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التوثيق الالكتروني والميكروفيلم

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بعض الوثائق الأصلية تالفة

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بالرسالة صفحات
لم ترد بالأصل

AN IMAGING STRATEGY FOR ORBITAL LESIONS

Thesis

submitted to the Faculty of Medicine, University of Alexandria, in partial fulfillment of the requirements of the degree of

Doctor of Radiodiagnosis

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2002

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ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my creator, ALLAH, who without his help I would not have been able to complete this work.

I would like to give a special thanks to my parents, wife and daughters, a thanks beyond words can express.

My deepest thanks to ***Prof. Dr. Soad Mohamed Kishk*** *Professor of Radiology, Faculty of Medicine, Alexandria University, who without her help, this work would not have been born. My deep appreciation for her precious advice, time and effort she gave to me in every single step.*

Many thanks to ***Prof. Dr. Vijay M. Rao,*** *Professor of Radiology, Thomas Jefferson University Hospital, for her unlimited support and encouragement that assisted me much in bringing this work to light.*

Many thanks to ***Professor Dr. Ahmed Abdel Karim Elmasry*** *Professor of Ophthalmology, Faculty of Medicine, University of Alexandria, for his help, care and useful advice.*

Many thanks to ***Dr. Alaa El-Din Eissa,*** *Associate Professor of Neurosurgery, Faculty of Medicine, Alexandria University, for his sincere and strong support throughout this work.*

My sincere thanks to ***Dr. Alaa Mohamed Fathi Mowaki,*** *Associate professor of Radiology, Faculty of Medicine, Alexandria University for his very gracious dedication, advice and effort he granted me throughout this work.*

Special thanks to ***Prof. Dr. Reda Mohamed Darweesh*** *Professor of Radiology Faculty of Medicine Alexandria University for his undeniably influential vision and guidance.*

A lot of thanks to my senior and junior colleagues who generously offered me all the help they could.

Finally, my thanks to every person who by one mean or another gave me a hand during the performance of this work, hoping it will add something to the efforts for the caring of human health.

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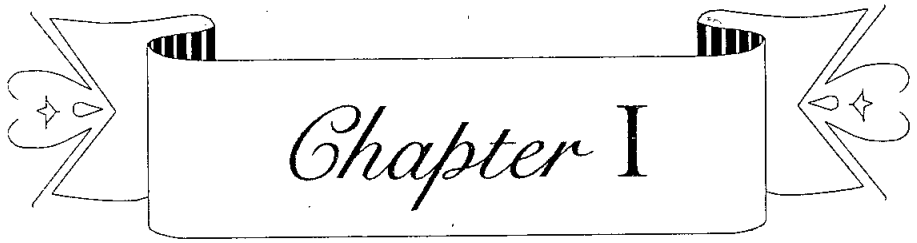


INTRODUCTION

INTRODUCTION

Embryology of the Eye

The eyes develop from three sources: (a) neuroectoderm of the forebrain, (b) surface ectoderm of the head, and (c) mesoderm between these layers. The surface ectoderm forms the lens, and the surrounding mesoderm gives rise to the vascular and fibrous coats of the eye.[1]

Eye formation is first evident at the beginning of the fourth week of development, when grooves called optic sulci appear in the neural folds at the cranial end of the embryo. As the neural folds fuse to form the forebrain vesicle, the optic sulci evaginate to form hollow diverticula called optic vesicles. These vesicles project from the sides of the forebrain into the adjacent mesenchyme. The cavities of these vesicles are continuous with the lumen of the forebrain vesicle. As the bulb-like optic vesicles grow laterally, their distal ends expand and their connections with the forebrain constrict to form hollow optic stalks. As the optic vesicles grow, their lateral surfaces become flattened. Concurrently, the surface ectoderm adjacent to the optic vesicle thickens to form lens placodes, the primordial of the lenses. The formation of the lens placodes is stimulated by the optic vesicles.[1]

The central region of each lens placode soon invaginates and sinks deep to the surface, forming a lens pit. The edges of this pit gradually approach each other and fuse to form a spherical lens vesicle, which is soon pinched off from the surface ectoderm.

