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Alternative, Effective and Cheap Method for Scleral Depression of ROP (Retinopathy of Prematurity) Examination

Prematüre Retinopatisi Muayenesinde Alternatif, Efektif ve Ekonomik Skleral Depresyon Yöntemi

ABSTRACT

Objective:
To evaluate the effectiveness of plastic-coated paper clips in scleral buckling by comparing it with a standard non-ring-shaped steel indentator which is commonly used for ROP examination.

Material and Methods:
The prospective, randomized and controlled study was performed in this study by comparing the effectiveness and examination time of plastic-coated paper clips and standard non-ring-shaped steel scleral depressors.

Results:
In our study, we found that, we could do ROP (Retinopathy of Prematurity) examination faster with paper clips (mean time: 7.6 seconds) when compared to standard steel depressors (mean time: 8,4 seconds). No significant difference was found between the mean examination times of the two different types of scleral depressors.

Conclusion:
We think that our study is the first study to explain the advantages of paper clips as the usage of an alternative, cheap and effective scleral depression method in ROP examination, since there has been no previous study on the use of paper clips for ROP examination.

Key Words:
Retinopathy of Prematurity Screening, Retinopathy of Prematurity, Sclera

ÖZ

Amaç:

Prematüre Retinopatisi (PR) muayenesinde, plastik kaplı ataçların skleral depresyondaki etkinliğini, yaygın olarak kullanılan standart halka şeklinde olmayan çelik skleral depresörlerle karşılaştırarak değerlendirmek.

Gereç ve Yöntemler:

Bu çalışmada plastik kaplı ataçlar ile standart halka şeklinde olmayan çelik skleral depresörlerin etkinliği ve muayene süresi karşılaştırılarak, prospektif, randomize ve kontrollü bir çalışma yapıldı.

Bulgular:

Çalışmamızda, standart çelik depresörlere (ortalama süre: 8,4 saniye) kıyasla, plastik kaplı ataçlarla (ortalama süre: 7,6 saniye) daha hızlı sürede PR (Prematüre Retinopatisi) muayenesi yapabildiğimizi tespit ettik. İki farklı tip skleral depresörün ortalama muayene süreleri arasında anlamlı bir fark bulunmamıştır.

Sonuç:

Daha önce ROP muayenesinde ataç kullanımı ile ilgili bir çalışma yapılmadığından, çalışmamızın ROP muayenesinde alternatif, ucuz ve etkili bir skleral çökertme yöntemi olarak, plastik kaplı ataçların avantajlarını açıklayan ilk çalışma olduğunu düşünmekteyiz.

Anahtar Kelimeler:

Prematüre Retinopatisi Taraması, Prematüre Retinopatisi, Sklera

INTRODUCTION

Retinopathy of Prematurity (ROP) is a potentially blinding eye disorder that occurs in low birth weight (<1500 g) and preterm newborns (<32 weeks) and is caused by abnormal development of retinal vessels in the eye (1-8).

The basic strategy in preventing blindness due to retinopathy of prematurity is to examine babies who are at risk in terms of ROP and to identify those who need treatment. In this process called screening, examinations include the indirect ophthalmoscopic examination with 20 and 28 diopters (D) lenses and scleral depressor, performed after opening the eyelids with the appropriate cover speculum (1, 3-5, 8). Since this disease begins in the periphery of the retina, especially on the temporal side, scleral depression is required due to the peripheral location of the disease on examination (1, 3-5, 8, 9). There are various types of scleral depressors which can be used for this purpose (cotton swaps, steel scleral depressors, plastic-coated paper clips). During the examination, a separate sterile cover speculum and scleral depressant should be used for each patient. It has been reported that 70% isopropyl alcohol is not sufficient for bacteria and adenovirus disinfection (6).

