



Chirurgia maculare: in e out

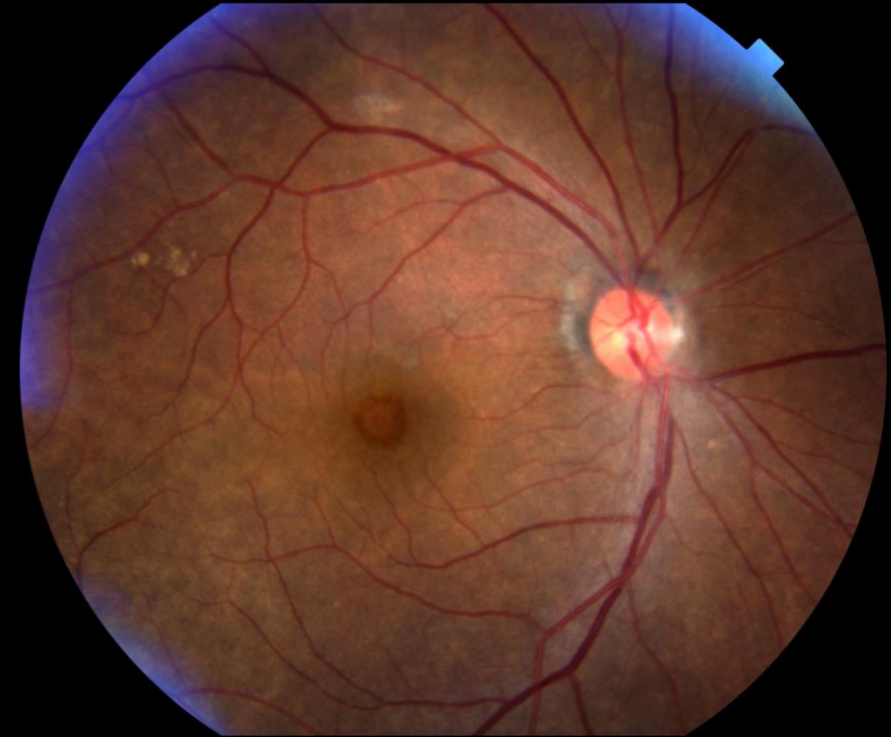
Michele Reibaldi

Dipartimento di Specialità Medico-Chirurgiche - Sezione di Oftalmologia

Università degli Studi di Catania

Foro Maculare

- 1991 primo intervento di vitrectomia per foro maculare
- Elevato tasso di successo anatomico e funzionale
- Essenziale tempestività diagnosi



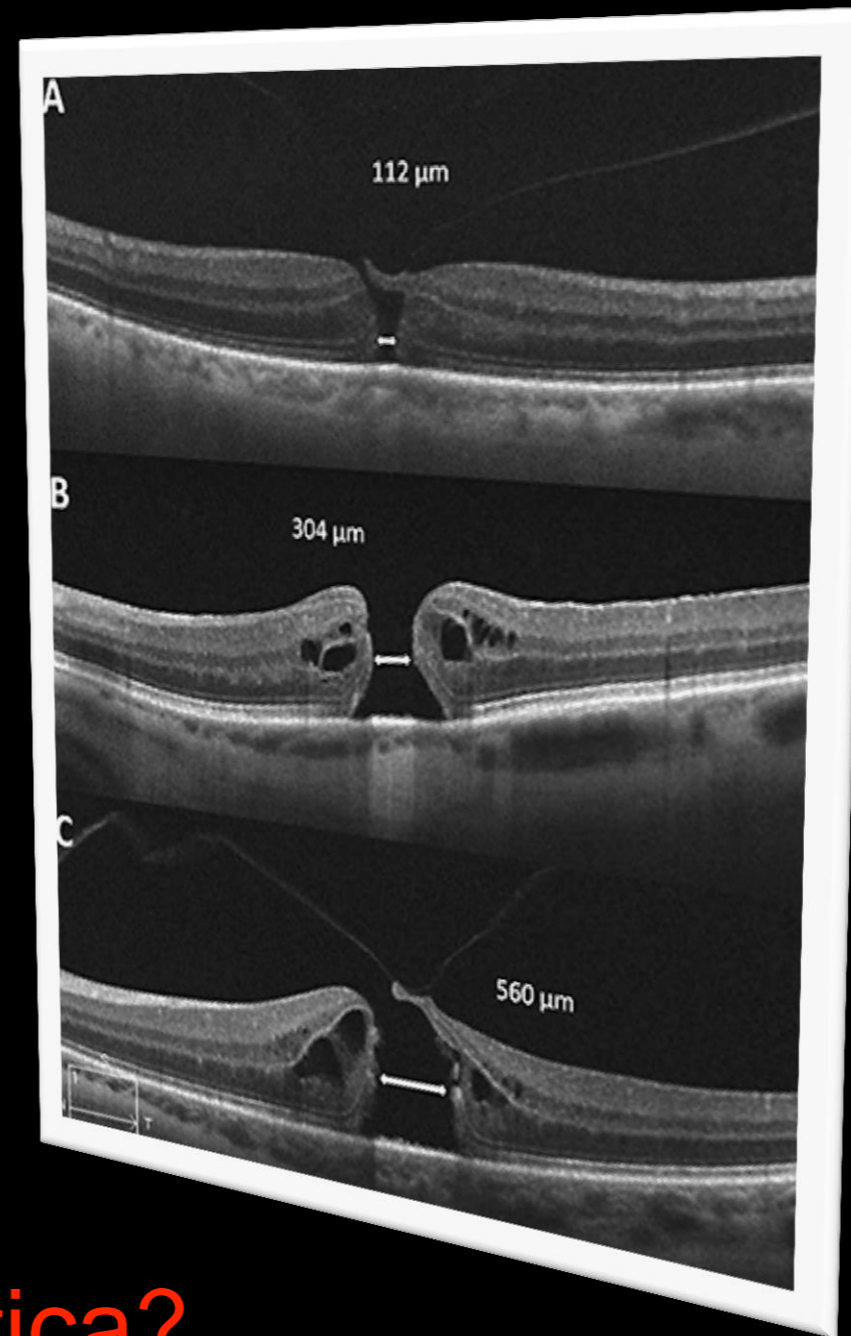
Foro Maculare: Classificazione

The International Vitreomacular Traction Study Group Classification

Piccolo $< 250\mu$

Medio $> 250\mu < 400\mu$

Grande $> 400\mu$



Utile per la scelta terapeutica?

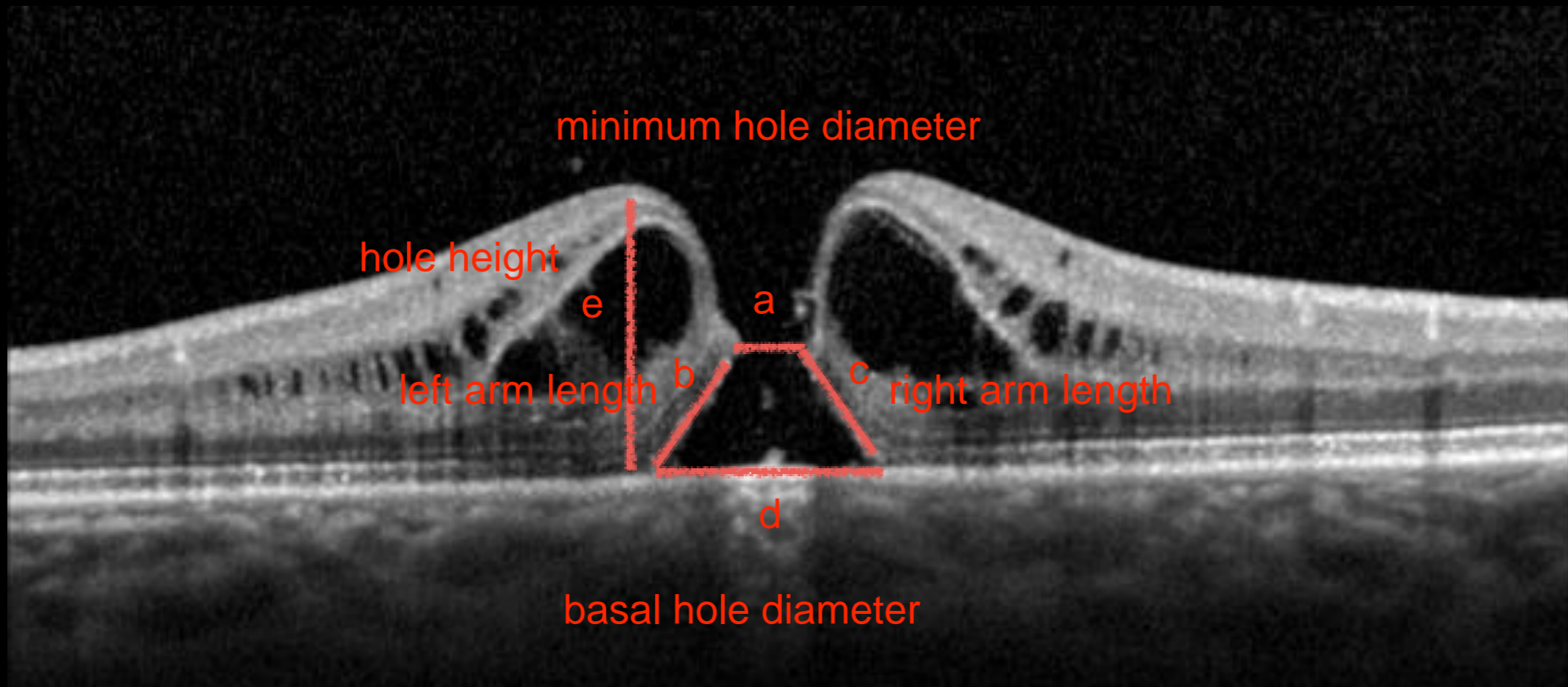
Foro Maculare: Fattori Predittivi

Possiamo predire il risultato visivo dopo chirurgia?

- Stadio del foro maculare
- Dimensione del foro maculare
- Durata dei sintomi
- Visus preoperatorio
- Microperimetria
- Parametri ed indici OCT



Parametri ed indici OCT



MHI (macular hole index) = e/d

THI (tractional hole index) = e/a

HFF (hole form factor) = $(b+c)/d$

Parametri ed indici OCT

Table 2 Assessment of variables associated with visual success

Parameter	p Value	OR	95% CI for OR	Area under ROC curve	95% CI for area under ROC curve
Age	0.820	0.991	0.913 to 1.075	0.488	0.319 to 0.657
Sex					
Male—reference category					
Female	0.241	0.423	0.100 to 1.784	0.586	0.417 to 0.754
Axial length (mm)	0.803	1.077	0.601 to 1.929	0.538	0.362 to 0.714
Base diameter (μm)	0.004	0.996	0.993 to 0.999	0.772	0.608 to 0.937
Macular hole inner opening (μm)	0.003	0.990	0.984 to 0.997	0.812	0.672 to 0.952
MLD (μm)	0.002	0.991	0.986 to 0.997	0.770	0.628 to 0.911
Hole height (μm)	0.463	0.997	0.990 to 1.004	0.543	0.343 to 0.743
MHI	0.011	2.806	1.262 to 6.241*	0.853	0.727 to 0.980
THI	0.012	1.333	1.065 to 1.668*	0.745	0.602 to 0.888

*Corresponding to a change in parameter value of 0.1 units.

MHI, macular hole index; MLD, minimum linear dimension; ROC, receiver operating characteristic; THI, tractional hole index.

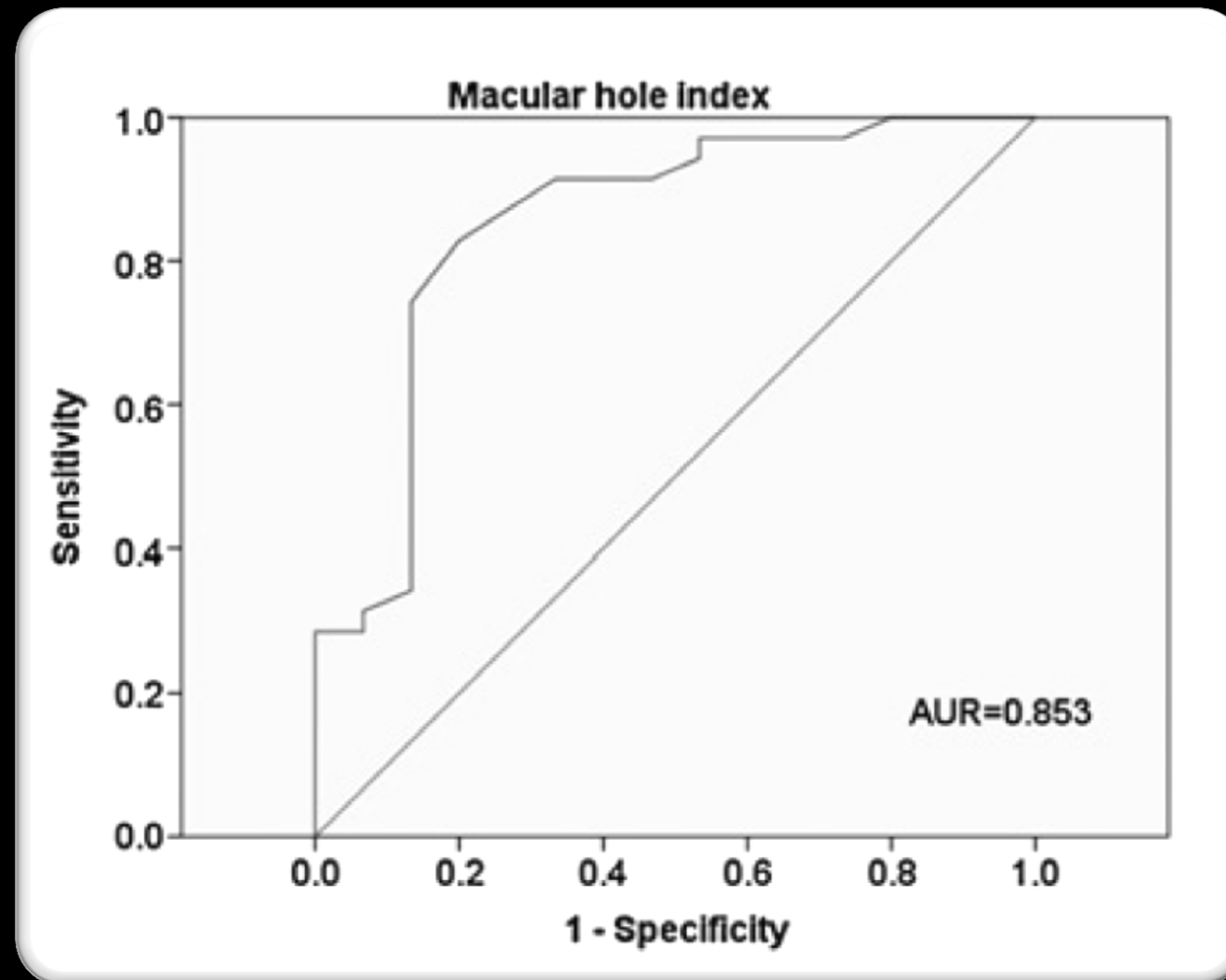
MHI, macular hole index; MLD, minimum linear dimension; ROC, receiver operating characteristic; THI, tractional hole index.