The lens vesicle develops into the lens of the eye. As the lens vesicles develop, the optic vesicles invaginate and become double walled structures called optic cups. The opening of each optic cup is large at first, but later the rim of the optic cup grows inward and converges around the lens. By this stage, the lens vesicles have lost their connections with the surface ectoderm and have entered the cavities of the optic cups.[1]

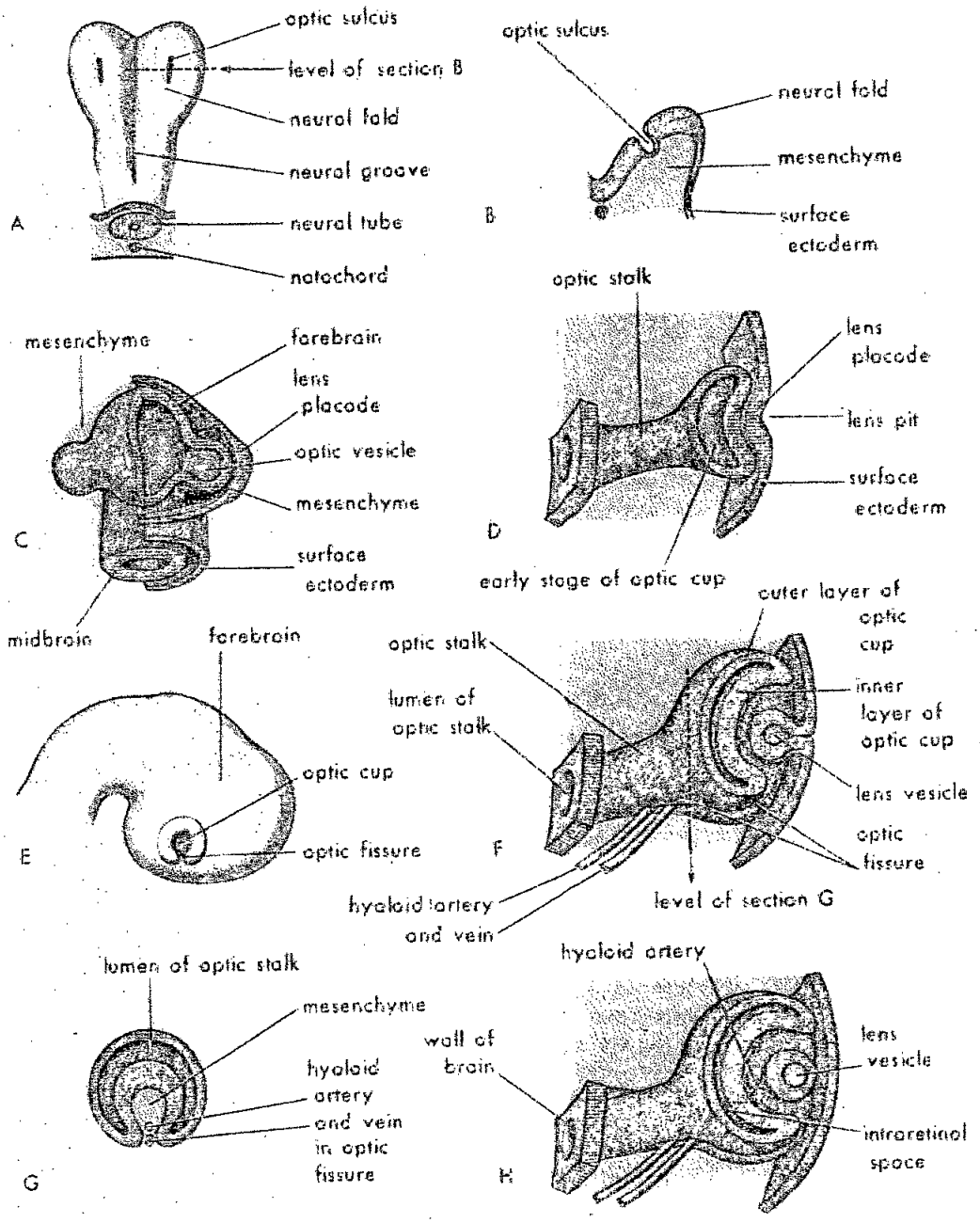
Linear grooves called optic fissures develop on the ventral surface of the optic cups and along the optic stalks. These fissures contain vascular mesenchyme from which the hyaloid blood vessels develop. The hyaloid artery, a branch of the ophthalmic artery, supplies the inner layer of the optic cup, the lens vesicle, and the mesenchyme in the optic cup. The hyaloid vein drains blood from these structures. As the edges of the optic fissure come together and fuse, the hyaloid vessels are enclosed within the optic nerve. The distal portions of the hyaloid vessels eventually degenerate, but their proximal portions persist as the central retinal artery and vein.[1] (Figure 1)

