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Statistical study on cornea profil and parameters between generations in Albania; Is there a prediction for future keratoconus?

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Statement of the Problem: Keratoconus is a degenerative disease of the cornea, starting generally at 14-25 years old, and causing progressive thinning of the cornea, leading to a conical shape and causing distortion of vision. Extreme advancement of the keratoconus can cause corneal perforation. At the last 20 years the incidence and prevalence of keratoconus has increased and also the number of keratoconus in children has increased. Lately, the number of patients in pediatric age, presenting high values of astigmatismus (4 and 5 diopters) has considerably increased. It is also not rare to examine children with evidenced progressive keratoconus. Trying to understand if the latest are only sporadic cases or is a real change in cornea profile between generations that could predict a keratokonic future generation; we collect data from patient of different ages and make a comparison statistical study.

Methodology & Theoretical Orientation: A total number of 701 eyes are examined, patient that undergone three dimensional corneal topography (Oculus Pentacam HR). Parameters recorded were: Corneal pachymetry: central and thinnest point, main perpendicular corneal radius (K1/K2) and maximal value Kmax, corneal astigmatismus and values of posterior face of the cornea. Patients are divided in three main groups: 1st group 1 (<14 years old) 215 eyes/2nd group 2 (14-40 years) 397 eyes/3rd group 3(>40 years) 81 eyes.

Findings: Corneal thickness 2nd group presents the lowest values (524.24±45.57) than 1st (545±45.57) and 3rd (549.42±43.89). The difference is statistically significant between the 1st and 2nd age group (p≤0.001) and between 1st and 3rd (p=0.02). Central corneal thickness is higher in 1st age group (549.42±43.89) than 2nd (524.24±51.48), difference statistically significant (p≤0.001). 3rd group measurements (533.87±69.49) are lower than 1st, a difference significant (p=0.06). The difference in measurements between the 2nd and the 3rd group (p=0.63). Corneal radius K1: The patient younger than 14 year old presents lowest values (49.64±51.45 D) than 3rd (51.75±51.19) and 2nd group (56.67±71.94). Corneal radius K2: 1st group has lower values (45.04±3.49), than 3rd (49.07±42.06) and 2nd group (50.23±49.60), however differences between the groups are not statistically significant (p=0.71; p=0.28). Furthermore the second age group records just slightly higher values than the third group, difference that is not statistically significant (p=0.960). Maximal radius Kmax is higher in 2nd group (51.56±49.74) compared 1st and 3rd, that have similar measurements (46.03±4.69; 46.65±5.20), however, there are not statistically significant (p=0.19; p=0.52). Corneal astigmatismus is higher in the patients under 14 years old (2.60±4.54) compared with 3rd (0.47±3.38) and 2nd (0.95±2.44), differences that are statistically significant (p=0.003; p≤0.001). The maximal value of cornea's posterior face is lower in the young patients (under 14 years old) (59.10±179.92) than in 3rd group (99.34±211.61), and the 2nd (186.93±253.70).

Conclusion & Significance: Keratoconus early signs are high values in corneal radius and posterior face of the cornea, accompanied with lower values of corneal thickness and also high and asymmetric astigmatismus. In this statistical study, we found that 1st group of patients (up to 14 years old) present high values of corneal astigmatismus but, low values of corneal radius and posterior face of the cornea and high values of corneal thickness. So there is an increasing in corneal astigmatismus but not predicting a future keratokonic generation.

Recent Publications:

1. Galletti J D, Ruiseñor Vázquez P R, Minguez N, Delrivo M, Bonthoux F F, Pfortner T and Galletti J G (2015) Corneal asymmetry analysis by pentacam scheimpflug tomography for keratoconus diagnosis. J Refract Surg. 31(2):116-23.
2. Yang Y, Hong J, Deng S X and Xu J (2014) Age-related changes in human corneal epithelial thickness measured with anterior segment optical coherence tomography. Invest Ophthalmol Vis Sci. 55:5032-5038.
3. Toprak I, et al (2017) Visual, topographic, and pachymetric effects of pediatric corneal collagen cross-linking. J Peds Ophthal Strabismus 54:84-89.

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4. Padmanabhan P, et al (2017) Corneal collagen cross-linking for keratoconus in pediatric patients – long term results. *Cornea* 36:138-143.
5. Léoni-Mesplié S, et al. (2012) Scalability and severity of keratoconus in children. *Am J Ophthalmol.* 154:56–62.

Biography

Teuta Haveri completed her MD diploma in 1999 and Specialization Diploma in Ophthalmology in 2006 from Faculty of Medicine University of Tirana. She is currently working as Ophthalmologist Surgeon at Eye Clinic, American Hospital of Tirana, Albania.

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