Risk Factors for Retinal Detachment after Cataract Surgery

A Population-based Case–Control Study

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Purpose: Previous analyses of Medicare claims data, as well as clinical series, have suggested that performance of neodymium:YAG (Nd:YAG) laser posterior capsulotomy after extracapsular cataract surgery increases significantly the risk of retinal detachment. However, methodologic problems with previous research limit the strength of conclusions that can be drawn from these earlier studies. This study was designed to resolve those methodological limitations while using a population-based approach for assessment of the independent association between the performance of Nd:YAG laser posterior capsulotomy and pseudophakic retinal detachment.

Methods: A nested case–control study was conducted. Medicare beneficiaries who had undergone extracapsular cataract extraction from 1988 to 1990 were identified from a 5% sample of Medicare claims data. Within this cohort, people who were diagnosed or treated for retinal detachment during the years 1988 through 1991 (cases) were identified from Medicare records. Four controls were matched to each case of retinal detachment using an incidence density design. Providers of the patients' cataract and retinal surgery were contacted and asked to provide clinical data for all cases and controls that they had treated.

Results: Seven hundred six cases of retinal detachment were originally identified from Medicare records. After exclusions due to ineligibility, a total of 291 cases and 870 matched controls were available for analysis. Conditional logistic regression models showed that a number of factors were associated independently with an excess risk of retinal detachment after cataract surgery. These included Nd:YAG laser capsulotomy (odds ratio [OR] = 3.8; 95% confidence interval [CI], 2.4–5.9), a history of retinal detachment (OR = 2.7; 95% CI, 1.2–6.1), a history of lattice degeneration (OR = 6.6; 95% CI, 1.6–27.1), axial length (OR = 1.21/mm; 95% CI, 1.03–1.43), refractive error (OR = 0.92/diopter; 95% CI, 0.88–0.95), and a history of ocular trauma after cataract surgery (OR = 6.1; 95% CI, 4.3–28.2).

Conclusion: Performance of Nd:YAG laser posterior capsulotomy is associated with a significantly elevated risk of retinal detachment in patients who have undergone extracapsular cataract extraction. Other independent risk factors for retinal detachment include axial length, myopia, posterior capsular rupture during surgery, history of retinal detachment or lattice degeneration, and ocular trauma after cataract surgery.

Ophthalmology 1996;103:1537–1545

Originally received: December 26, 1995.
Revision accepted: May 30, 1996.

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Retinal detachment is a well-recognized complication of cataract surgery,[1] occurring in 0.2% to 3.6% of persons after extracapsular cataract surgery, depending on the length of follow-up and the characteristics of the group under study.[2–4] Although the overall rate of retinal detachment after cataract surgery is low, the absolute number of these vision-threatening complications is substantial because of the high volume of cataract surgery. In 1992, we published a report linking neodymium:YAG (Nd:YAG) posterior capsulotomy to a fourfold increased risk of retinal detachment after cataract surgery.[5] That report was based on an analysis of Medicare claims data, which had a number of acknowledged limitations related to the claims data on which it was based. These limitations included a reliance on billing records to identify cases of cataract surgery, posterior capsulotomy, and retinal detachment repair; the lack of data regarding which eye each procedure was performed on; and a lack of patient-specific information on other risk factors for retinal detachment, such as myopia–axial length, lattice degeneration, history of retinal detachment, and posterior vitreous detachment. In response to these limitations, we undertook a national case–control study of retinal detachment among Medicare beneficiaries who had undergone extracapsular cataract surgery, with the objective of obtaining patient-specific information on laterality of procedures and events and data on other risk factors that might confound an observed association between performance of Nd:YAG posterior capsulotomy and retinal detachment.

Methods

Overview of Study Design

This study was conducted using a nested case–control design. A cohort of Medicare beneficiaries who underwent extracapsular cataract surgery was identified from inpatient and outpatient Medicare claims data files (see below). Within this cohort, people who were diagnosed or treated for a retinal detachment (potential cases) were identified by a search of their Medicare claims files. Each potential case was matched to controls from the cohort who did not have evidence of retinal detachment. A list of encrypted identifiers for cases and controls then was sent to the Health Care Financing Administration (HCFA), which provided the name of each case and control. Information regarding the identity of ophthalmologists who performed cataract surgery on cases or controls and who treated a retinal detachment on cases was obtained from local insurance carriers, with the assistance of the HCFA regional offices. These providers were then contacted directly by the study team and asked to complete a medical chart review and brief clinical data collection form for all cases and controls they had treated.

