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BIOLOGICAL TREATMENT IN PATIENTS WITH REFRACTORY BEHÇET'S UVEITIS: A RETROSPECTIVE SINGLE-CENTRE STUDY

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Abstract

Aim: This study aims to evaluate the examination findings and treatment outcomes of patients receiving biological therapy for Behçet's uveitis (BU) in a single center clinic.

Material and Methods: This retrospective, single-center study included patients diagnosed with BU who were treated with adalimumab (ADA) or infliximab (IFX). The demographic data of the patients, the medications used at the time of initial presentation, best-corrected visual acuity at the first and final examinations, findings of the anterior and posterior segments, presence of active uveitis, fundus fluorescein angiography (FFA) and optical coherence tomography findings, drug-related side effects, and medications used at the last visit were recorded.

Results: Thirty-four patients were included in the study. Seven (20.58%) were female and 27 (79.41%) were male. At initial presentation, 38.2% of the eyes had a pan-uveitis attack. Fifteen patients were receiving anti-tumor necrosis factor-alpha inhibitors at first visit. In the first FFA, disc staining and capillary leakage were detected in 47 eyes (69.1%), while 14 eyes (20.5%) showed disc staining alone. Sixteen (47.05%) patients received ADA as the first-line biologic agent, and 2 (5.8%) patients were started on IFX. At the final visit, the clinical remission rate was 85.2%, and the angiographic remission rate was 44.1%. Thirty patients (88.2%) were receiving biological therapy at the last visit.

Conclusion: Biological agents can be successfully used in cases of BU that complicated or resistant to conventional immunosuppressive therapy. FFA is the most important diagnostic tool for evaluating subclinical inflammation in patient follow-ups.

Keywords: Behçet's uveitis, refractory uveitis, adalimumab, infliximab

INTRODUCTION

Behçet's disease (BD) is a chronic, systemic vasculitis of unknown etiology, commonly seen in countries along the historical Silk Road. Its most frequent manifestations are oral aphthae and genital ulcers, with uveitis being a significant cause of ocular morbidity (1-3). Behçet's uveitis (BU) is a non-granulomatous uveitis characterized by flare-ups and remissions. Patients may present with anterior, posterior, or pan-uveitis. The most severe and important form of BU that leads to blindness is pan-uveitis. In this form, non-granulomatous anterior uveitis is accompanied

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by diffuse vitritis, retinal infiltrates, papillitis, periphlebitis, and occlusive retinal vasculitis. Macular edema, retinal and optic atrophy, cataracts, and glaucoma are the leading causes of vision loss. BU typically manifests as pan-uveitis in young males and is more frequent and severe than in females. Early diagnosis and treatment may prevent complications and blindness in a significant number of patients (3-5).

Fundus fluorescein angiography (FFA) and optical coherence tomography (OCT) are the most important imaging modalities for the follow-up and treatment of BU. The most typical BU finding in FFA is the fern-like leakage observed in the capillaries, which is correlated with disease activity. OCT may reveal macular findings and retinal nerve fiber defects at the posterior pole resulting from regressed retinitis (6-8).

The goal of BU treatment is to prevent acute flare-ups and recurrences, to achieve clinical and angiographic remission, and to prevent potential complications. Aggressive treatment is required to prevent blindness, especially in cases of pan-uveitis. In acute flare-ups, in addition to high-dose corticosteroid therapy, periocular and intravitreal corticosteroid injections are used, particularly in the presence of macular edema and unilateral severe uveitis. While systemic corticosteroids may treat acute flare-ups, they are insufficient for long-term remission, which is why conventional immunosuppressive or biological agents are employed in treatment (4,6,7,9-13). The most commonly used disease-modifying antirheumatic drugs (DMARDs) are azathioprine (AZA) and cyclosporine A (CSA). However, in complicated and resistant cases, interferon-alpha-2a (IFNα-2a), tumor necrosis factor-alpha (TNF-α) inhibitors such as adalimumab (ADA) and infliximab (IFX), are added to the treatment. In case of inefficacy of these anti-TNF agents, tocilizumab (TCZ), golimumab, and Janus kinase inhibitors may be used (13-16).