*Corresponding to a change in parameter value of 0.1 units.

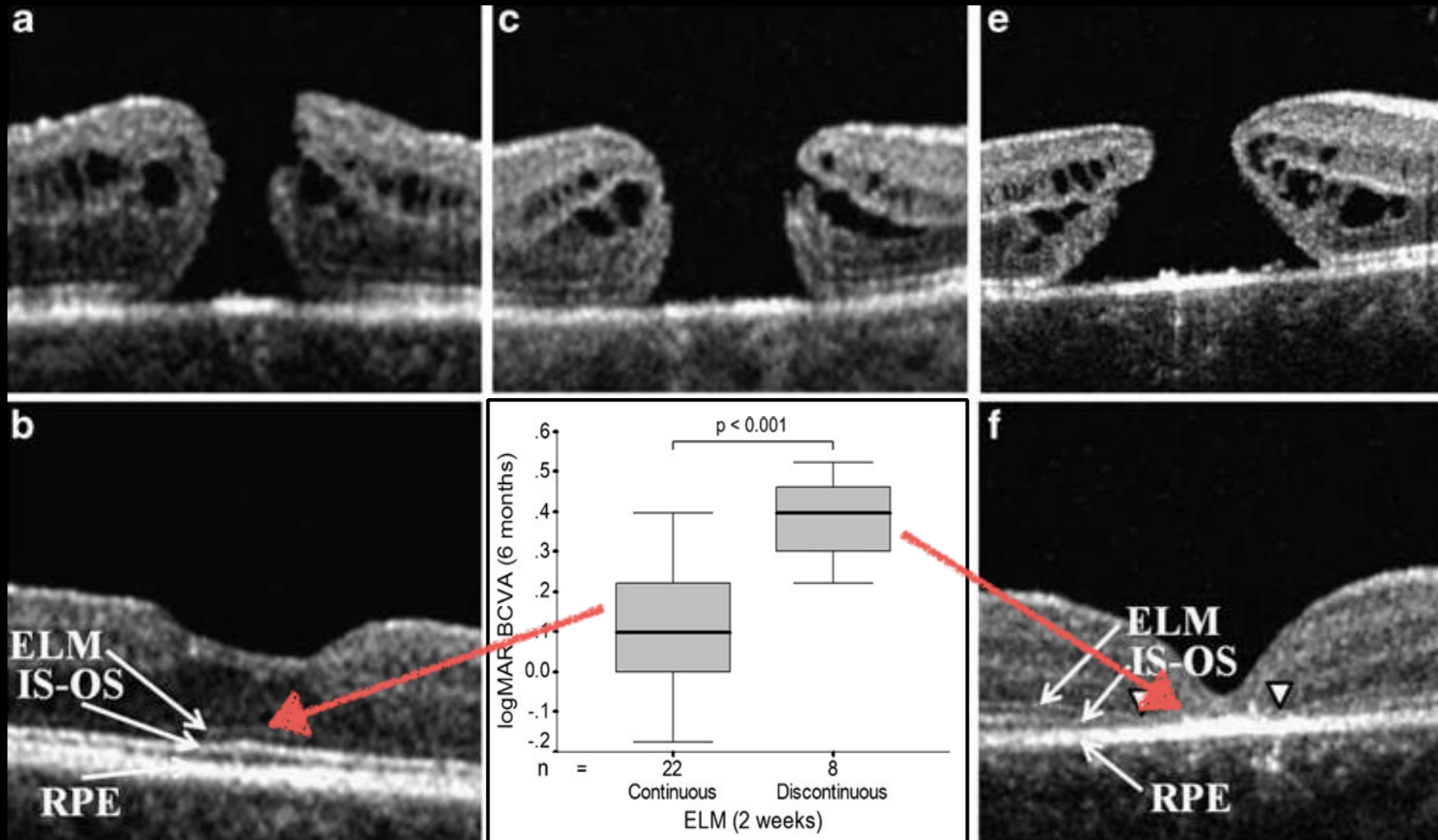
THI	0.012	1.333	1.065 to 1.668*	0.745	0.602 to 0.888
MHI	0.011	2.806	1.262 to 6.241*	0.853	0.727 to 0.980
Hole height (μm)	0.463	0.997	0.990 to 1.004	0.543	0.343 to 0.743

Parametri ed indici OCT

Possiamo fare di più?

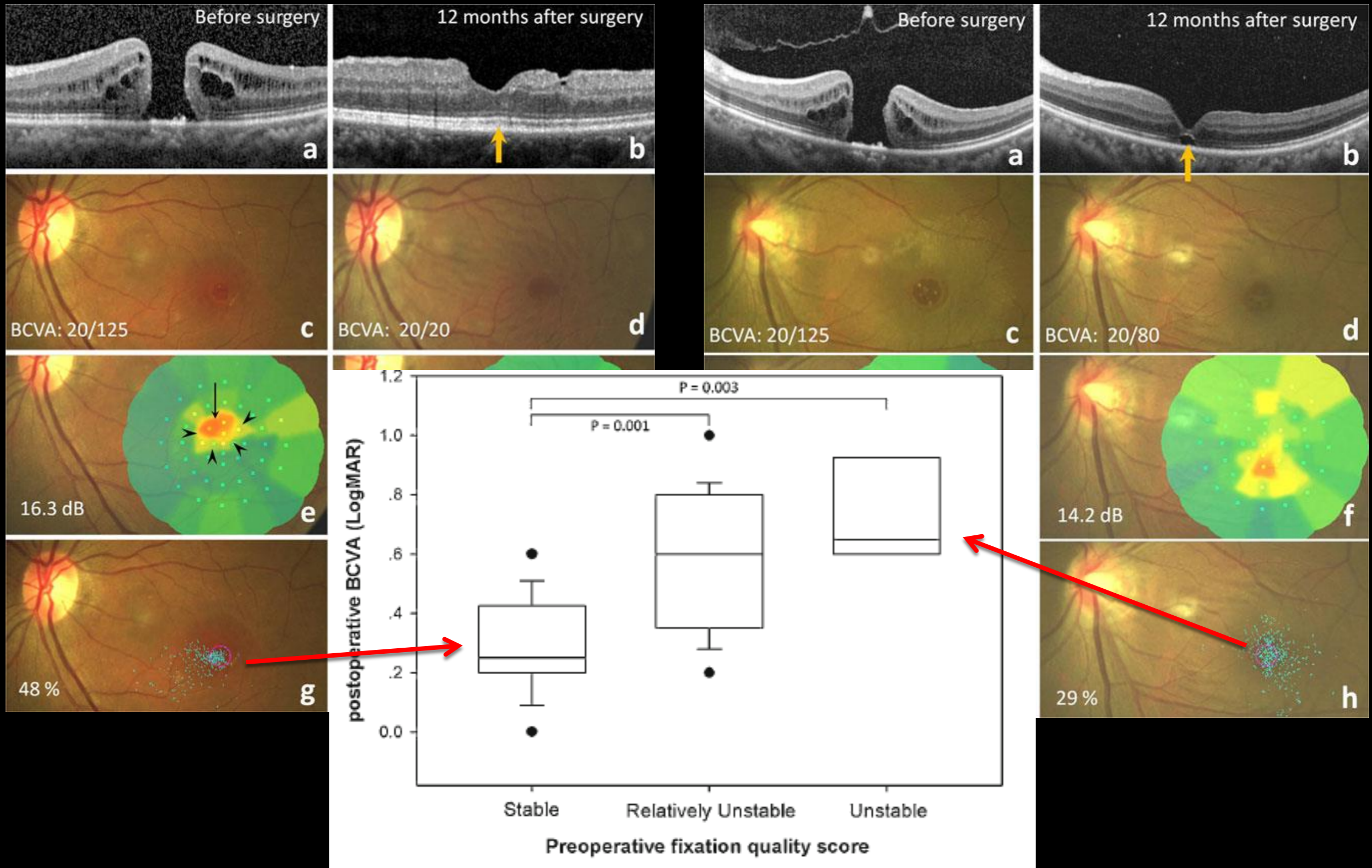


Parametri ed indici OCT

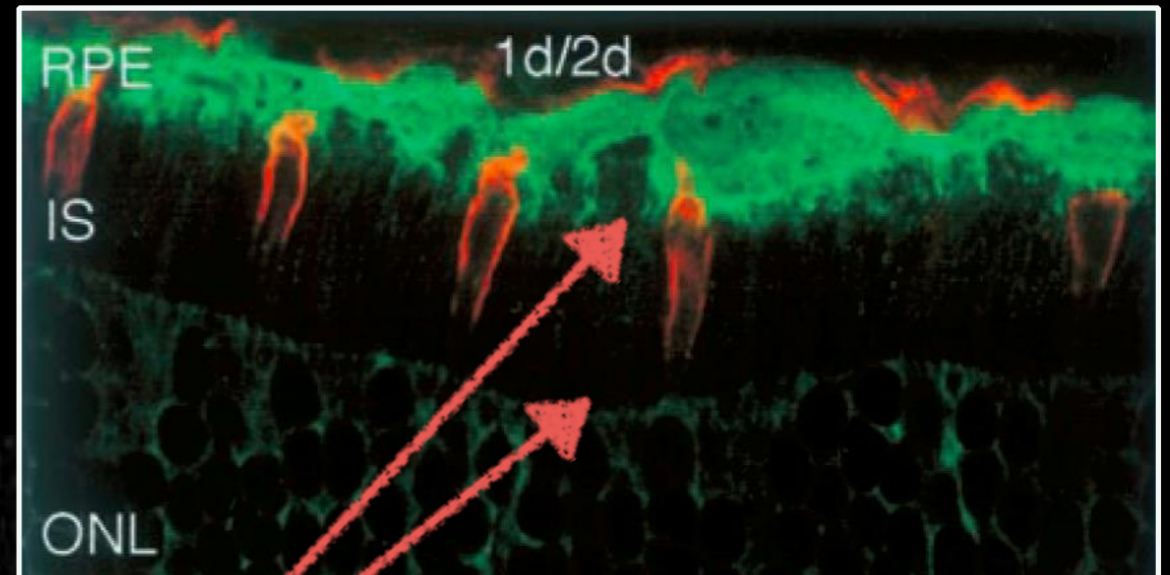
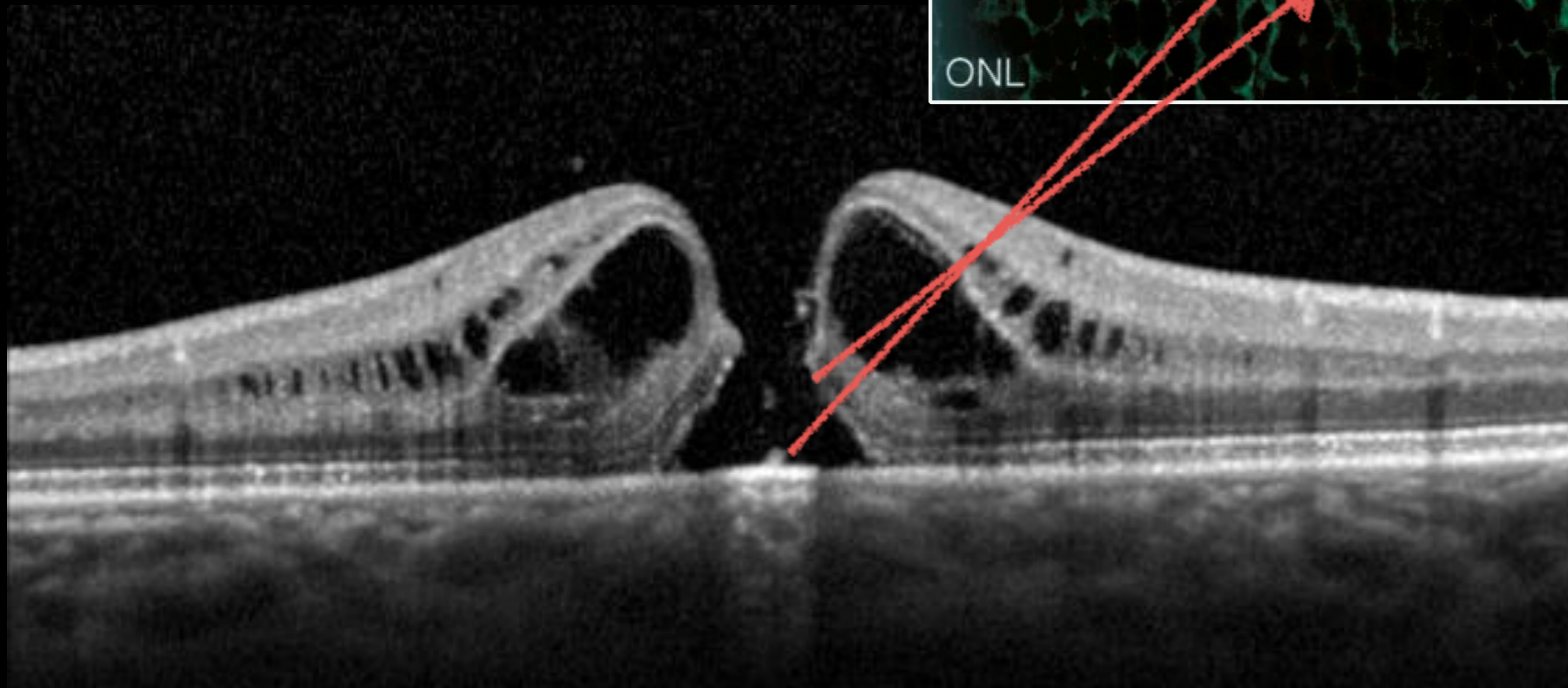