Identification of the Study Cohort

The cohort within which this case–control study was nested included a random 5% sample of Medicare beneficiaries who underwent extracapsular cataract extraction (ECCE) with or without phacoemulsification during the years 1988 through 1990 based on the HCFA Common Procedural Classification System used in Medicare Part B billing. Eligibility criteria for inclusion in this cohort required both a paid claim from a surgeon for ECCE and a paid claim from either an anesthesiologist, surgical assistant, or a facility for ECCE. These criteria correspond to our level I-1 definition (most stringent) of ECCE used in previous analyses of Medicare claims data.[5] Beneficiaries were excluded from this cohort if, at the time of their cataract surgery, they were not eligible for both parts A and B of the Medicare program, were members of a Health Maintenance Organization, were not residents of the United States, were younger than 60 years of age, or were eligible for Medicare only because they qualified under the end-stage renal disease or disability programs. Eligible subjects were censored from the cohort when they died, moved outside of the United States, no longer had both Medicare parts A and B coverage, if they joined a Health Maintenance Organization, or at the end of 1991 when follow-up was stopped. These exclusions were applied primarily to ensure that major medical procedures such as cataract surgery, Nd:YAG laser capsulotomy, and retinal detachment repair could be identified if they occurred. People without full parts A and B coverage or those who lived outside the United States could have obtained such care outside the Medicare System.

Identification of Potential Cases of Retinal Detachment

Potential cases of retinal detachment within the cohort of patients with ECCE were identified by searching inpatient and outpatient Medicare claims data files from 1988 through 1991 for evidence of a diagnosis or treatment of retinal detachment after the index cataract surgery. The specific files that were used included the Medicare Provider Annual Review file, the Part B Medicare Annual Data Beneficiary file, and the Part B Hospital Outpatient Facility file. Diagnoses of retinal detachment or treatment for retinal detachment were based on the International Classification of Diseases code[6] or the HCFA Common Procedural Classification System code.[7] The HFCA Common Procedural Classification System codes for repair of retinal detachment were the same as the Common Procedural Terminology codes[8] and included 67101, 67105, 67107, 67108, 67109, 67110, and 67112. The International Classification of Diseases code surgical procedure codes were 14.4 and 14.5, and the International Classification of Diseases code diagnosis code for retinal detachment was 361.0. Subjects were classified as potential

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Supported by grant HS-06280 from the Agency for Health Care Policy and Research, Rockville, Maryland.

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Table 1. Definitions of Potential Cases of Retinal Detachment

Level I potential cases (most stringent criteria); must meet criterion 1, 2, 3, or 4

(1) Both surgery procedure code for repair of and diagnostic code for retinal detachment in MEDPAR file,
or
(2) Both surgery procedure code for repair of and diagnostic code for retinal detachment in outpatient claims file,
or
(3) A surgeon's (ophthalmologist code 17, 18, or 49) bill for retinal detachment repair in BMAD file accompanied by at least one of the following:
(a) a bill related to retinal detachment repair from an anesthesiologist,
(b) a bill for retinal detachment repair from a surgical assistant,
(c) a bill for retinal detachment repair from an ambulatory surgical care center,
(d) a bill for retinal detachment repair from an outpatient or inpatient (MEDPAR) facility,
(e) a primary diagnosis of retinal detachment in the MEDPAR file or outpatient record file.
or
(4) An inpatient, outpatient or ambulatory center facility bill for retinal detachment repair or a primary diagnosis of retinal detachment on an inpatient or outpatient bill and an anesthesia bill or surgical assistant bill for retinal detachment repair.

