United Kingdom National Ophthalmology Database Study of Vitreoretinal Surgery

Report 3, Retinal Detachment

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Purpose: To describe rhegmatogenous retinal detachment (RD) surgery.

Design: National Ophthalmology Database study.

Participants: A total of 3403 eyes from 3321 patients undergoing primary RD surgery.

Methods: Participating centers prospectively collected clinical data using a single electronic medical record system, with automatic extraction of anonymized data to a national database, from 2002 to 2010.

Main Outcome Measures: Description of the primary procedures performed, intraoperative complication rate, and proportion of eyes undergoing subsequent RD or cataract surgery. We undertook an exploratory analysis of change in visual acuity (VA) using the data available.

Results: Of 3403 operations, 2693 (79.1%) were pars plana vitrectomy (PPV), 413 (12.1%) were retinopexy with a scleral buckle (SB), and 297 (8.7%) were PPV with an SB (PPV-SB). For PPV and PPV-SB, 18.8% were with hexafluoroethane, 12.1% were with perfluoropropane, 43.1% were with sulfahexafluoride, 1.8% were with air, 17.9% were with silicone oil, and 10.7% were with cataract surgery. Within 1 year of vitrectomy, 52.1% of phakic eyes had undergone cataract surgery. For all RD operations combined (and excluding cataract surgery complications), 5.1% had 1 or more intraoperative complication, 13.0% underwent further RD surgery, and 8.3% had silicone oil in situ at last review. The RD reoperation rate was 13.3%, 12.3%, and 14.5% for PPV, SB, and PPV-SB, respectively. For 961 eyes with a baseline and final VA measurement, the median presenting logarithm of the minimum angle of resolution VA improved from 1.0 to 0.5 (20/200–20/63) after a median follow-up of 0.6 years.

Conclusions: These results may help vitreoretinal surgeons to benchmark their intraoperative complication rate and reoperation rate and to compare their surgical techniques with their peers'. They suggest that the benefits of RD surgery greatly outweigh the risks.

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Rhegmatogenous retinal detachment (RD) is a potentially blinding disease with a reported annual incidence of 10.5 per 100 000.[1] There are 3 main operations for the treatment of RD: pneumatic retinopexy, pars plana vitrectomy (PPV) with retinopexy and intravitreal tamponade, and scleral buckle (SB) surgery (also called "cryobuckle" surgery). Vitrectomy is sometimes combined with placement of an SB (PPV-SB). Scleral buckle was once the most commonly performed RD surgery, but nowadays PPV predominates.[2–5] For example, in the United States approximately three quarters of RDs are treated by PPV.[6] A meta-analysis of randomized controlled trial (RCTs) comparing PPV and SB did not find any significant difference in the primary reattachment rate.[7]

Given that RD is the most commonly performed vitreoretinal operation,[8] and because surgical outcomes are less predictable than those for many other eye operations,[9,10] there is considerable clinical interest in the outcome of surgery, and RD success rates are often used as a benchmark outcome.[11,12] It can be difficult to determine the success of RD surgery from the literature because case series may be subject to publication bias[13] and RCTs may not reflect routine clinical care.

For these reasons, we collected pragmatic, anonymized, surgical data from 31 centers using the UK's National Ophthalmology Database (NOD) and recently presented the outcomes of 11 618 vitreoretinal operations performed for a range of conditions.[8] We subsequently analyzed the subset of patients with macular hole.[14] In this article, we analyze the largest subset of patients, those with RD.

Methods

Data Extraction

This report relates to primary vitrectomy and cryobuckle RD operations performed between December 2002 and November 2010. The NOD received data from 31 contributing National Health Service hospitals, as previously reported.[8] The NOD was

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established under the auspices of the Royal College of Ophthalmologists to facilitate national audit, research, and revalidation (mandated continuing professional development that is expected to include measured clinical outcomes).

