

ANTERIOR CHAMBER

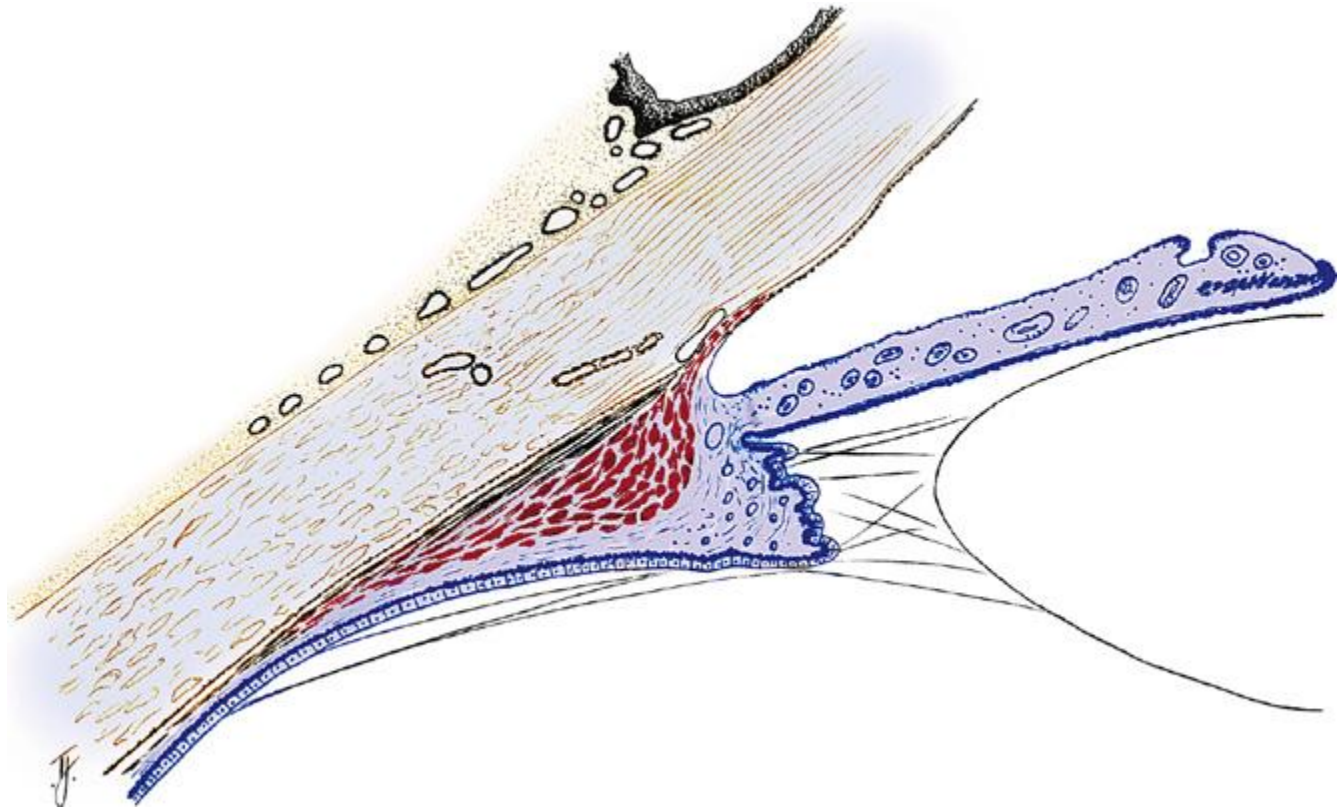
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HOD

Introduction

- The anterior chamber is bounded anteriorly by the corneal endothelium;
- peripherally by the trabecular meshwork,
- a portion of the ciliary body,
- and the iris root; posteriorly by the anterior iris surface and the pupillary area of the anterior lens

Introduction



Periphery of the anterior segment. Structures of the anterior chamber angle are labeled.