Level II potential cases; must meet criterion 1, 2, 3, or 4

(1) A surgeon's or facility bill for a retinal detachment procedure
or
(2) Principal diagnosis of retinal detachment on a facility bill
or
(3) Anesthesia and surgical assistant bills for retinal detachment repair
or
(4) Anesthesia or surgical assistant bill for retinal detachment repair and retinal detachment as a secondary diagnosis on inpatient or outpatient bill or a retinal detachment repair at an ambulatory surgical center.

cases of retinal detachment if they met any of the criteria for level 1 or level 2 cases as described in Table 1.

Selection of Control Subjects

For each potential case, we sought to identify four controls that had undergone cataract surgery but had not had a retinal detachment using an incidence density design.[9–11] Controls were matched to cases on year of cataract surgery, age in years, sex, zip code, and number of months since cataract surgery. When four exact matches could not be found for a potential case, the matching criteria were relaxed in the order described in Table 2. The matching on number of months since cataract surgery was not relaxed as the probability of becoming a case is directly related to the length of follow-up. Zip code was used as a proxy for socioeconomic status and access to eye care services. Keeping this factor in the matching was quite restrictive, as can be seen when it was relaxed first to the county level and then the state level (Table 2). As a result, the majority of case–control sets were matched only at the state or county level. Also seen in Table 2 is that, using the allowed relaxation rules for matching, we were able to identify a total of 2802 controls of a target of 2824 (706 cases × 4 controls per case).

Identification of Potential Neodymium:YAG Posterior Capsulotomies

The occurrence of Nd:YAG posterior capsulotomy was ascertained initially by identification of Common Procedural Terminology code 66821 in the Part B Medicare Annual Data files for both cases and controls at any time from the index cataract surgery through the completion of follow-up at the end of 1991. Subsequently, the performance of Nd:YAG capsulotomy was confirmed through the primary data collection process (see below) that allowed us to determine which eye received the capsulotomy.

Primary Data Collection

Once all potential cases and their matched controls were identified, the ophthalmologists who provided care to these patients were identified so that we could obtain information from them to confirm a patient's case or control status, the joint laterality (left or right eye) of the cataract surgery, retinal detachment, and Nd:YAG posterior capsulotomy, as well as information regarding potential risk factors for retinal detachment. Whereas a provider-specific identifier is available on the Medicare claims data, actual provider names and contact information are not. Such information is maintained by the local insurance carriers that hold the contract for processing Medicare claims in their area. At the request of HCFA central and regional offices, local carriers provided us with identifying information for all provider identification numbers listed as providing cataract or retinal surgical services to our study participants. We then contacted each provider and asked that each provider complete a medical chart review and brief clinical data collection form on the potential cases and controls that were treated. Specifically, we requested confirmation of cataract surgical status, date and laterality of cataract surgery; occurrence of or treatment for retinal detachment and the date and laterality of each episode; occurrence, date, and laterality of Nd:YAG laser posterior capsulotomy; history of retinal detachment, diabetic retinopathy, lattice degeneration, or other retinal

Table 2. Overview of Yield in Selection of Control Subjects

Order of Matching Criteria Relaxation	Year in Which Cataract Surgery Was Performed			
	*1988 (n = 334)**	*1989 (n = 216)*	*1990 (n = 156)*	*Total (n = 706)*
	No. (cumulative %)	*No. (cumulative %)*	*No. (cumulative %)*	*No. (cumulative %)*
Exact matches	35 (2.6)	21 (2.4)	10 (1.6)	66 (2.3)
Relax zip code to county	344 (28.4)	259 (30.0)	182 (30.8)	785 (30.1)
Relax zip code to state	866 (93.2)	508 (88.8)	367 (89.6)	1741 (91.8)
Keep zip code, drop sex	1 (93.3)	0 (88.8)	0 (89.6)	1 (91.8)
Relax zip code to county, drop sex	14 (94.3)	7 (89.6)	5 (90.4)	26 (92.7)
Relax zip code to state, drop sex	35 (96.9)	32 (93.3)	24 (94.2)	91 (96.0)
Keep zip code, drop sex, relax age ± 3 yrs	5 (97.3)	1 (93.4)	2 (94.6)	8 (96.2)
Relax zip code to county, drop sex, relax age ± 3 yrs	4 (97.6)	9 (94.4)	9 (96.0)	22 (97.0)
Relax zip code to state, drop sex, relax age ± 3 yrs	22 (99.3)	20 (96.8)	17 (98.7)	59 (99.1)
Keep zip code, drop sex, relax age ± 5 yrs	0 (99.3)	0 (96.8)	0 (98.7)	0 (99.1)
Relax zip code to county, drop sex, relax age ± 5 yrs	0 (99.3)	1 (96.9)	0 (98.7)	1 (99.2)
Relax zip code to state, drop sex, relax age to ± 5 yrs	0 (99.3)	2 (97.1)	0 (98.7)	2 (99.2)
Total number of control subjects matched to patients	1326 (99.3)	860 (97.1)	616 (98.7)	2802 (99.2)
Total needed if 4 control subjects per patient were successfully matched	1336 (100)	864 (100)	624 (100)	2824 (100)