There were 11 618 vitreoretinal operations recorded in the NOD within the 8-year study period, and of these 4217 were for RD. Only the 3403 patients undergoing primary rhegmatogenous RD surgery by PPV, PPV-SB, and cryobuckle were eligible for inclusion in the analysis, including those undergoing RD surgery combined with cataract surgery. The clinical interventions were not guided by any protocol because this database study was not designed as a clinical trial comparing a new intervention against a clinical standard; rather, it was designed to survey the care delivered outside of a trial setting. All data were captured using 1 electronic medical record (EMR) system (Medisoft Ophthalmology; Medisoft Limited, Leeds, UK). The EMR was designed with the aim of prospectively collecting pragmatic surgical data and having the ability to pool standardized, consistent data to report pooled outcome analyses and establish clinical benchmarks. The lead clinician and Caldicott Guardian (who oversees data protection) at each center gave written approval for the data extraction, and on this basis an ethics committee determined that ethics approval was not required, in line with UK guidance.[15] This study was conducted in accordance with the Declaration of Helsinki and the UK's Data Protection Act.

Complications of Retinal Detachment Surgery

The EMR required surgeons to record whether there were any surgical complications before they could save the operation note, as previously reported.[8,14] Once the surgeon identified that a complication or complications had occurred, he/she was required to select from a list of common complications or enter free text for complications that were not on the prepopulated list. All hospitals using the EMR for vitreoretinal procedures also recorded cataract surgery using the same system, with data submitted to the NOD, and this was used to estimate the incidence of postvitrectomy cataract surgery (PVCS).

Statistical Analysis

The operations were grouped according to the operative procedure used: PPV (without SB), SB without PPV, and PPV-SB. Visual acuity (VA) data were expressed on the logarithm of the minimum angle of resolution (logMAR) scale where VA was categorized as $\leq$0.30, >0.30−0.60, >0.60−0.90, >0.90−1.20, or >1.20 at the time of presentation and the last VA measurement. A VA of count fingers (CF), hand motions (HM), perception of light (PL), and no PL (NPL) were assigned 2.1, 2.4, 2.7, and 3.0, respectively.[14] Visual acuity values less than 6 weeks after primary RD surgery were excluded. Visual success at final review was defined as a gain of $\geq$0.3 logMAR units (~2 Snellen lines) or a final VA of $\geq$0.3 logMAR units (20/40). The Pearson's chi-square test[16] was used to investigate potential differences in the proportion of eyes achieving visual success according to primary RD surgery category and number of RD surgeries (1 vs. >1).

The time to PVCS was modeled using the Kaplan−Meier method,[17] where the failure event was cataract surgery after RD surgery. Eyes were censored at the last date on which follow-up data of any type were recorded on the EMR if they had not had cataract surgery, and all failure times were censored at 5 years. The log-rank test was used to investigate any potential difference in the PVCS rate according to the choice of tamponade used in the primary surgery. All analysis was conducted using Stata version 11 (StataCorp LP, College Station, TX) except for the calculations of 95% confidence intervals (CIs), which were calculated using CI analysis.[18]

Results

Patient Demographics, Presenting Visual Acuity, and Macular Status

A total of 3403 primary RD operations were reviewed. Of these, 150 were not the first vitreoretinal procedure in the eye: 45 had prior retinal tears, 20 had prior macular hole surgery, 16 had prior epiretinal membrane surgery, 12 had prior diabetic vitrectomy surgery, and 67 had other prior vitreoretinal operations. These 150 operations were conducted at a median of 0.2 years (range, 0.0−4.0 years) before the primary RD surgery. The primary RD operations were performed on 1653 left eyes and 1750 right eyes of 3321 patients. Patient demographics are presented in Table 1; the median age at primary RD surgery was considerably lower for SB than for PPV or PPV-SB. Of the RDs, 82 patients had surgery on both eyes and 74 operations were for chronic RD.

The presenting VA was recorded for 1674 eyes (49.2%), with a median logMAR VA of 0.8 and mean of 1.1. The presenting logMAR VA was $\leq$0.30 in 569 eyes, >0.30 to 0.60 in 171 eyes, >0.60 to 0.90 in 131 eyes, >0.90 to 1.20 in 131 eyes, and >1.20 in 672 eyes, including 193 eyes with CF, 336 eyes with HM, 76 eyes with PL, and 7 eyes with NPL.

