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75	Editorial
76	Original articles
85	How frequently should asymptomatic patients be dilated?
95	Effect of a new type of contact lens on the corneal curvature
103	Effect of a new type of contact lens on the corneal curvature
110	Effect of a new type of contact lens on the corneal curvature

ORIGINAL ARTICLE

How frequently should asymptomatic patients be dilated?

Paul Varner

John J Pershing Veterans Affairs Medical Center, Poplar Bluff, Missouri, USA

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KEYWORDS

Pupillary dilation;
Frequency;
Diagnostic yield

Abstract

Purpose: To determine if routine dilated fundus examination (DFE) should be performed sooner than at 10-year intervals in asymptomatic patients.

Methods: Records for all patients consecutively evaluated in a one-year time frame were systematically reviewed. Of those patients who received initial DFE and were living 10 years later, records for sequential DFE were again evaluated to determine presence of clinically-significant, peripheral retinal findings. Databases were also searched in order to determine the number of patients during the same 10-year time period who developed vision or life-threatening peripheral retinal findings. The two groups were cross-matched to determine effectiveness of routine DFE.

Results: Only 10 of 592 patients were deemed to have “clinically-significant” peripheral retinal findings—none of whom developed untoward outcomes. Of the 29 new retinal detachments and four intraocular tumors discovered during ten years of clinical follow-up, nearly 90% were symptomatic at the time of discovery. Three detachments and one tumor were detected as incidental findings in asymptomatic patients. No further treatment was recommended for the three detachments and the patient with the tumor survives, although with profound loss of vision in the involved eye.

Conclusions: In the absence of symptoms, routine DFE seems to have a very low yield for discovery of serious ocular events and appears to be ineffective in altering the course of incidental findings. Routine DFE is not indicated for older, asymptomatic patients—even at decade intervals. The findings of this study should be prospectively confirmed in population-based studies.

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PALABRAS CLAVE

Dilatación pupilar;
Frecuencia;
Rendimiento diagnóstico

¿Con qué frecuencia debe dilatarse a los pacientes asintomáticos?

Resumen

Objetivo: Determinar si el examen rutinario del fondo de ojo debe realizarse con más frecuencia que a intervalos de 10 años en pacientes asintomáticos.

E-mail address: paul.varner@va.gov

Métodos: Se revisaron sistemáticamente las historias de todos los pacientes consecutivamente evaluados durante un periodo de un año. Se volvieron a evaluar las historias de aquellos pacientes cuyo fondo había sido inicialmente examinado, y que seguían con vida 10 años después, para determinar la presencia de hallazgos con significación clínica relativa a la retina periférica. Se realizó también una búsqueda en las bases de datos para determinar el número de pacientes, durante el mismo periodo de 10 años, que había desarrollado casos en la retina periférica, con riesgo de vida o visión. Se cruzaron los dos grupos para determinar la efectividad del examen rutinario del fondo de ojo.

Resultados: Únicamente 10 de entre 592 pacientes mostraron casos en la retina periférica "clínicamente significativos", de los que ninguno evolucionó inadecuadamente. De los 29 nuevos desprendimientos de retina y cuatro tumores intraoculares descubiertos durante los diez años de seguimiento clínico casi el 90% fueron asintomáticos en el momento de su descubrimiento. Se detectaron tres desprendimientos y un tumor como casos incidentales en pacientes asintomáticos. No se recomendó ningún tratamiento adicional para los tres desprendimientos, y el paciente con el tumor sigue vivo, aunque con una profunda pérdida de visión en el ojo afectado.

Conclusiones: En ausencia de síntomas, el rendimiento del examen rutinario del fondo de ojo es muy bajo a la hora de descubrir eventos oculares serios, revelándose poco eficaz para alterar el curso de los hallazgos incidentales. Dicho examen no está indicado en pacientes de edad y asintomáticos, incluso a intervalos de 10 años. Los hallazgos de este estudio deberán confirmarse prospectivamente mediante estudios basados en población.

