

OPTICAL COHERENCE TOMOGRAPHY OF THE ANTERIOR SEGMENT IN GLAUCOMA SURGERY

N. Castellino, F. Visalli, M. Capobianco, S. Ficili, A. Longo

Clinica Oculistica
Università di Catania
Dir. Prof. Teresio Avitabile

Study Objectives

PRIMARY OBJECTIVE:

- **EVALUATE THE ROLE** OF AS-OCT IN ASSESSING POST-SURGERY BLEB MORPHOLOGY.

SECONDARY OBJECTIVES:

- **COMPARE** AS-OCT FINDINGS WITH SLIT-LAMP BIOMICROSCOPY.

Study Design & Methods

PROSPECTIVE OBSERVATIONAL STUDY ON PATIENTS UNDERGOING GLAUCOMA SURGERY WITH FILTERING BLEB FORMATION.

INCLUSION CRITERIA:

- **NO PREVIOUS** GLAUCOMA FILTERING SURGERY.
- **PRESENCE** OF A FUNCTIONING OR NON-FUNCTIONING **BLEB** POST-SURGERY.

AS-OCT IMAGING PROTOCOL:

- BLEB ANALYSIS USING HEIDELBERG SPECTRALIS AND CASIA-2 DEVICES.
- COMPARISON WITH CLINICAL EVALUATION.