Sappiamo che il ripristino dello strato fotorecettoriale è associato ad un buon risultato visivo dopo intervento di vitrectomia

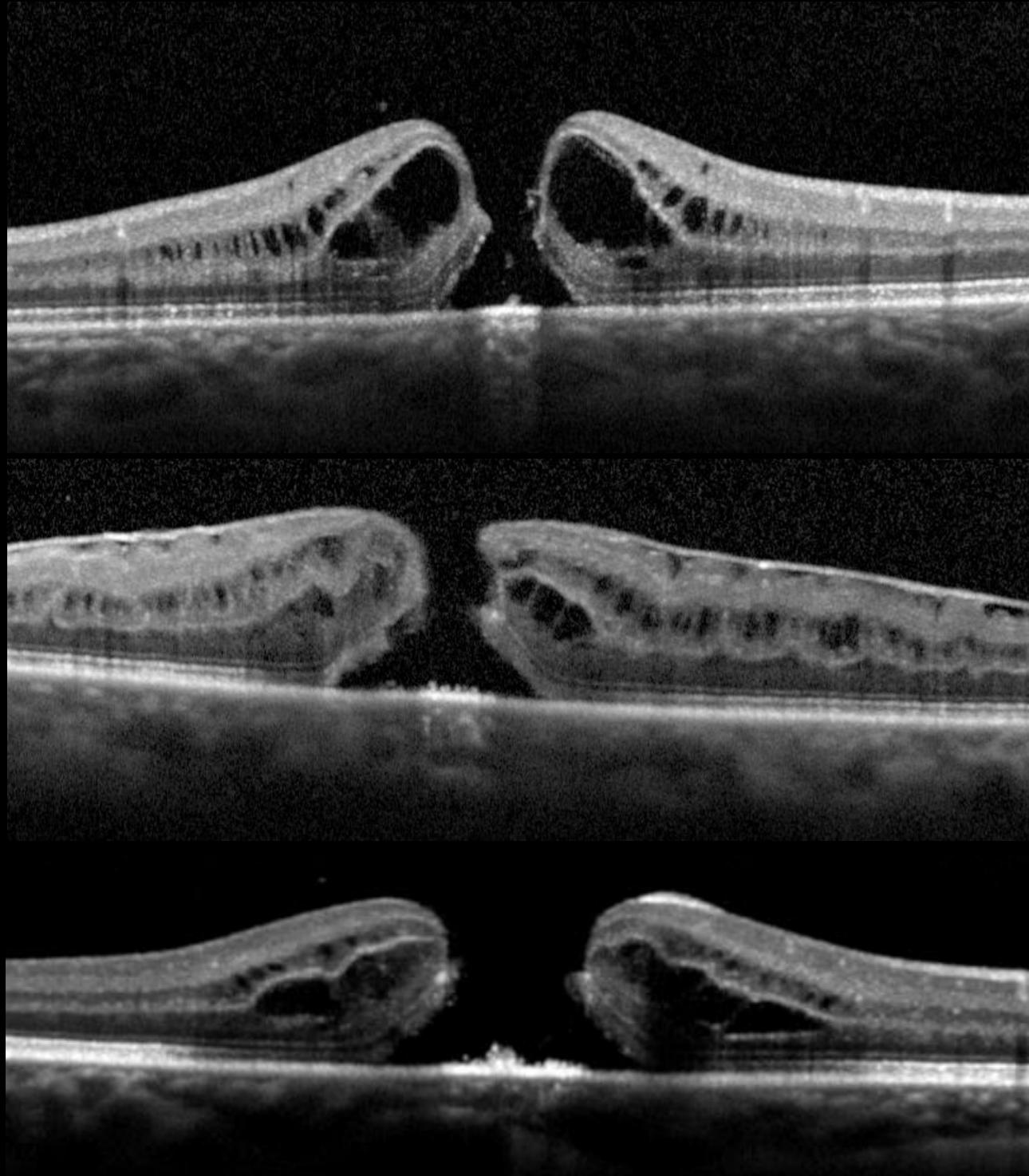
Foro Maculare: Microperimetria



Foro maculare: Epitelio pigmentato retinico



Foro maculare: Epitelio pigmentato retinico



Original Paper

Ophthalmologica

Ophthalmologica 2014;232:194–199
DOI: 10.1159/000364883

Received: January 20, 2014
Accepted after revision: May 22, 2014
Published online: October 15, 2014

Correlation of Preoperative Retinal Pigment Epithelium Status with Foveal Microstructure in Repaired Macular Holes

Michele Reibaldi^a Teresio Avitabile^a Antonio Longo^a Maurizio Giacinto Uva^a
Vincenza Bonfiglio^a Andrea Russo^a Mario D. Toro^a Santo Stella^a
Alfonso Giovannini^b Francesca Viti^b Michele Nicolai^b Andrea Saitta^b
Gilda Cennamo^c Caterina Gagliano^a Cesare Mariotti^b

Department of Ophthalmology, ^aUniversity of Catania, Catania, ^bUniversity of Ancona, Ancona, and ^cUniversity of Naples, Naples, Italy

Key Words

Macular hole · Optical coherence tomography · Retinal pigment epithelium

Abstract

Purpose: To investigate, with spectral-domain optical coherence tomography, if the preoperative status of the retinal pigment epithelium (RPE) affects the postoperative foveal morphology and visual outcomes in eyes with surgically closed macular holes (MHs). **Methods:** In 52 eyes with surgically closed MHs, preoperative RPE morphology was evaluated and graded based on the measurement of the largest hyperreflective protrusions above the RPE line. Foveal microstructural features and best-corrected visual acuity (BCVA) were evaluated 12 months after surgery. **Results:** At 12 months, a significant correlation was found between postoperative degree of integrity of the photoreceptors with preoperative RPE morphology, and base diameter of the hole ($p = 0.003$ and $p = 0.028$, respectively); mean BCVA at 12 months in eyes with diffuse RPE alteration was significantly lower than in eyes with small or no RPE alteration ($p < 0.05$). **Conclusions:** Preoperative RPE integrity may be indicative of good photoreceptor restoration and visual recovery in patients with surgically closed MHs.

© 2014 S. Karger AG, Basel

Introduction

Anatomical and visual outcomes of macular hole (MH) surgery have significantly improved in recent years. Optical coherence tomography (OCT) has become the gold standard for the diagnosis of MH and for confirming anatomical closure after surgery. Spectral-domain optical coherence tomography (SD-OCT) has substantially improved the visualization of foveal microstructures of the outer retina, revealing distinct hyperreflective lines, corresponding to the external limiting membrane (ELM), the inner segment/outer segment (IS/OS) junction layer, the outer segment layer, and retinal pigment epithelium (RPE) [1]. Recent reports have demonstrated that the postoperative status of the IS/OS and ELM layer significantly correlates with the visual outcome of MH surgery [1–10]. Photoreceptors are a critical determinant of macular function. The IS/OS junction represents one aspect of photoreceptor integrity and probably also reflects its function [11]. Improved visual acuity of patients with repaired MH obviously implies that photoreceptor function is recovered, both morphologically and functionally, as well as restoration of their interaction with the RPE [12].

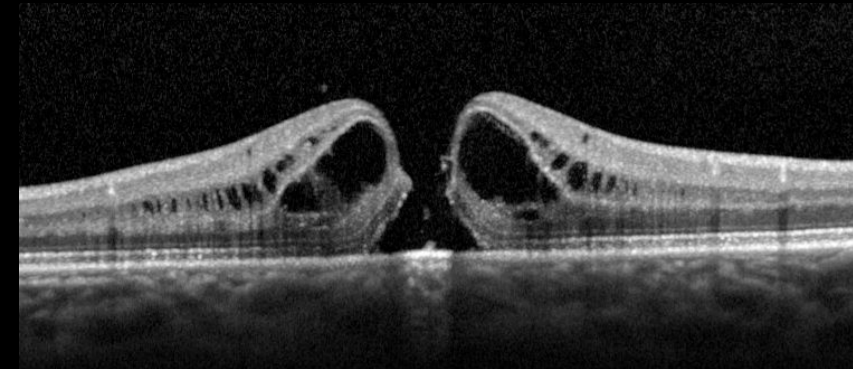
KARGER

© 2014 S. Karger AG, Basel
0030-3755/14/2324-0194\$39.50/0

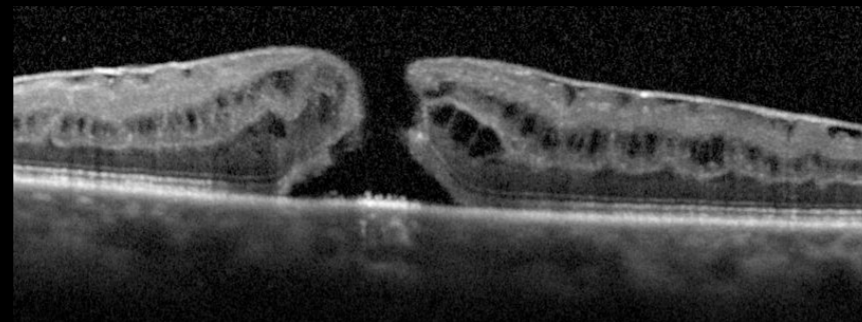
E-Mail karger@karger.com
www.karger.com/oph

Michele Reibaldi, MD, PhD
Department of Ophthalmology
University of Catania
Via S. Sofia 78, IT-95124 Catania (Italy)
E-Mail mreibaldi@libero.it

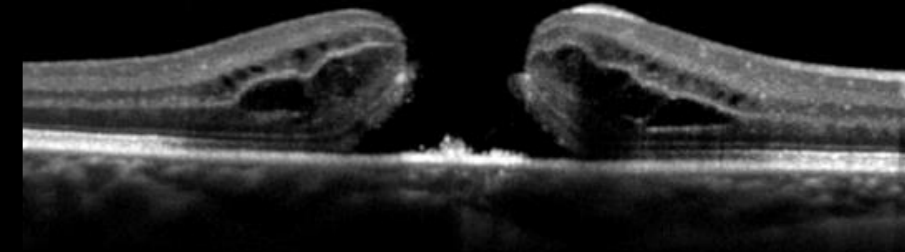
Foro maculare: Epitelio pigmentato retinico



Group A: none
pre-op RPE alteration at SD-
OCT
(n=27; **52%**)



Group B: small
pre-op RPE alteration at SD-
OCT (n=16; **31%**)

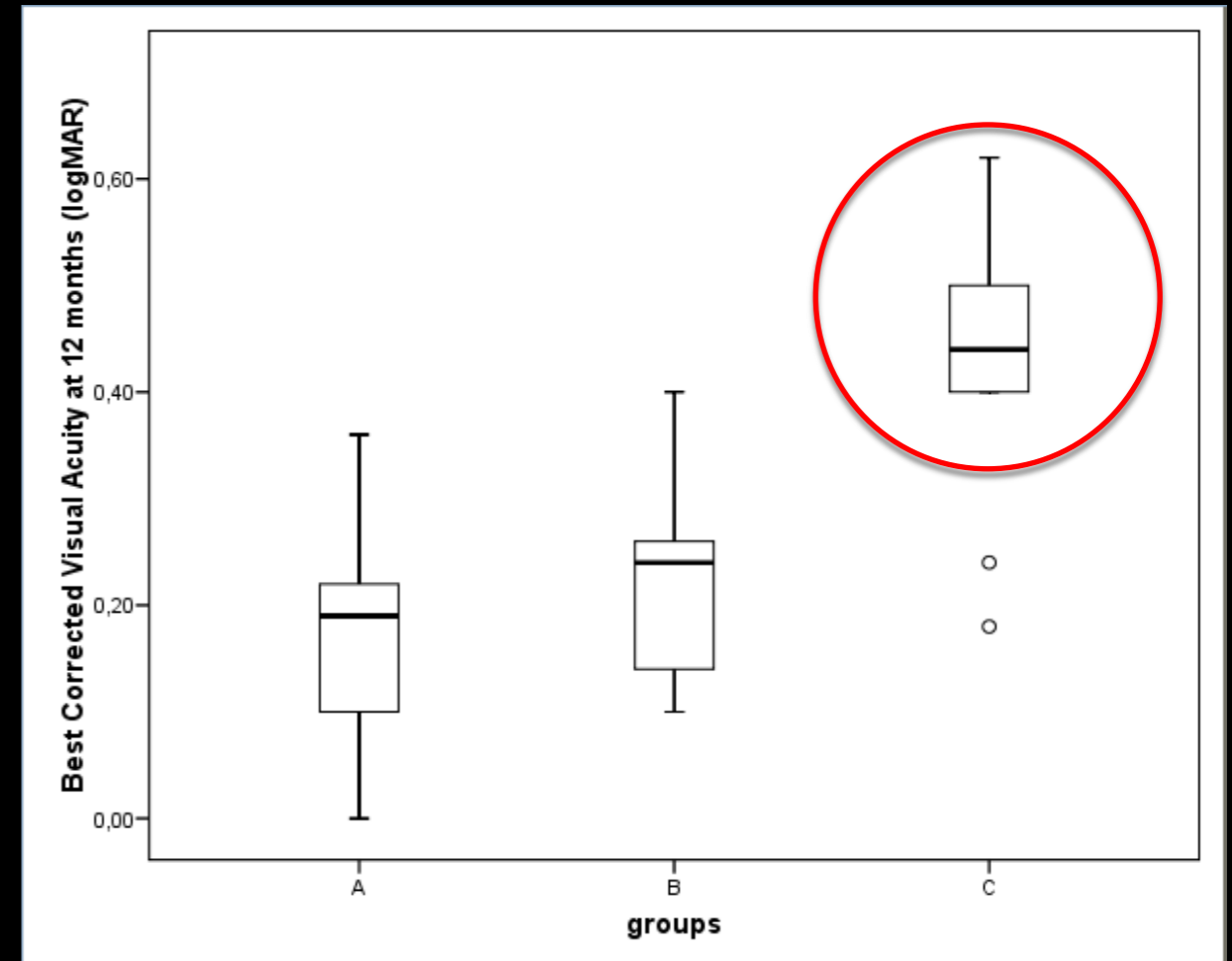


Group C: diffusive pre-op RPE
alteration at SD-OCT
(n=9; **17%**)