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Routine Dilated Fundus Examination (DFE) is considered by many eye care providers to be the standard of ophthalmic care¹; however, further clarification is required. DFE may be considered to be "routine" when completed in the absence of any symptoms suggestive of acute retinal disease (floaters, photopsia, peripheral visual distortions, etc.), or when performed as part of periodic monitoring for chronic ophthalmic conditions (screening for diabetic retinopathy, stereoscopic evaluation of optic nerve head in glaucoma follow-up, etc.). Although for these latter conditions, DFEs are performed systematically and at periodic intervals to monitor for ophthalmic disease progression, the necessity of systematic routine DFE in asymptomatic patients without ophthalmic disease has not been established.

Recommendations for routine ocular examination are published by both ophthalmologic and optometric groups^{2,3}; however, the frequencies for routine DFE—again in the absence of symptoms—are not specified.^{4,5} While routine DFE in the absence of symptoms may be inexpensive, it is not cost-effective,⁶ has a low yield for significant findings,⁷ and is not always perceived to be a benign event by patients—especially children.⁸ Therefore, it is in the interest of both clinicians and patients to discern the most judicious application of DFE as an ophthalmic procedure.

DFE is performed in order to assess those portions of the peripheral retina that are unobservable through the non-mydratic pupil. There are myriad conditions to be found in the peripheral retina, although very few of those findings can be considered clinically significant⁹ and few are unobservable through undilated pupils.¹⁰

Through the important research work of Norman Byer, it is now clinically understood that common peripheral retinal findings—lattice degeneration,¹¹ retinoschisis,¹²

cystic retinal tufts,¹³ asymptomatic retinal breaks (even from tractional tears)¹⁴—are largely benign and do not require prophylactic laser retinopexy. Retinal pavingstone degeneration is another common peripheral retinal finding with low clinical risk.¹⁵ In the end, it is the presence of patient symptoms that becomes the most important prognostic indicator associated with clinically significant, peripheral retinal findings.¹⁶

Choroidal nevi offer a clinical challenge of ambiguous consequence. An estimate of malignant transformation of choroidal nevi into melanoma has been assigned an annual risk of 1 in 8845,¹⁷ although this assignment was based on the assumption that *all* malignant melanomas arise from pre-existing choroidal nevi—the validity of which is uncertain. Stratifying nevi by basal diameter yielded an 18% transformation to melanoma for those lesions larger than 10 mm,¹⁸ perhaps suggesting the need for closer monitoring of those patients; however, patient symptomatology was not reported in this study. With regard to symptomatology for intraocular tumors, presymptomatic detection of metastatic uveal melanoma conferred little additional survival time, calling into question the efficacy of earlier detection.¹⁹

Ultimately then, the purpose of performing DFE is two-fold: to determine the clinical risk of morbidity (e.g. vision-threatening retinal detachment or neoplasms) or mortality (e.g. life-threatening malignant melanoma, metastatic lesions) in the presence of patient symptoms. Fortunately, both of these conditions are rare. Unfortunately, they are also not always preventable—even with routine DFE.⁶ It is the intention of this paper to help better define the role of DFE as a symptom-driven procedure for clinicians to employ judiciously.

Methods

A single facility's electronic medical records database was searched for all patients consecutively evaluated in the eye clinic during a one-calendar-year period of time. Each of the records was systematically reviewed to form this retrospective, consecutive, non-comparative case series. All the medical records in this facility are electronically recorded, stored and readily available for review, thus precluding lost paper charts or record omissions.

Initial record review determined which patients received DFE during 1998. At that time, clinical protocol for this facility included DFE for most patients regardless of symptomatology. Exceptions included problem-oriented follow-up appointments for anterior segment diseases, glaucoma, refractive cases, and some neurological findings (e.g. diplopia). Those not receiving DFE were excluded from this review. A handful of patients who received multiple DFE during that year (for sequential diabetic retinopathy or AMD follow-up) were counted only once. All the 1998 patients surviving in 2008 were then identified to form the study cohort. Records were further reviewed in order to determine which of the 10-year survivors had already received DFE in 2008 or later. No specific risk factors were pre-selected for the initial cohort—the intent was to determine if there would have been any inherent clinical omissions made for patients not receiving sequential, routine DFE after ten years had passed.

