Anterior Segment Spectral-Domain Optical Coherence Tomography and Anterior Chamber Inflammation

Carneiro, Inês[1]; Coelho, João[1]; Macedo, Mafalda[1,2]; Furtado, Maria João[1]

[1] Centro Hospitalar Universitário do Porto EPE- Hospital de Santo António
[2] Instituto de Ciências Biomédicas Abel Salazar

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Background:

The standard of care for recording the degree of anterior chamber (AC) inflammation in eyes with anterior uveitis is based on clinical criteria, according to the **Standardization of Uveitis Nomenclature (SUN) Working Group scale**. Considering that it is a quite subjective method, our study was designed to determine the viability of **anterior segment optical coherence tomography (AS-OCT)** to objectively image and quantify the degree of AC inflammation.

Patients & Methods:

Observational study of patients with anterior uveitis admitted in the emergency room. Clinical grading was based on SUN classification. Bidimensional AS-OCT (SPECTRALIS®, Heidelberg) scans were obtained and manually graded to evaluate for the presence or absence of cells in the AC (Figure 1). Clinical grading scores were correlated to the number of cells seen in AS-OCT analysis. It should be noted that the clinical grade was established prior to OCT imaging, and that the grade was not changed based on OCT results. All patients were observed by the same ophthalmologist, specialized in eye inflamation .

Inclusion criterias: Diagnosis of anterior uveitis in Emergency Room in August 2016

Exclusion criterias: Corneal opacities that decrease quality of AS OCT images

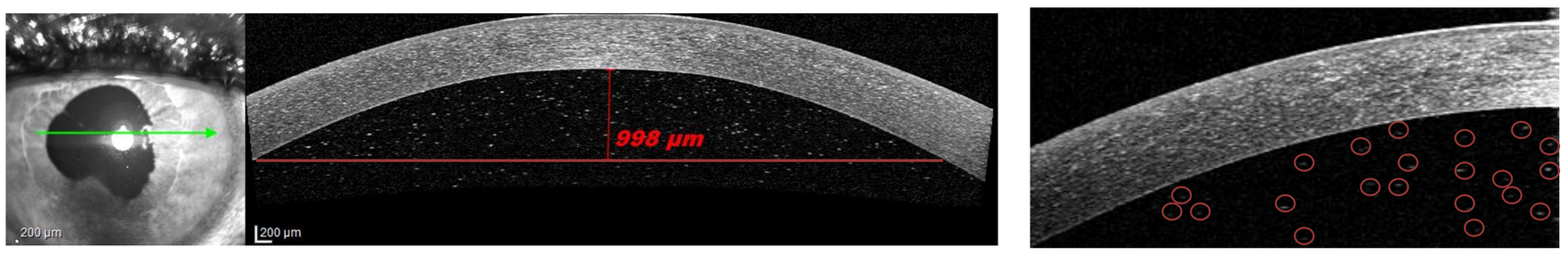

Figure 1 – Selection of AS-OCT images. Firstly, in order to standardize the images obtained in all patients, the plane analysed was taken centered on corneal apex. Then, due to the impossibility of obtaining a complete image of the AC, a standard AC area was selected. For that, an area of AC with **1000 µm ± 10** of highest deep, from corneal center, was analysed. Finally, a manual count of cells was done. Cells are seen as hyperreflective spots in the AC. The red circles identify each individual cell.

Results:

N $_{Men}$ = 4
N $_{Women}$ = 3

N $_{eyes/\ observations}$ = 10

Mean age: 49,8 years old

Morbidities	n
Spondylitis ankylosing	3
AMD	1
Multiple anterior uveitis without known systemic disease	1

Figure 2. Patients morbidities

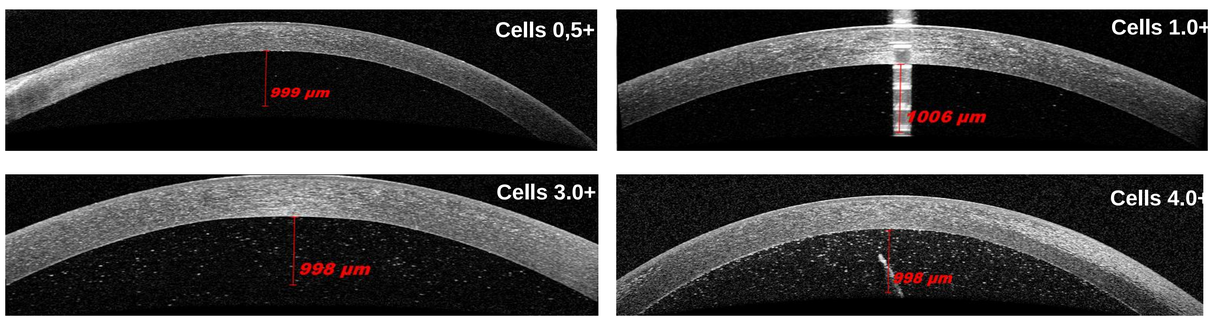

Figure 3. Exemples of images of patients with active anterior uveitis, with different SUN classification score. The cells are seen as hyper-reflective spots on anterior chamber. The highest the clinical score, the highest number of cells are identified.

	Clinical variables				Imagiological variables
Measure	Membranes	Precipitates	Pigment	SUN Classification	AS OCT cells count
1		x		1	6
2		x		1	25
3				0.5	4
4	x	x		4	320
5		x		3	241
6				0.5	1
7				1	20
8				1	6
9				2	120
10				2	105

Figure 4. Table with clinical and imagiological variables of all observations.

Spearman correlation coefficient comparing the manual and automated cell counts with the clinical grade was **0.997** ($P < 0.0001$).

Conclusions:

Anterior segment OCT can be used to image and quantify the degree of AC inflammation. In our study, clinical grading **strongly correlates** with the cell count on AS-OCT line scans. In the near future, development of an automated algorithm with AS-OCT may be useful in clinical practice, as it precisely quantifies AC inflammation and defines response to treatment strategies. The few number of eyes analyzed and the difficulty in comparing with flaremeter limits our conclusions.

Final goals

- ✓ Development of an automatic method for analysis of anterior segment OCT images.
- ✓ Development of a quantitative score.