SOPTI Meeting 2021: Abstracts

After more than a year of blockade due to the Covid-19 pandemic, it was finally possible to return to the events in the presence. The 26th National Conference of the Italian Optometric Association (SOPTI) was held in Bologna on October 10–11, 2021.

The theme of the conference was "Good practice in Optometry and Contact Lenses", with the accent on two topics: the optometric management of the patient in old age and the progression of myopia.

Four keynote speakers were invited during the conference: Prof. Rigmor C. Baraas from the University of South-Eastern Norway in Kongsberg, Prof. David B. Elliot from the University of Bradford, Dr. Fabrizio Zeri from the University of Milano Bicocca and the IACLE President, Prof. Phil Morgan, from the University of Manchester.

The abstracts from accepted posters and free papers are presented here.

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Corneal densitometry by sublayers: an alternative method for analyzing Scheimpflug images of normal or keratoconic eyes

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Abstract

Loss of corneal transparency is a key element to monitor in ophthalmic practice, as it may be symptomatic of a wide range of conditions including corneal dystrophies. The most common is keratoconus, a non-inflammatory corneal ectasia characterized by a progressive thinning of corneal tissue and formation of corneal protrusion. Densitometric analysis has recently been introduced. It is an objective and non-invasive technique capable of quantifying corneal transparency with the aid of various imaging technologies including Scheimpflug photography. Pentacam Scheimpflug, the most used instrument, calculates density of corneal layers respecting fixed depth values. This work proposes an alternative method based on segmentation of the epithelium and stroma starting from an image obtained with Sirius Tomograph (CSO, Italy).

180 images of the anterior segment of 30 subjects (24.1 ± 4.4 years) with healthy eyes and 50 images of eyes belonging to 22 subjects (28.8 ± 8.4 years) with unilateral keratoconus were analyzed. These were acquired with the Sirius tomograph (CSO, Italy). The stroma and the epithelium associated with Bowman's membrane were segmented from each tomography corresponding to the horizontal meridian. Only the central 3-mm-diameter zone was considered. The computing platform used was MATLAB. In the process, the identification of the corneal apex is obtained by the `apex.m` function. It requires the coordinates of two points respectively to the left (L) and to the right (R) of the apex. On the other hand, the function used for the segmentation in the different layers of the corneal thickness was `region3mm.m` which exploits the region-growing technique.

Student's t-test showed that the subjective choice of points L and R does not determine significant changes in the identification of the apical coordinates. The thresholds used to segment are expressed in a grayscale from 1 (white) to 256 (black). They were 18 and 41 for the stroma, 41 and 63 for the epithelium. The segmentations obtained, introducing variations of ± 5 units to the thresholds, were classified into *adequate*, *almost adequate* and *inadequate* both for healthy and keratoconus eyes. Subsequently, the densitometric values or the stroma and epithelium were calculated by adopting two different criteria: the first referring to the extremes of the peaks identified by the intensity distribution of the pixels, the second referring to the thresholds.

The segmentations are adequate in healthy corneas with a success rate above 80%. The application of the method to corneas affected by keratoconus shows, as expected, a lower success rate around 50% (figure 1). The reliability of the `apex.m` algorithm is demonstrated. The `region3mm.m` function is more suitable for healthy corneas than corneas with keratoconus.

The densitometric results were converted to GSU (figure 1) and compared with the values reported in the studies by Dhubhghaill et al. (Ní Dhubhghaill et al., 2014) and Tekin et al. (Tekin et al., 2017) obtained from Pentacam Scheimpflug. The agreement with Tekin's study is the best among those considered, but not statistically significant. The comparison is weak because, with the Pentacam tomograph, corneal segments are evaluated for depth without recognition of different substrates.

