increased with extensive thick, ropy, white serpentine thickenings with diffuse congestion and edema (Figure 1D, E and F). Her systemic condition was also poorer by then.

Discussion

Breast tumors, in particular, preferentially utilize the lymphatic system for tumor cell dissemination. Overexpression of VEGF-C has been shown in breast tumors, and this stimulates lymphangiogenesis and facilitates the dissemination of tumor cells from the primary tumor site [7]. Our patient had extensive lymphatic spread and recurrences despite several cycles of chemotherapy and radiotherapy. She was on regular follow-up at a tertiary cancer center.
Conjunctival lymphatics from the medial side drain into the ipsilateral submandibular lymph nodes while from the lateral side they drain into the ipsilateral superficial parotid lymph nodes. Efferents from both these nodes drain into the deep cervical lymph nodes [8]. A retrograde spread from the cervical nodes to the conjunctival lymphatics resulted in the conjunctival thickening in our patient.
AS-OCT is helpful in establishing an in vivo diagnosis of several ocular surface pathologies. It is a non-contact, non-invasive imaging device that provides high resolution, real-time and in situ visualization of tissue microstructure. It has been shown to be a useful tool to image dilated lymphatic channels in patients with conjunctival lymphangiectasia [1], [2]. Dilated lymphatic vessels are seen as empty thin-walled spaces of varying caliber in the subconjunctival space [1], [2].
Our patient presented with a unilateral progressive conjunctival congestion and chemosis. Clinically dilated, thick, cord-like lymphatic channels were seen below the conjunctiva. AS-OCT demonstrated the presence of dilated lymphatics with presence of cord-like masses in some of the ducts. These represent dilated lymphatics with intraluminal cords of tumor cells filling them and causing obstruction to flow of lymph. Though the diagnosis was known clinically in our case, this imaging observation adds to the clinical utility of AS-OCT in evaluating ocular surface pathologies.
To the best of our knowledge there is no similar case reported as yet in the literature and no previous report of AS-OCT showing tumor masses in the conjunctival lymphatics.

Notes

Patient consent

Patient consent was obtained for publication.

Competing interests

The author declares that he has no competing interests.

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