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RESEARCH ARTICLE

First-Year Fellow Single Surgery Success Rate in Primary Rhegmatogenous Retinal Detachments

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Abstract

Purpose: To evaluate the single surgery success rate (SSSR) of a first-year vitreoretinal surgery fellow managing primary rhegmatogenous retinal detachments (RRDs) under attending supervision.

Methods: A retrospective review of primary RRD cases performed by a first-year vitreoretinal fellow at Retina Associates of Cleveland Inc from July 1, 2023, to June 30, 2024 was conducted. Cases included pars plana vitrectomy (PPV) with gas endotamponade, excluding primary scleral buckles and combined procedures. The primary outcome was defined as successful retinal reattachment without additional surgical intervention within 3 months. Subgroup analysis excluded eyes with prior vitreoretinal surgery and complex cases such as proliferative vitreoretinopathy (PVR), giant retinal tears, choroidal detachments, or retinoschisis. Statistical analysis was performed using R and Microsoft Excel software. Chi-square testing was utilized to analyze the potential influence of attending surgeons on surgical outcomes.

Results: The overall SSSR was 91% (95% CI 84%, 96%), with 98 eyes successfully reattached after a single surgery. The reoperation rate within 3 months was 9%, and the overall reoperation rate was 10%. Excluding prior surgeries and complex cases, the SSSR improved to 94%. No significant differences in outcomes were observed across attending surgeons ($p = 0.764$). The fellow's success rate was comparable to published SSSR rates among experienced retinal surgeons.

Conclusions: A first-year vitreoretinal fellow achieved a 91% SSSR in primary RRD repair, improving to 94% in less complex cases. These findings suggest that, under appropriate supervision, early surgical competency in vitreoretinal surgery can be achieved with outcomes comparable to attending surgeons.

Keywords: First-Year Vitreoretinal Fellow, Single Surgery Success Rate, Primary Rhegmatogenous Retinal Detachment, Pars Plana Vitrectomy, Retinal Reattachment, Surgical Competency.

1. Introduction

Rhegmatogenous retinal detachment (RRD) remains a critical ophthalmic emergency with potentially devastating consequences for vision if not promptly and effectively addressed. The global incidence of RRD is approximately 12.17 per 100,000 population annually, with higher rates in populations with significant myopia and among individuals aged 50-70 years old[1–3]. Surgical intervention represents the primary management strategy, with multiple techniques including pneumatic retinopexy, scleral buckle, and pars plana vitrectomy offering varying success rates in anatomical and functional restoration of the retina[1].

The development of surgical expertise in vitreoretinal surgery presents a complex challenge in medical

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education. Fellowship programs play a crucial role in bridging the gap between theoretical knowledge and practical surgical skills, providing a structured environment where emerging ophthalmologists can develop critical technical competencies[4,5]. Recent literature emphasizes the delicate balance between patient safety and educational progression, highlighting the importance of supervised surgical training in ophthalmology[3,6–10].

Despite the importance of RRD repair, limited research exists specifically examining the performance of first-year fellows[6,8,10–12]. Other fields have demonstrated higher failure rates in procedures completed by non-experienced fellows compared to experienced fellows[13], and one study of vitreoretinal fellows showed significant improvement in rate of anatomic success in tractional retinal detachment surgery from the first year of fellowship to the second[14]. This study addresses a gap in current literature by evaluating the single surgery success rate (SSSR) of a first-year vitreoretinal fellow in RRD repair by pars plana vitrectomy (PPV). The significance of this research extends beyond immediate surgical outcomes. It represents a critical examination of how structured surgical training can effectively prepare ophthalmologists for the complex and delicate procedures required in retinal surgery. By documenting the performance of a first-year fellow under direct attending supervision, this study provides a transparent and comprehensive view of the learning process in vitreoretinal surgical training and provides a benchmark for fellows in training and program directors.