Surgical Technique and Anesthesia

For primary RD, 2693 operations (79.1%) were PPV, 413 operations (12.1%) were SB, and 297 operations (8.7%) were PPV-SB. For eyes undergoing primary PPV (with or without SB), 1289 (43.1%) used sulfahexafluoride, 561 (18.8%) used hexafluoroethane, 363 (12.1%) used perfluoropropane, 53 (1.8%) used air, 534 (17.9%) used silicone oil, and in 190 (6.4%) the type of tamponade was not recorded. Laser retinopexy was used in 946 eyes (31.6%), cryotherapy was used in 2043 eyes (68.3%), and both were used in 339 eyes (11.5%). Cataract surgery was performed in 320 eyes (10.7%). General anesthesia was used for 823 operations (27.5%), local anesthesia was used for 1663 operations (55.6%; 25 with sedation), and for 504 operations (16.9%) the anesthesia used was unrecorded.

For eyes undergoing primary SB surgery, 44 (10.6%) included drainage of subretinal fluid. Cryotherapy was used for 327 eyes (79.2%), laser retinopexy was used for 11 eyes (2.7%), and both

Table 1. Patient Demographics

Demographics	PPV (n=2628)	SB (n=403)	PPV-SB (n=290)	Total (N=3321)
Sex				
Male	1531 (58.3)	243 (60.3)	182 (62.8)	1956 (58.9)
Female	1096 (41.7)	159 (39.5)	106 (36.6)	1361 (41.0)
Not recorded	1 (0.0)	1 (0.2)	2 (0.7)	4 (0.1)
Ethnicity				
Caucasian	1564 (59.5)	247 (61.3)	145 (50.0)	1956 (58.9)
Asian	24 (0.9)	4 (1.0)	4 (1.4)	32 (1.0)
Black	18 (0.7)	4 (1.0)	3 (1.0)	25 (0.8)
Other	25 (1.0)	4 (1.0)	4 (1.4)	33 (1.0)
Not recorded	997 (37.9)	144 (35.7)	134 (46.2)	1275 (38.4)
Age (yrs) at first retinal detachment surgery				
Median	62.6	39.0	58.4	60.8
Range	0.4−97.2	4.2−85.8	9.4−96.2	0.4−97.2

PPV = pars plana vitrectomy; PPV-SB = pars plana vitrectomy with scleral buckle; SB = scleral buckle.
Data are n (%) unless otherwise indicated.

were used for 6 eyes (1.5%). General anesthesia was used for 274 eyes (66.3%), local anesthesia was used for 67 eyes (16.2%) (none with sedation), and for 72 eyes (17.4%) the anesthesia used was unrecorded.

Intraoperative Complications

Of 3403 primary RD operations, 3197 (93.9%) were recorded as having no intraoperative complication. The overall operative complication rate was 6.1% (206/3403 operations; 95% CI, 5.3−6.9), and the operative complication rates were 6.1% (95% CI, 5.3−7.1), 3.6% (95% CI, 2.2−5.9), and 8.8% (95% CI, 6.0−12.5) for PPV, SB, and PPV-SB, respectively (Table 2). Two intraoperative complications occurred in 12 eyes, and 3 intraoperative complications occurred in 1 eye. If the complications associated with cataract surgery were excluded, then the overall complication rate attributable to RD surgery was 5.1% (187/3384; 95% CI, 4.8−6.3): 5.0% (150/2678; 95% CI, 4.8−6.5) for PPV, 3.6% (15/413; 95% CI, 2.2−5.9) for SB, and 7.5% (22/293; 95% CI, 5.0−11.1) for PPV-SB.

Further Retinal Detachment Surgery

At least 1 further RD operation was undertaken in 445 eyes (13.1%; 95% CI, 12.0−14.3) at a median of 1.4 months (range, 0−31.4 months) after the primary surgery. Eighty-nine eyes (2.6%) had a third RD operation, and 22 eyes had 4 or more RD operations. The RD reoperation rate after primary surgery was 13.0% (351/2693), 12.3% (51/413), and 14.5% (43/297) for PPV, SB, and PPV-SB, respectively. In addition, 282 eyes (8.3%) had silicone oil used for primary surgery that was not recorded as having been removed at last follow-up. A total of 727 (21.4%) primary operations had reoperation for RD or silicone oil in situ at final follow-up.

