

BIOMETRIC CHARACTERISTICS OF CHILDREN EYES WITH NON-ACQUIRED ABNORMALITIES IN LENS SHAPE AND POSITION

Mohamed Shafik Shaheen, Nihal Mohamed Abd El Moniem El Shakankiri, Nader Hussein Lotfy Bayoumi, Nada Alaaelden Abdelrahman Khalifa

Department of Ophthalmology, Faculty of Medicine, Alexandria University

INTRODUCTION

Non-acquired lens anomalies are rather rare diseases. However, they are a cause a significant visual impairment presenting at a young age and a major cause of amblyopia. Besides the ocular implications, these anomalies could be either isolated or associated with systemic disorders, thus warranting systemic evaluation once diagnosed.

Ectopialentis (EL) is one of those anomalies that usually presents bilateral. Microspherophakia (MSP) is another lens anomaly where zonular development is defective, similar to ectopialentis, causing a smaller and spherical crystalline lens and thus causing lenticular myopia. Other less common lens anomalies include lenticonus, lentiglobus and lens coloboma.

The biometric characteristics of the crystalline lens anomalies have always been a field of concern in research to provide a better understanding of the shape of eyes in such conditions and might aid in diagnosis as those conditions are rare but rather imperative to be recognized because of the sight threatening complications.

AIM OF THE WORK

The aim of this study was to report on the biometric characteristics of the anterior segment of children eyes with non-acquired abnormalities in the natural crystalline lens shape or position.

PATIENTS AND METHODS

All children with non-acquired abnormalities in the shape or position of the natural crystalline lens presenting to the pediatric ophthalmology clinic of Alexandria Main University Hospital in a period of 6 months from September 2022 to March 2023 were included in this study, excluding children with the following:

- o Acquired lens pathology
- o Isolated congenital / developmental cataract
- o Any ocular condition other than non-acquired abnormalities in the shape or position of the natural crystalline lens

57 eyes of 30 study children were included in this study. They were subjected to thorough history taking from the care-providers, ophthalmic examination and UBM was done afterwards.

Systemic evaluation ensued by a pediatrician

The biometric characteristics of a historical control of comparable age and gender with congenital cataract that presented over a period of six months were measured using similar procedures to compare with those of the previously mentioned study children.

RESULTS

MSP cases had a higher median IOP (14 mmHg) than EL cases (6 mmHg). Similarly, The median corneal diameter in mm was greater in MSP cases (12.8 mm) than in EL cases (2 mm). The median ACD in mm was significantly different between the two groups, with MSP cases having a lower median (2.2) compared to EL cases (2.9). The average Axial Length in mm was 23.2 overall, with no significant difference between the two groups (p-value: 0.3801).

Term	Overall	Microspherophakia	Ectopialentis	p-value
K1 (in mm)	Avg (SD) 8.3 (0.4)	8.2 (0.5)	8.3 (0.4)	t: 0.4833
K2 (in mm)	Avg (SD) 8 (0.4)	8 (0.5)	8 (0.3)	t: 0.5910
Axial Length (mm)	Avg (SD) 23.2 (1.5)	23 (1.5)	23.4 (1.4)	t: 0.3801
CCT (um)	Avg (SD) 469.4 (43)	453.8 (38.6)	477.4 (43.4)	t: 0.0651
AC Central Depth in mm	Med (IQR) 2.8 (0.5)	2.2 (1.2)	2.8 (0.4)	U: <0.001***
Lens Thickness (mm)	Avg (SD) 4.1 (0.4)	4.3 (0.3)	4.1 (0.4)	t: 0.0756
Lens Equatorial Diameter (mm)	Avg (SD) 7.4 (0.8)	7.1 (0.7)	7.5 (0.8)	t: 0.0832
Corneal Diameter pre	Med (IQR) 12 (0.5)	12.8 (1.1)	12 (0)	U: <0.001***
Sulcus to sulcus distance	Avg (SD) 12 (0.6)	12.2 (0.7)	11.8 (0.5)	t: 0.0282*

Cases examined under GA only

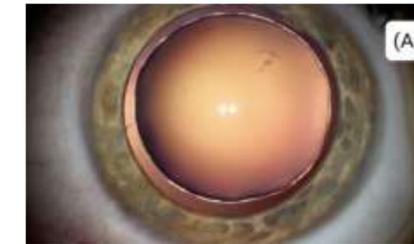
Term	Overall	Microspherophakia	Ectopialentis	p-value
IOP Value	Med (IQR) 6 (2.5)	12.5 (6.5)	6 (1)	U: 0.0028**

Cases with non-dilated pupil only

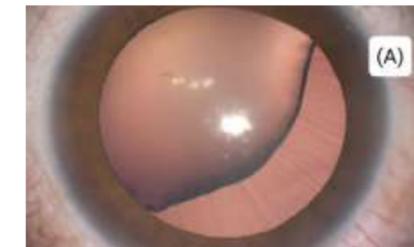
Term	Overall	Microspherophakia	Ectopialentis	p-value
Iris Mid-Iris Thickness in mm	Avg (SD) 0.4 (0.1)	0.4 (0.1)	0.4 (0.1)	t: 0.6815
Iris Pupil Diameter in mm	Avg (SD) 2.5 (0.8)	2.3 (0.6)	2.7 (0.8)	t: 0.3602

$\alpha = 0.05$. $p < 0.05^*$, $p < 0.01^{**}$, $p < 0.001^{***}$

P-values obtained from two-sample t-test (t) or Mann-Whitney test (U)



Right eye with microspherophakia.
(A) Intraoperative view of the right eye showing microspherophakia with the golden ring of the lens equator demonstrated after pupil dilatation.
(B) Axial UBM scan of a horizontal view of the patient's right eye.



Right eye with ectopialentis.
(A) Intraoperative view of the right eye showing superotemporal subluxation of the lens.
(B) Axial UBM scan of a horizontal view of the patient's right eye.

CONCLUSION

After reviewing all subjects' eyes, ectopialentis was found to be the most common of all lens anomalies, excluding congenital cataract, presenting in this period followed by microspherophakia. There were noticeable differences in axial lengths between eyes with ectopialentis and controls, where ectopialentis eyes were longer. Microspherophakia, on the other hand, are larger regarding the anterior segment structures only.

Ectopialentis and microspherophakia eyes demonstrate thinner central corneal thickness than normal eyes. Microspherophakia eyes presented with significantly higher average IOP values than controls that could be attributed to the significantly crowded anterior segment in such eyes.



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