



ORIGINAL ARTICLE

Reliability of retinal imaging screening in retinopathy of prematurity[☆]



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Received 8 July 2013; accepted 31 October 2013

Available online 27 August 2014

KEYWORDS

Retinopathy of prematurity;
Preterm infants;
Retinal image;
Diagnostic imaging;
Telemedicine

Abstract

Introduction: The retinopathy of prematurity (ROP) is a potentially avoidable cause of blindness in children. The advances in neonatal care make the survival of extremely premature infants, who show a greater incidence of the disease, possible. The aim of the study is to evaluate the reliability of ROP screening using retinography imaging with the RetCam 3 wide-angle camera and also to study the variability of ROP diagnosis depending on the evaluator.

Materials and methods: The indirect ophthalmoscopy exam was performed by a paediatric ROP-expert ophthalmologist. The same ophthalmologist and a technician specialised in digital image capture took retinal images using the RetCam 3 wide-angle camera. A total of 30 image sets were analysed by 3 masked groups: group A (8 ophthalmologists), group B (5 experts in vision), and group C (2 ROP-expert ophthalmologists).

Results: According to the diagnosis using indirect ophthalmoscopy, the sensitivity (26–93), Kappa (0.24–0.80), and the percentage agreement were statistically significant in group C for the diagnosis of ROP type 1. In the diagnosis of ROP type 1 + type 2, Kappa (0.17–0.33) and the percentage agreement (58–90) were statistically significant, with higher values in group C.

Conclusion: The diagnosis, carried out by ROP-expert ophthalmologists, using the wide-angle camera RetCam 3 has proven to be a reliable method.

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DOI of original article: <http://dx.doi.org/10.1016/j.anpedi.2013.10.055>

[☆] Please cite this article as: Navarro-Blanco C, Peralta-Calvo J, Pastora-Salvador N, Álvarez-Rementería L, Chamorro E, Sánchez-Ramos C. Fiabilidad en el cribado de la retinopatía del prematuro mediante el análisis de retinografías. An Pediatr (Barc). 2014;81:149–154.

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PALABRAS CLAVE

Retinopatía del prematuro;
Recién nacido pretérmino;
Imagen retina;
Diagnóstico imagen;
Telemedicina

Fiabilidad en el cribado de la retinopatía del prematuro mediante el análisis de retinografías**Resumen**

Introducción: La retinopatía del prematuro (ROP) es una de las principales causas de ceguera infantil potencialmente evitable. Los avances en los cuidados neonatales consiguen la supervivencia de niños de bajo peso extremo asociado con una mayor incidencia de la enfermedad. El objetivo de este estudio es evaluar la fiabilidad en el diagnóstico de la ROP a través de retinografías obtenidas con la cámara de campo amplio RetCam 3 y estudiar la variabilidad en el diagnóstico de ROP en función del evaluador.

Material y métodos: El examen con oftalmoscopia indirecta fue realizado por un oftalmólogo pediátrico experto en ROP. Las imágenes retinianas fueron obtenidas por el mismo oftalmólogo y un técnico especializado en la captura de imágenes digitales. Un total de 30 sets de imágenes fueron analizados por 3 grupos enmascarados: grupo A (8 oftalmólogos), grupo B (5 expertos en visión) y grupo C (2 oftalmólogos expertos en ROP).

Resultados: Acorde con el diagnóstico mediante oftalmoscopia indirecta, la sensibilidad (26-93), el índice Kappa (0,24-0,80) y el porcentaje de aciertos fueron estadísticamente significativos en el grupo C para el diagnóstico de ROP tipo 1. En el diagnóstico de ROP tipo 1 + tipo 2 el índice Kappa (0,17-0,33) y el porcentaje de aciertos (58-90) fueron estadísticamente significativos, obteniendo valores superiores en el grupo C.

Conclusiones: El diagnóstico realizado por oftalmólogos expertos en ROP con el retinógrafo móvil RetCam 3 ha demostrado ser un método fiable.

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Introduction

Despite advances in retinopathy of prematurity (ROP), this disorder is one of the main potentially avoidable causes of childhood blindness.¹ ROP is a vasoproliferative retinopathy, characterised by the presence of an immature and partially vascularised retina, affecting low birth-weight preterm infants. The spectrum of possible results for patients with ROP ranges from mild cases, where the sequelae are minimal and do not affect vision, to more aggressive, bilateral cases, with total and irreversible blindness.² Prompt intervention is critical to maximise the chance of a favourable outcome³; without treatment, at least 50% of eyes with severe ROP will suffer serious and permanent visual loss.³

Recent studies show that in the last 20 years the number of children requiring monitoring has risen constantly.^{1,4-7} Advances in neonatal care enable very low weight newborns to survive; low weight and gestational age are associated with a higher incidence of severe ROP.^{4,8-10} The incidence of the disorder in developed countries varies compared to developing countries,^{11,12} partly due to greater use of assisted conception, increasing maternal age, possible genetic aetiologies and other socioeconomic issues.¹³ Prevalence in Spain, during the last decade and the beginning of the present one,¹¹ was similar to that of other developed countries in the European Community and the United States.^{7,14} Currently, according to the available data from the Instituto Nacional de Estadística (INE: National Statistics Institute), the number of newborns whose weight was less than 1500 g in Spain in 2011 was 4178, of whom 682 were in the Autonomous Community of Madrid.

The current method of diagnosis, binocular indirect ophthalmoscopy (BIO), has serious limitations.⁵ The examiner's interpretations are transcribed onto ophthalmological examination sheets, where the interpretation is assumed to be correct and cannot be revised.¹⁵ Another worrying factor is the shortage of trained ophthalmologists capable of performing examinations for diagnosis of ROP.^{5,6,10} As a result, a large number of untrained ophthalmologists are carrying out screening and treatment of ROP.^{10,16,17} Several studies show that inexperienced ophthalmologists are less skilled than trained ophthalmologists at identifying clinically significant ROP by analysing digital images.^{10,17,18} Because of the shortage of trained ophthalmologists, long delays can occur in screening; another alternative is for the infants to be transferred, with the considerable cost this entails and the potential risk to which the premature baby is subjected.³

Telemedicine makes it possible to capture images and send them for subsequent interpretation by a remote expert,⁶ thereby solving many of the limitations in diagnosis of ROP performed by means of the "gold standard". By using wide-angle cameras, telemedicine has demonstrated high precision and reliability in the diagnosis of ROP,^{6,19-26} and may be more cost-effective than the current method of diagnosis.^{6,27}

The main objectives of this study are:

- To assess the reliability of diagnosis of ROP through ocular fundus images obtained with a RetCam 3 mobile retinal camera (Clarity Medical Systems Inc.) via telemedicine.
- To explore the variability in diagnosis of ROP according to the training profile of the evaluator.

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