2. Materials and Methods

A retrospective review was conducted of all primary RRD cases performed by the first-year vitreoretinal fellow at Retina Associates of Cleveland Inc from July 1, 2023 to June 30, 2024. Primary cases were defined as >95% of the case performed by the fellow. Data collected included eye laterality, macular status, lens status, attending surgeon, history of prior vitreoretinal surgery, and presenting features portending to surgical failure. The primary outcomes were SSSR, defined as successful retinal reattachment without additional surgical intervention within 3 months, and the overall reoperation rate. All patients included underwent PPV with gas endotamponade. Inclusion criteria encompassed all primary RRD cases performed by the first-year fellow under direct attending supervision. Primary scleral buckles and combined scleral buckle-vitrectomies were both excluded to make the analysis more robust with only primary vitrectomies and smaller numbers of these other surgeries. A subgroup analysis was performed excluding eyes with prior vitreoretinal surgery and complex cases, such as those involving pre-existing proliferative vitreoretinopathy (PVR), giant retinal tears (GRT), choroidal detachments, or retinoschisis. The influence of different attending surgeons on outcomes was also analyzed using a Chi-square test.

A comprehensive follow-up protocol was implemented, with patients evaluated at standard intervals: immediate postoperative period, one-month, and three-month post-surgical assessments. Anatomical success was determined through ophthalmologic examination and diagnostic imaging, specifically optical coherence tomography (OCT) and fundus photography.

Statistical analysis was performed using R and Microsoft Excel software. Chi-square testing was utilized to analyze the potential influence of attending surgeons on surgical outcomes. A significance level of $p < 0.05$ was predetermined to indicate statistical significance. A subgroup analysis was conducted to evaluate SSSR excluding eyes with prior vitreoretinal surgery and complex cases such as those involving PVR, choroidal detachments, retinoschisis, or giant retinal tears.

The study protocol was approved by the institutional review board, with patient confidentiality maintained through comprehensive anonymization procedures. Patient consent was obtained through standard institutional procedures. All patient data were anonymized and handled in compliance with Health Insurance Portability and Accountability Act (HIPAA) regulations. The study design prioritized patient safety and adhered to the principles of the Declaration of Helsinki for medical research involving human subjects.

3. Results

A total of 109 eyes from 107 patients were included, consisting of 70 males and 37 females, with 66 right eyes and 41 left. Surgeries were performed under the supervision of 9 different attending surgeons within the practice. Seven eyes had prior vitreoretinal surgery for retinal detachment and 4 eyes had prior vitreoretinal surgery for other retinal pathology. 55 cases involved the macula, compared to 52 cases that did not. 64 cases were pseudophakic compared to 43 that were phakic eyes.

The overall SSSR was 90% (95% CI 84%, 96%), with 98 eyes successfully reattached after a single surgery. The reoperation rate within 3 months was 9%, the reoperation rate after 3 months was 1% (1 case), and the overall reoperation rate was 10% (11 cases). Eyes with macula-on detachments demonstrated significantly higher success rates to those with macula-off detachments (p=0.003). When eyes with prior vitreoretinal surgery and complex cases, including PVR, giant retinal tear, schisis, and choroidal detachment, were excluded, the SSSR improved to 94%.

Significance testing comparing the 3 month surgical success rate of this study to that found in a large study of retinal surgeons by Ryan et al. found the SSSR was not significantly different than the published rate of 83.1% SSSR in phakic eyes treated with PPV (p=0.985) (Figure 1)[15].