Foro maculare: Epitelio pigmentato retinico

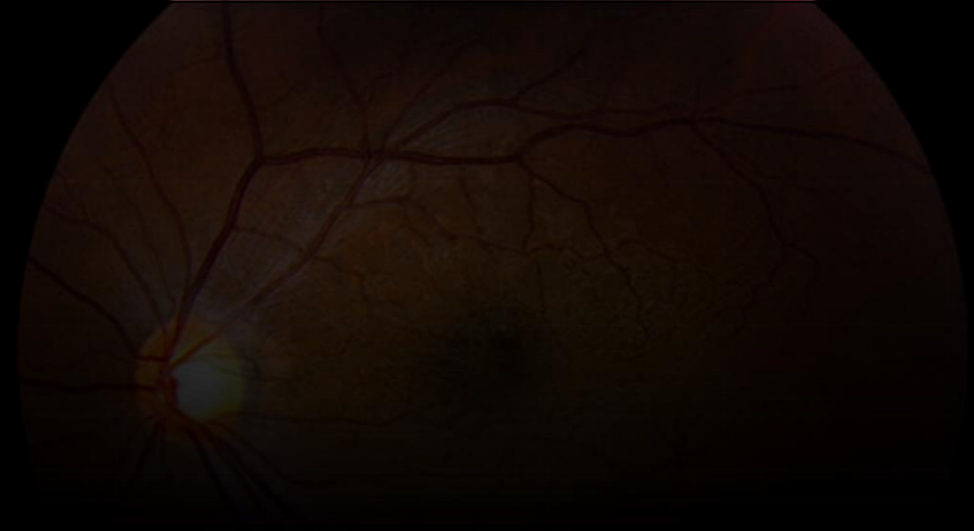
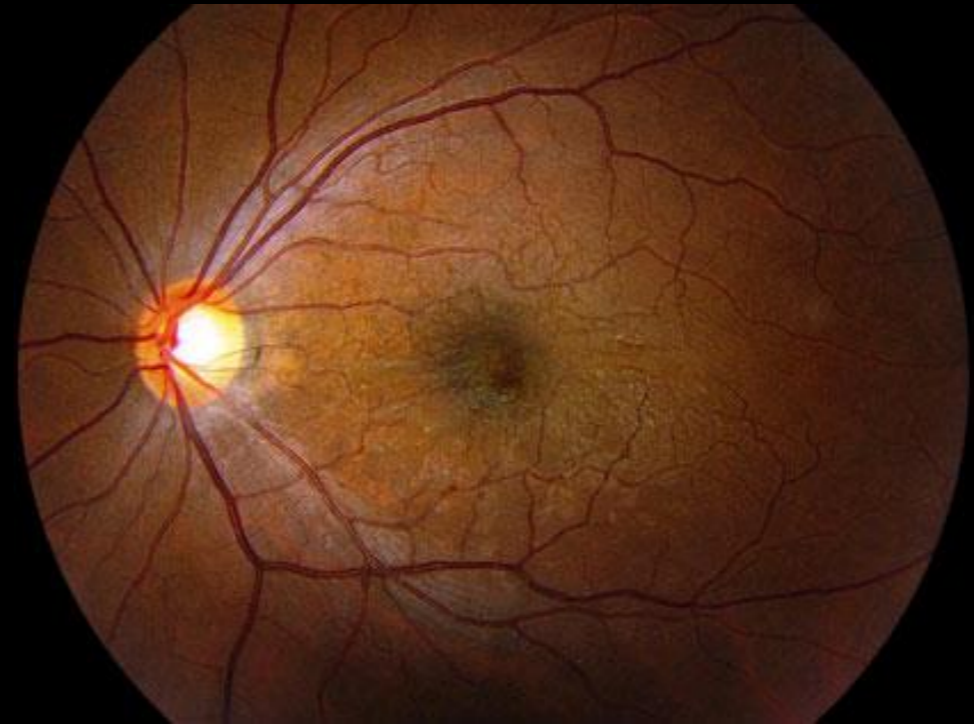


The integrity of the foveal photoreceptor layer was significantly correlated with the postoperative BCVA ($r = 0.354$; $P = 0.010$)



Membrana epiretinica

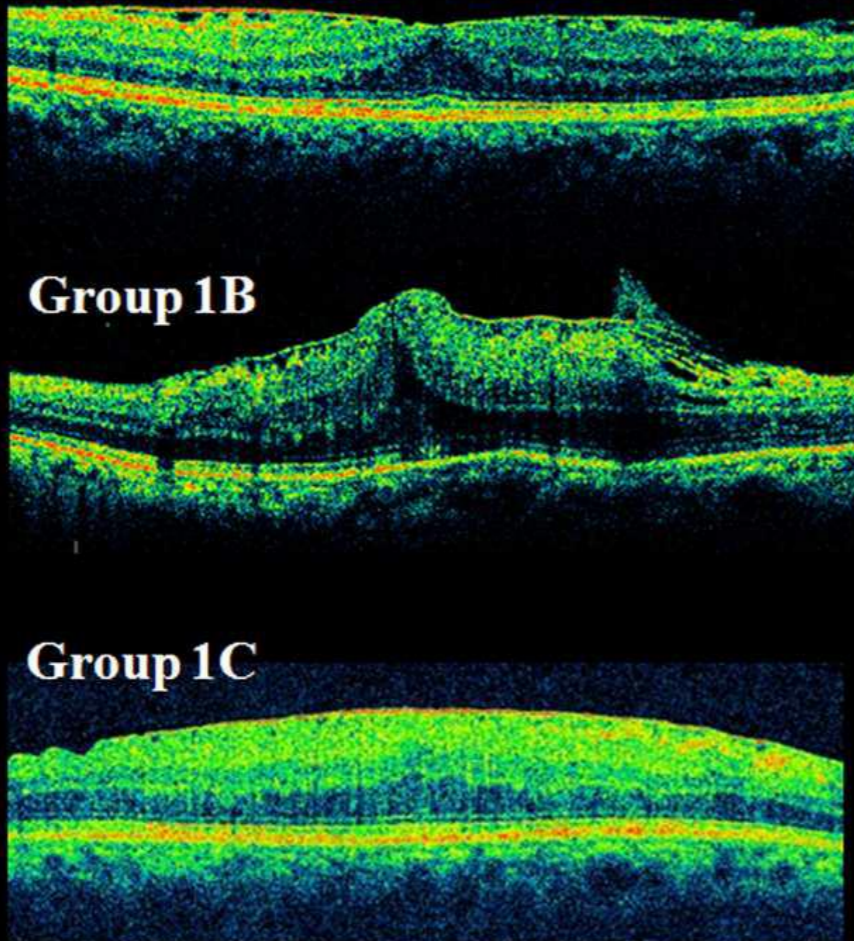
- 1978 Machemer primo intervento di vitrectomia per membrana epiretinica
- Successo anatomico e funzionale in oltre 75% dei casi
- Predire il risultato visivo è difficile per i molteplici fattori associati