This study aims to assess the findings and outcomes of patients receiving biological therapy for BU at our institution.

MATERIAL AND METHODS

This retrospective, single-center study was approved by the Clinical Research Ethics Committee of the University of Health Sciences Türkiye, Diyarbakır Gazi Yaşargil Training and Research Hospital (approval number: 226, date: 11.10.2024) and conducted in accordance with the Declaration of Helsinki. The ethics committee disregarded the requirement to obtain patient consent due to the retrospective nature of the study. Patients diagnosed with BU who were treated with biological therapy, and followed jointly by the rheumatology and Behçet's-uveits departments, of our hospital between 2018 and 2024 were included in the study. The medical records of these patients were retrospectively reviewed. Demographic characteristics; age at diagnosis; presence of systemic comorbidities; follow-up duration; best-corrected visual acuity (BCVA) at the initial and final examinations using the Snellen chart; presence of glaucoma and cataracts; history of intraocular surgery; anterior chamber reaction and vitritis severity at baseline and final examination; as well as posterior segment findings, were recorded. The severity of anterior chamber reaction was classified according to the "standardization of uveitis nomenclature working group" criteria (17).

The medications used by the patients at the time of initial presentation, medications added during follow-up, and any drug-related side effects were documented. The findings from the first and last FFA and OCT examinations were reviewed to assess whether clinical and angiographic remission had been achieved.

The drugs and drug combinations and the treatment scheme to be applied to the patients were created by taking into account the patient's systemic findings and the severity of uveitis. The doses and frequency of application of the agents used are as follows:

1. AZA was administered at a dose of 2.5 mg/kg/day, and CSA at 3-5 mg/kg/day.

2. ADA was initiated with a subcutaneous loading dose of 80 mg, followed by 40 mg weekly for the first week, then 40 mg every 2 weeks. In patients who did not achieve clinical and angiographic remission after at least 3 months of ADA 40 mg every 2 weeks, the frequency was increased to once a week.

3. IFX was administered intravenously at a dose of 5 mg/kg in a 0, 2, and 6-week loading regimen followed by 4-6 week intervals. If remission was not achieved, the infusion frequency was adjusted to 4 weeks.

4. TCZ was administered as a subcutaneous injection at a dose of 162 mg per week.

Clinical remission was defined as the absence of active inflammation in the anterior chamber and vitreous without the need for topical or systemic corticosteroids for at least 3 months, with fundus examination showing no retinitis, retinal vasculitis, macular edema, or papillitis. Angiographic remission was defined as the absence of optic disc staining, macular leakage, and peripheral vascular leakage. Resistant uveitis was defined as the presence of acute flare-ups requiring topical or systemic corticosteroids despite at least one immunosuppressive therapy, recurrence during corticosteroid dose reduction, development of new complications related to uveitis, and continued or

worsening activation on angiography. Patients with resistant uveitis were started on biological therapy or had the frequency of their current biological therapy adjusted.

All patients were informed about the side effects of the drugs used. Patients receiving biological treatment were evaluated for malignancy, tuberculosis, syphilis, viral hepatitis, and multiple sclerosis before initiating therapy. A complete blood cell count, renal and hepatic function tests, and a chest X-ray was performed at the initial presentation and during follow-ups. Purified protein derivative (PPD) testing was performed at six month intervals. At each visit, patients were questioned about systemic symptoms regarding side effects. If side effects were detected, the responsible agent was discontinued and, if necessary, treatment for the side effects was applied.

Statistical Analysis

The normality of data distribution was assessed using the Kolmogorov-Smirnov test. The Mann-Whitney U test was used for comparisons of non-parametric data. Statistical analyses were performed using the Jamovi software (The Jamovi Project, 2024, version 2.5, Sydney, Australia). Welch's t-test was used to compare continuous variables between two groups. Changes in vision levels at initial and final visits were compared with the Wilcoxon test. The significance level was set at $p<0.05$.

RESULTS

A total of 68 eyes from 34 patients receiving biological therapy for BU were included in the study. Of the patients, 7 (20.58%) were female, and 27 (79.41%) were male. The average age at initial presentation was 31.85±7.66 years (range: 18-47), and the average age at diagnosis of BU was 24.74±6.66 years (range: 14-37). The mean follow-up duration was 32.82±21.97 months (ranging 3-78) (Table 1).

