How frequently should asymptomatic patients be dilated?

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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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Routine Dilated Fundus Examination (DFE) is considered by many eye care providers to be the standard of ophthalmic care; 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; however, the frequencies for routine DFE—again in the absence of symptoms—are not specified. While routine DFE in the absence of symptoms may be inexpensive, it is not cost-effective, has a low yield for significant findings, and is not always perceived to be a benign event by patients—especially children. 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-dilated pupil. There are myriad conditions to be found in the peripheral retina, although very few of those findings can be considered clinically significant and few are unobservable through undilated pupils.

Through the important research work of Norman Byer, it is now clinically understood that common peripheral retinal findings—lattice degeneration, retinoschisis, cystic retinal tufts, asymptomatic retinal breaks (even from trational tears)—are largely benign and do not require prophylactic laser retinopexy. Retinal pavingstone degeneration is another common peripheral retinal finding with low clinical risk. In the end, it is the presence of patient symptoms that becomes the most important prognostic indicator associated with clinically significant, peripheral retinal findings.

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, 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, 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.

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. 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, whatever), “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, chorioternal scars, retinal pavingstone degeneration, etc. Those with predominantly neurosensory retinal findings included retinal lattice/snailtrack degeneration, white without pressure, retinoidalysis, peripheral drusen, retinoschisis, opecculated 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 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 docu-
cmented 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 periph-
eral 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 pre-
cluded bilateral 10-year sequential DFE (2 mature cataracts,
conical leukoma, 2 phthisis bulbii). For each of these
patients it should be noted that fellow eye DFE was unre-
markable 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 detach-
ments 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 inciden-
tal findings in eyes without functional vision (previous RD,
CRVO, advanced AMD). None of these three cases were ulti-
mate 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 signifi-
cant 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 periph-
eral retinal pathologies of clinical import did not reach
epidemic proportions. This review seems to provide a clin-
ical 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 only[5]); 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 sur-
vival rate (only 55% of original DFE cohort was living ten
years after initial DFE), is highly related to the study popula-
tion (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 possibil-
ities 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. This review's finding that the identification of
a single retinal finding of clinical importance in an asym-
omatic 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 sug-
gestions that the "value" of routine DFE remains low. 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 med-
cal 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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References

1. Bullinore MA. Is routine dilation a waste of time? Optom Vis
quency of Ocular Examinations. San Francisco; 2009. Available
at: http://www.aao.org/about/policy/upload/Frequency-of-
Ocular-Exams-2009.pdf
3. American Optometric Association. Recommendations for Reg-
ular Optometric Care. Saint Louis; 1994. Available at: http://
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