Introduction

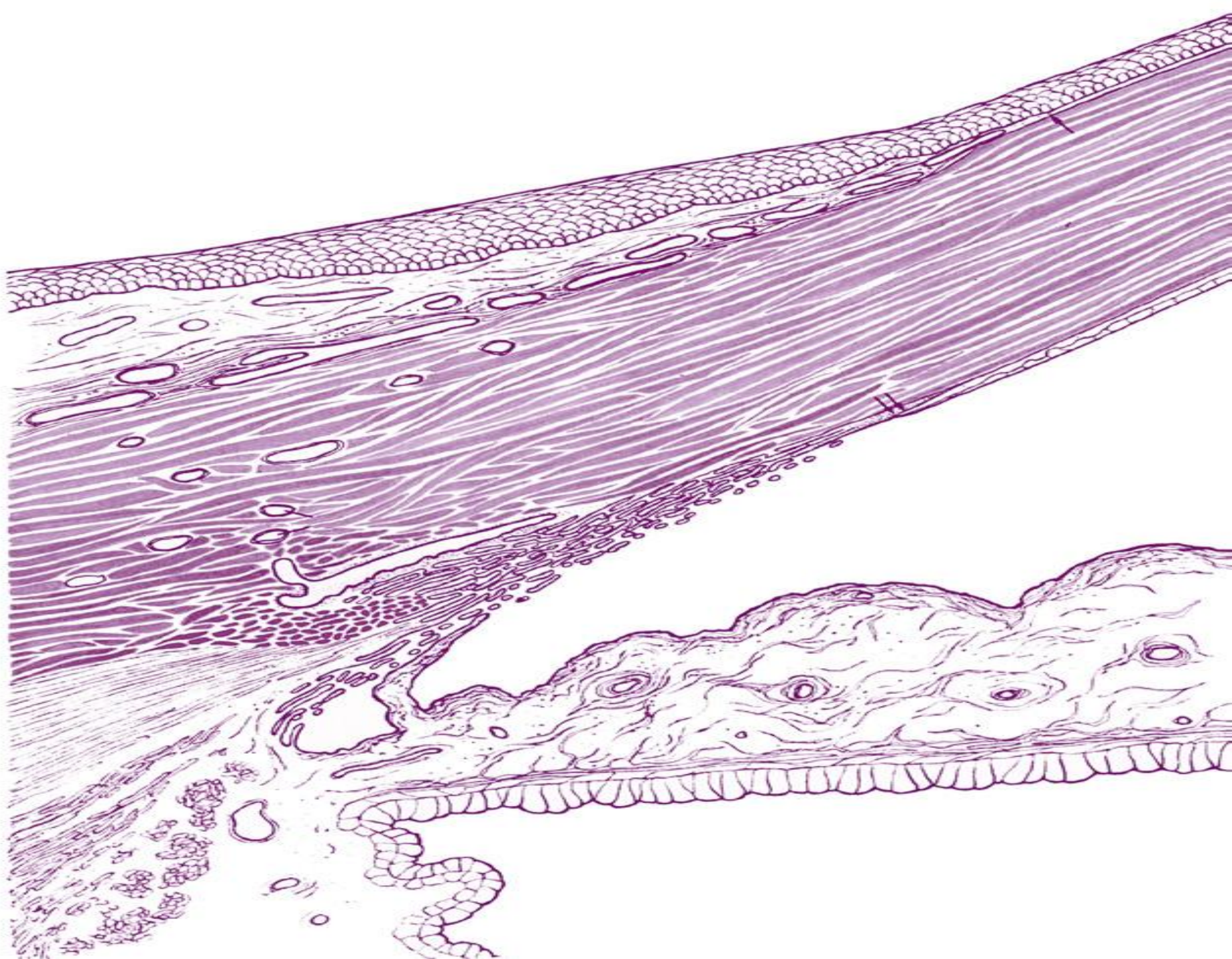
- The center of the anterior chamber is deeper than the periphery.
- The anterior chamber angle is formed at the periphery of the chamber,
- where the corneoscleral and uveal coats meet.
- The aqueous humor exits the anterior chamber through the structures located in this angle.

ANTERIOR CHAMBER ANGLE STRUCTURES

- The structures through which aqueous exits, collectively called the filtration apparatus, consist of the trabecular meshwork and Schlemm's canal.
- These structures and the scleral spur occupy the excavated area located at the internal corneoscleral junction known as the internal scleral sulcus.

