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Original article

Clinical features of optic nerve head in healthy newborns[☆]



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ABSTRACT

Objective: To determine the size and clinical features of the optical disk in healthy term infants.

Methodology: Descriptive, observational, cross-sectional, and retrospective study based on complete medical records of newborns at the Angeles Pedregal Hospital, Mexico DF, from May to August 2015. The measurements of the optical disk and clinical features were obtained from digital photographs and evaluated by 2 experts. Frequencies, means and standard deviation were calculated using the SPSS version 17.0 for Windows.

Results: The study included a total of 121 patients and 121 eyes. There were 65 males. The mean vertical diameter was 1.60 ± 0.17 mm, horizontal diameter 1.31 ± 0.13 mm, optical disk area 1.43 ± 0.26 mm², and cup to disk ratio 0.25 ± 0.11 . The neuroretinal ring color was orange in 116 (95.9%) eyes. The cribriform plate was not visible in any patient, and in 90 (74.4%) eyes the appearance of the vessels in the papilla was central, and nasal in the rest. The cilioretinal artery was present in 38 (31.4%) eyes. A hyper- and hypo-pigmented peripapillary ring was observed in 114 eyes (94.2%).

Conclusion: The mean area of the optic nerve is 1.43 ± 0.26 mm², slightly higher than previously reported. The mean cup to disk ratio is less than 0.3, as reported in the literature, and it is noteworthy that all eyes have a hyper-pigmented and hypo-pigmented peripapillary ring.

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Características clínicas de la cabeza del nervio óptico en recién nacidos sanos

R E S U M E N

Palabras clave:
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Objetivo: Determinar el tamaño y características clínicas del disco óptico en recién nacidos sanos a término.

Metodología: Estudio descriptivo, observacional, transversal y retrospectivo basado en expedientes clínicos completos de recién nacidos en el Hospital Ángeles de Pedregal (Ciudad de México) entre mayo y agosto del 2015. Las medidas del disco óptico y las características clínicas fueron obtenidas de fotografías digitales y evaluadas por dos expertos. Para los datos obtenidos utilizamos el cálculo de frecuencias, medias y desviación estándar con el programa SPSS versión 17.0 para Windows.

Resultados: Tuvimos un total de 121 pacientes y 121 ojos elegidos, 65 fueron varones. El diámetro vertical promedio fue de $1,60 \pm 0,17$ mm, el diámetro horizontal de $1,13 \pm 0,13$ mm, el área de disco óptico de $1,43 \pm 0,26$ mm², la excavación de $0,25 \pm 0,11$. El color del anillo neuroretiniano era naranja en 116 (95,9%) ojos. La lámina cribosa no era visible en ningún paciente, en 90 ojos (74,4%) la aparición de los vasos en la papila era central y nasal en los restantes. En 38 ojos (31,4%) estuvo presente la arteria ciliarretiniana. La presencia de un anillo peripapilar hiper- e hipopigmentado se evidenció en 114 ojos (94,2%).

Conclusión: El promedio de área del nervio óptico es $1,43 \pm 0,26$ mm², ligeramente superior a lo reportado por otros autores; la excavación promedio es menor a 0,3, como se informa en la literatura y llama la atención que todos los ojos tienen un anillo peripapilar hiperpigmentado e hipopigmentado.

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Introduction

The optic nerve is the structure in the posterior part of the eye that carries visual information to the central nervous system. Approximately 120 million rods and cones perceive light in the external retina. This information is transmitted to 1.2 million ganglion cells in the internal retina, which converge to form the optic nerve, the central portion of which is called optic disk cup.¹

Khodadaust et al. referred that the optic papilla in normal newborns is orange although it could exhibit slight paleness and a small physiological cup. In the majority of cases, said cup is symmetric for both eyes, with asymmetry being a sign suggesting glaucoma. In addition, cup/disco ratios (CDR) above 0.3 are rare in normal infants but common in those with glaucoma and should be considered suspicious.²

Only a handful of studies describe the appearance of the optic nerve in children and even less in newborns. Kandasamy et al. carried out an ophthalmoscopic study with retinal camera in 35 healthy on term newborns and found a median optic disk area of $1.26 \text{ mm}^2 \pm 0.23 \text{ mm}^2$, without influence of gestational age or sex in optic disk size.³

In addition, it is known that many alterations compromising the optic papilla are present at birth, including slight alterations such as nerve fiber myelination, Bergmeister papilla, staphyloma, megalopapilla, etc., as well as severe alterations such as optic nerve hypoplasia, coloboma, glaucoma, etc. All these alterations would produce structural changes in the optic nerve. Said changes are the basis

for diagnosing the presence of disease. Accordingly, it is important to have a detailed understanding of the normal appearance of the optic nerve head in order to differentiate normal from pathological conditions. The literature includes said descriptions for adults⁴ but very few for newborns. In this shortcoming lies the importance of this study, aimed at describing normal optic nerve characteristics in healthy newborns.

Subjects, material and methods

A descriptive, observational, transversal and retrospective study based on a review of clinical records of newborns in the Ángeles de Pedregal hospital between May and August 2015. The study included all newborns within term and complete clinical records including digital photographs of the retina of both eyes. Newborns with systemic or ocular diseases were excluded as well as those requiring respiratory support, blood transfusions and poor quality retinal photographs.

Optic disk measurements such as vertical and horizontal diameter, cup area and CDR were taken utilizing image analysis software (Illustrator CS5, Adobe Systems Incorporated, San José, California, USA). The conversion from pixels to millimeters was based on a calibration provided by the retinal camera manufacturer, i.e., Pictor-Digital Ophthalmic Imager – Volk optical (Ohio, USA) (0.001 mm/pixel with 45 degrees of lens).

The data of the obtained measurements and the clinic characteristics of the optic nerve (neuroretinal ring color,

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