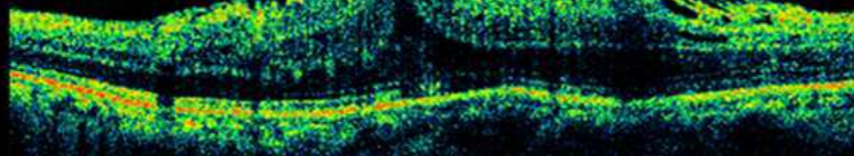
Membrana epiretinica: Classificazione

Fovea-attached type ERM

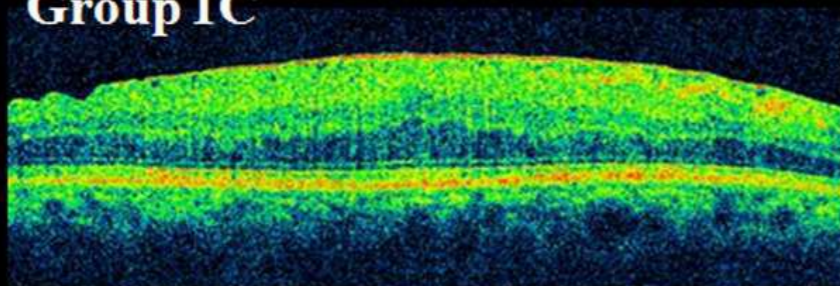
Group 1A



Group 1B

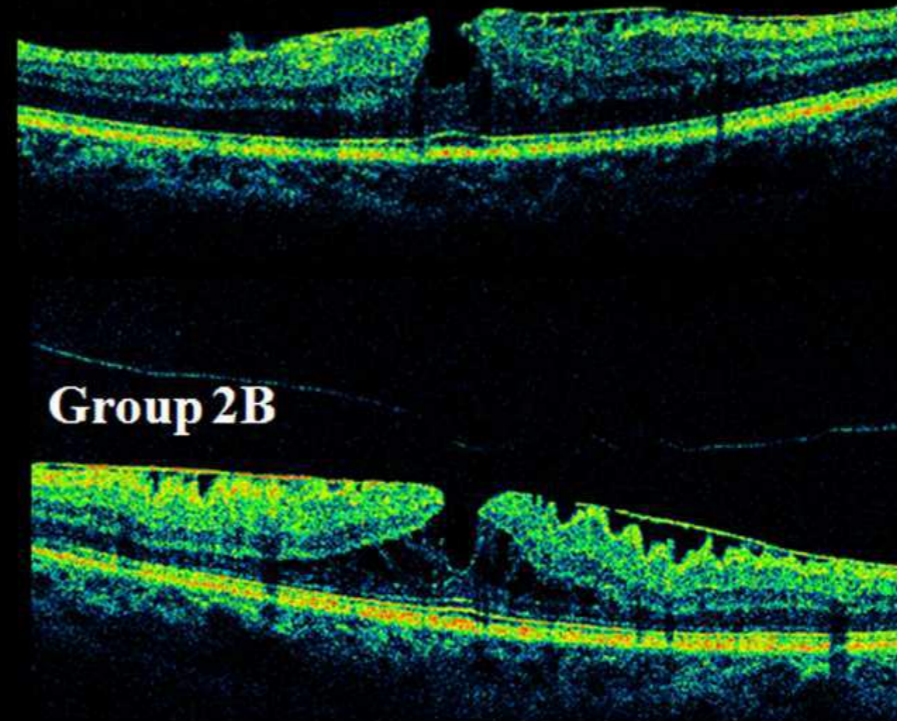


Group 1C

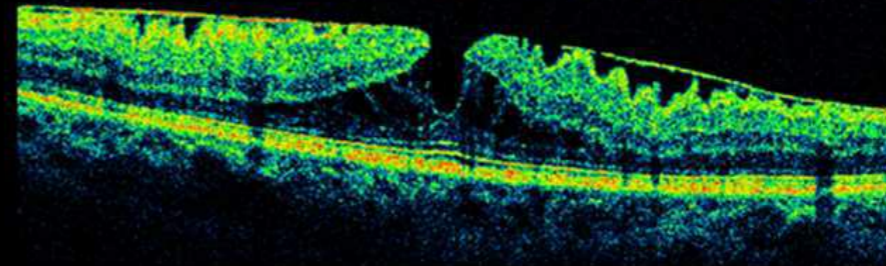


Pseudohole type ERM

Group 2A



Group 2B



Membrana epiretinica: Fattori Predittivi

Metamorfopsia

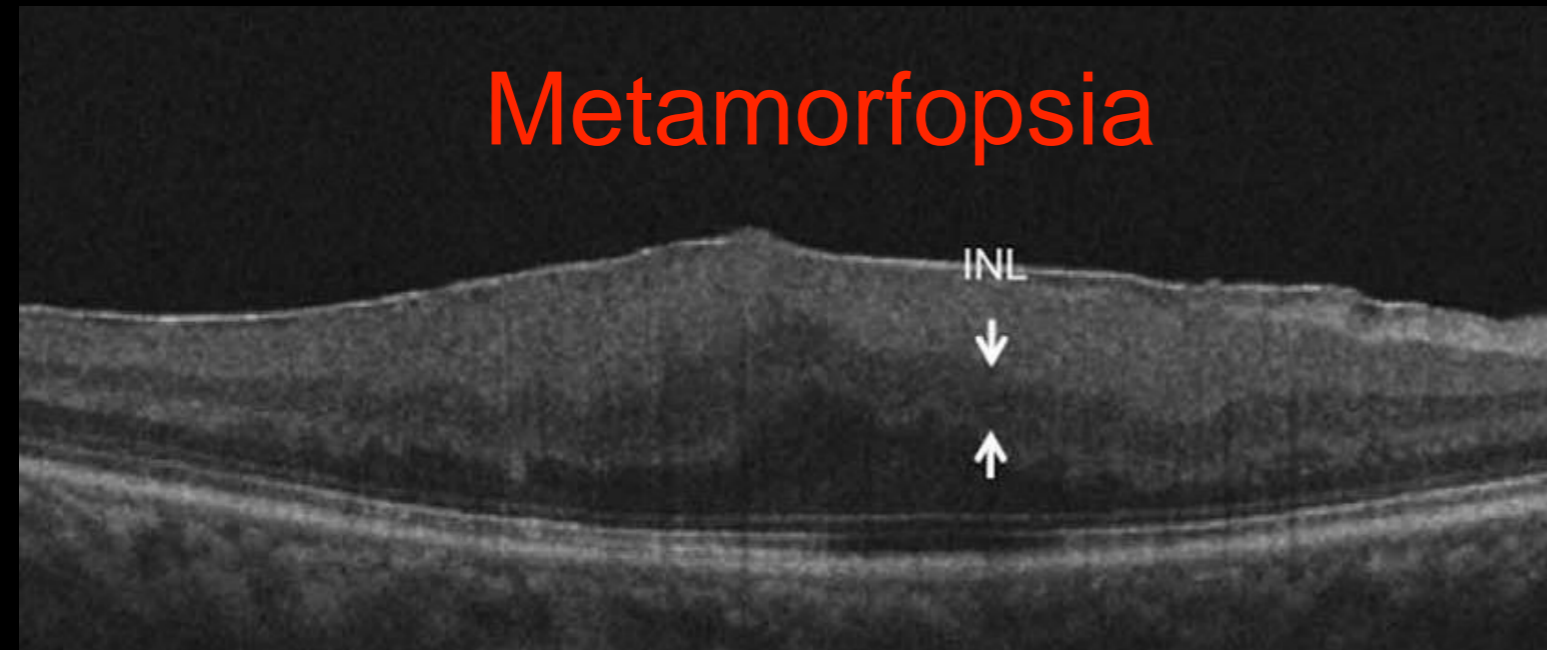


TABLE 2. Multiple Regression Analysis of the Average Metamorphopsia Score and Optical Coherence Tomography Parameters in Patients with Epiretinal Membrane

	β	SE	P Value
CFT (μm)	0.103	0.001	0.703
CRT-1mm (μm)	-0.055	0.002	0.893
CRT-3mm (μm)	-0.372	0.004	0.417
MV (mm^3)	0.037	0.114	0.888
Mean GCL thickness (μm)	-0.207	0.003	0.376
Mean INL thickness (μm)	1.080	0.003	<0.0001*
Mean ONL+OPL thickness (μm)	-0.135	0.003	0.451
Degree of IS/OS disruption (No.)	0.003	0.044	0.998
Degree of ELM disruption (No.)	-0.100	0.035	0.532

TABLE 3. Multiple Regression Analysis of the LogMAR BCVA and Optical Coherence Tomography Parameters in Patients with Epiretinal Membrane

	β	SE	P Value
CFT (μm)	0.391	0.002	0.100
CRT-1mm (μm)	-0.480	0.001	0.244
CRT-3mm (μm)	0.274	0.001	0.547
MV (mm^3)	-0.268	0.034	0.316
Mean GCL thickness (μm)	-0.229	0.001	0.256
Mean INL thickness (μm)	0.208	0.001	0.266
Mean ONL+OPL thickness (μm)	-0.173	0.001	0.404
Degree of IS/OS disruption (No.)	0.473	0.013	<0.05*
Degree of ELM disruption (No.)	0.181	0.010	0.262

Acuità visiva



Membrana epiretinica: Fattori Predittivi

Possiamo predire il risultato visivo dopo chirurgia?

	Odds ratio (Final BCVA \geq 20/20 group vs. final BCVA $<$ 20/20 group)	95% Confidence interval	P-value
Age			
Odds ratio	1.067	1.003 - 1.135	.040
Duration of symptoms			
Odds ratio	1.045	1.006 - 1.087	.025
Initial BCVA			
Odds ratio	<u>27.51</u>	3.286 - 230.3	<u>.002</u>
Preoperative mean foveolar thickness			
Odds ratio	0.996	0.991 - 1.001	.137
Preoperative IS/OS disruption score			
DS 1-2 vs. DS 0, odds ratio	1.839	0.808 - 4.185	<u>.010</u>
DS 3-4 vs. DS 0, odds ratio	<u>15.86</u>	2.501 - 100.6	

BCVA: best corrected visual acuity; IS/OS: inner and outer segment junction; DS: disruption score.

	Odds ratio	95% Confidence interval	P-value
DS 3-4 vs. DS 0, odds ratio			
	15.86	2.501 - 100.6	.010
DS 1-2 vs. DS 0, odds ratio			
	1.839	0.808 - 4.185	.010
Preoperative IS/OS disruption score			
Odds ratio	0.996	0.991 - 1.001	.137
Preoperative mean foveolar thickness			
Odds ratio	27.51	3.286 - 230.3	.002
Initial BCVA			
Odds ratio	1.045	1.006 - 1.087	.025
Duration of symptoms			
Odds ratio	1.067	1.003 - 1.135	.040

Membrana epiretinica: Fattori Predittivi

Prognostic factors	Weight
Age (years)	
≥ 75	0
< 75	2
Duration of symptoms (months)	
≥ 12	0
< 12	2
Preoperative BCVA (Snellen)	
< 20/100	0
≥ 20/100 and < 20/33	2
≥ 20/33	5
IS/OS line (SD-OCT)	
Disrupted or irregular	0
Continuous	1

*BCVA: best corrected visual acuity; IS/OS: inner and outer segment junction.
The 10-points predictive score was calculated by adding the points assigned for each prognostic factor.*

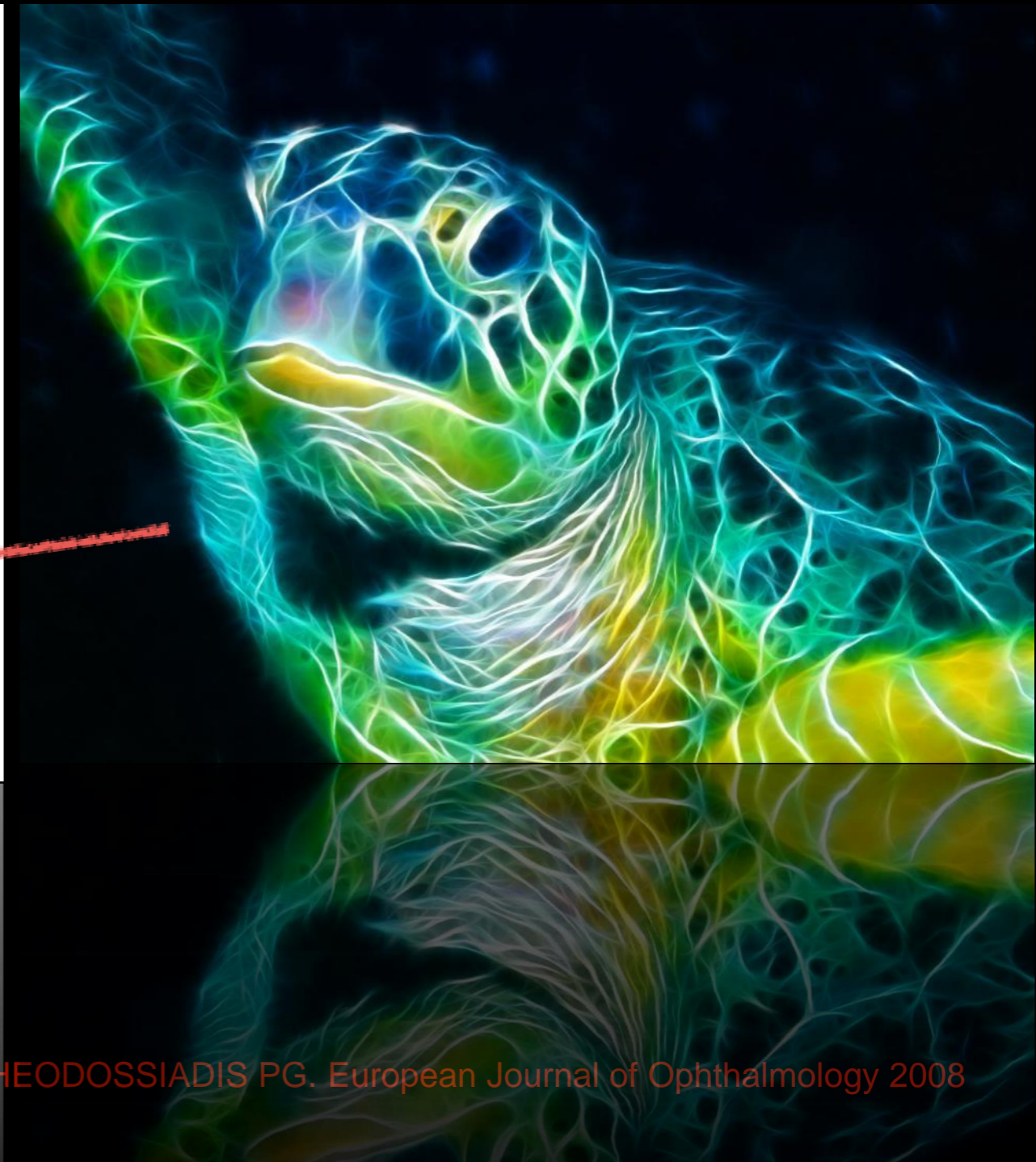
Predictive score	Final BCVA ≥ 20/20	Final BCVA < 20/20
0	< 1%	≥ 99%
1	< 1%	≥ 99%
2	< 1%	≥ 99%
3	11%	89%
4	15%	85%
5	27%	73%
6	56%	44%
7	56%	44%
8	67%	33%
9	88%	12%
10	88%	12%

BCVA: best corrected visual acuity.

Membrana epiretinica: Progressione

Progressione media in tre anni

Characteristic	Value	p
Age, yrs, mean (SD)	70.23 (5.77)	
Sex, M/F, n (%)	30 (42.25)/41 (57.75)	
Fovea*		
[Mean (SD)]		
Baseline	325.29 (57.28)	
Final	363.81 (59.62)	
Difference	38.52 (23.55)	<0.001
Relative difference (%)	12.29 (7.69)	
VA†		
[Mean (SD)]		
Baseline	43.26 (6.71)	
Final	39.20 (7.54)	
Difference	<u>-4.06 (2.87)</u>	<0.001
Follow-up, mo, mean (SD)		
(range)	36.01 (9.28) (24-56)	



(range)	36.01 (9.28) (24-56)	
Follow-up, mo, mean (SD)		
Difference	-4.06 (2.87)	<0.001
Final	39.20 (7.54)	
Baseline	43.26 (6.71)	
[Mean (SD)]		
VA†		

Membrana epiretinica: Progressione

Progressione dopo chirurgia cataratta ?

TABLE 3. 12- and 36-Month Cumulative Incidence Rates of Epiretinal Membranes in the Australian Prospective Cataract Surgery and Age-related Macular Degeneration Study, Among 1119 Eyes Without Epiretinal Membranes at the 1-Month-Postoperative Visit

Cumulative Incidence, % (95% CI)	Category of ERM		
	Cellophane Reflex	Preretinal Fibrosis	Total ERM
12-month	3.4 (2.5-4.6)	1.6 (1.0-2.5)	5.0 (3.9-6.5)
24-month	5.8 (4.5-7.3)	3.4 (2.4-4.7)	9.0 (7.5-10.9)
36-month	7.0 (5.6-8.8)	4.4 (3.3-5.9)	11.2 (9.4-13.4)

CI = confidence interval; ERM = epiretinal membranes.

CI = confidence interval; ERM = epiretinal membranes.

36-month	7.0 (5.6-8.8)	4.4 (3.3-5.9)	11.2 (9.4-13.4)
24-month	5.8 (4.5-7.3)	3.4 (2.4-4.7)	9.0 (7.5-10.9)
12-month	3.4 (2.5-4.6)	1.6 (1.0-2.5)	5.0 (3.9-6.5)

Cumulative incidence, % (95% CI)

Category of ERM

Cellophane Reflex

Preretinal Fibrosis

Total ERM

1-Month-Postoperative Visit

TABLE 4. Progression or Regression of Pre-existing Epiretinal Membranes in Affected Cases From 1-36 Months Postoperatively

3-Year Change, N (%)	Type of ERM After 1 Month		
	Cellophane Reflex (N = 133)	Preretinal Fibrosis (N = 74)	ERM (N = 207)
Progressed	60 (45.1)	29 (39.0)	89 (43.0)
Stable	36 (27.1)	31 (42.0)	67 (32.4)
Regressed	37 (27.8)	14 (19.0)	51 (24.6)

ERM = epiretinal membranes.

ERM = epiretinal membranes.

Regressed	37 (27.8)	14 (19.0)	51 (24.6)
Stable	36 (27.1)	31 (42.0)	67 (32.4)
Progressed	60 (45.1)	29 (39.0)	89 (43.0)

3-Year Change, N (%)

Cellophane Reflex (N = 133)

Preretinal Fibrosis (N = 74)

ERM (N = 207)

Type of ERM After 1 Month

Vitrectomia o non vitrectomia.....

questo è il problema?





think different

TRANSCONJUNCTIVAL NONVITRECTOMIZING VITREOUS SURGERY VERSUS 25-GAUGE VITRECTOMY IN PATIENTS WITH EPIRETINAL MEMBRANE

A Prospective Randomized Study

MICHELE REIBALDI, MD, PhD,* ANTONIO LONGO, MD, PhD,* TERESIO AVITABILE, MD,*
VINCENZA BONFIGLIO, MD,* MARIO D. TORO, MD,* ANDREA RUSSO, MD,*
FRANCESCA VITI, MD,† MICHELE NICOLA, MD,† ANDREA SAITTA, MD,†
ALFONSO GIOVANNINI, MD,† CESARE MARIOTTI, MD,†

Purpose: To compare the clinical outcomes and the rate of complications of 27-gauge transconjunctival nonvitrectomizing vitreous surgery (NVS) and of 25-gauge transconjunctival sutureless vitrectomy surgery for idiopathic epiretinal membrane removal.