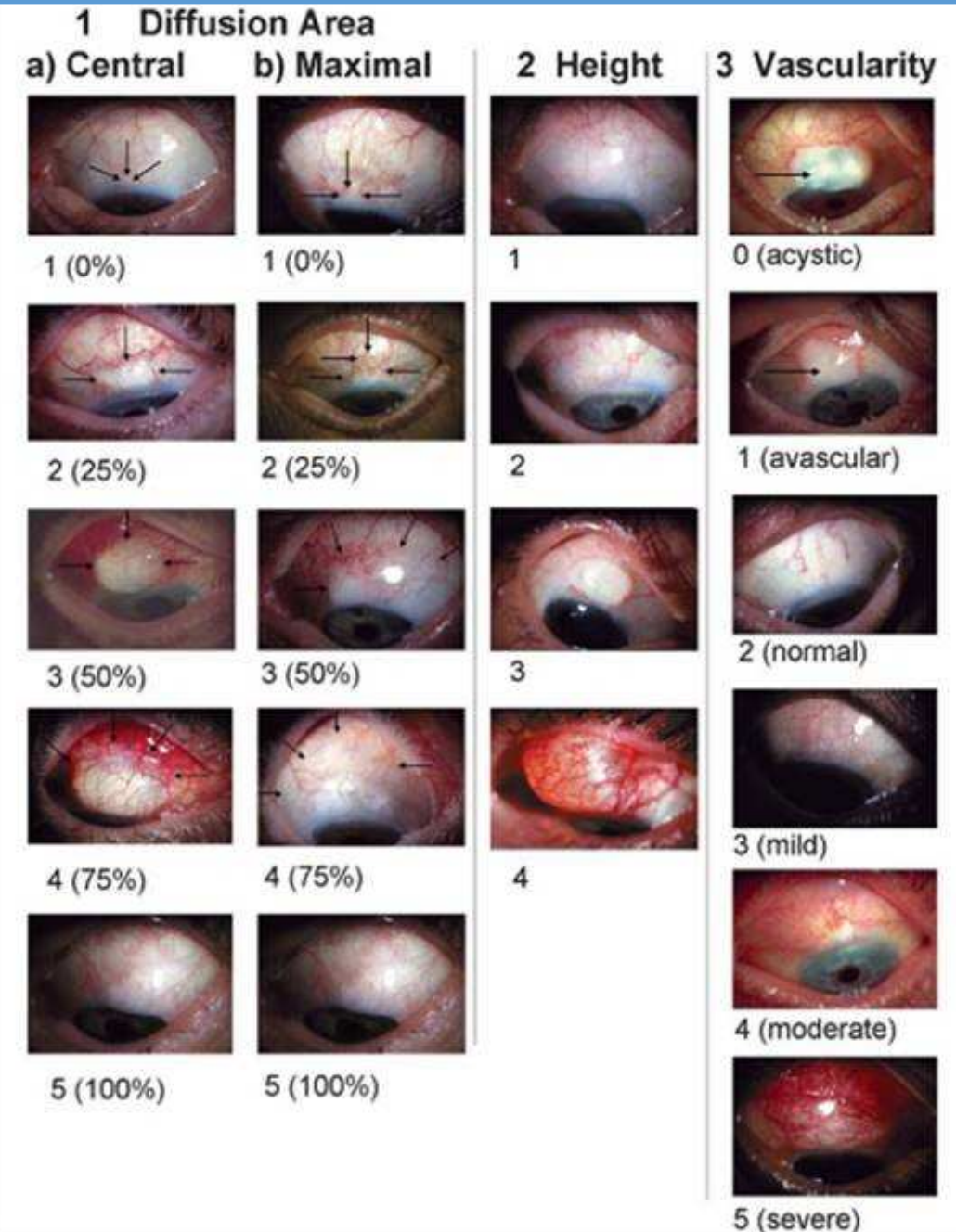
Moorfields Bleb Grading System

Bleb Area (BA)	Grade 1: <50% Of The Available Conjunctiva
	Grade 2: 50–75%
	Grade 3: >75%

Bleb Height (BH)	Grade 1: Flat
	Grade 2: Moderately Elevated
	Grade 3: Highly Elevated

Bleb Vascularity (BV)	Grade 1: Hypovascular (pale, avascular)
	Grade 2: Normal vascularization
	Grade 3: Hypervascular (red, congested)

Bleb Wall (BW) – Presence of Microcysts	Grade 1: Absent
	Grade 2: Few present
	Grade 3: Abundant



RESULTS

- **36 eyes of 32 patients** (with 12 females) affected by glaucoma were enrolled in the study
 - ✓ 15 eyes underwent **Trabeculectomy** (41,7 %)
 - ✓ 13 eyes underwent **Ex-press** MicroShunt surgery (36,1 %)
 - ✓ 5 eyes underwent standalone **XEN gel implant** (13,9 %)
 - ✓ 3 eyes underwent **Preserflo** MicroShunt surgery (8,4 %).
- **FILTERING BLEBS: 26 eyes (72,2 %)**
- **FILTERING FAILURE: 10 eyes (27,8 %)**

Table 4.1 Demographic and clinical characteristics of the study population.

	Patients (n=32) (36 eyes)
Age (years), mean \pm SD	64,1 \pm 11,9
Gender (male:female)	24:12
BCVA (logMAR), mean \pm SD	0,23 \pm 0,28
Refractive errors, (D), mean \pm SD	-0,76 \pm 0,61
IOP in patients with surgery failure (mmHg), mean \pm SD	20,2 \pm 1,8
IOP in patients with successful blebs (mmHg), mean \pm SD	13,7 \pm 6,1
POAG, n (%)	24 (66,7 %)
ACG, n (%)	5 (13,9 %)
PEX glaucoma, n (%)	4 (11,2 %)
Uveitic glaucoma, n (%)	3 (8,34 %)
Failure of the surgery, n (%)	10 (27,8 %)
Blebs with Fibrous Pattern, n (%)	10 (27,8 %)
Blebs with Subconjunctival Filtration Pattern, n (%)	16 (44,4 %)
Blebs with Cystoid Pattern, n (%)	10 (27,8 %)

SD = standard deviation; BCVA = best corrected visual acuity; D = diopters; IOP = intraocular pressure
POAG=Primary Open Angle Glaucoma; ACG=Angle Closure Glaucoma.

AS-OCT Patterns:

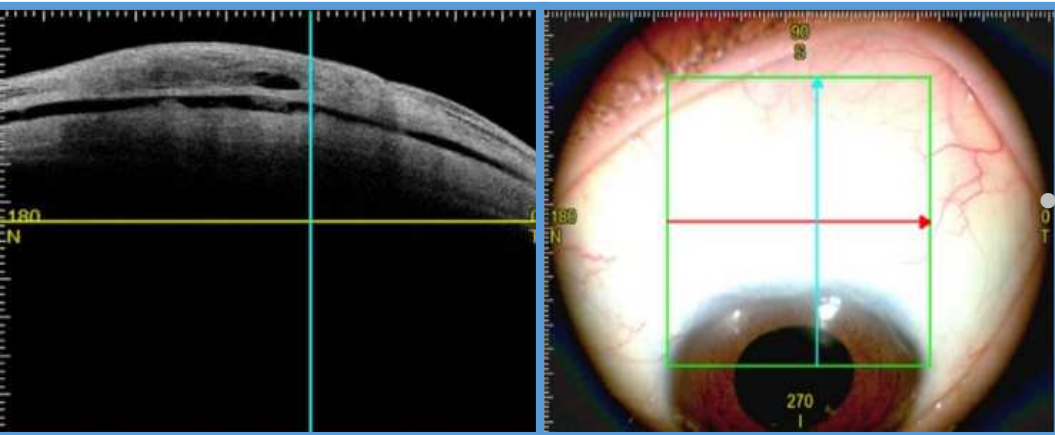
1. 10 blebs with **fibrous pattern** (27,8 %)
2. 10 blebs with **cystoid pattern** (27,8 %)
3. 16 blebs with **subconjunctival filtration pattern** (44,4 %).