Postvitrectomy Cataract Surgery

Of the 2990 eyes undergoing PPV as the primary treatment for RD, 1712 were excluded from the PVCS analysis: 259 because the NOD indicated that they had previous cataract surgery, 320 because they had combined RD and cataract surgery, 303 because they had further RD surgery, 32 because they experienced a lens touch complication during primary surgery, and 798 because they had less than 3 weeks of follow-up. Of the remaining 1278 eyes eligible for analysis, the median follow-up was 0.7 years (range, 22−5.6 years), and 581 (45.5%) were subsequently recorded as undergoing cataract surgery. The 1, 2, 3 and 5 years PCVS rates were 54.1%, 73.0%, 78.8% and 87.4% respectively (Fig 1). No statistical differences in the PVCS rate were observed for the type of tamponade used ($P = 0.442$).

Change in Visual Acuity

Of the 1674 eyes with a presenting VA recorded, 154 had no further VA measurements and 559 had less than 6 weeks of follow-

Table 2. Intraoperative Complications

	PPV (N = 2693) n (%)	SB (N = 413) n (%)	PPV-SB (N = 297) n (%)	Total (N = 3403)
Operations with no reported complications	2528 (93.9%)	398 (96.4%)	271 (91.2%)	3197 (93.9)
Operations with reported complications	165 (6.1%)*	15 (3.6%)*	26 (8.8%)*	206 (6.1)
Reported complications				
Iatrogenic tear	50 (1.9)	0 (0.0)	6 (2.0)	56 (1.6)
Lens touch	36 (1.3)	0 (0.0)	1 (0.3)	37 (1.1)
Choroidal/suprachoroidal hemorrhage	12 (0.4)	1 (0.2)	2 (0.7)	15 (0.4)
Infusion cannula in subretinal/suprachoroidal space	13 (0.5)	0 (0.0)	1 (0.3)	14 (0.4)
Iatrogenic retinal trauma	13 (0.5)	0 (0.0)	1 (0.3)	14 (0.4)
Posterior capsule rupture, no vitreous loss*	7 (0.2)	0 (0.0)	4 (1.3)	11 (0.3)
Subretinal hemorrhage	6 (0.2)	3 (0.7)	2 (0.7)	11 (0.3)
Conjunctival buttonhole	6 (0.2)	0 (0.0)	1 (0.3)	7 (0.2)
Inadvertent subretinal fluid drainage	0 (0.0)	6 (1.5)	1 (0.3)	7 (0.2)
Corneal epithelial abrasion	2 (<0.1)	1 (0.2)	2 (0.7)	5 (0.1)
Hyphema	4 (0.1)	0 (0.0)	0 (0.0)	4 (0.1)
Retinal hemorrhage	2 (<0.1)	1 (0.2)	1 (0.3)	4 (0.1)
Corneal edema	2 (<0.1)	0 (0.0)	0 (0.0)	2 (<0.1)
Iris trauma*	2 (<0.1)	0 (0.0)	0 (0.0)	2 (<0.1)
Nuclear/epinuclear fragments into vitreous*	2 (<0.1)	0 (0.0)	0 (0.0)	2 (<0.1)
Posterior capsule rupture, vitreous loss*	2 (<0.1)	0 (0.0)	0 (0.0)	2 (<0.1)
Retinal incarceration	1 (<0.1)	0 (0.0)	1 (0.3)	2 (<0.1)
Vitreous hemorrhage	2 (<0.1)	0 (0.0)	0 (0.0)	2 (<0.1)
Zonule rupture, vitreous loss*	2 (<0.1)	0 (0.0)	0 (0.0)	2 (<0.1)
Subretinal heavy liquid	1 (<0.1)	0 (0.0)	0 (0.0)	1 (<0.1)
Suprachoroidal silicone oil	1 (<0.1)	0 (0.0)	0 (0.0)	1 (<0.1)
Zonule dialysis*	1 (<0.1)	0 (0.0)	0 (0.0)	1 (<0.1)
Other	10 (0.4)	4 (1.0)	3 (1.0)	17 (0.5)
Total†	177	16	26	219

PPV = pars plana vitrectomy; PPV-SB = pars plana vitrectomy with scleral buckle; SB = scleral buckle.
*The number of patients with complications (as shown in the second row) includes lens-related complications occurring in eyes with combined cataract surgery. These complications are marked with an asterisk in the first column. If the complications associated with cataract surgery were excluded then the overall complication rate reduced to 5.1%. Further details are provided in the text.
†More than 1 intraoperative complication could be reported for each operation, and therefore the sum of the individual complication percentages exceeds the percentage of operations with a complication.

