Ain Shams University
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Recent Methods in Treatment of Congenital Nasolacrimal Duct Obstruction

Essay Submitted for the partial fulfillment of
Master Degree In Ophthalmology

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بسم الله الرحمن الرحيم

(قَالُوا سُبْحَانَكَ لا عِلْمَ لَنَا إلا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ)

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Karim Mohammed Tharwat

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List of abbreviations

Atm	Atmospheres
BCI	Bi Canalicular Intubation
BSS	Balanced Salt Solution
CNLDO	Congenital Nasolacrimal Duct Obstruction
CT	Computed Tomography
CT-DCG	Computed Tomography Dacryocystography
DCG	Dacryocystography
DCP	Dacryocystoplasty
DCR	Dacryocystorhinostomy
ELDCR	Endoscopic laser DCR
FDT	Fluorescein Dye Disappearance Test
ILC	inferior lacrimal canaliculi
IML	Inferior Meatal Lamina
KTP	Potassium Titanyl Phosphate
LD	Lacrimal Duct
LC	Lacrimal cord
LDS	Lacrimal Duct System
LG	Lacrimal groove

LNP	Lateral nasal process
LS	Lacrimal Sac
MCI	Monocanalicular silicone intubation
MMC	Mitomycin C
MR-DCG	Magnetic Resonance Dacryocystography
MRI	Magnetic Resonance Imaging
MNP	Medial nasal process
MT	Middle Turbinate
MxP	Maxillary process
NC	Nasal cord
NLD	Nasolacrimal Duct
NLS	Nuclear Lacrimal Scan
PANDO	Primary Acquired Nasolacrimal Duct Obstruction
PEDIG	Pediatric Investigator Group
PM	Pushed Monoka
PMCI	Pushed Monocanalicular silicone intubation
SLC	Superior lacrimal canaliculi
Tc^{99m}	Technetium-99m
TCL-DCR	Trans Canalicular laser DCR
T-ECLAD	Transcanalicular Endoscope Combined Laser Assisted DCR
YAG	Yttrium Aluminum Garnet

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Embryology of lacrimal drainage system

The entire lacrimal drainage apparatus is of ectodermal origin, surrounded by muscles of mesodermal source. [1]

In utero, a solid cord of epithelium forms in the region of the medial lower eyelid, eventually sending projections temporally to form the canaliculi and inferiorly to form the nasolacrimal duct. Thus, the puncta and the valve of Hasner are considered "embryologically distal" structures, explaining why most congenital abnormalities of tear drainage are found at these sites [2]

Canalization of the solid cord begins at 4 months of gestation and may continue after birth. Indeed, the most inferior portion of the nasolacrimal duct is imperforate at birth in 50% to 70% of individuals. [3]

At 5.5 weeks' gestation (Fig. 1-A), an ectodermal invagination forms between the lateral nasal process and maxillary process, which becomes pinched off from the surface. At 6 weeks' gestation (Fig. 1-B), a solid cord of ectoderm is located between the primitive medial canthus and nose.

At 12 weeks' gestation (Fig. 1-C), proliferation of the cord occurs laterally toward the eyelid and inferiorly toward the inferior turbinate. The isolated cavities shown appear at 3 to 4 months. At 7 months, canalization is nearly complete (Fig. 1-D), with only the puncta and valve of Henle remaining imperforate. [4]

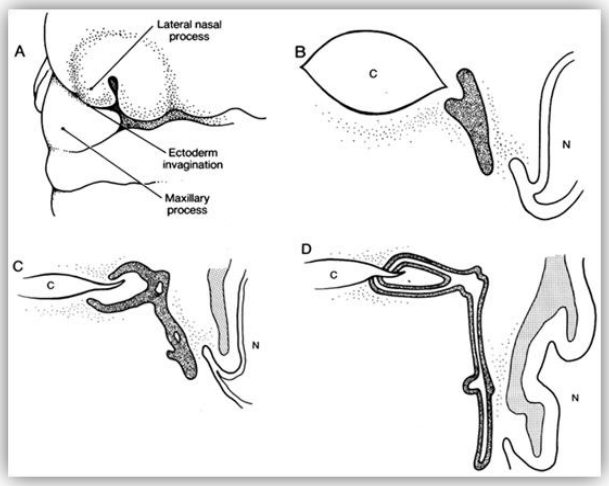

Fig. 1: Embryology of lacrimal drainage system [4]

Stages of the development of the human lacrimal drainage system:

(A) Formation of the lacrimal lamina (Carnegie stage 16-18 ca 39-44 days) The 'lacrimal lamina' (LL) appears as an epithelial thickening of the lacrimal groove (LG) observed between the lateral nasal process (LNP) and the maxillary process (MxP). At Carnegie stage 18 the lacrimal lamina bifurcates at its medial extreme and is arranged lateral to the nasal cavity but without reaching it. [5]

(B) Formation of the lacrimal cord (Carnegie stage 19-23 ca 46-53 days) The lacrimal lamina (LL) separates from the surface ectoderm to form the 'lacrimal cord' (LC). The lacrimal cord bifurcates at its lateral extreme and forms the superior & inferior lacrimal canaliculi (SLC and ILC). The mesenchyme surrounding the canalicular primordium condenses. [5]