Normal eyes (N=180)		stroma		epithelium	
		extremes	thresholds	extremes	thresholds
adequate	mean value	11,3	11,2	18,9	18,7
	SD	0,9	0,5	1,4	0,7
	%	92%		79%	
almost adequate	mean value	12,1	11,7	20,5	19,4
	SD	0,5	0,3	1,2	0,6
	%	3%		4%	
inadequate	mean value	11,9	11,6	20,0	18,9
	SD	1,3	0,6	2,4	1,0
	%	5%		16%	
Normal eyes of monolateral KC (N=25)		**stroma**		**epithelium**	
		extremes	thresholds	extremes	thresholds
adequate	mean value	11,8	11,4	19,3	18,8
	SD	1,0	0,5	1,3	0,7
	%	64%		64%	
almost adequate	mean value	11,9	11,7		
	SD	0,3	0,3		
	%	8%			
inadequate	mean value	10	10,3	21,2	19,3
	SD	2,8	1,5	6,2	0,5
	%	28%		36%	
Keratoconus eyes (N=25)		**stroma**		**epithelium**	
		extremes	thresholds	extremes (N=22)	thresholds (N=25)
adequate	mean value	11,4	11,2	19,6	19,2
	SD	0,6	0,3	1,6	0,8
	%	52%		45%	40%
almost adequate	mean value	10,2	10,4		
	SD	1,3	0,9		
	%	20%			
inadequate	mean value	13,0	12,0	20,9	19,6
	SD	1,0	0,3	3,2	0,3
	%	28%		55%	60%

Figure 1: all densitometric values are reported in GSU and divided into the analyzed samples. The percentages obtained from the classification of segmentations in adequate, almost adequate and inadequate are also reported.

References

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Subjective measurement of fusional vergences, dissociated heterophorias and associated heterophorias: comparison between monocular and binocular prismatic apposition

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Abstract

The aim of the study is the measure of fusional vergences, dissociated heterophorias and associated heterophorias both in the phoropter and in the open field, comparing the data obtained when the prisms are placed in front of only one eye or on both eyes. Most of the studies in the literature, in fact, compare the various measurement methods but do not make a direct comparison between monocular and binocular prismatic apposition.

The study sample included 40 subjects (age 22.5±3.1) were examined in which the lenses of the subjective refraction performed at the phoropter were worn during the tests, then balanced with Humpriss in the open field. For each subject, the following were measured from afar (6 metres) and near (40 centimeters): the smooth fusional vergences (phoropter) and jumps (open field), the dissociated heterophorias by means of the von Graefe test (phoropter) and the of Maddox modified Thoringhton (open field) and finally, the heterophoria associated for distance, through the cross and needle test both to the phoropter and in open field and the associated phrases for near through the Wesson card (phoropter) and the Mallet Unit (open field). Wilconxon's non-parametric test was applied to study the comparison between the samples, considering a significance level of 0.05 (Figure 1).

COMPARISONS	*p-value*
V_S FNEBMO – V_S FNEBBI	0,023
V_S NNEREMO – V_S NNEREBI	0,003
V_S NPOBMO – V_S NPOBBI	0,002
V_S NPOREMO – V_S NPOREBI	0,041
V_J FNEBMO – V_J FNEBBI	0,001
V_J FNEREMO – V_J FNEREBI	0,012
V_J NNEREMO – V_J NNEREBI	0,004
V_S FPOREMO- V_J FPOREMO	4*10^-4
V_S NPOBMO- V_J NPOBMO	0,001
V_S FPOREBI- V_J FPOREBI	0,002
V_S NNEREBI- V_J NPOREBI	2*10^-4
$MADDOX_{MOF}$ *VS* $MADDOX_{BIF}$	0,0455
$MADDOX_{MON}$ *VS* $MADDOX_{BIN}$	0,0062
$MALLET_{MON}$ in OF *VS* $MALLET_{BIN}$ in OF	0,001
CROSS $TEST_{MOF}$ in CF *VS* CROSS $TEST_{MOF}$ in OF	0,021
NEEDLE $TEST_{MOF}$ in CF *VS* CROSS $TEST_{MOF}$ IN OF	0,036
$WESSON_{MON}$ in CF *VS* $MALLET_{MON}$ in CA	0,002
CROSS $TEST_{BIF}$ in CF *VS* CROSS $TEST_{BIF}$ in OF	0,003
NEEDLE $TEST_{BIF}$ in CF *VS* NEEDLE $TEST_{BIF}$ in OF	0,019

LEGEND

V: Vergences
J: Jumps (open field)
S: Smooth (phoropter)
F: Far
N: Near
PO: Positive
NE: Negative
MO: Monocular prismatic apposition
BI: Binocular prismatic apposition
B: Break
RE: Recovery
OF: Open field
CF: Closed field

Figure 1: Comparisons that showed significant differences with Wilconxon's non-parametric test.