Scleral Spur

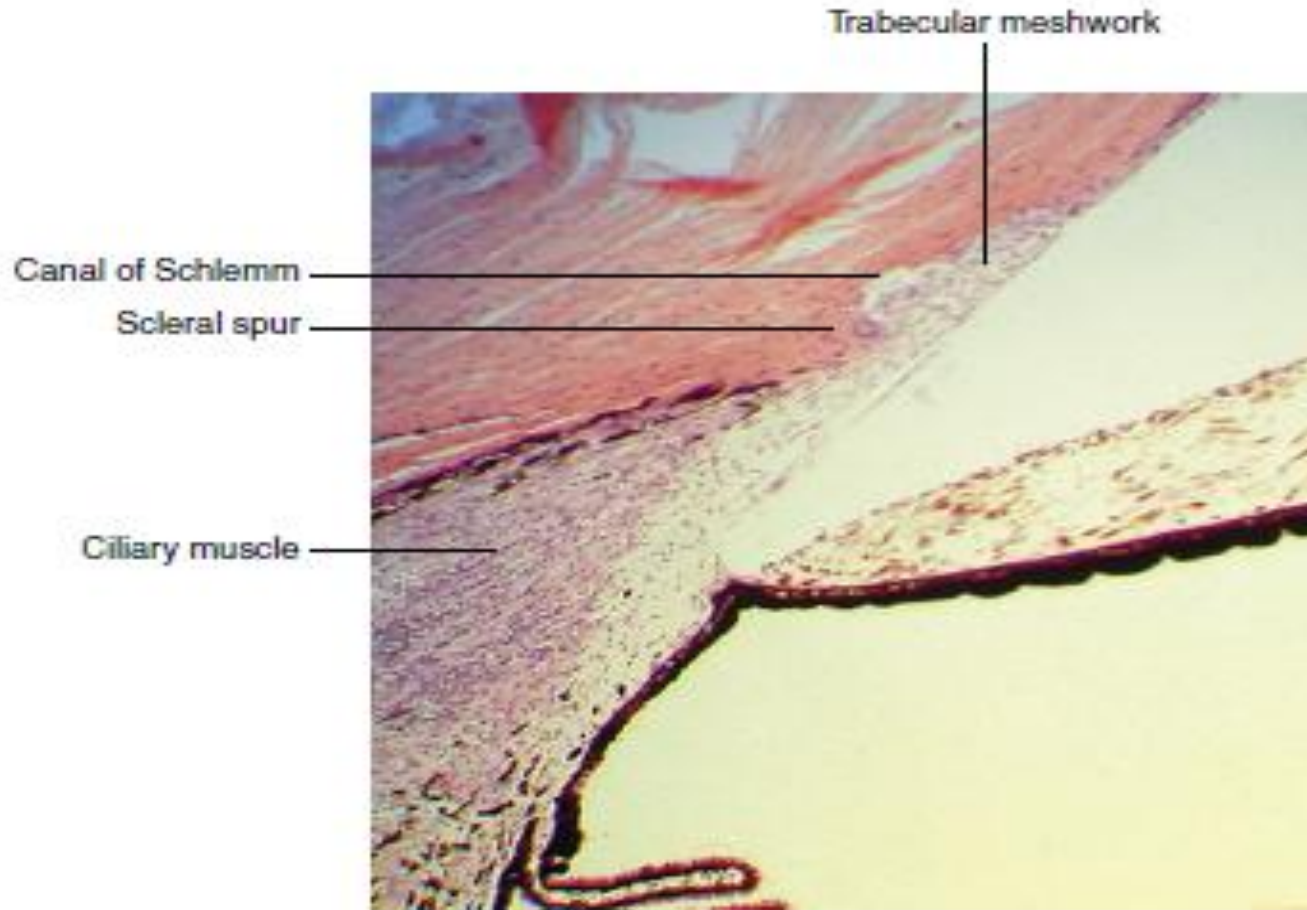
- The scleral spur lies at the posterior edge of the internal scleral sulcus.
- The posterior portion of the scleral spur is the attachment site for the tendon of the longitudinal ciliary muscle fibers,
- whereas many of the trabecular meshwork sheets attach to the spur's anterior aspect, such that the collagen of the spur is continuous with that of the trabeculae.



Trabecular Meshwork

- The trabecular meshwork encircles the circumference of the anterior chamber, occupying most of the inner aspect of the internal scleral sulcus.
- In cross section it has a triangular shape, with its *apex at the termination*
- of Descemet's membrane (Schwalbe's line) and its *base* at the scleral spur.
- The inner face borders the anterior chamber, and the outer side lies against corneal stroma, sclera, and Schlemm's canal

Trabecular Meshwork



showing trabecular meshwork, scleral spur, and Schlemm's canal.

Trabecular Meshwork

- The meshwork is composed of flattened perforated sheets, with three to five sheets at the apex.
- These sheets branch into 15 to 20 sheets as they extend posteriorly from Schwalbe's line to the scleral spur

Trabecular Meshwork

- The trabecular meshwork is an open latticework, the branches of which interlace.
- The intertrabecular spaces between the sheets are connected through pores, or openings within the sheets
- (historically called the “spaces of Fontana”)

Trabecular Meshwork

- The meshwork can be separated into two anatomic divisions.
- The **corneoscleral meshwork** is the outer region; its sheets attach to the scleral spur.
- The inner sheets, which lie inner to the spur and attach to the ciliary stroma and longitudinal muscle fibers, make up the uveal meshwork. some of these sheets may attach to the iris root

Trabecular Meshwork

- The meshwork trabeculae consist of an inner core of collagen and elastic fibers embedded in ground substance and covered by basement membrane and endothelium.
- The endothelial cells are a continuation of the
- corneal endothelium.