* One patient from 1988 had no matching control subjects.

conditions; preoperative refraction; axial length; intraoperative complications during cataract surgery, and other potential risk factors for postoperative retinal detachment. No financial or other inducement was provided for physician participation, but our package contained letters of support for the study from the HCFA Administrator, the Director of AHCPR, and the Presidents of the American Academy of Ophthalmology (AAO) and the American Society of Cataract and Refractive Surgeons (ASCRS).

The data were analyzed as a matched case–control study with a variable number of controls per case using conditional logistic regression[12] as implemented in Statistical Analysis System (SAS, Statistical Analysis System for Windows; SAS Institute, Inc, Cary, NC). The study was approved by the Committee on Human Volunteers at the Johns Hopkins School of Hygiene and Public Health. Variables with significant associations in the bivariate analyses were included in the multivariate models.

Results

A total of 706 potential cases of retinal detachment were identified from HCFA Medicare claims data files from the cohort of ECCE patients (Fig 1). In 1 case, the file could not be linked to a patient name, and in 14 other cases there was no match between the provider identification number in the claims file with an actual provider in the insurance carrier's database. This left 691 cases for whom we attempted to obtain chart abstract information. For 152 cases (22.0%), we received no response from the provider despite multiple attempts using both mail and telephone contacts. In 19 cases, the providers reported that they had not performed cataract surgery within 4 weeks of the procedure date on the claims file; in 11 of these, the provider denied ever performing cataract surgery on the patient, and in the other 8 cases the surgery date was greater than 4 weeks from the date listed in the claims file. Cases with dates of cataract surgery more than 4 weeks from the procedure date on the claims file were considered unconfirmed surgeries and were excluded. For another 66 potential cases, information obtained from the provider indicated that the retinal detachment occurred in the eye opposite to the index cataract surgery eye. In 149 other potential cases, there was no confirmed occurrence of retinal detachment within 4 weeks of the date on the claims data record. In 69 of these 149 cases, both the cataract and retinal care providers reported no retinal detachment or treatment for retinal detachment within 4 weeks of the date on the claims file. Many of these cases had undergone retinal procedures for other conditions. For the other 80 of the 149 unconfirmed cases, we did