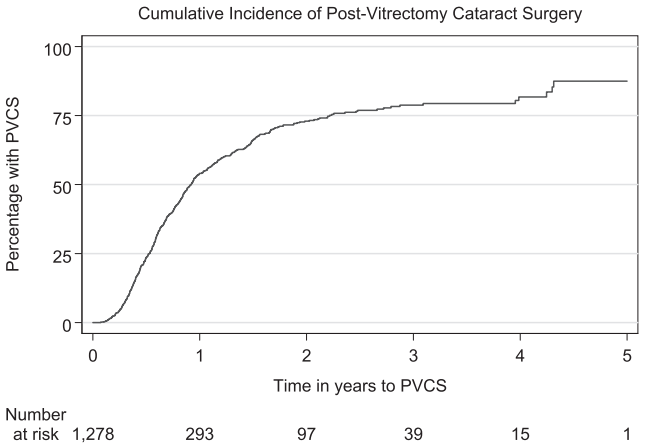

Figure 1. Kaplan–Meier failure graph of postvitrectomy cataract surgery (PVCS), with cataract surgery modeled as failure. The rates are those for eyes in which a pars plana vitrectomy was performed for primary rhegmatogenous retinal detachment, excluding eyes known to be pseudophakic, eyes with lens touch recorded during vitrectomy, or cases with less than 3 weeks of follow-up.

up data. Of the 961 eyes eligible for change in VA analysis, the median presenting logMAR VA was 1.0 (Snellen 20/200) and the mean presenting logMAR VA was 1.2 (20/317). At 12 weeks after primary RD surgery, 508 eyes had a VA record. The median VA was 0.5 (20/63) and the mean VA was 0.8 (20/126), including 55 eyes with CF, 22 eyes with HM, 5 eyes with PL, and 2 eyes with NPL. At 52 weeks, the 696 eyes eligible for analyses had a median VA of 0.5 (20/63), and the mean VA was 0.8 (20/126), including 52 eyes with CF, 37 eyes with HM, 10 eyes with PL, and 5 eyes with NPL. The last recorded VA ranged from 6.1 weeks to 6.3 years (median 0.6 years) after primary RD surgery. At this time, the median VA was 0.5 (20/63) and the mean VA was 0.7 (20/100), including 79 eyes with CF, 49 eyes with HM, 15 eyes with PL, and 6 eyes with NPL (Fig 2). Of the 961 eyes with a final

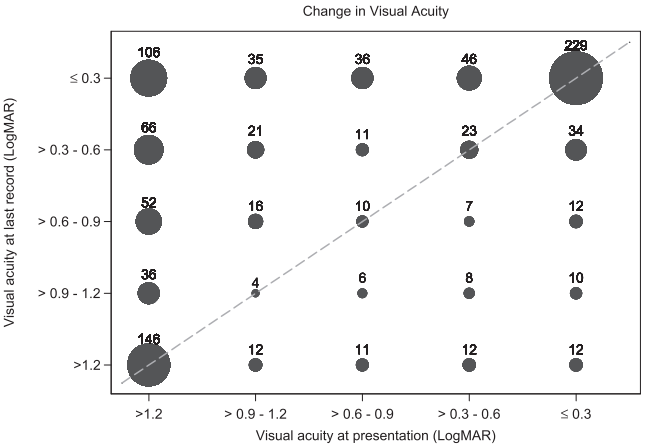

Figure 2. The logarithm of the minimum angle of resolution (logMAR) visual acuity (VA) at presentation is compared with the measurement at final review in 961 eyes. The area of each data point reflects the number of eyes in that category. An eye that has an increase in VA appears above the *diagonal gray line* of identity, eyes with no change in VA lie on the line, and eyes with a decrease in VA lie below the line. The VA at final review was in a better VA category than at presentation for 425 eyes, in the same category for 412 eyes, and in a worse category for 124 eyes.