Plastic-coated paper clips can be a good scleral depressor alternative for retinopathy of premature examination, as they are inexpensive and easily accessible, and also allow the use of a sterile examination set for each patient. In this study, it was aimed to evaluate the effectiveness of plastic-coated paper clips in scleral buckling by comparing it with a standard non-ring-shaped steel indentator which is commonly used for ROP examination in terms of examination times.

MATERIALS and METHODS

The prospective, randomized and controlled study was performed in this study by comparing examination times of plastic-coated paper clips and standard non-ring-shaped steel scleral depressors. The study was conducted between August 2020 and November 2020 at Mugla Education and Research Hospital in Turkey and was approved by the institutional ethics committee (72855364-0.50.01.04-E.195566/2020/07/02). Written informed consent was obtained from at least one of the parents prior to inclusion into the study and tenets of Declaration of Helsinki were followed throughout the study.

Premature infants who were under 36 weeks of gestation age and/or 1500 grams of birth weight and who reached the 4th week after birth were included in the study. Babies, who have the same stage of ROP at each eye were included in the study. Babies, who have, different stages of ROP, anterior chamber anomalies like iris coloboma, parents who refuse to be involved in the study, and 37 weeks or more gestational age were excluded from the study.

All the ROP examinations were done in outpatient settings. Pupil dilatation was provided by phenylephrine (2.5%), and tropicamide (0.5%). Topical anesthesia with Proparacaine HCL (0.5%) droplet was applied just before the examination. The examination included an indirect ophthalmoscopic examination with 20 and 28 diopters (D) lenses and scleral depressor was performed after opening the eyelids with the appropriate cover speculum.

In the examination, starting from the anterior segment, a sequence including optic disc and macula, vascular structure, and then evaluation of the temporal side of the retina or if needed 360-degree peripheral retina evaluation was followed in the posterior pole with scleral depressors.

One eye of any baby was examined by a paper clip depressor (Figure 1, 2), and the other eye of the same baby was examined by non-ring-shaped standard steel scleral depressor (Figure 3, 4).

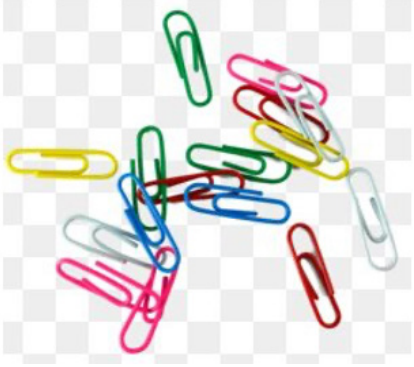

Figure1. Plastic-coated paper clips

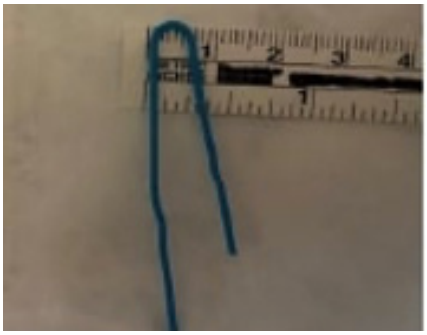

Figure 2. Scleral depressors in the form of plastic-coated paper clips are about 7 mm in size where they press on the sclera

Figure 3: Non-ring-shaped standard steel scleral depressor

Figure 4: The part where the steel scleral depressor presses on the sclera is 5 mm in size

Examinations of the babies always started from the left eye. If a steel scleral depressor was used in the first examined eye in a baby, then a paper clip scleral depressor was used in the first eye of the examined babies.Randomization was achieved by this way.

All the paper clip depressors were used as sterilized packages for 50 babies included in the study. Only 5 non-ring-shaped steel scleral depressors were used as sterilized packages but disinfection solution was applied for multiple uses of non-ring-shaped steel scleral depressors. For the first 5 babies, sterilized packages of non-ring-shaped steel scleral depressors were used and then disinfection solution was used to examine the other 45 babies with non-ring-shaped steel scleral depressors. After all 5 sterilized packages of non-ring-shaped steel scleral depressors had been opened, for multiple examinations of the babies, non-sterilized but disinfection solution applied non-ring-shaped steel scleral depressors were used for the remaining 45 babies. Steel scleral depressors were kept in disinfectant solution for 20 minutes, then washed with saline and then used.