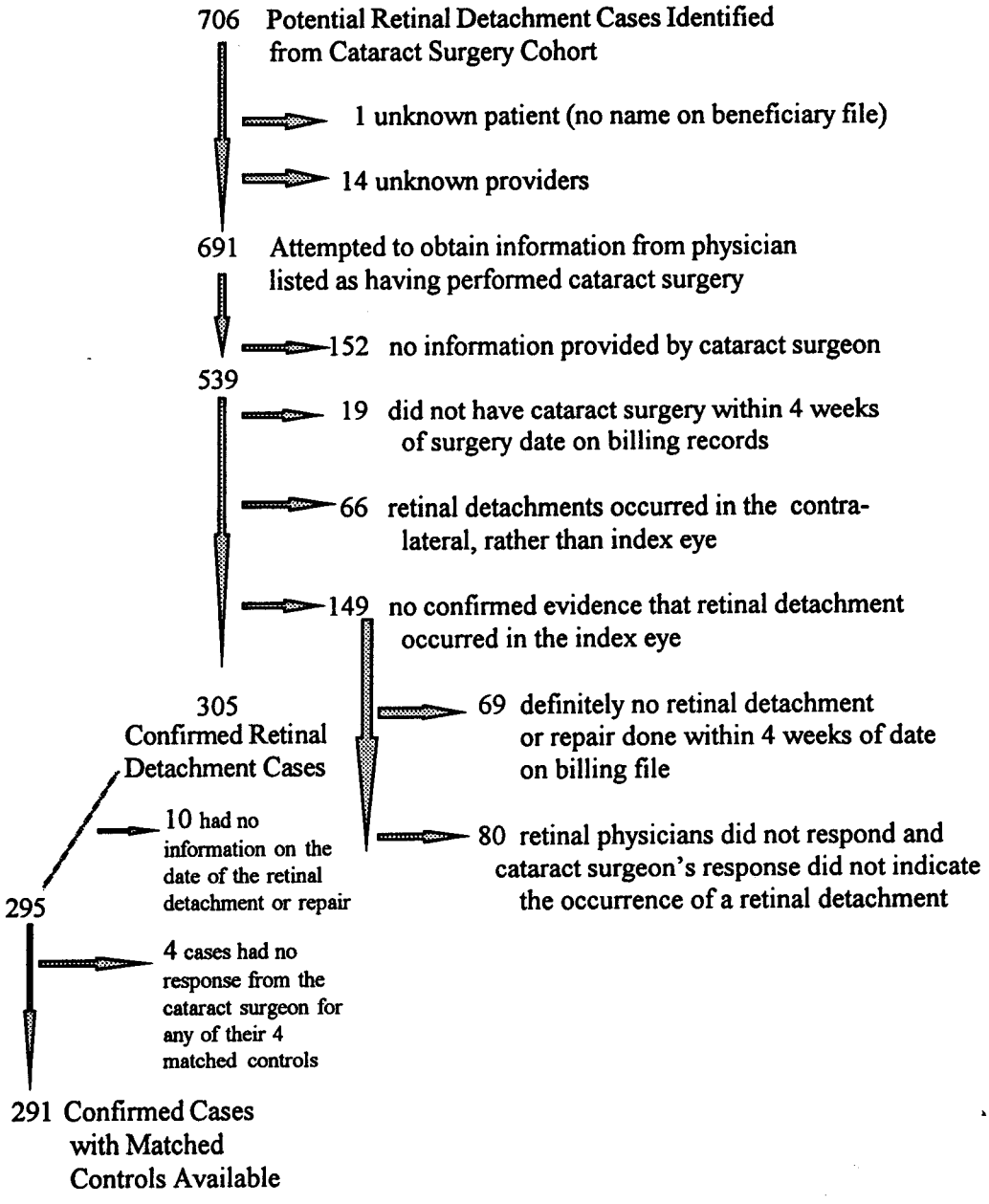

Figure 1. Flow chart for case identification.

not receive a response from the retinal procedure provider, and the cataract provider could not confirm that a retinal detachment had occurred. This left a total of 305 confirmed cases of retinal detachment in the same eye that had undergone cataract surgery. In 10 of these 305 cases, the providers did not include information on the date of the diagnosis or repair of the retinal detachment. In 4 others, no data were available from the cataract surgery provider for any of their matched controls, leaving a total of 291 cases for analysis (Fig 1).

A total of 2802 controls were matched to the original 706 potential cases identified from the Medicare claims files (Table 2). Of these, 2676 controls were usable (i.e., they were not missing patient or provider identifiers), and we approached the cataract surgery providers for the chart abstract information. The response rate was 76.9% (2059/2676), almost identical to the 78.0% response rate for the cases. Of the original 2802 controls, 1160 had been matched to the eventual 291 confirmed cases used in the analysis. The response rate for chart abstract data from the provider who performed cataract surgery on these controls was 75.0% (870/1160). There were no significant differences between respondent and nonrespondent controls on age, sex, or year of cataract surgery.