AS-OCT Bleb Morphology Classification

- **Type A: Subconjunctival Filtration Pattern**
 - Diffuse, hyporeflective space under conjunctiva.
 - Indicates effective aqueous humor drainage.
- **Type B: Cystoid Pattern**
 - Well-demarcated, multilobulated cystic spaces.
 - Suggests functional but structurally fragile blebs.
- **Type C: Fibrotic Pattern**
 - Hyperreflective, collapsed structure with minimal fluid accumulation.
 - Correlates with surgical failure.

Type A: Subconjunctival Filtration Pattern

- **Type A: Subconjunctival Filtration Pattern**
 - **Diffuse, hyporeflective space under conjunctiva.**
 - **Indicates effective aqueous humor drainage.**



Type B: Cystoid Pattern

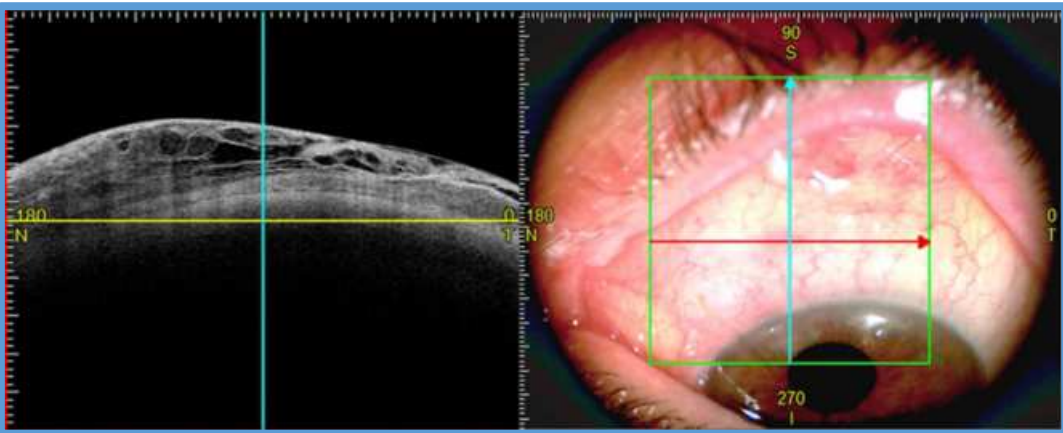
- Well-demarcated, multilobulated cystic spaces.
- Suggests functional but structurally fragile blebs.

Type C: Fibrotic Pattern

- Hyperreflective, collapsed structure with minimal fluid accumulation.
- Correlates with surgical failure.

Type B: Cystoid Pattern

- **Type A: Subconjunctival Filtration Pattern**
 - Diffuse, hyporeflective space under conjunctiva.
 - Indicates effective aqueous humor drainage.
- **Type B: Cystoid Pattern**
 - **Well-demarcated, multilobulated cystic spaces.**
 - **Suggests functional but structurally fragile blebs.**
- **Type C: Fibrotic Pattern**
 - Hyperreflective, collapsed structure with minimal fluid accumulation.
 - Correlates with surgical failure.