The retina

The retina develops from the walls of the optic cup, an outgrowth of the forebrain. The outer, thinner layer of the optic cup becomes the retinal pigment epithelium, and the inner, thicker layer differentiates into the complex neural retina.

The ciliary body

The pigmented portion of the epithelium of the ciliary body is derived from the outer layer of the optic cup and is continuous with the retinal pigment epithelium. The nonpigmented portion of the ciliary epithelium represents the anterior prolongation of the neural retina, in which no neural elements differentiate.



3 :

Figure (1): Diagram illustrating early eye development.

A, Dorsal view of the cranial end of an embryo of about 22 days, showing the first indication of eye development. B, Transverse section through an optic sulcus. C, schematic drawing of the forebrain, its covering layers of mesoderm and surface ectoderm, at about 28 days. D, F, and H, schematic sections of the developing eye illustrating successive stages in the development of the optic cup and the lens vesicle. E, lateral view of the brain of an embryo of about 32 days, showing the external appearance of the optic cup. G, transverse section through the optic stalk, showing the optic fissure and its contents. Note that the edges of the optic fissure grow together and fuse, thereby completing the optic cup and enclosing the central artery and vein of the retina in the cup and the optic nerve.

After Moore KL, 1988

The iris

The iris develops from the anterior part of the optic cup, which grows inward and partially covers the lens. The epithelium of the iris represents both layers of the optic cup. It is continuous with the double-layered epithelium of the ciliary body and with the neural pigment epithelium and the neural retina.[1]

The lens

The lens develops from the hollow lens vesicle, a derivative of the surface ectoderm. Although the developing lens is supplied by the hyaloid artery, it becomes avascular in the fetal period. Thereafter, it depends on diffusion from the aqueous humor in the anterior chamber bathing its anterior surface and from the vitreous humor around the rest of it.[1]

The aqueous chambers and cornea

The anterior chamber develops from a cleft-like space that forms in the mesenchyme located between the developing lens and the cornea. After the lens is established, it induces the surface ectoderm to develop into the epithelium of the cornea and conjunctiva. Hence, the cornea is formed from two sources: surface ectoderm and mesoderm.[1]

The sclera and choroids

The mesenchyme surrounding the optic cup differentiates into an inner vascular layer, the choroid, and an outer fibrous layer, the sclera. At the attachment of the optic nerve to the eye, the choroid is continuous with pia-arachnoid of the brain, which forms the internal sheath around the optic nerve. The sclera is continuous with the dura mater of the brain, which forms the external sheath around this nerve.[1]

The eyelids

The eyelids develop from two surface ectodermal folds containing cores of mesenchyme. The eyelids meet and adhere by about the tenth week of gestation and remain adherent till about the twenty-sixth week.

The orbicularis oculi muscle is formed from the mesenchyme in the second branchial arch. As a result, it is supplied by the seventh cranial nerve (CN VII).

The lacrimal glands

At the superolateral angles of the orbits, the lacrimal glands develop from a number of solid buds from the surface ectoderm. These branch and become canalized to form the ducts and alveoli of the gland. The lacrimal glands are small at birth and do not function fully for about six weeks. Hence the newborn infants does not produce tears when it cries.[1]

Anatomy of the normal orbit:

The orbits are two bony recesses that contain the globes, muscles, blood vessels, lymphatics, cranial nerves (II, III, IV, V, and VI), adipose and connective tissues, and most of the lacrimal apparatus (Figure 2). The orbital septum and globe, as a unit, divide the orbit into anterior and posterior compartments. The posterior compartment, also called the retrobulbar space, is further divided into the intraconal and extraconal spaces. The cone consists of the extraocular muscles and an envelope of fascia. The optic nerve is located within the intraconal space. The globe has its unique anatomy. The bony orbit can be considered another compartment of the orbit.[2-5]