Finally, attempts were made to communicate with all the remaining unaccounted-for survivors in order to repeat DFE after the decade interval. Those who declined or were unavailable for repeat examination (largely due to invalid contact information) were excluded from review. For patients from this group who may have had DFE prior to the conclusion of the 10-year interval, most recent DFE results were not carried forward.

For the patients with initial and final records at least ten years apart, peripheral retinal findings were classified as “unremarkable” (i.e. no peripheral findings, whatsoever), “remarkable” (for any peripheral findings), or “unable to grade” if visualization of retina was not possible. “Remarkable” peripheral findings were further divided into “clinically significant” or “clinically insignificant” groups.

“Clinically insignificant” findings represented the vast majority of patients and included lesions involving either primarily the retinal pigmented epithelium (RPE) or the neurosensory retina. RPE-level findings included window defects, hypertrophic changes, atrophic findings, chorioretinal scars, retinal pavingstone degeneration, etc. Those with predominantly neurosensory retinal findings included retinal lattice/snailtrack degeneration, white without pressure, retinodialysis, peripheral drusen, retinoschisis, operculated retinal tears, etc.

Those peripheral findings of potential clinical significance and deemed “remarkable” included peripheral choroidal nevi and those patients who were *status post* scleral buckling procedures. For both of these cases retinal findings were judged to be too anterior in location to be observable through non-mydriatic pupils. Complete stratification of patients is provided in Fig. 1.

Final observations included whether any of the patients with “remarkable” peripheral retinal findings developed

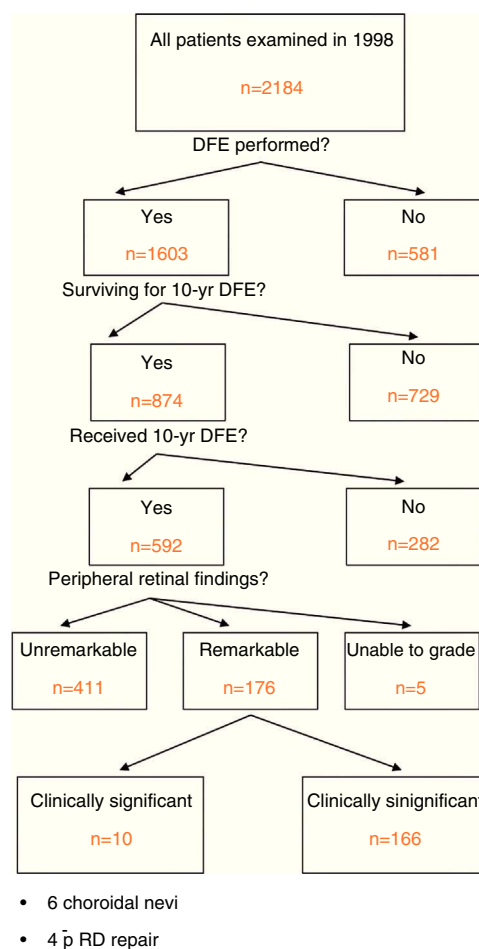


Figure 1 Stratification of study patients.

any untoward peripheral retinal outcomes during the follow-up period.

Ophthalmic ICD-9 codes were searched to reveal all facility patients who developed retinal detachment (361 series) or posterior segment melanoma (190 series) during the same ten-year follow-up period (1998–2008). Each of these records was reviewed in order to determine patient symptomatology at the time of initial diagnosis and cross-referenced to the original cohort in order to determine if sequential DFE was useful in identifying these patients.

Results

A total of 2184 patients were examined during the 1998 calendar year. Of those patients, 1603 (73% of original cohort) received DFE. 874 of those patients (55% of DFE patients) were surviving and eligible for sequential DFE after a ten-year interval. Of the 874 subjects available for potential review, retinal findings for 592 patients (68% of surviving DFE patients), were available for final evaluation. The remaining 282 patients either declined repeat examination or did not have valid contact information and were unreachable by telephone or standard mail.

For the 592 patients with initial and final records ten years apart, peripheral retinal findings were classified as “unremarkable” for 69% (411/592) of the study cohort and

“remarkable” for 30% (176/592) of patients. The remaining 5 patients (<1%, 5/592) were “ungradable” at decade’s end. Focus was then placed on the 176 patients deemed to have “remarkable” peripheral retinal findings.