Methods: In this prospective randomized study, 83 phakic eyes of 83 consecutive patients with an idiopathic epiretinal membrane were randomized to receive 27-gauge NVS (NVS-group) or 25-gauge vitrectomy (Standard-group). Main outcome measures were best-corrected visual acuity, central retinal thickness, nuclear density units' changes, and rate of complications.

Results: Thirty-nine eyes of the Standard-group and 40 of the NVS-group were considered in final analysis. Mean best-corrected visual acuity improved significantly in both groups, with a significant better result at 12 months in NVS-group ($P = 0.039$; t -test). Central retinal thickness decreased significantly in both groups ($P < 0.001$, Tukey test), without significant difference between the two groups at any time point. At 12 months, nuclear density increased significantly in the Standard-group (analysis of variance, $P < 0.001$), and it did not change in the NVS-group (analysis of variance, $P = 0.537$). Epiretinal membrane recurred in 5.1% of eyes in the Standard-group and in 7.5% of eyes in the NVS-group (Fisher's exact test, $P = 1.000$).

Conclusion: The 27-gauge NVS is an effective surgical procedure in eyes with epiretinal membrane and it induces less progression of nuclear sclerosis than 25-gauge vitrectomy.

RETINA 00:1-7, 2014

Epiretinal membrane (ERM) removal has become a standard technique in vitreoretinal surgery. Vitrectomy is currently being performed in eyes with relatively good visual acuity, because the threshold

for surgery for ERM has decreased due to improvements in surgical techniques.¹

Recent introduction of transconjunctival small-gauge vitrectomy surgery has provided potential advantages over traditional 20-gauge surgery, including faster wound healing, less conjunctival scarring, decreased operating time, improved patient comfort, and less postoperative inflammation with early visual recovery.^{2,3}

However, despite continuous advances to improve safety of vitrectomy for macular diseases, cataract progression and iatrogenic peripheral retinal breaks

From the *Eye Clinic, University of Catania, Catania, Italy; and †Eye Clinic, Azienda Ospedaliero Universitaria Ospedali Riuniti Umberto I-GM Lancisi-G Salesi di Ancona, University of Marche, Ancona, Italy.

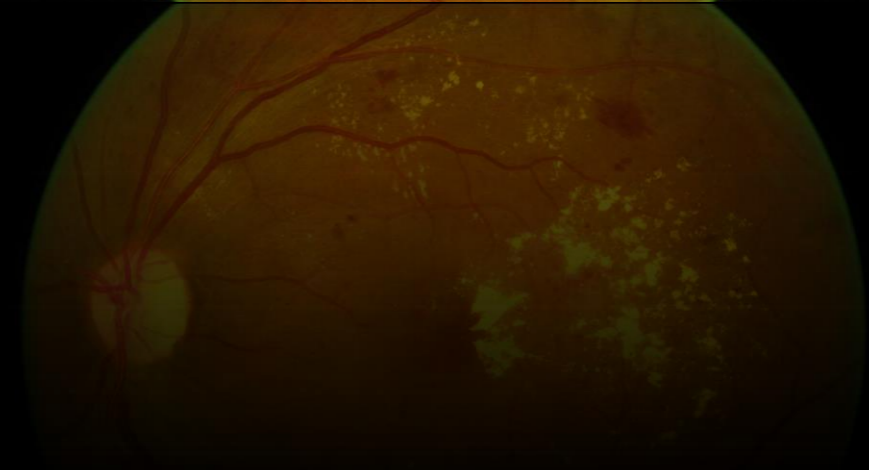
None of the authors have any financial/conflicting interests to disclose.

Reprint requests: Antonio Longo, MD, PhD, Eye Clinic, University of Catania, Via Santa Sofia 78, Catania, Italy; e-mail: ant-longo@libero.it

think different

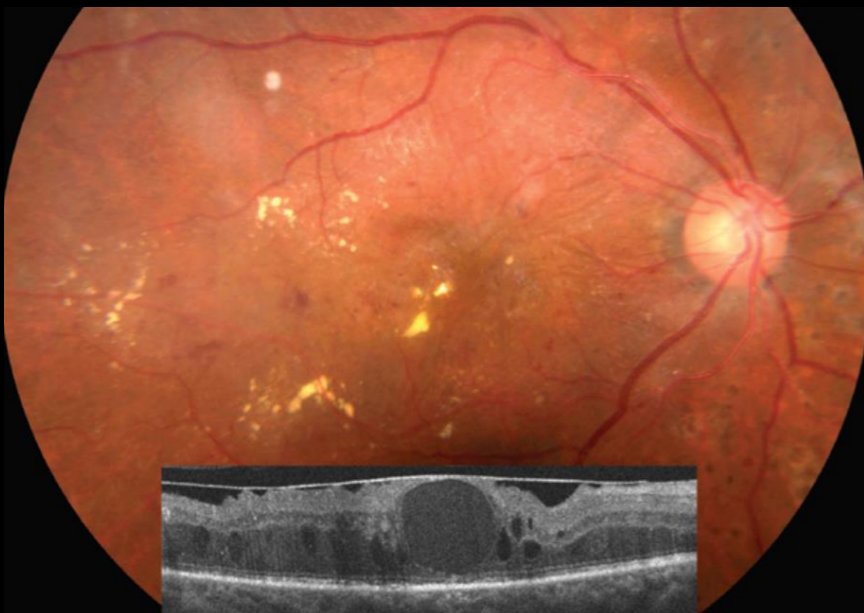
Edema maculare diabetico

- 1992 primo intervento di vitrectomia per edema diabetico
- Risultati della vitrectomia contraddittori
- Spesso intervento chirurgico ultima spiaggia

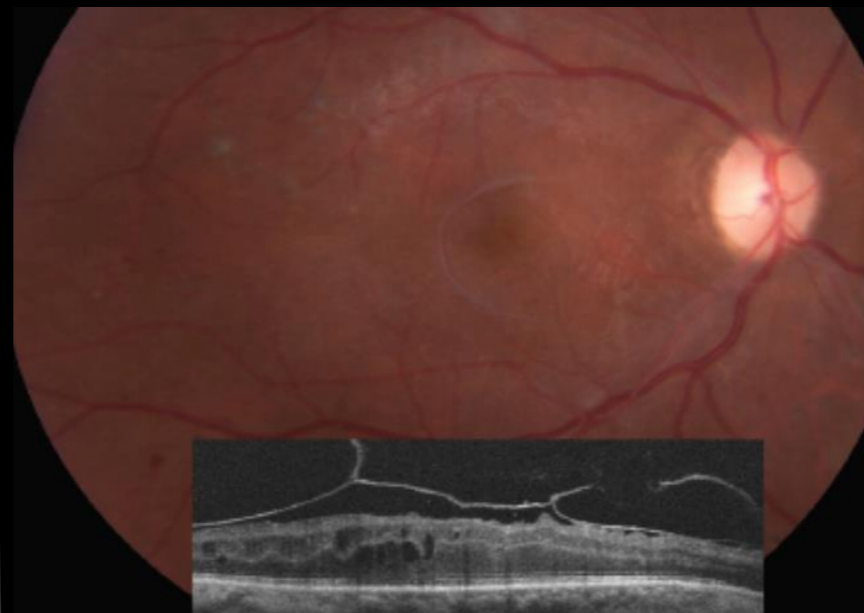


Edema maculare diabetico: Classificazione

Ialoloide ispessita



Trazione vitreo-maculare

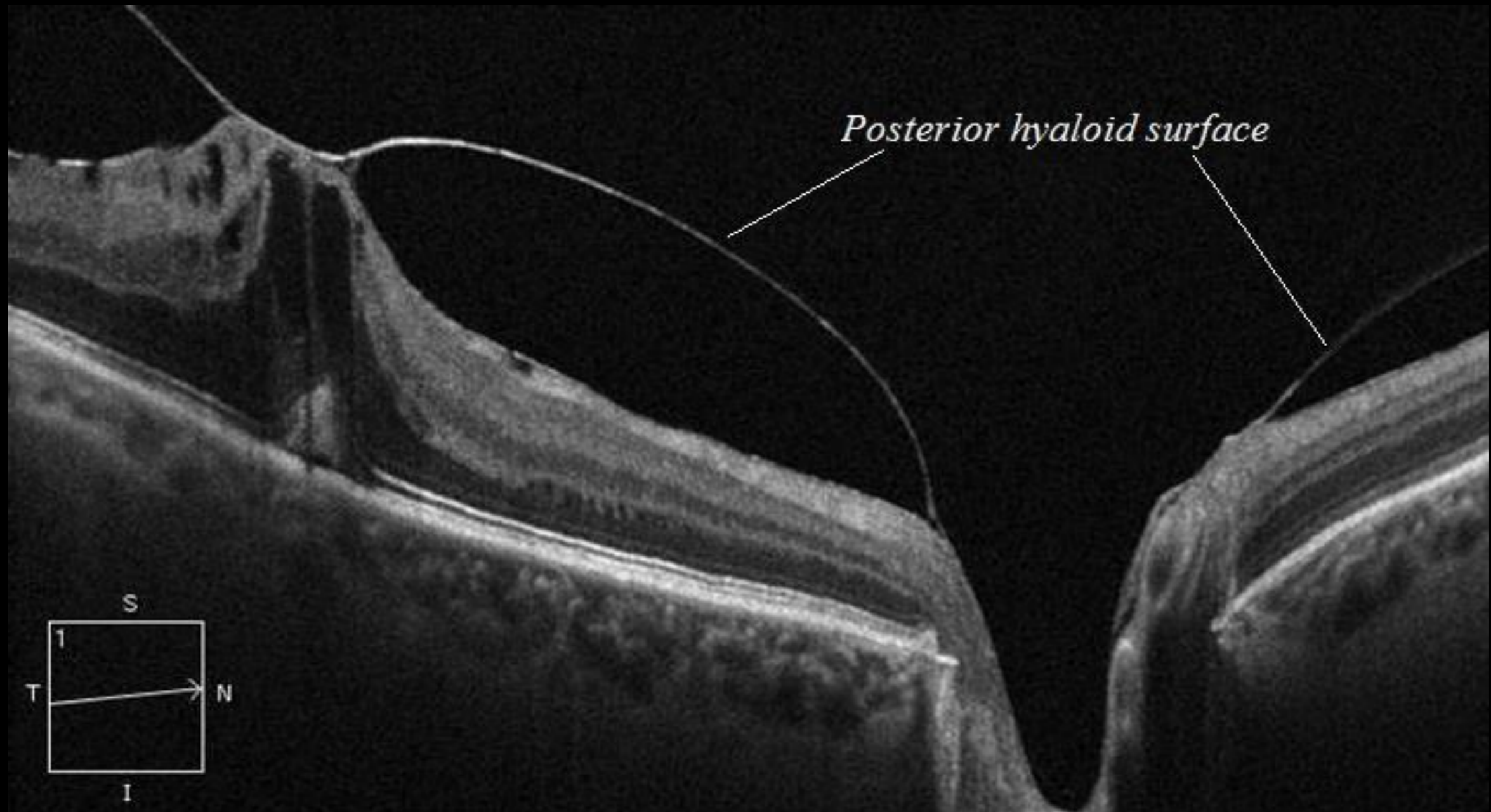


Membrana epiretinica



Trazione causa o conseguenza?

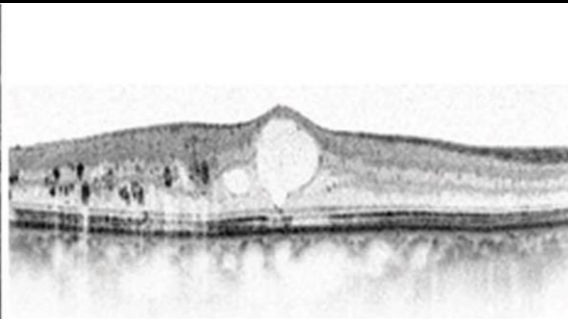
Edema maculare diabetico: Classificazione



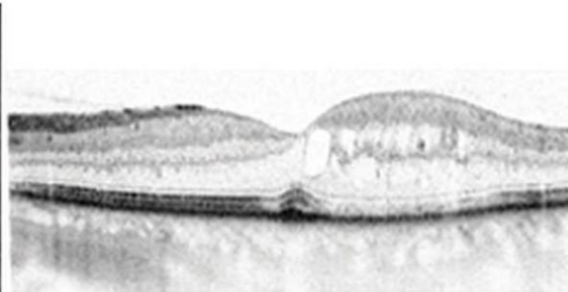
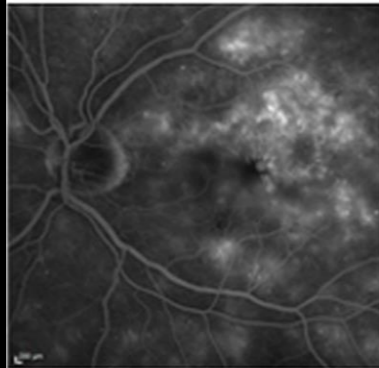
85% dei casi desione vitreo-papillare