VA, 664 had a presenting VA <20/40 (median 2.1/CF; mean 1.7), and for these the final median VA was 0.6 (20/80) with a mean of 0.9 (20/159). For the 297 eyes with a presenting VA of ≥20/40 (median 0.2; mean 0.1), the final median VA was 0.2 (20/32) with a mean of 0.3 (20/40).

In 823 eyes undergoing primary RD surgery with PPV, the VA improved from a median of 1.0 (20/200; mean 1.2, 20/317) at presentation to 0.5 (20/63; mean 0.7, 20/100) at final review. For the 74 eyes with primary SB surgery for RD, the median presenting VA of 0.5 (20/63; mean 0.7, 20/100) improved to 0.3 (20/40; mean 0.5, 20/63) at final review. For the 64 eyes in the primary PPV-SB group, the median presenting VA of 2.1/CF (mean 1.6, 20/796) improved to 0.8 (20/126; mean 1.1, 20/252) at final review.

Overall, 69.6% (669/961; 95% CI, 66.6–72.4) of eyes achieved visual success, including 217 (22.6%; 95% CI, 20.0–25.3) that gained 0.3 logMAR units (~2 Snellen lines), 452 (47.0%; 95% CI, 43.9–50.2) that obtained a final logMAR VA of ≥0.3 (20/40), and 221 (23.0%; 95% CI, 20.4–25.8) that met both criteria for success. There was no significant difference in the proportion of eyes achieving visual success by surgery category, where 69.7%, 71.6%, and 65.6% of eyes whose primary RD was PPV, SB, and PPV-SB, respectively, achieved visual success ($P = 0.730$) (Table 3, available at http://aaojournal.org). A lower proportion of eyes undergoing repeat RD surgery achieved visual success compared with eyes undergoing only 1 RD surgery (42.9% vs. 75.3%; $P < 0.001$) (Table 4).

Discussion

This database study provides pragmatic clinical data on the treatment of RD. We found that 5.1% of RD operations had an intraoperative complication, 13.1% required further RD surgery, and 54.1% of phakic eyes underwent cataract surgery within 1 year of PPV. Median VA improved substantially, from 20/200 to 20/63 at 1 year.

The complication rate is consistent with the literature. Our database study of 11 618 vitreoretinal operations,[8] of which the present data are a subset, found that PPV was associated with intraoperative complications in 7.8% of cases, and as with the present report, iatrogenic retinal tears were the most common complication. Several recent studies specifically reported the incidence of iatrogenic retinal breaks during PPV,[19–23] but all except one of these

Table 4. Visual Success in 961 Eyes

	Visual Success (n)	No Visual Success (n)	Total (n)	% Achieving Visual Success	P Value*
Type of surgery					.73
PPV	574	249	823	69.7	
SB	53	21	74	71.6	
PPV-SB	42	22	64	65.6	
No. of operations for RD					.00
1 operation	597	196	793	75.3	
>1 operation	72	96	168	42.9	

PPV = pars plana vitrectomy; PPV-SB = pars plana vitrectomy with scleral buckle; RD = retinal detachment; SB = scleral buckle.
*Chi-square test.

excluded cases of RD. That study reported 30% of cases developed an iatrogenic retinal break, but the study included only 20 patients with RD.[21] A large RCT of PPV for RD reported entry site breaks in 0.65% of cases, compared with 2.0% in the present series, but our series did not limit iatrogenic retinal breaks to those occurring near the ports. Vitrectomy is known to cause cataract, and the rate of post-vitrectomy cataract is as expected.[8–10]

The finding that 13.1% of eyes required further RD surgery suggests an anatomic success rate of 86.9%. This assumes that eyes with primary RD failure undergo further surgery, which, on the basis of clinical practice, is likely to be true for the majority of cases, but some patients with failed primary surgery may elect not to undergo further intervention, and therefore the true success rate may be slightly lower. Conversely, a small number of late failures, occurring beyond our median follow-up of 7 months, may increase our failure rate. The literature suggests that this effect is likely to be small because most failures occur within 3 months of primary surgery.[24,25] In support of the literature, we found that the second RD operation occurred at a median of only 1.4 months after the first. Some patients may elect to have their second operation elsewhere, at a center that does not provide data to the NOD, although within the UK system that is likely to be a small proportion. There were also 8.3% of patients who had primary surgery with silicone oil in situ at last follow-up. If success is defined as no further RD surgery and with silicone oil removed, then the overall success rate decreases to 79%.