Ninety-seven (33.3%) of the 291 cases had data for all 4 matched controls, 112 (38.5%) had 3 controls, 64 (22.0%) had 2 controls, and 18 (6.2%) had only 1 matched control. Cases and controls were similar in their age and sex distributions (Table 3).

Potential risk factors for retinal detachment were divided into three groups: (1) those based on ocular history, (2) those based on anatomic characteristics, and (3) those

Table 3. Age and Sex of Patients and Control Subjects

	Patients			Control Subjects		
	Males	*Females*	*Total*	*Males*	*Females*	*Total*
Age (yrs)	*No. (%)*	*No. (%)*	*No. (%)*	*No. (%)*	*No. (%)*	*No. (%)*
65–69	45 (31.9)	34 (22.7)	79 (27.2)	116 (29.4)	109 (23.0)	225 (25.9)
70–74	45 (31.9)	39 (26.0)	84 (28.9)	120 (30.4)	123 (25.9)	243 (27.9)
75–79	30 (21.3)	40 (26.7)	70 (24.1)	93 (23.5)	127 (26.7)	220 (25.3)
80+	21 (14.9)	37 (24.7)	58 (19.9)	66 (16.7)	116 (24.4)	182 (20.9)
Total	141 (100)	150 (100)	291 (100)	395 (100)	475 (100)	870 (100)

associated with the cataract surgery itself or its complications. Table 4 presents the bivariate associations between selected risk factors from these three groups and postcataract surgery retinal detachment. Among the ocular history variables, a history of retinal detachment, posterior vitreous detachment (PVD), and lattice degeneration all were associated with a significantly elevated risk of postcataract surgery retinal detachment, with odds ratios ranging from 2.2 for PVD to 11.0 for lattice degeneration.

As expected, both axial length and myopia were associated strongly with an excess risk of retinal detachment in a dose-dependent fashion. Axial lengths of 26 mm or greater were associated with an eightfold excess risk when compared with people with axial lengths of less than 22 mm. Myopia greater than −4 diopters increased the risk of retinal detachment by threefold over those with hyperopia of +2 diopters or more.

Type of cataract surgical procedure (e.g., phacoemulsification versus manual expression) was not associated with the risk of retinal detachment, but a history of ocular trauma after cataract surgery, although rare, was associated with a fourfold excess risk. Disruption of the posterior capsule as a complication of cataract surgery or via Nd:YAG laser posterior capsulotomy was associated with a significantly elevated risk of retinal detachment. The excess risk associated with Nd:YAG laser capsulotomy was modified by the effect of posterior capsular rupture during cataract surgery. Patients who received only Nd:YAG laser capsulotomy without prior posterior capsular rupture had an almost 4 times greater risk of retinal detachment. Patients who had the posterior capsule ruptured during cataract surgery but no Nd:YAG capsulotomy were 11 times more likely to suffer a retinal detachment. Cataract surgery patients with both intraoperative capsular rupture and Nd:YAG laser capsulotomy were rare (a total of four cases and three controls) and, hence, the confidence interval around the odds ratio for this small group was quite wide. The association between Nd:YAG laser capsulotomy and retinal detachment was not modified by other factors such as age, sex, or a history of retinal detachment, lattice degeneration, or PVD.

Multivariate adjustment using conditional logistic regression resulted in few changes in the unadjusted results (Table 5). When uncomplicated by intraoperative posterior capsular rupture, Nd:YAG laser capsulotomy was associated with an almost fourfold excess risk of retinal detachment after adjustment for other potentially confounding variables. Isolated intraoperative capsular rupture produced a 13-fold excess risk, and the combination of the 2 factors was associated with a sixfold excess risk, although this estimate is subject to significant uncertainty due to the small number of subjects with both events. This interaction between capsular rupture during surgery and Nd:YAG capsulotomy was the only important interaction in the data.

The strength of the associations between retinal detachment and a history of retinal detachment, lattice degeneration, and PVD declined after adjustment for the other factors in the regression model. Axial length and refractive error, as measured by spherical equivalent, and trauma after cataract surgery remained strongly associated with postcataract surgery retinal detachment. Of particular interest was the independent contribution of axial length and refraction to the risk of retinal detachment.