“Clinically insignificant” retinal findings were documented for most of the “remarkable” group (166/176 or 94% of this set) after 10 years of follow-up. The remaining 10 patients (10/592, or <2% of original cohort) were deemed to be “clinically significant.” These cases were found to have peripheral choroidal nevi ($n=6$) or were *status post* RD repairs ($n=4$), although in each of these cases the patient was asymptomatic at time of DFE. Only one of the six patients with choroidal nevi demonstrated a large peripheral nevus (>10 mm in basal diameter), and this lesion had no demonstrable morphological change during the follow-up period. It should be noted that none of these ten patients developed consequential ophthalmic events, and that they all remained asymptomatic of peripheral retinal findings throughout the follow-up period.

Five patients were classified as “ungradable” due to profound ocular findings in at least one eye that precluded bilateral 10-year sequential DFE (2 mature cataracts, corneal leukoma, 2 phthisis bulbi). For each of these patients it should be noted that fellow eye DFE was unremarkable and B-scan ultrasonography did not suggest any remarkable posterior segment findings. These five patients were not included in final calculations.

For the same 10-year time-frame, 29 new retinal detachments were diagnosed. 26 of these were symptomatic, including central or peripheral visual symptoms with floaters and/or photopsia. The three new-onset, asymptomatic RDs were all delimited in nature, and all occurred as incidental findings in eyes without functional vision (previous RD, CRVO, advanced AMD). None of these three cases were ultimately treated after retinal consultation.

There were four new intraocular tumors identified during the period of regard: three melanomas and one metastatic uveal tumor. Of these, three were symptomatic (primarily with peripheral visual field changes), and one was entirely an incidental finding. This eye—diagnosed with choroidal melanoma—ultimately developed Light Perception vision despite immediate brachytherapy. The patient survived after five years of follow-up.

Conclusions

Intuitively, the inherent risk of “missing” clinically significant peripheral retinopathy must be low when considering the history of optometry prior to the widespread use of diagnostic pharmaceutical agents. Millions of undilated eye examinations were performed by optometrists, yet peripheral retinal pathologies of clinical import did not reach epidemic proportions. This review seems to provide a clinical basis for this observation.

These results are limited by the same challenges that face all retrospective studies (i.e. accuracy of medical records, difficulties in controlling for confounders/bias, hypothesis generating only²⁰); however, it is the best way to evaluate conditions of rare occurrence. The high rate of attrition from the original group of patients in terms of survival rate (only 55% of original DFE cohort was living ten

years after initial DFE), is highly related to the study population (the average age of patients in this facility is 70 years of age [internal data], and predominantly male) and suggests that DFE near the end of life may be even less clinically consequential. Nearly one-third of the eligible cohort (32% of 874) was not re-examined, thus introducing real possibilities of selection bias. Another potential source of selection bias could be from the choice of the initial cohort. Inclusion of all the patients examined during a single, calendar year was chosen in order to eliminate possible bias from exclusion criteria noted in earlier studies of DFE. These shortcomings are acknowledged and it is recognized that these results may or may not be generalizable to a population including all ages of patients.

However, these results must be understood within the context of the very low risks associated with various peripheral ophthalmic conditions^{11–15} and the low yield of “clinically significant” peripheral retinal findings on *initial* routine DFE.¹⁰ This review’s finding that the identification of a single retinal finding of clinical importance in an asymptomatic patient out of ten years of follow-up of 592 older patients—and that the outcome of that single case was not altered by presymptomatic diagnosis—confirms earlier suggestions that the “value” of routine DFE remains low.⁶ This study fails to disprove that null hypothesis.

The dangling implication of this report is that it remains entirely possible that an older, asymptomatic patient may *never* require DFE during the course of his or her life. Long-term prospective, population-based study is required to follow up on this intriguing hypothesis and to provide medical evidence to substantiate an old clinical practice. In the final analysis, patient symptomatology continues to be the single most important factor in discovering highly significant peripheral retinal findings. To answer the question posed by the title of this article then, clinicians must recognize that it is quite possibly “never.”

Conflicts of interest

Dr. Varner reports no financial conflicts of interest.

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