



## Research Article

### Enhancing Surgical Outcomes in Retinal Vein Thrombosis: A Comparative Study of Treatment Approaches

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#### ABSTRACT

**Background:** Retinal vein thrombosis (RVT) is a prevalent retinal vascular disorder that can lead to significant vision loss due to complications such as macular edema and retinal neovascularization. Effective management of RVT involves various surgical interventions including vitrectomy, retinal laser photocoagulation, and intravitreal anti-VEGF injections. Despite advancements in treatment, optimizing outcomes remains challenging. Understanding how different surgical approaches impact visual acuity and complication rates is crucial for improving patient care. This study aims to compare these treatment modalities to identify the most effective strategies for enhancing visual outcomes and minimizing complications in RVT management.

**Objective:** To assess the effectiveness of vitrectomy, retinal laser photocoagulation, and intravitreal anti-VEGF injections in improving visual acuity and reducing complications in RVT patients.

**Material and Methods:** A study was conducted in the Department of Ophthalmology including 60 patients with RVT. Patients received one of three surgical treatments: vitrectomy, laser photocoagulation, or anti-VEGF injections. Outcomes were measured in terms of visual acuity and postoperative complications.

**Results:** Vitrectomy resulted in the greatest improvement in visual acuity. Laser photocoagulation and anti-VEGF injections also showed significant improvements, with varying incidence rates of complications.

**Conclusion:** Tailoring surgical interventions to the specific needs of RVT patients can enhance visual outcomes and reduce complications. Combining treatment modalities may offer optimal results.

**Keywords:** Retinal vein thrombosis, Vitrectomy, Laser photocoagulation, Anti-VEGF injections, Visual acuity, Surgical outcomes

#### INTRODUCTION:

Retinal vein thrombosis (RVT) is a significant cause of vision loss in adults, characterized by the occlusion of one of the retinal veins. This condition can lead to serious complications such as macular edema, neovascularization, and subsequent vision impairment. Optimal management of RVT involves a combination of medical and surgical interventions aimed at improving visual outcomes and minimizing complications (1).

The surgical treatment of RVT has evolved over the years, with advancements in techniques and technology enhancing the efficacy of interventions. One of the key components in optimizing surgical outcomes is the selection of appropriate treatment modalities based on the type and severity of the thrombosis (2). Current surgical options include vitrectomy, retinal laser photocoagulation, and intravitreal injections of anti-vascular endothelial growth factor (anti-VEGF) agents (3). These treatments aim to

address complications such as macular edema and retinal neovascularization, which are common in RVT cases.

**Vitrectomy** is often employed to remove vitreous hemorrhage and treat retinal neovascularization, potentially improving visual outcomes in severe cases of RVT (4). **Retinal laser photocoagulation** helps to reduce retinal ischemia and prevent neovascularization, which can significantly impact the progression of RVT (5). Additionally, **intravitreal anti-VEGF injections** have been shown to be effective in managing macular edema associated with RVT, leading to improved visual acuity (6).

Despite the availability of these treatments, optimizing surgical outcomes requires a comprehensive approach that includes patient selection, timing of intervention, and combination therapies. Various studies have demonstrated that individualized treatment plans based on the specific characteristics of RVT can lead to better visual outcomes and reduced complications (7). Understanding the factors that influence the effectiveness of surgical interventions in RVT is crucial for improving patient care and achieving optimal results.

This study aims to evaluate and optimize the surgical treatment outcomes of RVT by analyzing different treatment modalities and their impact on visual acuity and complication rates.

### Aims and Objectives:

**Aim:** To evaluate and optimize the surgical treatment outcomes for patients with retinal vein thrombosis (RVT).

### Objectives:

1. To assess the effectiveness of different surgical treatments for RVT in improving visual acuity.

2. To identify factors that influence the success of surgical interventions and their impact on complications associated with RVT.

### Material and methods:

This study was conducted in the Department of Ophthalmology at a tertiary care hospital. The study included 60 patients diagnosed with retinal vein thrombosis.

### Study Population:

#### • Inclusion Criteria:

- Patients diagnosed with retinal vein thrombosis.
- Patients aged 18 years and above.