Discussion

The results of this population-based case–control study are consistent with the results of our previous analysis of the Medicare claims data, which suggested that Nd:YAG laser posterior capsulotomy is associated with a 3.9-fold excess risk of pseudophakic retinal detachment.[5] The principal methodologic limitations of the previous study, particularly the lack of information on laterality of cataract surgery, Nd:YAG laser capsulotomy, and retinal detachment, and the lack of information regarding other patient and procedural characteristics potentially associated with retinal detachment, were resolved by contacting the cataract and retinal surgery providers to obtain detailed information not available in the claims database. These current results are consistent also with other reports that have examined this issue.[3,4,13–18] The identification of intraoperative posterior capsular rupture as an important risk factor for retinal detachment is similarly consistent with our previous report of a fivefold increase in the risk of retinal detachment after cataract surgery with anterior vitrectomy as compared with cataract surgery alone.

The specific mechanism by which posterior capsule disruption induces this excess risk is not known. It has been hypothesized that alterations in the structure of the vitreous induced by capsulotomy, with accompanying

Table 4. Bivariate Association of Selected Variables with Postcataract Surgery Retinal Detachment

Variables	Patients *Yes/No**	Control Subjects *Yes/No**	Matched Odds Ratio	95% Confidence Interval
Ocular History				
History of retinal detachment in either eye	23/266	13/856	6.0	3.0, 11.8
History of ocular trauma in the cataract surgery eye	4/285	10/859	1.1	0.4, 3.7
History of intraocular surgery in the cataract surgery eye	7/282	21/848	1.2	0.5, 2.7
History of laser surgery in the cataract surgery eye	14/275	27/842	1.6	0.8, 3.1
History of posterior vitreous detachment in the cataract surgery eye	20/269	32/837	2.2	1.2, 4.1
History of lattice degeneration in either eye	13/276	4/865	11.0	3.6, 33.8
History of diabetic retinopathy in the cataract surgery eye	9/280	20/849	1.5	0.6, 3.5
Anatomic Characteristics				
Axial length (mm)				
<22	10	73	1.0	—
22–<23	50	240	1.7	0.8, 3.8
23–<24	62	327	2.6	1.2, 5.6
24–<25	78	141	5.0	2.3, 11.0
25–<26	27	53	4.3	1.8, 10.3
≥26 mm	12	13	8.1	2.8, 24.0
Refraction (spherical equivalent) (diopters)				
>+2.00	28	120	1.0	—
+2.00 to −1.00	98	404	1.1	0.7, 1.7
−1.25 to −2.50	61	137	1.8	1.3, 2.7
−2.625 to −4.00	37	96	1.7	1.1, 2.7
>−4.00	54	86	3.0	1.9, 4.6
Intra- and Postcataract Surgery Characteristics				
Phacoemulsification	127/164	385/483	1.0	0.7, 1.3
Ocular trauma after cataract surgery	6/285	5/865	3.9	1.2, 12.7
Posterior Capsule Integrity				
Posterior capsule intact	137	705	1.0	—
Posterior capsular rupture during cataract surgery alone	61	27	11.1	6.5, 19.0
Nd:YAG capsulotomy alone	87	130	3.8	2.6, 5.5
Both capsular rupture during cataract surgery and Nd:YAG capsulotomy	4	3	6.8	1.4, 33.0

Nd:YAG = neodymium:YAG.

* Yes = subject had the characteristic; no = subject did not have the characteristic.

traction on the retina, may be responsible.[5] The role that posterior vitreous detachment plays in this scenario is also unclear, but in our data both PVD and capsular rupture contributed independently to the risk of retinal detachment. The association between PVD and retinal detachment that we observed may be a result of ascertainment bias and should be viewed with caution, especially as it contradicts at least one previous report.[19] Although we asked on the clinical data form about retinal and vitreous status before cataract surgery, it may have been that physicians treating cases of retinal detachment were more rigorous in their fundus examinations for other factors potentially related to the onset of retinal detachment and assumed that these conditions existed before the index cataract surgery. The same also may be true for a history of lattice degeneration. There is little doubt that lattice degeneration is associated with an increased risk of retinal detachment, but the magnitude of the excess risk observed in our study may be overstated.