A large database study from Taiwan found a 13.8% readmission rate after RD surgery, using data from 2005.[26] A nationwide, cross-sectional survey of 768 patients in the UK, reporting in 2002, found a primary retinal reattachment rate of 82%.[11] A UK RCT of 615 patients undergoing PPV for RD reported a failure rate of 15.6%, similar to the 13.0% in the 2693 eyes undergoing PPV in our study, but less than the 23.3% reported in a large European RCT.[9] A recent population-based Scottish epidemiology study recently reported a success rate of 81%, excluding cases with silicone oil in situ.[27]

Because the VA dataset had poor levels of data completeness, it should be considered exploratory in nature; however, median VA improved substantially. This suggests that RD surgery produces a meaningful benefit in the majority of patients. Defining visual success was difficult because we were not able to accurately determine whether RDs were macular-on or macular-off. Therefore, we defined success as those eyes gaining 0.3 logMAR units (~2 Snellen lines) or those eyes with a final logMAR VA of $\geq$0.3 (20/40). On this basis, 69.1% achieved visual success. Defined visual outcomes allowed us to compare different techniques, revealing little difference in the success of PPV, SB, and combined PPV-SB; however, it is not certain whether this approach is an effective proxy for knowing the macular status, and an eye that presented with a macular-on RD that went from 20/10 to 20/40 after surgery would be classified as a success. Nonetheless, for categoric analysis, benchmarking, and comparison with the literature, it can be helpful to choose a definition of success, accepting that it is somewhat arbitrary.

A strength of our study is that the results may be more representative than those obtained from RCTs, which usually have close monitoring of clinical care and typically occur within university hospitals. Furthermore, RCTs usually have mandated interventions and follow-up that are dictated by trial design rather than usual clinical practice, and where rigid eligibility criteria can lead to selection bias. Our results may also be less subject to publication bias than series from single centers, assuming clinicians are reluctant to be associated with poor outcomes, and that journals may be less likely to publish average or below average results or those with little novelty.[13] The EMR-mandated collection of complication data is likely to encourage reporting, in that clinicians could not simply omit to report a complication, unless they made a false declaration that none occurred. Anonymized data collection may also encourage open reporting of surgical complications, although it may not alter an innate tendency to underreport adverse events.

Weaknesses of this study include the fact that data capture was not mandated in all fields of the EMR, and consequently some items were incomplete. Most notable, only 28% of cases had baseline and follow-up VA data beyond 6 weeks. This raises the possibility of selective data capture, and therefore the VA data are likely to be less reliable than the data on surgical procedures and intraoperative complications. As such, this study provides helpful data on surgical techniques and complications, but the VA results must be interpreted with considerable caution. Also, our findings may not be generalizable to all clinical environments and countries.

In conclusion, these results may help clinicians to compare their surgical techniques with their peers' and to benchmark their reoperation and intraoperative complication rates. One option is to choose the upper 95% CI of the intraoperative complication rate (6.3%, excluding complications associated with cataract surgery) as a minimum standard. Although this has appeal in terms of simplicity, it is important to consider the complexity of the case mix, the timing of patient presentation, the level of surgeon experience, and any regional or national differences in service provision. Many of these variables are difficult to assess, but future studies might attempt to quantify known prognostic indicators[28] and mandate collection of nationally agreed postoperative data.

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United Kingdom National Ophthalmology Database Study of Vitreoretinal Surgery: Report 3, Retinal Detachment 000

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A database study of 3403 retinal detachment operations found a 5.1% intraoperative complication rate, with 13.1% requiring reoperation for retinal detachment.