Edema maculare diabetico : Fattori predittivi

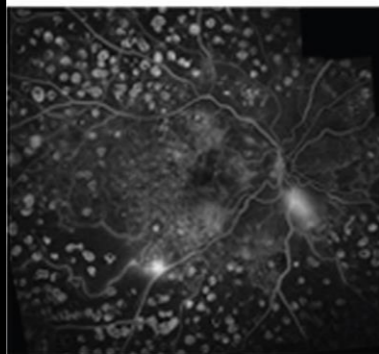
Focale o
multifocale



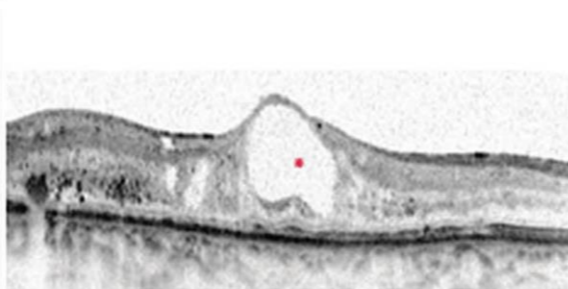
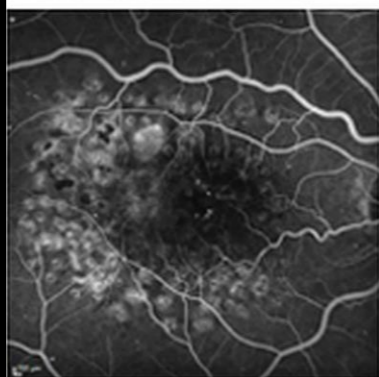
Diffuso



Ischemia
maculare o
periferica



Edema atrofico



Subretinal fluid

Area

Vitreoretinal-interface

Etiology

Edema maculare diabetico: Fattori Predittivi

Table 2 Fleiss' κ values for the inter-grader agreement of the three graders

Category	Grader 1: grader 2: grader 3	
	Cirrus	Spectralis
Subretinal fluid	0.90	0.82
Area	1.0	1.0
<u>Vitreo-retinal interface</u>	<u>0.25</u>	<u>0.42</u>
Oedema type 1	0.80	0.77
Oedema type 2	0.80	0.77
Oedema type 3	0.63	0.58
Oedema type 4	0.70	0.57

Oedema type 4

0.80

0.77

Oedema type 3

0.63

0.58

Oedema type 2

0.80

0.77

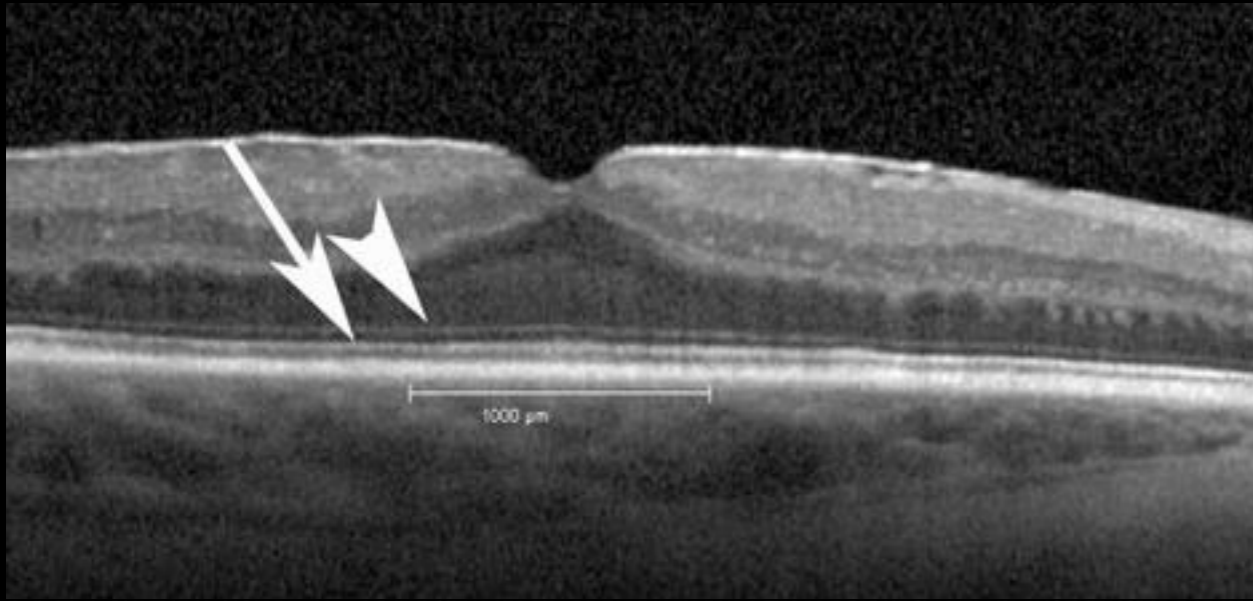
Oedema type 1

0.90

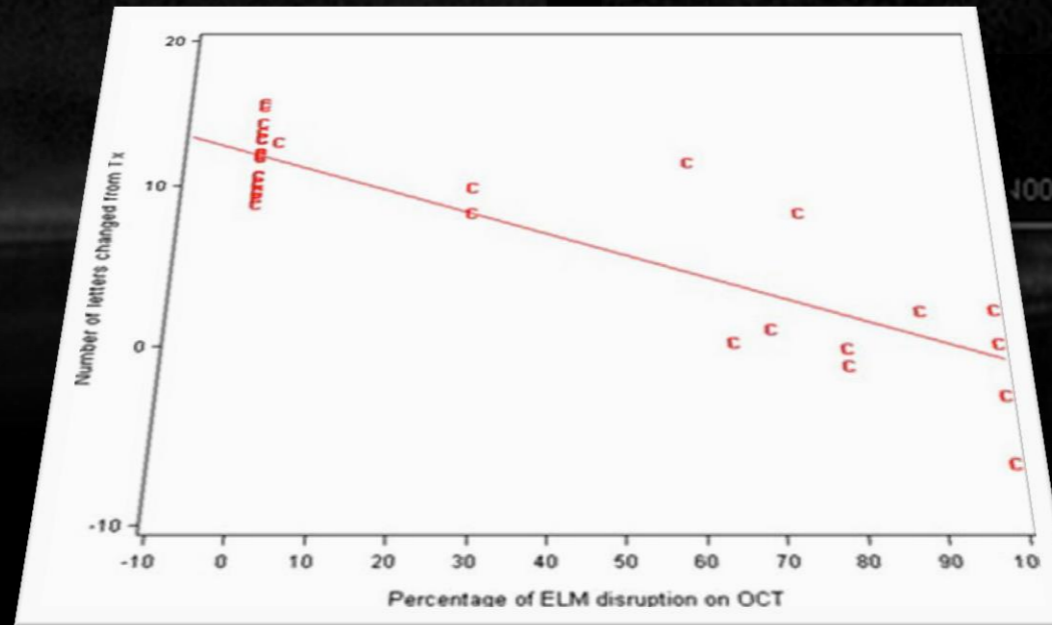
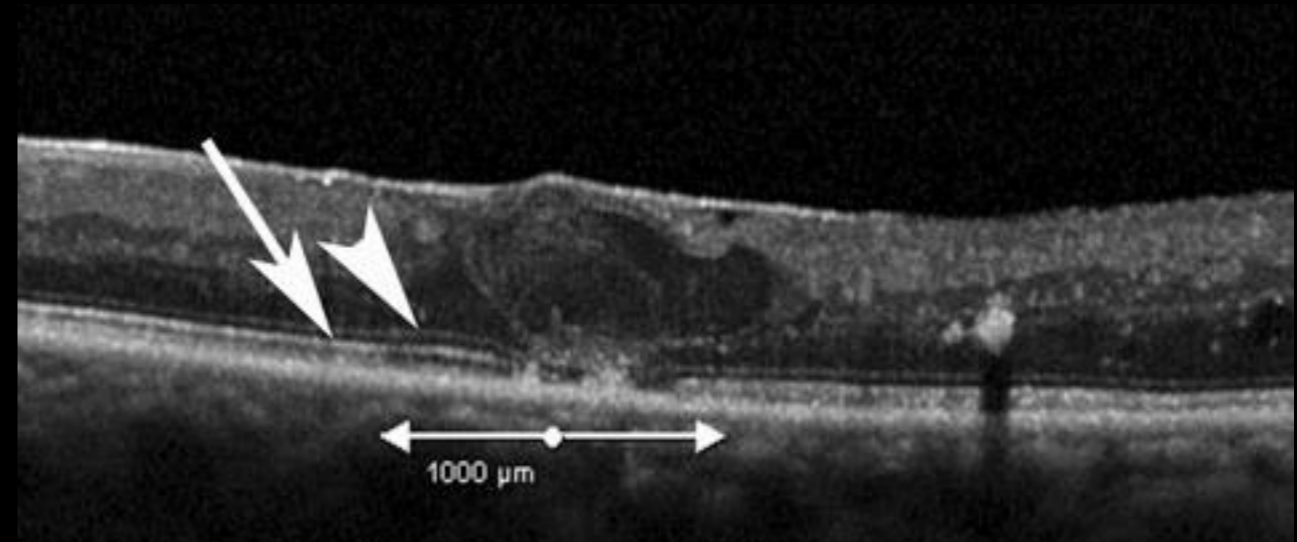
0.82

Edema maculare diabetico: Fattori Predittivi

Fotorecettori integri

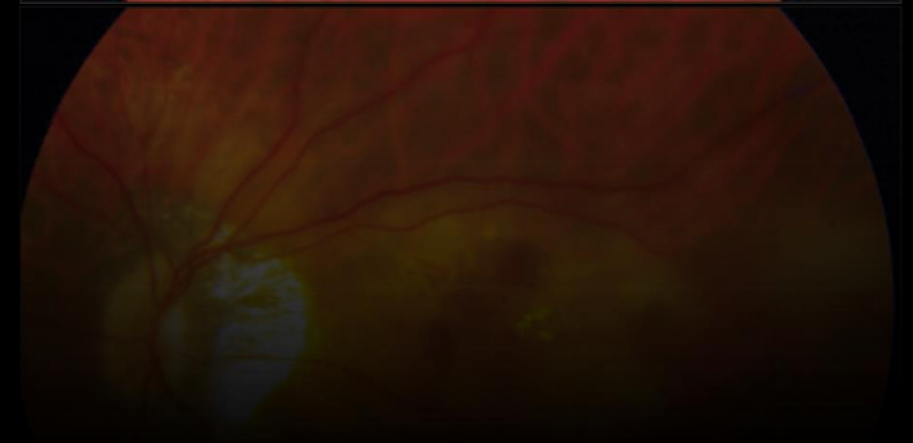
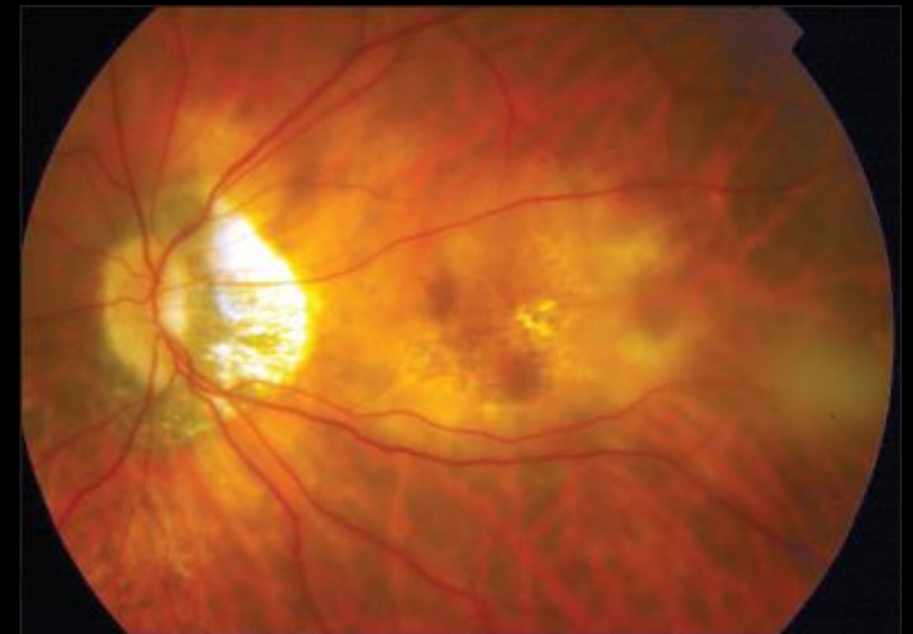


Fotorecettori alterati



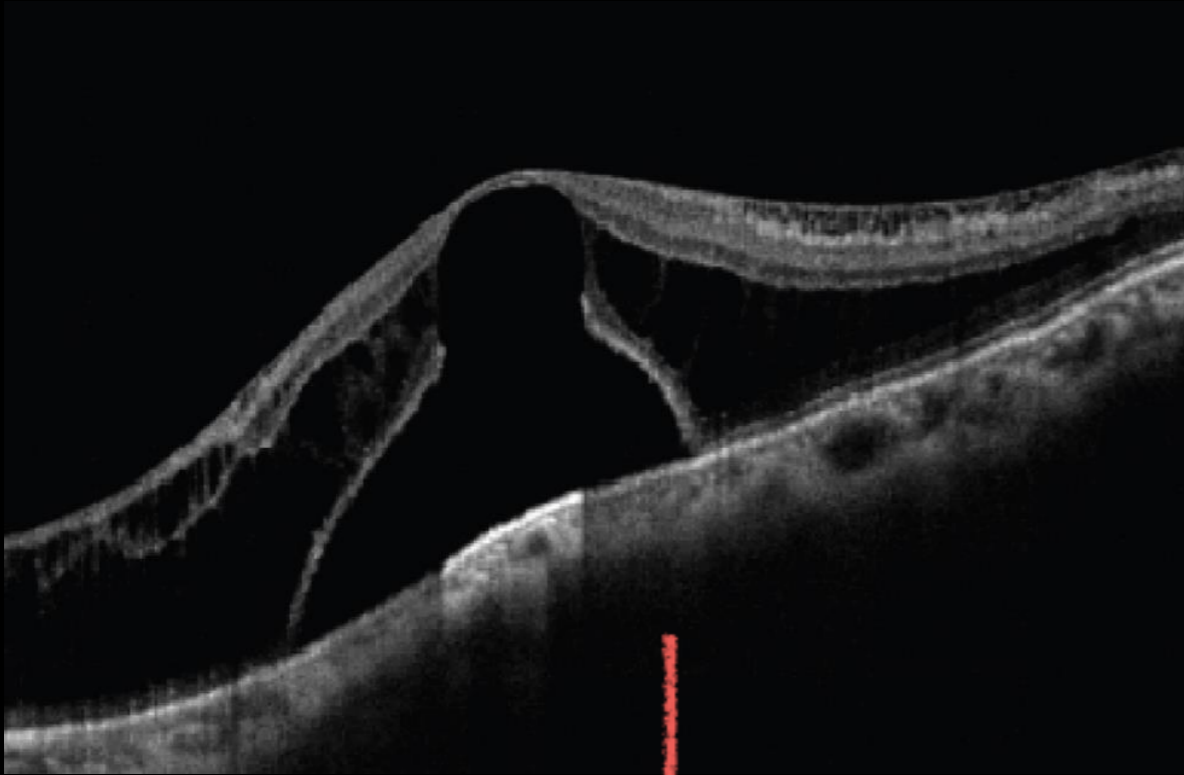
Foveoschisi miopica

- Associata a miopia elevata e stafiloma
- OCT essenziale per la diagnosi
- Vitrectomia o rinforzamento sclerale



