**Management of Bilateral Corneal Perforation Complicating Rheumatoid Arthritis: *A Case Report***

**Abstract:**

Rheumatoid arthritis (RA) can lead to severe ophthalmological complications, particularly peripheral ulcerative keratitis (PUK), which may progress to corneal perforation, threatening both functional and anatomical prognosis. We report the case of a 65-year-old patient with erosive and deforming RA who developed bilateral corneal perforation. Management required a multidisciplinary approach combining medical and surgical treatments, including amniotic membrane transplantation and anti-TNF biotherapy. The outcome was marked by satisfactory corneal healing and partial functional improvement. This case highlights the importance of early diagnosis and appropriate management to optimize visual prognosis.

**Keywords:** Corneal perforation, rheumatoid arthritis, peripheral ulcerative keratitis, amniotic membrane transplantation, anti-TNF biotherapy

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**Introduction**:

Rheumatoid arthritis (RA) is a systemic autoimmune disease characterized by chronic inflammation that primarily affects the synovial joints but can also involve extra-articular organs, including the eyes. Peripheral ulcerative keratitis (PUK) is the most severe ocular manifestation of RA, often leading to corneal thinning and perforation, which threaten visual function and ocular integrity. Corneal perforation is a rare but devastating complication that requires urgent intervention to preserve vision and the structural integrity of the eye.

Several therapeutic strategies have been employed to manage RA-associated corneal perforations, including medical treatment with immunosuppressive agents and surgical interventions such as amniotic membrane transplantation (AMT) and keratoplasty. This article presents a detailed case report of a patient with bilateral corneal perforation associated with RA and provides an extensive discussion based on a review of the literature.

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**Case Report:**

A 65-year-old patient followed for 17 years for seropositive erosive and deforming RA, was hospitalized in internal medicine for a severe flare of her disease. She presented to ophthalmology with bilateral decreased visual acuity associated with ocular pain and redness.

Ophthalmological examination revealed:

- Bilateral corneal perforation.

- Left eye (LE): 4 mm perforation nasally. **(figure 2)**

- Right eye (RE): 3 mm perforation superonasally. **(figure 1)**

 

**Figure 1**: Perforation 3 mm RE **Figure 2**: Perforation 4mm LE

Management was conducted in two stages:

**1. Control of perforation and inflammation:**

 - Administration of corticosteroid boluses.

 - Immunosuppressive therapy with anti-TNF biotherapy.

 - Amniotic membrane transplantation (AMT) using the inlay and onlay technique. **(figure 3)**

 - Use of scleral lenses and autologous serum.



 **Figure 3**: Amniotic membrane transplantation

2. **Management of underlying RA:**

 - Adaptation of systemic therapy with the introduction of anti-TNF biotherapy.

 - Treatment of severe dry eye syndrome.

Postoperative evolution showed satisfactory anatomical restoration, with complete graft epithelialization within five weeks. (Figure 4 and 5 )



 

Figure 4: complete graft epithelialization RE. Figure 5: complete graft epithelialization LE.

Functionally after scleral adaptation the best visual acuity was 1/10 RE (**figure 6)** and 2/10 LE **(figure 7)**

 

Figure 6 : Right eye (1/10 RE) Figure 7 : Left eye (2/10 LE)

**Discussion:**

Peripheral ulcerative keratitis (PUK) is a severe manifestation of RA resulting from inflammatory and immune-mediated corneal tissue destruction. Corneal perforation represents the most critical complication, necessitating rapid and tailored intervention.

**Pathophysiology of RA-associated Corneal Perforations:**

RA-related ocular complications are primarily mediated by an immune response targeting corneal stromal components. The inflammatory cascade is driven by an imbalance in cytokines, particularly tumor necrosis factor-alpha (TNF-α), interleukin-1 (IL-1), and matrix metalloproteinases (MMPs), leading to corneal thinning and eventual perforation. Vascular compromise exacerbates tissue damage, impairing corneal healing mechanisms.

**Therapeutic Management:**

The management of RA-associated corneal perforations relies on several pillars:

- **Medical treatment:** Systemic immunosuppression, particularly with anti-TNF biotherapies, is crucial to controlling RA inflammatory activity and preventing ocular complications. Methotrexate, azathioprine, and cyclophosphamide have been historically used; however, the advent of biologic agents such as infliximab and adalimumab has significantly improved disease control.

- **Surgical treatment:** Amniotic membrane transplantation (AMT) is an effective therapeutic option due to its anti-inflammatory, anti-angiogenic, and antibacterial properties. Several techniques have been described:

 - Inlay technique: Integration of the membrane within the corneal stroma to provide structural support.

 - Onlay technique: Surface coverage of the cornea acting as a biological dressing.

 - Combined inlay and onlay technique: Offers enhanced restoration of corneal thickness and surface protection.

In cases where AMT alone is insufficient, tectonic penetrating keratoplasty (PK) or lamellar keratoplasty (LK) may be required. The use of fibrin glue and scleral patch grafts has also been explored in severe cases.

**Role of Biotherapy in RA-Associated Ocular Disease:**

Biologic agents, particularly anti-TNF drugs, have revolutionized the management of RA and its ocular manifestations. These agents effectively reduce systemic inflammation and slow disease progression. Studies have shown that anti-TNF therapy not only improves joint symptoms but also stabilizes corneal involvement, reducing the risk of perforation.

However, long-term immunosuppression requires careful monitoring due to potential adverse effects, including an increased risk of infections. Thus, a tailored approach balancing disease control and minimizing systemic complications is necessary.

**Comparative Outcomes and Prognosis:**

Recent studies analyzing outcomes in patients with RA-associated corneal perforations have reported variable prognoses. Watson et al. (1992) and Bernauer et al. (1995) demonstrated that prompt intervention with AMT and immunosuppressive therapy significantly improves outcomes, with a high rate of corneal stabilization. However, delays in treatment or inadequate immunosuppression often result in progressive thinning and subsequent perforation requiring more invasive procedures such as PK.

**Conclusion:**

Peripheral ulcerative keratitis complicating RA is a therapeutic emergency requiring a multidisciplinary approach. Amniotic membrane transplantation combined with systemic immunosuppressive therapy is an effective treatment strategy. Early and appropriate management significantly improves the visual and sometimes vital prognosis of patients with severe RA.

This case underscores the importance of collaboration between ophthalmologists and rheumatologists in managing RA-related ocular complications and highlights the growing role of biotherapies in this treatment approach.

**Disclaimer (Artificial intelligence)**

**Option 1**: The authors declare that no generative AI technologies (such as large language models like ChatGPT, COPILOT, or text-to-image generators) were used during the writing or editing of the manuscript.

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