Management of cystoid macular edema

Essay
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Abstract

Cystoid macular oedema is the final common pathway of many intraocular and system insults . It has characteristic petaloid appearance. Although cystoid macular oedema may be associated with underlying conditions , it is most commonly seen following intraocular surgery, venous occlusive disease , diabetic retinopathy , and posterior segment inflammatory disease . As well as clinical suspicion, a wide range of investigations may lead to the diagnosis of cystoid macular oedema . Fluorescein angiography and optical coherence tomography provide enhanced visualization of the geometry and distribution of cystoid macular oedema . A variety of approaches to the treatment of cystoid macular oedama have been attempted , with a variable degree of success . These options have included topical and systemic steroids , topical and oral non-steroidal anti-inflammatory agents and laser photocoagulation treatment. Other therapeutic modalities, including immunomodulators, intravitreal injection of triamcinolone, and pars plana vitrectomy have also been employed . More recently the use of anti-VEGFs and steroid slow-release intravitreal devices for the management of cystoid macular oedema secondary to uveitis and diabetes.

Key words: anatomy, pathophysiology , macular oedema, cystoid macular oedema , diabetic macular oedema, diagnosis , treatment , corticosteroids , triamcinolone , laser photocoagulation , vitrectomy VEGF and avastin.

List of abbreviations

AIDS	: Aquired immunodeficiency syndrome
BAB	: Blood-aqueous barrier
BCVA	: Best corrected visual acuity
BRVO	: Branch retinal vein occlusion
CAIS	: Carbonic anhydrase inhibitors
CFZ	: Capillary-free zone
CME	: Cystoid macular oedema
CMEA	: Cystoid macular oedema angiography
CRVO	: Central retinal vein occlusion
cSLO	: Confocal scanning laser ophtalmoscope
DDS	: Drug delivery system
DME	: Diabetic macular oedema
ELM	: External limiting membrane
ERG	: Electroretinogram
ETDRS	: Early Treatment Diabetic Retinopathy Study
FA	: Fluorescein angiography
FDA	: Food and drug administration
HRT	: Heidelberg retinal tomography
ICAM-1	: Intracellular adhesion molecule-1
ICG	: Indocyanine green
IGF-1	: Insulin-like growth factor-1
ILM	: Internal limiting membrane
IOP	: Intra ocular pressure
ISPR	: Inner segment photoreceptor
KHZ	: Kilo hertz
ME	: Macular oedema
MHZ	: Mega Hertz
MMG	: Mild macular grid
ND:YAG	: Neodymium: yttrium- Aluminum- Garnet
NFL	: Nerve fiber layer
NPDR	: Non-proliferative diabetic retinopathy
NSAIDS	: Non steroidal Anti-inflammatory Drugs
OCT	: Optical Coherence Tomography
OSPR	: Outer segment photoreceptors

PAF : Platelet- activating factor
PDR : Proliferative diabetic retinopathy
PGS : Prostaglandins
PKC : Protein kinase C
PPV : Pars plana vitrectomy
PR : Photoreceptor
PRP : Pan retinal photocoagulation
PVD : Posterior vitreous detachment
RP : Retinitis pigmentosa
RPE : Retinal pigment epithelium
SRD : Serous retinal detachment
SLO : Scanning laser Ophthalmoscope
TA : Triamcinolone acetonide
VA : Visual acuity
VEGF : Vascular endothelial growth factor
VMT : Vitreomacular traction

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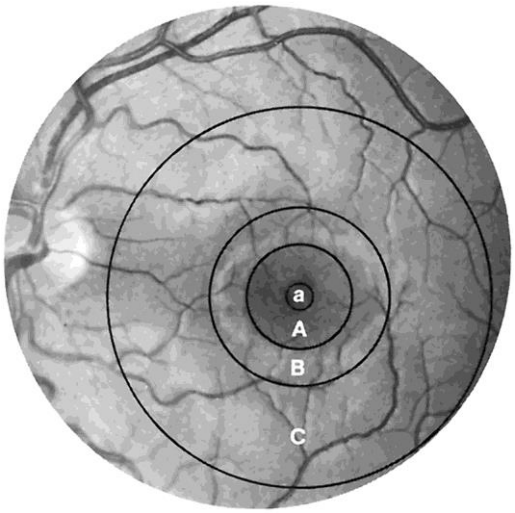
Anatomy of the macula

