

RUBEOSIS IRIDES

An Essay

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Master Degree of Ophthalmology

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INTRODUCTION

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INTRODUCTION

The term rubeosis (ruber = red in latin) was first used to describe the reddish facial skin colouration caused by enlargement of the intermediate portion of the capillaries in diabetics (Noorden G.H., 1927). By extension, the pink hue of the abnormally vascularized iris in certain cases of glaucoma in patients with long standing diabetes and in occlusive disease of the major retinal vessels has been termed rubeosis irides.

Iris neovascularization which accompanies these ocular diseases often appears to be misguided in its purpose and may ultimately lead to blindness. New blood vessels which are formed on the anterior surface of the iris frequently disrupt the delicate structure of the aqueous filtration apparatus and lead to intractable glaucoma. The ineffectiveness of current therapy of rubeotic and haemorrhagic glaucoma reflects our ignorance of the process. The high frequency with which the condition is associated with loss of vision is indicative of its seriousness.

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Rubeosis was until recently considered to be a relatively rare condition, appearing exclusively in diabetics, invariably leading to a severe, usually intractable, type of secondary glaucoma (Francois J., 1972). But it is now well documented that rubeosis may be associated with numerous disease states and that the frequently ensuing glaucoma is a progression of the iris neovascularization to include the angle and render it ineffectual.

(Madsen P. H., 1971)

INCIDENCE OF RUBEOSIS
IRIDES

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INCIDENCE OF RUBEOSIS IRIDES

According to the work done by Schulze in 1967, on enucleated eyes, rubeosis irides was seen most commonly in cases of glaucoma following central retinal vein occlusion.

There, it was seen in 80% of such cases. Eyes with long standing retinal detachment comprised the second most common category. In about two thirds of these eyes there was a history of injury. Ten percent of all cases of retinal detachment showed rubeosis.

Five percent of all choroidal melanoma cases had rubeosis, in these cases the tumour was large and there was extensive secondary retinal detachment. Only three cases with diabetic retinopathy were found, due to the fact that such eyes are less likely to be enucleated. There has not been found any statistical report correlating the incidence of occurrence of rubeosis irides in different causal types.

According to the work of Herman et al 1970, it is estimated that nearly 1% of the world population

suffers from diabetes. Patients with this disease suffer 10% to 20% times greater risk of becoming blind than unaffected population.

(Davis, 1976)

The frequency of rubeosis irides diabetica in a representative diabetic material is stated very differently in various studies: 5.5% (Palomar - Palomar, 1956), 0.37% (Jahnert et al, 1957), 10% (Armstrong et al, 1960), 1% (Armaly and Baloglou, 1967), 10% (Ohrt, 1967) and 6.8% (Ohrt, 1971).

Rubeosis of the iris is relatively frequent in eyes with simple diabetic retinopathy and occurred in 7.84% of cases.

(Ohrt, 1971)

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ANATOMY OF THE IRIS
AND ANGLE OF ANTERIOR
CHAMBER

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ANATOMY OF THE IRIS AND ANGLE OF ANTERIOR CHAMBER

The iris is a circular diaphragm stretching across the anterior part of the eye. It is perforated near its center, slightly to the nasal side forming the pupil. Its thickness is about 0.5 mm and its diameter about 12 mm. Peripherally it is continuous with the anterior aspect of the ciliary body, therefore part of the ciliary body enters in the formation of the anterior chamber.

The anterior surface of the iris is divided by a zigzag line called the collarette into a peripheral ciliary zone and a central pupillary zone.

The ciliary zone presents a series of radial streaks. These are straight when the pupil is small, wavy when it is dilated.

(Wolf, 1976)

Near the pupillary margin is an incomplete circular series of ridges overlying an incomplete vascular circle (circulus vasculosus irides minor). In the region of the circulus minor are many pit-

like depressions called the Crypts of Fuchs, the superficial tissue layers of the iris, at which are deficient so that fluids can get in and out of the iris during contraction and relaxation of the pupil. (Wolf, 1976)

The posterior surface is dark brown or black in colour and smooth. With low magnification fine folds and furrows can be detected, namely:-

- Schwalbe's contraction folds which begin about 1 mm from the pupillary margin, wind round it and notching it.
- Schwalbe's structural furrows which start about 1.5 mm from the pupillary margin, they are present in the vessel layers also.
- Circular furrows which cross structural folds at regular intervals, and are present near the pupillary margin.

Microscopically the iris consists of the following layers:-

- 1- Anterior limiting membrane.

2- Stroma.

3- Posterior membrane (anterior epithelium).

4- Posterior pigment epithelium.

The anterior surface was thought before to be covered by an anterior endothelium, but now this has been definitely dismissed.

(Fine and Yanoff, 1977)

It is found to be a condensation of anterior part of stroma forming a dense matting, produced by the anastomosing processes of connective tissue cells and pigment cells. The connective tissue cells are star shaped, spreading out parallel to the surface, the pigment cells are numerous, in dense sheets, formed of two types, melanocytes and fibroblasts.

The stroma forms the bulk of the iris, it consists of loosely arranged collagenous network in which are embedded the sphincter pupillae muscle, iris vessels and nerves and pigment cells, there are no elastin fibers.

The vessels run radially with a sinuous course to allow for free iris mobility. At the iris root, there is a purely arterial anastomosis between the

two long posterior ciliary arteries and anterior ciliary arteries. the circulous vasculous irides major. while the circulous vasculous irides minor which lies near the pupillary margin is arterial and venous.

The iris arterioles have walls with a single muscle layer and no internal elastic membrane.

(Shakib and Chumba-Vaz, 1966)

It has been speculated that their thick adventitia possibly helps to avoid kinking and collapse of the arterioles during extreme movements of the iris. Recent electron microscopic studies have determined that the adventitia is a double layered structure of longitudinally oriented collagen fibers. Ground substance is interspread between the fibers and the two layers are inter-connected by additional criss-crossing fibers, which rule out the hypothesis that these concentric fibers are capable of a telescopic sliding action when the iris is dilated.

(Laties and Rapoport, 1976)

The endothelium of iris capillaries is non fenestrated and has a continuous basement membrane so they are considered to be the site of a blood-iris barrier.