During the examination of each eye by each different scleral depressor, timer was kept by an assistant to see how long any scleral depressors take for examination of the temporal side or 360 degrees of retina. Time, for each eye examination by each different scleral depressor was kept to compare each other. All the examinations were applied by a single researcher.

Statistical Analysis

SPSS version 18 (SPSS Inc., Chicago, IL, USA) was used as a statistics program in the study (two independent sample t-test). Normality was evaluated by using the one-sample Kolmogorov-Smirnov test. Two independent sample t-test was used to compare the examination times between groups. For statistical significance, p-value <0.05 was taken.

RESULTS

A total of 50 babies, 29 female (%58) and 21 male (%42) were included in the study. The mean gestational age was 32.3±3.4 weeks (27-36 weeks).

In accordance with the inclusion criteria, ROP was detected as the lowest Stage 0 and the highest Stage 3 in babies with symmetrical ROP in both eyes. The number of babies according to their gestational ages and stages of ROP is shown in Table I.

Table I. Number of Babies According to their Gestational Ages and Stages of ROP

The Gestational Ages	Stages of ROP	Number of Babies
≤28 Weeks (n:1)	Stage 0	0
	Stage 1	0
	Stage 2	0
	Stage 3	1
29-32 Weeks (n:10)	Stage 0	3
	Stage 1	4
	Stage 2	3
	Stage 3	0
33-36 Weeks (n:39)	Stage 0	31
	Stage 1	6
	Stage 2	2
	Stage 3	0

Scleral depressors in the form of plastic-coated paper clips are about 7 mm in size where they press on the sclera (Figure 2). On the other hand, the part where the steel scleral depressor presses on the sclera is 5 mm in size (Figure 4). Therefore, plastic-coated paper clips can provide a larger depression area image at the time of depression than steel depressors do (Figure 5).

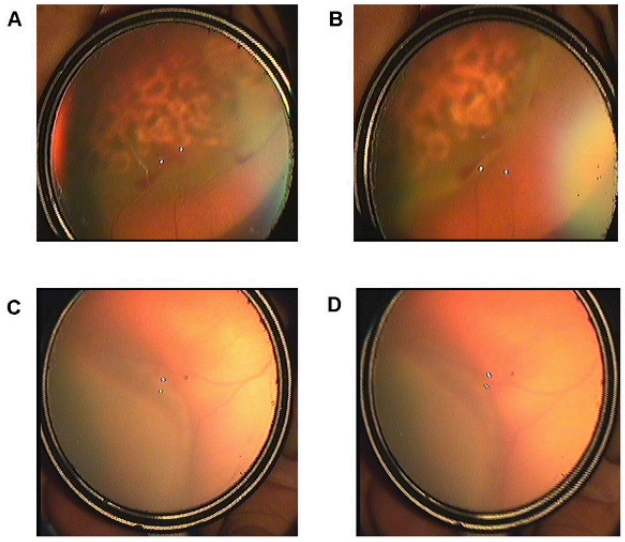

Figure 5: In Figure 5A and 5C; scleral depression areas by plastic-coated paper clips are shown. In Figure 5B and 5D; scleral depression areas by standard steel scleral depressor are shown.

In Figure 5A and 5C; scleral depression area by plastic-coated paper clips is shown. In Figure 5B and 5D; scleral depression area by standard steel scleral depressor is shown. In our study, we found that, we could do our examination with paper clips faster (mean time: 7.6 seconds), on the other hand, the mean duration during the examination with steel depressors was detected as 8.4 seconds (Table II).

