

METHODS OF MEASUREMENT OF CORNEA DIAMETER IN CHILDREN

Nazirova Zulfiya Rustamovna

Associate professor, Doctor on Medical Sciences
Department of Ophthalmology, Pediatric ophthalmology
Tashkent Pediatric Medical Institute

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Abstract. *The article presents the data of a comparative analysis of methods for measuring the diameter of the cornea in various ophthalmopathologies in preschool children. The total number of children was 50 (100 eyes) with various ophthalmopathy. The studies were conducted in the Department of Ophthalmology of TashPMI. The indicators obtained by measuring the diameter of the cornea with a surgical compass were taken by us as a basis, as the most objective method of remote measurement of the diameter of the cornea. The average value was 10.48 ± 0.97 mm. These indicators were compared with the indicators obtained by measuring with a ruler and special "glasses" offered by us. Special "glasses" for measuring the diameter of the cornea give reliably accurate indicators, are safe and convenient for use in pediatric ophthalmology. And also, they make it possible to dynamically monitor the progression of the process and archive the data obtained.*

Keywords: *corneal diameter, ruler, special "glasses", compass Castroviejo, ophthalmopathy in children, remote measurement of corneal diameter.*

Actuality. Young children with visual impairments may experience delays in motor, language, emotional, social and cognitive development, which may have long-term consequences [1,3]. Among school-age children suffering from visual impairments, reduced academic performance is often observed [4,9]. There are at least 200 million cases of visual impairment or blindness in children worldwide, with more than 95 million of these resulting from lack of timely diagnosis or treatment. One of the main directions of modern ophthalmology is the development of promising methods for early diagnosis of ophthalmic pathologies in children [2,5,8]. Anomalies in the development of the cornea are diverse. Of the developmental anomalies, microcornea should be noted. In a newborn, the horizontal size of the cornea is 9 mm. If the diameter of the newborn's cornea is 1-2 mm smaller, then this is microcornea, and an increase by the same amount is macrocornea. According to Zaikova I.S. (1991), the horizontal diameter of the cornea in a newborn is 9.62, at 1 year – 11.29, at 6 years – 11.36, in an adult – 12. The thickness in the center of a newborn is 0.560, at 1 year – 0.524, at 6 years old – 0.535, in an adult – 0.516. In adults, the horizontal size of the cornea is 11.5 mm. Pediatric glaucoma is a group of potentially blinding diseases characterized by the development of abnormalities in the aqueous humor outflow system of the eye. Neonatal and infantile eyes are elastic and increased IOP leads to distension of the eyeball (buphthalmos) [7,10]. In turn, stretching involves other structures of the eye such as the cornea, anterior chamber structures, sclera, optic nerve, scleral canal and cribriform plate. Corneal changes in PIH lead to the classic clinical triad of epiphora (lacrimation), blepharospasm (constriction of the eyelids) and photophobia (sensitivity to light). The diameter of a normal cornea is 9.5 - 10.5 mm at birth and 10 - 12 mm at two years. If the corneal diameter is asymmetrical, or the diameter is greater than 13 mm at any age, or 12 mm at birth, then the diagnosis of glaucoma

should be excluded [6]. A device widely used in practice for measuring the diameter of the cornea of the eye in the form of a measuring compass with sharp ends is known. The disadvantage of this device is the risk of injury to the eye from the sharp ends of the measuring compass when taking measurements. When measuring the diameter of the cornea of the eye with a measuring compass, the cornea is measured at two points, which does not give an objective picture of the size of the cornea of the eye in two mutually perpendicular directions. Thus, multiple measurements of the corneal diameter along several axes are required. A device for ophthalmological measurements is known, containing a plate with through calibrated holes of different diameters, placed in a uniformly varying sequence. The disadvantage of this device is the lack of measurement accuracy due to the impossibility of bringing the measuring instrument as close as possible to the eye when taking measurements. In addition, these known devices cannot be used for a wide range of measuring the diameter of the cornea of the eye, because in different patients this diameter varies from 8 to 15 mm, and it is necessary to have holes of different diameters within these limits [4, 6]. Taking this into account, the above served as a prerequisite for carrying out this study and made it possible to formulate the goals and objectives of this work. Purpose of the study: comparative analysis of methods for measuring corneal diameter in various ophthalmopathologies in children.

Material and research methods: 50 patients had their corneal diameter measured using a ruler, special “glasses,” and a Castroviejo compass in the eye department of the TashPMI clinic for the period from 2021 to 2023.

Results and discussion: The indicators obtained by measuring the diameter of the cornea using a surgical compass were taken by us as the basis as the most objective method of remotely measuring the diameter of the cornea. The average value was 10.48 ± 0.97 mm. These indicators were compared with the indicators obtained by measuring with a ruler and the special “glasses” we proposed. All indicators were subjected to statistical processing to identify significant differences in indicators (Table 1).

Table 1

Results of comparison of methods for measuring corneal diameter

Way measurements	Compass (n=50)	Ruler (n=50)	Glasses (n=50)
Indicators (mm)	10.48 ± 0.97	10.74 ± 1.0	10.38 ± 0.98
Student's criteria (t)		t= 4.3 p≤0.05 (Critical value: 2.02)	t=1.4 p>0.05 (Critical value: 2.02)

When comparing the indicators obtained using a compass and a ruler (12.48 ± 0.97 and 12.74 ± 1.0 , respectively), the difference in mean values was not statistically different ($t = 4.3$ $p \leq 0.05$ "critical value: 2.02"). When comparing the indicators obtained using a compass and "glasses" (12.48 ± 0.97 and 12.38 ± 0.98 , respectively), the difference in average values turned out to be not significant ($t = 1.4$ $p > 0.05$ "critical value : 2.02").

This confirms that there were no differences in the indicators obtained when measuring with compasses and "glasses", which means that the method of measuring the diameter of the cornea using "glasses" is quite accurate, convenient and can be used in pediatric practice for all eye pathologies accompanied by changes corneal diameter.

Conclusion and suggestions: Measuring the diameter of the cornea using special "glasses" contributes to the early diagnosis of pathological deviations of the cornea in diameter, which is very important during the dynamic observation of children. The sensitivity and specificity of this method were 90.5% and 85.7%, respectively.

The invention we propose for a method of measuring the diameter of the cornea in the form of glasses solves the problem of obtaining results quickly, clearly, and conveniently. The special "glasses" we offer for measuring the diameter of the cornea provide reliably accurate indicators, are safe and convenient for use in pediatric ophthalmology. They also make it possible to dynamically monitor the progression of the process and archive the data obtained.

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