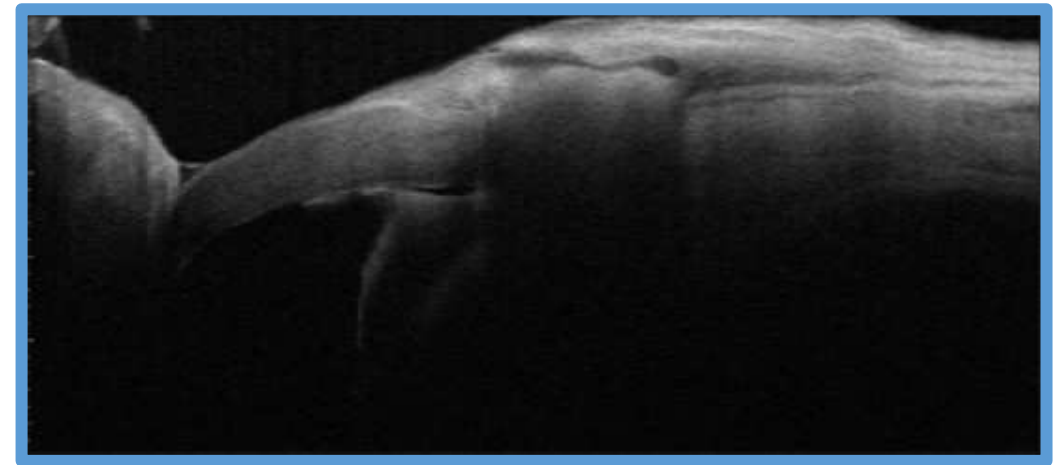
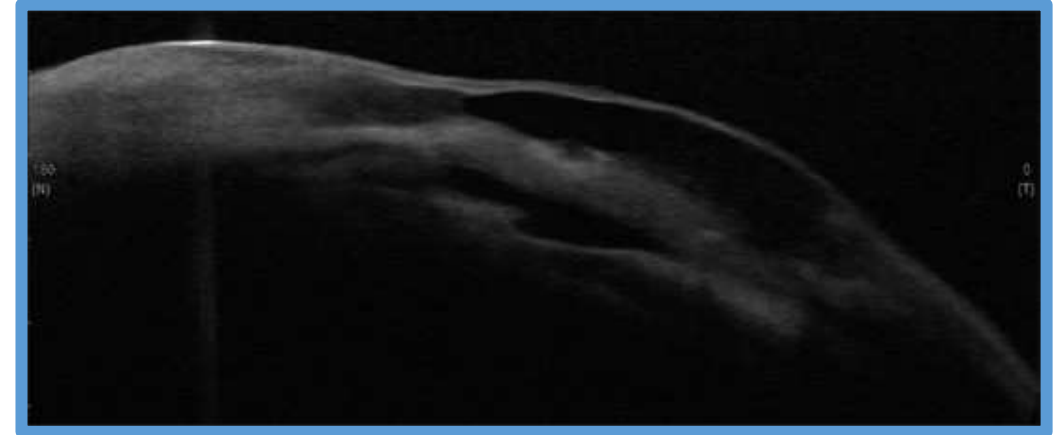
Type C: Fibrotic Pattern

- **Type A: Subconjunctival Filtration Pattern**
 - Diffuse, hyporeflective space under conjunctiva.
 - Indicates effective aqueous humor drainage.
- **Type B: Cystoid Pattern**
 - Well-demarcated, multilobulated cystic spaces.
 - Suggests functional but structurally fragile blebs.
- **Type C: Fibrotic Pattern**
 - **Hyperreflective, collapsed structure with minimal fluid accumulation.**
 - **Correlates with surgical failure.**



Key Results - Bleb Morphology and Function

- Functional blebs (Type A & B):
 - **Higher** bleb height and greater **hyporefectivity**.
 - Strong correlation with **IOP reduction**.
- Non-functional blebs (Type C):
 - Minimal hyporefective space.
 - Associated with **higher IOP** and need for additional interventions.



Clinical Implications & Future Directions



AS-OCT enhances early detection of bleb failure, allowing for timely interventions (needling, anti-fibrotic therapy).



Improved surgical planning: Preoperative AS-OCT could help predict post-op outcomes.



Potential for real-time monitoring: Future AS-OCT developments may provide real-time assessment of aqueous humor flow dynamics.



Need for further studies: Larger, multicenter studies are required to validate findings and optimize imaging protocols.

Conclusions

- AS-OCT is a **powerful tool** for evaluating filtering blebs post-SURGERY.
- **Strong correlation** between AS-OCT morphology and clinical outcomes.
- Routine AS-OCT use could **improve patient management** and long-term surgical success.
- **Future advancements** may refine its role in glaucoma surgery follow-up.