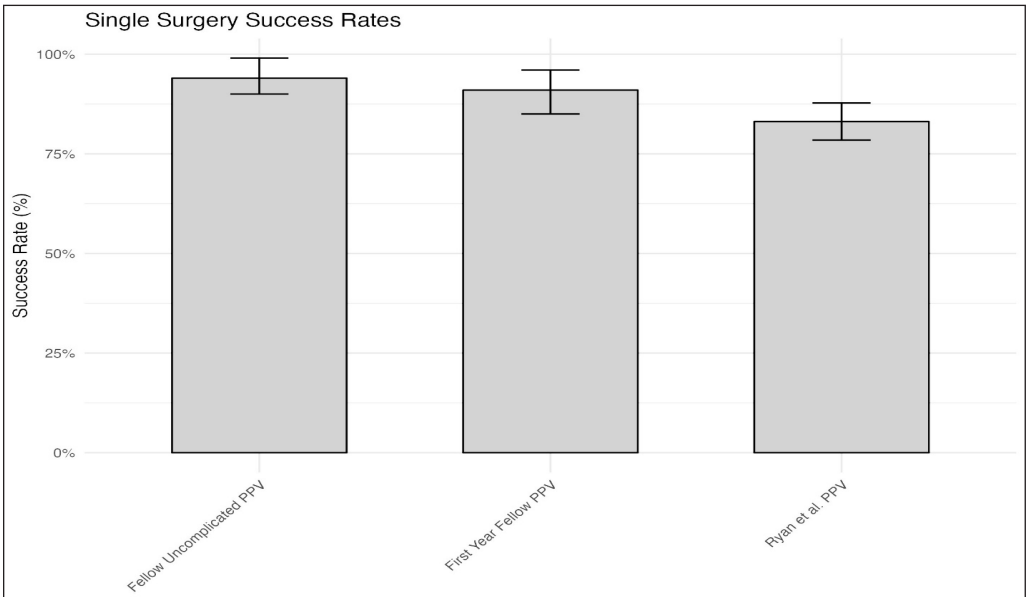

Figure 1. Analysis of attending surgeon showed no statistically significant differences in reoperation rates (p = 0.764), indicating consistent outcomes across different supervising attending surgeons.

4. Discussion

The findings of this study provide critical insights into the surgical performance of a first-year vitreoretinal surgery fellow managing primary rhegmatogenous retinal detachments. The overall single surgery success rate of 91%, improving to 94% when excluding eyes with prior vitreoretinal surgery and complex cases, demonstrates remarkable early competency in surgical intervention under appropriate supervision.

This analysis revealed consistent success rates across different attending surgeons, suggesting a standardized and effective supervision model. This finding carries important implications for fellowship training programs, as it demonstrates that with proper supervision, early surgical independence can be achieved safely. The supervision model appears to effectively balance educational needs with patient safety. This aligns with previous literature showing that graduated responsibility in surgical training leads to improved outcomes[16–18].

Reoperation rates of 9-10% are consistent with existing literature on RRD repair, suggesting that the first-year fellow's performance is on par with established surgical standards[6,10,15,19]. Additionally, increased rate of reoperation with giant retinal tears and PVR on presentation is consistent with existing literature[20,21]. The distribution of case complexity in our study merits careful consideration. While cases with prior vitreoretinal surgery, pre-existing PVR, and GRTs were excluded, our cohort included a representative mix of macula-on and macula-off detachments, as well as phakic and pseudophakic cases. This diverse case mix suggests that first-year fellows can successfully manage varying levels of surgical complexity. However, the improved SSSR (94%) when excluding eyes with prior vitreoretinal surgery and complex cases highlights the importance of appropriate case selection early in training. This finding supports a graduated approach to surgical education, where fellows begin with straightforward cases before progressing to more complex presentations.

Prior study has found similar complication rates in fellows compared to attending surgeons in primary pars plana vitrectomy, epiretinal membrane peeling as well as macular hole repair[7,22]. In addition,

surgeries involving fellows take longer than surgeries by attending surgeons[23]. This study found similar safety and efficacy in vitrectomies for primary retinal detachment repair for the first-year fellow to those previously reported, supporting early independent surgery for vitreoretinal fellows under appropriate supervision.

Limitations of the study include the single fellow being studied and the single-center design. Future research should consider multi-fellow and multi-center comparisons to validate these findings. Additionally, a more detailed analysis of specific factors contributing to surgical success could provide deeper insights into surgical training methodologies.

The implications for clinical practice are substantial. Our findings support the early integration of fellows into the surgical management of primary RRDs, provided appropriate supervision is maintained. This has important implications for patient counseling, as our data suggests that fellow involvement does not compromise surgical outcomes. However, the potential impact on surgical efficiency[23], must be balanced against the educational benefit and the maintenance of high surgical standards.

5. Conclusion

A first-year vitreoretinal fellow achieved a 91% single surgery success rate in primary RRD cases, with improvement to 94% with exclusion of eyes with prior vitreoretinal surgery and complex cases. The SSSR from this study is comparable to accepted SSSR among attending surgeons, as demonstrated in previous literature. These findings support the early competency of the fellow in straightforward repairs.

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