The findings of this study show no association between ECCE using phacoemulsification as compared to ECCE using manual expression and retinal detachment (odds ratio = 1.0; 95% confidence interval, 0.7–1.3). The AHCPR-sponsored Cataract Management Guideline Panel was unable to address this issue in its report due to a lack of adequately controlled information.[20] We be-

Table 5. Multivariate Association of Selected Factors with Postcataract Surgery Retinal Detachment

Factor	Adjusted Odds Ratio*	95% Confidence Interval
Posterior Capsule Integrity		
Posterior capsule intact	1.0	—
Posterior capsular rupture during cataract surgery alone	13.4	7.1, 25.2
Nd:YAG capsulotomy alone	3.8	2.4, 5.9
Both posterior capsular rupture during cataract surgery and Nd:YAG	6.3	1.2, 32.9
History of retinal detachment in either eye	2.7	1.2, 6.1
History of lattice degeneration in either eye	6.6	1.6, 27.1
History of posterior vitreous detachment in the cataract surgery eye	1.8	0.8, 3.8
Ocular trauma after cataract surgery	6.1	4.3, 28.2
Axial length (mm)†	1.21	1.03, 1.43
Spherical equivalent (diopters)†	0.92	0.88, 0.95

Nd:YAG = neodymium:YAG.

* All estimates adjusted for the other factors listed. Other factors in bivariate analyses were not significant contributors to the multivariate model.

† Adjusted odds ratio reflects the change in relative odds per mm increase in axial length or 1 diopter increase in spherical equivalent.

lieve that our study has sufficient statistical power to suggest that this issue is of little concern.

The methodologic approach used in this study for ascertainment of cases and controls ensured that the study population was nationally representative of Medicare beneficiaries undergoing cataract surgery. This study is unique in that we not only used the Medicare claims data as a source of the study population, but we were able to go back to original patient records to collect additional information not available in the claims data files. This was possible only because of the broad support for this study from the federal agencies involved (HCFA and AHCPR), the ophthalmologic organizations that recognized the importance of the study (AAO and ASCRS), and our assurance that confidentiality would be maintained. One potential limitation relates to the 22% and 25% nonresponse for cases and controls, respectively. There were no important differences between these groups on basic demographic characteristics, leading us to conclude that it is unlikely that selection bias could be responsible for the observed associations.

As with any observational study, we cannot make absolute conclusions regarding the causal connection between Nd:YAG posterior capsulotomy or any of the other risk factors reported here, and retinal detachment after cataract surgery. However, the consistency of the data from a variety of sources and the strong biologic rationale make causal inference regarding the role of Nd:YAG capsulotomy in retinal detachment a convincing one. We believe the evidence is strong enough to support a causal relationship between these two events.

The findings of the current study, based on a large number of patients and detailed data collected directly from clinical providers, reinforce the need for strong clinical and functional justification for performance of Nd:YAG laser capsulotomy. All patients undergoing this procedure, as well as those who suffer posterior capsule rupture during cataract surgery, should be educated about the symptoms of retinal detachment and told to present promptly for ophthalmologic care if such symptoms develop.

Acknowledgments. The authors thank the following individuals who provided significant assistance to this project: Dr. Debra Street and Qin Wang at Georgetown University School of Medicine, and Phoebe Sharkey at the Loyola College School of Business. In addition, the following federal agencies and other organizations provided invaluable assistance and support: the Agency for Health Care Policy and Research, the Health Care Financing Administration, the American Academy of Ophthalmology, the American Society of Cataract and Refractive Surgeons, and Survey Research Associates, Inc. The authors also thank all the ophthalmologists around the country who responded to their requests for information on their patients and their national advisory board that strongly encouraged the authors to pursue this study. These include Drs. Donald Doughman, Merton Flom, Thomas Harbin, Harry Knopf, Thomas Lewis, Stephen Obstbaum, Denis O'Day, Walter Stark, Arlo Terry, and C. P. Wilkinson.

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