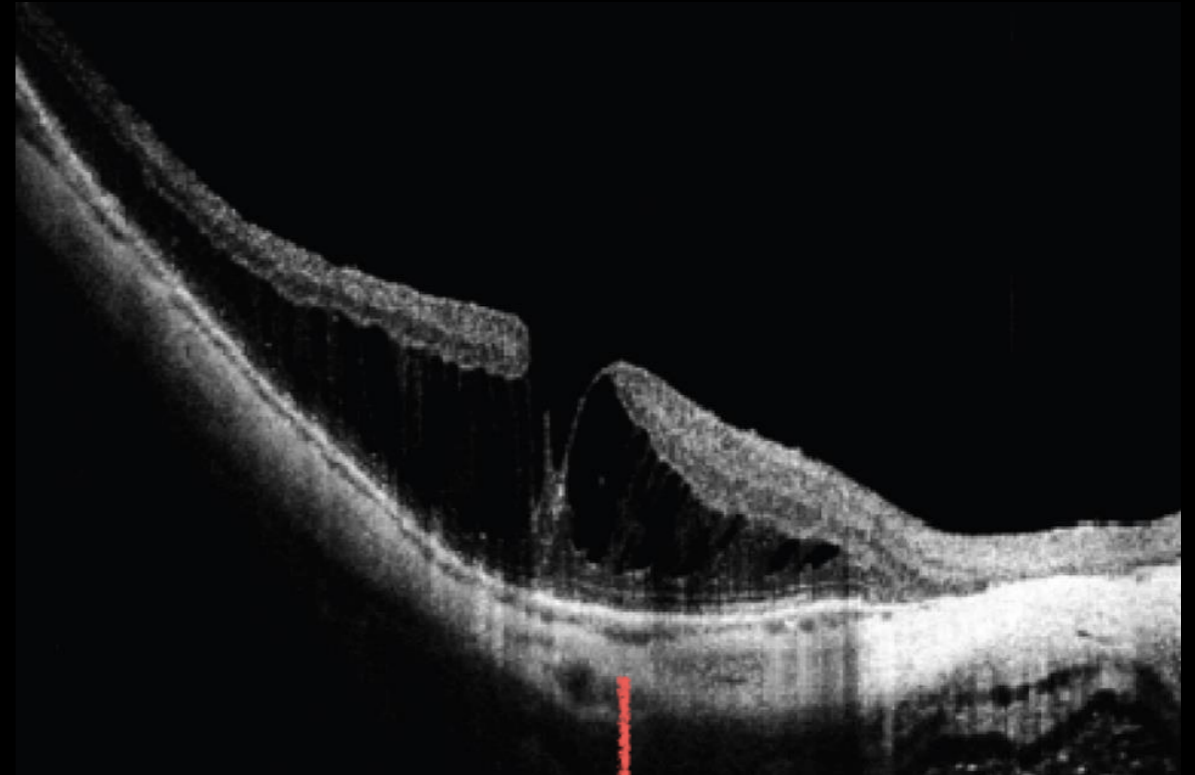
Foveoschisi: Classificazione

Con distacco foveale



Elevata percentuale di miglioramento visivo

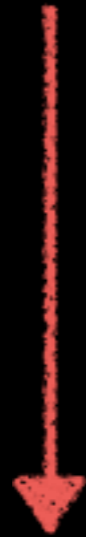
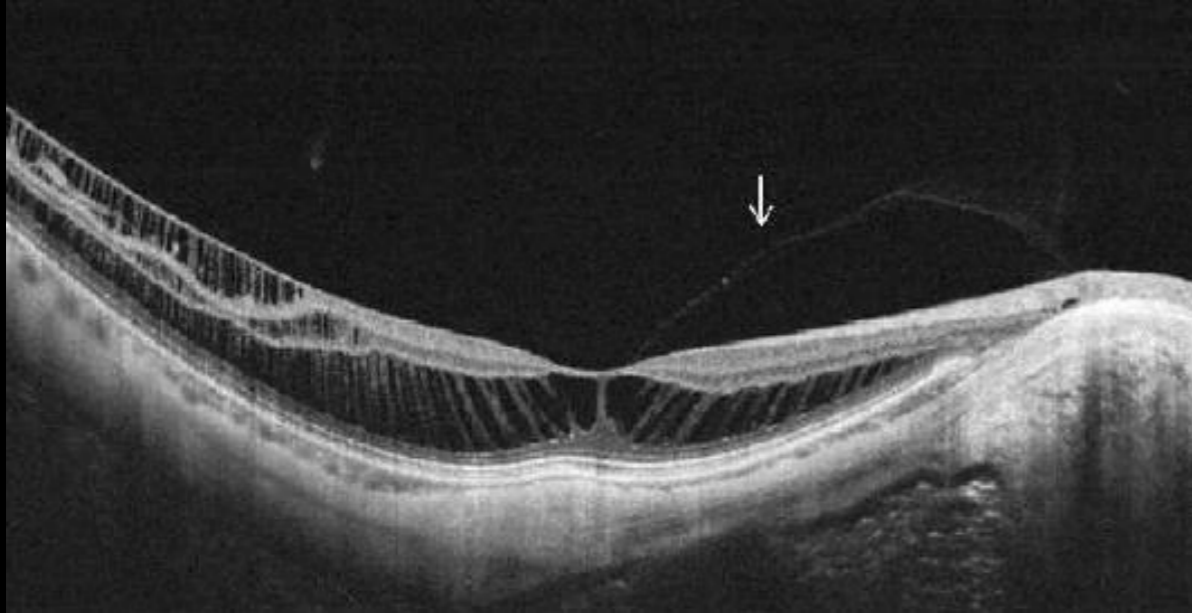
Senza distacco foveale



Ridotta percentuale di miglioramento visivo

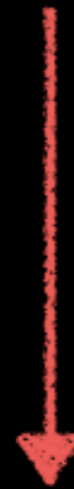
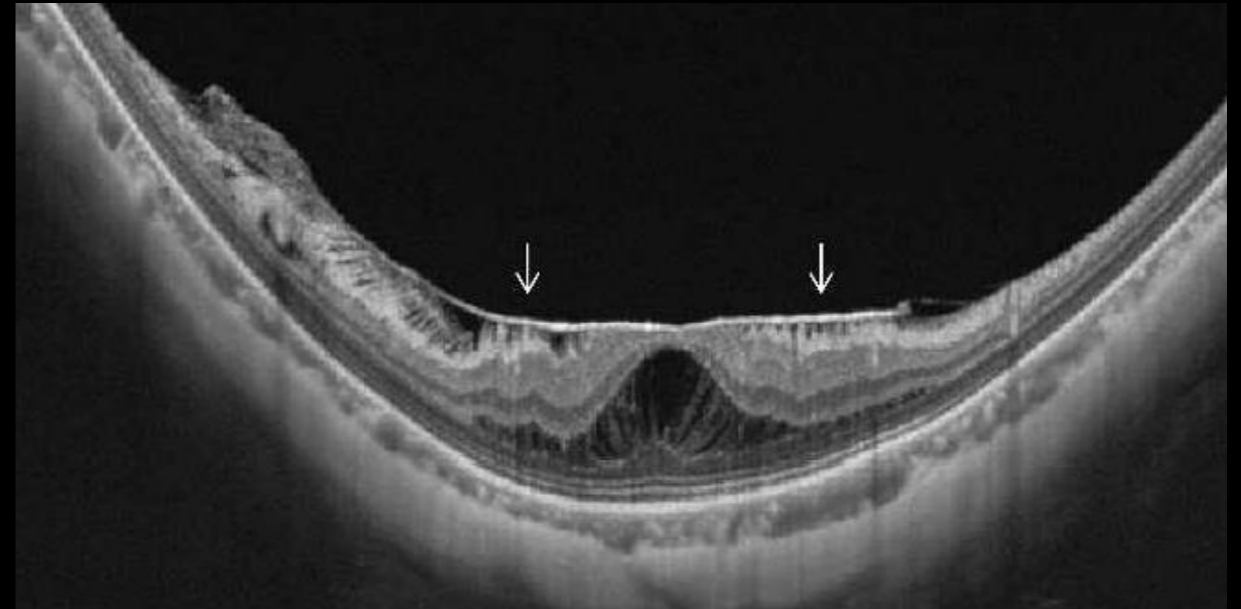
Foveoschisi: Classificazione

Aderenza vitreo-retinica



Progressione

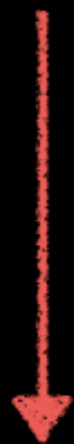
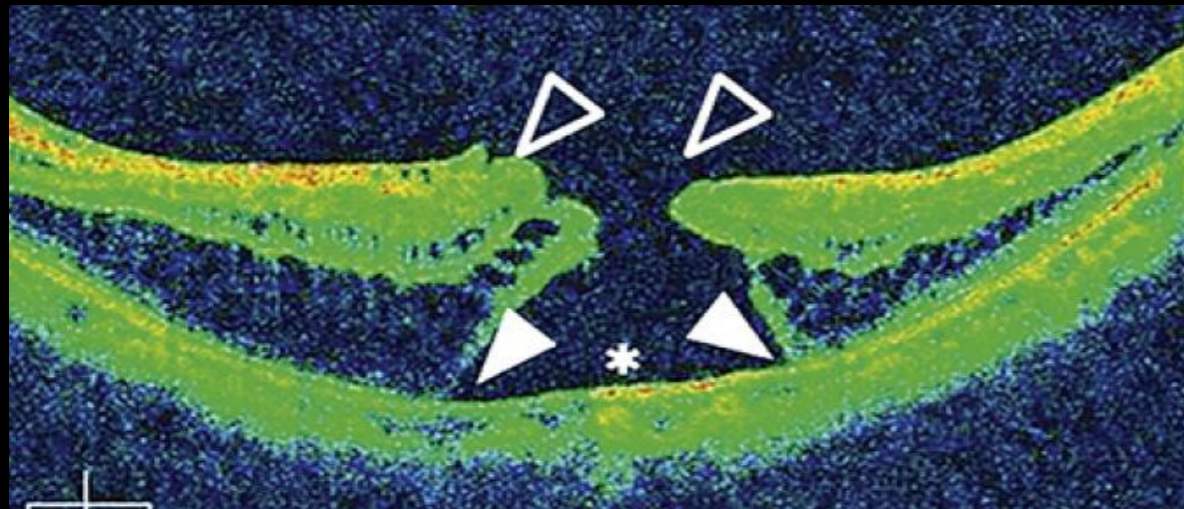
Membrana epiretinica



Progressione

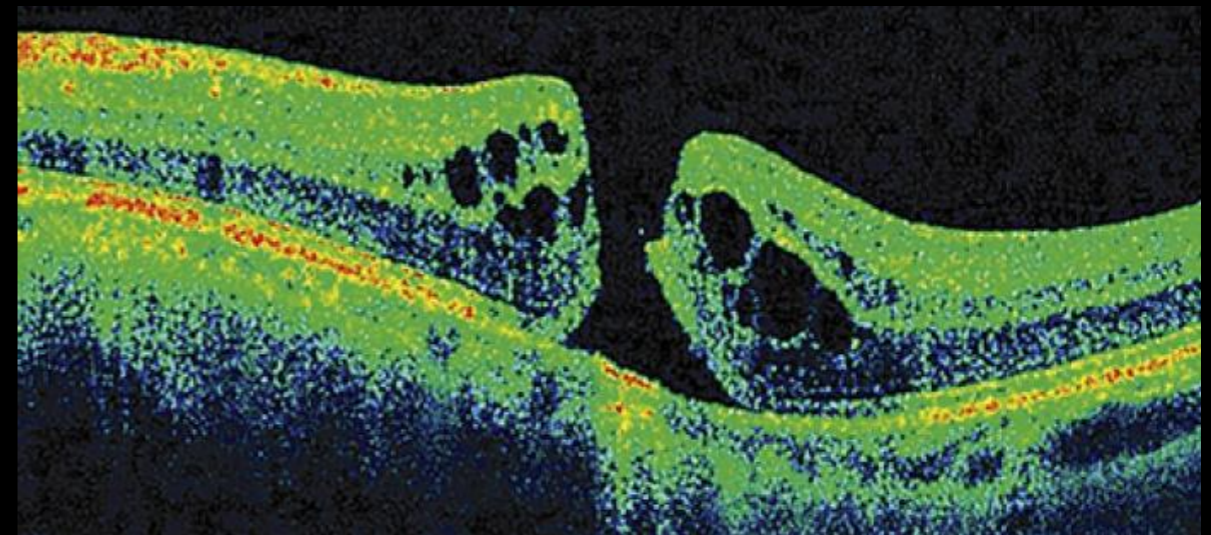
Foveoschisi Foro Maculare: Classificazione

Foro maculare con schisi



Possibile evoluzione verso il distacco

Foro maculare senza schisi



Minore rischio di distacco