#### • Exclusion Criteria:

- Patients with other major retinal diseases or systemic conditions affecting the retina.
- Patients with incomplete data or follow-up.

**Data Collection:** Patients were assessed preoperatively and postoperatively using standard ophthalmic evaluations. Surgical treatments included vitrectomy, retinal laser photocoagulation, and intravitreal anti-VEGF injections. Visual acuity was measured using Snellen charts, and retinal imaging was performed to assess macular edema and neovascularization. Complications and outcomes were recorded throughout the follow-up period.

**Outcome Measures:** The primary outcomes included changes in visual acuity and the incidence of postoperative complications. Data were analyzed using statistical methods to compare the effectiveness of different surgical interventions.

### Results:

**Table 1: Visual Acuity Improvement Post-Surgery**

| Treatment                  | Mean Preoperative VA (LogMAR) | Mean Postoperative VA (LogMAR) | Improvement (LogMAR) |
|----------------------------|-------------------------------|--------------------------------|----------------------|
| <b>Vitrectomy (n = 20)</b> | 1.60 ± 0.45                   | 0.90 ± 0.40                    | 0.70 ± 0.35          |

|                                        |             |             |             |
|----------------------------------------|-------------|-------------|-------------|
| <b>Laser Photocoagulation (n = 20)</b> | 1.55 ± 0.50 | 1.05 ± 0.45 | 0.50 ± 0.30 |
| <b>Anti-VEGF Injection (n = 20)</b>    | 1.70 ± 0.55 | 1.10 ± 0.50 | 0.60 ± 0.40 |

**Table 1** shows the improvement in visual acuity (VA) for different surgical treatments. Vitrectomy resulted in the greatest improvement in VA, with a mean change of 0.70 LogMAR.

Laser photocoagulation and anti-VEGF injections also showed significant improvements, but with less pronounced gains compared to vitrectomy.

**Table 2: Incidence of Postoperative Complications**

| Treatment                              | Macular Edema (%) | Retinal Neovascularization (%) | Infection (%) |
|----------------------------------------|-------------------|--------------------------------|---------------|
| <b>Vitrectomy (n = 20)</b>             | 15%               | 10%                            | 5%            |
| <b>Laser Photocoagulation (n = 20)</b> | 20%               | 5%                             | 0%            |
| <b>Anti-VEGF Injection (n = 20)</b>    | 25%               | 15%                            | 0%            |

**Table 2** presents the incidence of postoperative complications associated with each treatment modality. Anti-VEGF injections had the highest incidence of macular edema, while vitrectomy had the lowest rate of retinal neovascularization. Laser photocoagulation showed the lowest rates of complications overall.

### Discussion:

The results of this study underscore the effectiveness of various surgical treatments for retinal vein thrombosis. Vitrectomy demonstrated the most significant improvement in visual acuity, likely due to its ability to address both vitreous hemorrhage and retinal neovascularization. This finding aligns with previous studies highlighting the benefits of vitrectomy in severe cases of RVT (8).

Laser photocoagulation was effective in reducing retinal neovascularization and preventing further complications, but with a moderate impact on visual acuity compared to vitrectomy (9). Anti-VEGF injections, while beneficial for managing macular edema, were associated with a higher incidence of postoperative macular edema. This finding suggests that while anti-VEGF therapy is effective, it may need to be combined with other interventions for optimal results (10).

The incidence of complications varied across treatment modalities, highlighting the need for individualized treatment plans based on the specific characteristics of RVT and patient health status. The results suggest that a tailored approach, potentially combining different surgical interventions, may offer the best outcomes for managing RVT (11).

### Conclusion:

Optimizing the surgical treatment of retinal vein thrombosis involves selecting appropriate interventions based on the severity and type of RVT. Vitrectomy showed the highest efficacy in improving visual acuity, while laser photocoagulation and anti-VEGF injections also provided beneficial outcomes with varying degrees of effectiveness. Individualized treatment plans and combination therapies may enhance overall treatment success and minimize complications. Future research should continue to explore and refine these strategies to improve patient outcomes in RVT management.

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