Anatomically the macula (macula lutea or central retina) is defined as that portion of the posterior retina that contains xanthophyll and two or more layers of ganglion cells. It measures approximately 5.5 mm in diameter and is centered approximately 4 mm temporal to and 0.8 mm inferior to the center of the optic disc (Fig. 1-1) ***(Gass, 1997)*.**

On the basis of microscopic anatomy, the macular area can be further subdivided into several zones. The fovea (fovea centralis) is a depression in the inner retinal surface in the center of the macula (Fig. 1-1; A). It measures approximately 1.5 mm or one disc diameter in size**.** The central floor of the fovea is called the foveola. It measures approximately 0.35 mm in diameter (Fig. 1-1; *a).* It lies within the capillary-free zone (cfz), which measures approximately 0.5 mm in diameter in most patients (Fig. 1-1; *cfz).*A small depression in the center of the foveola is called the umbo (Fig. 1-1; *u).*The Fovea is surrounded by a 0.5-mm-wide ring zone where the ganglion cell, inner nuclear layer, and outer plexiform layer of Henle are the thickest is called the parafoveal area (Fig. 1-1; *B).* This zone is in turn surrounded by a 1.5-mm zone referred to as the perifoveal area (Fig. 1-1; C) ,with a max retinal thickness (approximately 0.55 mm) at the foveal margin and minimal thickness (0.13mm) at the umbo ***(Gass, 1997)*.**



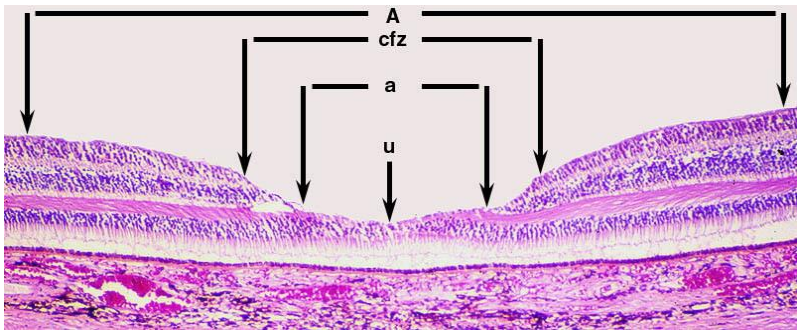


Fig. 1-1 *Normal Macula* ***(Hogan and Alvarado et al, 1971)***

Topographic anatomy *(above)* and histopathology (below) of the macula. **A**, Fovea containing the foveola (a), capillary-free zone (cfz), and umbo (u). **B**, Parafovea. **C**, Perifovea.

Ophthalmoscopically, the anatomic subdivisions of the macula are ill defined. Where, the center of the macula appears as a poorly defined, one-fourth to one disc diameter size zone of greater pigmentation that is maximum in the foveolar area. The foveal reflex appears to lie just in front of the center of the foveola in most normal eyes and therefore overlies the anatomic umbo. There are no consistent ophthalmoscopic landmarks to indicate the margins of either the 0.35-mm diameter foveola or the 1.5-mm diameter fovea. The margins of the

capillary-free zone of the retina that in most patients measures approximately 500 μm in diameter angiographically can only be estimated biomicroscopically because the perifoveolar capillary network is not visible***(Fig.1-2, A)***. In younger patients an oval or round halo light reflex at the inner retinal surface may correspond with the foveal margin ***(Fig. 1-2, B)***. Whereas, the foveal depression can be visualized with the narrow slit-lamp beam. ***(Justice and Lehmann, 1976)(Gass, 1997) .***

A **B**

Fig. 1-2 *Ophthalmoscopic Appearance of Normal Macula.*

(Gass, 1997)

A: Brunette fundus showing moderate to heavy concentration of pigment in the RPE that obscures most of the choroidal vessels. Note greater density of pigment in the macular area, the cilioretinal artery (large black arrow), a first order arteriole (upper black arrow), and a second-order arteriole (lower black arrow).

B: Blond fundus, choroidal vessels arc visible every where except in the macular area. The oval light reflex in the macula of this young child is located at the margin of the fovea.