Trabecular Meshwork

- The endothelial cells contain the cellular organelles for protein synthesis and apparently are capable of replacing the connective tissue components.
- These cells also contain lysosomes, which give them the capacity for phagocytosis.
- Gap junctions and short areas of tight junctions join the endothelial cells

Trabecular Meshwork

- No zonula occludens are found.
- Cytoplasmic projections connect cells of neighboring sheets.
- At the scleral spur, the trabecular sheets lose their endothelial covering, but the collagenous and elastic fibers continue into the connective tissue of the spur and ciliary body

Trabecular Meshwork

- Some connective tissue fibers of the ciliary muscle pass forward and merge with the inner sheets of the meshwork.

Canal of Schlemm

- The canal of Schlemm is a circular vessel and is considered to be a venous channel, although it normally contains aqueous humor rather than blood.
- It is outer to the trabecular meshwork and anterior to the scleral spur.
- The external wall of the canal lies against the limbal sclera, and the internal wall lies against the juxtacanalicular connective tissue and the scleral spur .

Canal of Schlemm

- Thin tissue septa may bridge the lumen, dividing it into several channels.
- The lumen is lined with endothelial cells, many of which are joined by zonula occludens.
- The endothelial cells have an incomplete basement membrane.

Canal of Schlemm

- The continuous endothelial lining with cells joined by tight junctions make the canal similar to blood vessels, whereas the discontinuous basement membrane make it similar to lymph channels.
- The tight junctions of the inner wall restrict flow into the canal between the lateral walls of the cells.
- Pores and pinocytic vesicles in the cell membrane may be an avenue for passage of aqueous humor

Juxtacanalicular Connective Tissue

- The region separating the endothelial cell lining of the canal from the trabecular meshwork is called the juxtacanalicular tissue.
- It consists of endothelial cells and fibroblasts embedded in a matrix of collagen, elastic-like fibers, and ground substance.
- The cells of this region have processes occasionally joined by adhering and gap junctions.

Juxtacanalicular Connective Tissue

- The cells also form similar connections with the endothelium of the inner wall of Schlemm's canal.
- There are micronsized spaces within the juxtacanalicular tissue that appear to lack extracellular matrix

Juxtacanalicular Connective Tissue

- may provide a tortuous pathway for fluid to move toward the inner wall of the canal.
- The endothelium of Schlemm's canal is anchored to the juxtacanalicular tissue by a network of elastic-containing fibrils that is also connected to the scleral spur and the tendon of the ciliary muscle.
- This connective network might help in modulating aqueous outflow

FUNCTION OF THE FILTRATION APPARATUS

- The primary function of Schlemm's canal and the trabecular meshwork is to provide an exit for the aqueous humor.
- In addition, with the movement of aqueous through these structures,
- nutrients can diffuse into surrounding tissue, thereby supplying nutrients to the nearby deep limbal and scleral tissue.

Anterior Chamber at a glance

1. Volume: 220 μL .
2. Chamber Volume decreases by 0.11 μL /year life
3. Depth: 3.15mm (2.6- 4.4mm)
4. Chamber depth decreases by 0.01mm/year of life.
5. Chamber depth is shallower in the hypermetropic than myopic .Chamber deepens by 0.06mm for each diopter of myopia.
6. Chamber depth is slightly diminished during accommodation, partly by increased lens curvature & partly by forward translocation of the Lens.
7. Wide angle of anterior chamber denotes the eye in which the angle between iris and surface of the trabecular meshwork is between 20 to 45 degrees. Angles less than 20 degrees are termed as narrow angles.(Becker- Shaffer's diagnosis and therapy of glaucomas)

Clinical Comment: Gonioscopy

- The condition of the anterior chamber angle structures is clinically important because this angle is the location of exit for aqueous humor.
- It must be able to flow freely and unimpeded out of the anterior chamber.
- If its exit is blocked, pressure within the eye will increase, and ocular tissue damage will occur.

Clinical Comment: Gonioscopy

- The width of the angle can be estimated and graded using biomicroscopy to determine whether the angle appears wide enough to provide easy access to the trabecular meshwork.
- A direct view of the angle cannot be achieved because the limbus is opaque, and light directed obliquely through the cornea into the angle does not exit because of total internal reflection