Table II. Duration of Examination According to the Instrument Used in ROP Examination

		Plastic-Coated Paper Clips	Non-ring-shaped Steel Scleral Depressor	p-value
Time of Examination (Seconds)	Mean ± SD	7.6±2.5	8.4± 2.3	0,10*
	(Range)	(4-12)	(5-13)	

SD: Standard deviation *two- independent sample t test

However, no significant difference was found between the mean examination times of the two different types of scleral depressors.

DISCUSSION

Scleral depression is very important for ROP examination because the disease starts from the periphery of the retina. Scleral depression is essential for this area to be seen in detail (6-8). In a study conducted, it was shown that ROP examinations performed without scleral depression may have diagnostic errors (2).

Cotton swaps, steel scleral depressors (ring-shaped, non-ring-shaped), plastic-coated paper clips are usually used for ROP examination, while depressing the sclera, in order to see Zone 3 (10). Non-ring-shaped steel scleral depressors are robust tools that can be used for years, but because they are expensive, only 3-4 pairs can be provided to an ophthalmology clinic. For multiple uses in ROP clinics, steel scleral depressors are compulsorily used by cleaning in disinfectant solutions. After the application to disinfectant solutions, these instruments should be kept in saline solution for a while. This causes a waste of time, in crowded clinics. The use of separate sterilized tools (scleral depressor and eye speculum) is very important to avoid bacterial and viral contamination and epidemics, especially in intensive clinics where large numbers of babies are examined (6). Besides, disinfection has no advantage over sterilization. On the other hand, plastic-coated paper clips are very cheap materials, and can be easily found everywhere. Because they are very cheap, large amounts can be provided to a clinic and all of them can be sterilized easily and separately. Sterilization of each paper clip protects the ophthalmologists from anxiety about infection and epidemics. Usage of paper clips for ROP examination also provides time saving as we do not wait for disinfection unlike steel ones. Because the parts of the paper clips that depress the sclera are about 0.2 mm wider than the steel ones, paper clips will provide an extra time saving during the ROP examination especially looking over the periphery area of the retina, to the ophthalmologist (Figure 4).

The use of paper clips in crowded clinics where ROP examination is performed seems to be a very ideal method in terms of time saving, infection safety and cost calculation. We think that our study is the first study to explain the advantages of paper clips as the usage of an alternative, cheap and effective scleral depression method in ROP examination, since there has been no previous study on the use of paper clips for ROP examination. As being a prospective and randomized and controlled study, we think that our study is valuable. As a limitation of our study, only 2 types of scleral depressors and a limited number of cases were included in our study. We think that this is the most important limitation of our study.

New studies that reduce ROP screening examination to simple methods and base them on evidence-based medicine will make ROP examination easier and can be done in all conditions.

CONCLUSION

Plastic-Coated Paper clips can be used all over the world as an alternative, effective and cheap method for ROP screening.

Ethics Committee Approval:
This research complies with all the relevant national regulations, institutional policies and is in accordance with the tenets of the Helsinki Declaration, and has been approved by the Mugla Medical Faculty Ethical Committee, Mugla University (Approval number: 72855364-0.50.01.04-E.195566/2020/07/02).

Informed Consent:
All the participants' rights were protected and written informed consents were obtained before the procedures according to the Helsinki Declaration.

Author Contributions:
Concept – G.A., C.K., Ö.İ., A.K; Design - G.A., C.K., Ö.İ., A.K; Supervision - G.A., C.K., Ö.İ., A.K; Resources - G.A., C.K., Ö.İ., A.K; Materials - G.A., C.K., Ö.İ., A.K; Data Collection and/or Processing - G.A., C.K., Ö.İ., A.K; Analysis and/ or Interpretation - G.A., C.K., Ö.İ., A.K; Literature Search - G.A., C.K., Ö.İ., A.K; Writing Manuscript - G.A., C.K., Ö.İ., A.K; Critical Review - G.A., C.K., Ö.İ., A.K

Conflict of Interest:
The authors have no conflict of interest to declare.

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Presented at Congress:
The data of this study were presented as a poster at the 3rd International Behçet Uz Congress, in September 2021, in İzmir/Turkey.

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