In the study, the difference in fusional vergences was greater especially on breakages and recoveries for the most part negative and for the least part positive. In dissociated heterophorias, significant differences appear only on the data in the open field, so there may be a different adaptation to the monocular prism compared to the binocular when the data is not taken at the phoropter. In the associated heterophoria, the comparison histograms showed a greater presence of exophoric subjects in a monocular condition and a greater presence of exophoric subjects in a binocular condition.

The only test that did not show significant difference in open and closed field was that of the cross, probably due to the absence of a central fusional recall. The study results show a new perspective on binocular vision investigation methods. In this regard, in order to have a more specific and broader understanding of the commonly used procedures, it would be useful to deepen the study with a larger sample both in terms of number and variety.

Contrast sensitivity measures: comparison between professional and casual drivers

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Abstract

Given the lack of evidence in the procedures defining visual standards for driving licenses and the lack of understanding of how visual decay impacts on safety and driving performance, in the study we aim to have contrast sensitivity measurements, paying particular attention to sample definition. Therefore the aim of the study is to analyze the differences between contrast sensitivity (CS) measurements obtained on a population of professional drivers (GP) and one of occasional drivers (GNP) weighting the role of binocular vision.

The subjects considered for this study are 60, of which 30 GP and 30 GNP. For the CS measurements, the Pelli-Robson subjective test in digital format was used. Before proceeding with the measures, all subjects were given a questionnaire with an indication of age, gender, profession, visual experiences driving in low-contrast conditions, number of accidents in the last year and reported data on the state of health. During the measurements all subjects wore their usual correction. First of all, visual acuity was measured, then subjective measurement of contrast sensitivity was carried out with Pelli-Robson test; the evaluation ended when the subject did not recognize at least 2 letters of the triplet presented.

The statistical analysis is presented, which shows on average better values of AV and CS for the sample of professional drivers. The statistically significant differences between the two categories and the role of binocularity for the measurement of contrast sensitivity are highlighted.

Use of comfort questionnaires in a sample of irregular cornea contact lens wearers

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Abstract

To evaluate the possibility of administering short item questionnaires created for regular cornea subjects and daily disposable contact lens wearers to irregular cornea subjects wearing any kind of contact lens (CL). To compare two questionnaires among them.

In this study, 67 subjects were involved, wearing any kind of contact lens (Rigid, Soft, Hybrid contact lenses): 32 of them

presented regular corneas (RC) and 37 irregular corneas (IC). Monocular visual acuity (VA) with spectacles (when available) and monocular VA with CL were taken.

Two questionnaires were used: the Contact Lens Dry Eye Questionnaire (CLDEQ-8), made of 8 questions, and a new questionnaire from IRSOO (Istituto di Ricerca e di Studi in Ottica e Optometria), made of 7 questions and related to evaluating vision comfort in CL wearers. Subjects were habitual CL wearers and independently filled the questionnaires, referring to the previous two weeks' CL wearing experience.

The statistical analysis used for comparing answers to both questionnaires was the Pearson's correlation coefficient (P). Comparison among VA with the different types of CL was assessed, assuming a p-value ≤ 0.05 as statistically significant.

Results and conclusions: Both questionnaires show a high correlation (P=0.73 for CLDEQ-8 and P=0.74 for IRSOO-7), for the two subgroups also: myopes (My) and keratoconus (Kc). There is no significant statistical difference ($p\text{-}value>0.05$) between VA with Soft and Rigid CL and with Soft and Hybrid CL, while the difference of VA between Hybrid and Rigid CL is statistically significant ($p\text{-}value<0.05$). Also, VA in the main Groups (RC, IC) and subgroups (My, Kc) was better while wearing CL rather than spectacles (RC 0.05 LogMAR vs 0.06 LogMAR; IC 0.09 LogMAR vs 0.27 LogMAR; My 0.04 LogMAR vs 0.05; Kc 0.09 LogMAR vs 0.29).

Both questionnaires therefore can be used in a routinary clinical practice to evaluate the use of a CL fitting quality over time or to compare the performance among different types of CL.