All patients had been diagnosed with uveitis prior to presenting to our clinic. At initial presentation, 30 (88.2%) patients had a diagnosis of BD, whereas 4 (11.8%) patients were diagnosed with BD and associated uveitis at our institution. One patient had Crohn's disease along with BD. All patients had a history of topical and systemic corticosteroid usage. One patient, previously undiagnosed with BD and was treated only with systemic corticosteroids, had a history of corticosteroid-induced diabetes.

Table 1. Data for male and female

	Female (n=7)	Male (n=27)	p-value
Age	33.50±10.6	30.27±7.85	0.528
Age of diagnosis	26.88±8.28	24.085±6.11	0.528
Total follow-up time (month)	53.00±15.55	34.07±22.21	0.393
Initial visual aquity	0.61±0.42	0.53±0.39	0.415
Final visual aquity	0.76±0.29	0.76±0.45	0.497

Initial Examination Findings

All patients had bilateral BU. The BCVA measured using the Snellen chart was 0.87 (range 0-1.0) at the first examination. Initial clinical findings were given in Table 2. In addition to the retinitis-panuveitis (Figure 1), 4 eyes (5.8%) had terminal-stage BU findings, while 2 eyes (2.9%) had retinal vein occlusion, 1 eye (1.4%) had glaucomatous optic atrophy, and 1 eye (1.4%) had inoperable retinal detachment. FFA at initial presentation revealed disc staining and capillary leakage in 47 (69.1%) eyes, and disc staining alone in 14 (20.5%) eyes. No angiographic activation was found in 6 (8.8%) eyes, as shown in the consort Figure 2. One

Table 2. Clinical findings at initial visit and at the last follow-up visit

Clinical findings	Initial visit (n=number of eyes)	Last follow-up visit	p-value
Anterior uveitis	28 (41.1%)	2 (2.9%)	<0.01
Glaucoma	2 (2.9%)	2 (2.9%)	1
Pseudophakia	7 (10.2%)	8 (11.7%)	>0.05
Cataract	10 (14.7%)	14 (20.5%)	>0.05
Diffuse vitritis	26 (38.2%)	10 (14.7%)	<0.01
Retinitis	26 (38.2%)	0 (0%)	<0.01
BCVA	0.87 (0-1)	0.92	0.01

BCVA: Best-corrected visual acuity

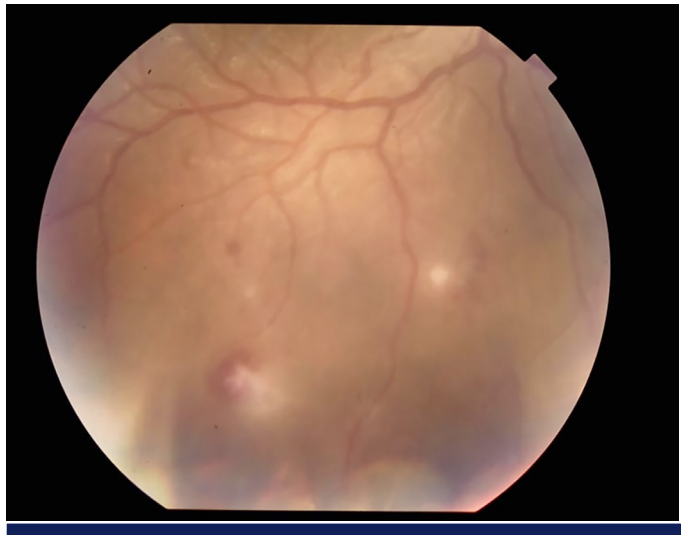

Figure 1. Hemorrhagic retinitis is observed in a 22-year-old male patient receiving azathioprine at 100 mg/day treatment

eye showed secondary optic nerve head neovascularization with fern-like leakage (Figure 3). In OCT, 5 (7.3%) eyes had epiretinal membrane (ERM), 2 (2.9%) had macular holes, 5 (7.3%) had foveal atrophy, and 7 (10.2%) had macular edema.

The medications used by the patients at the time of their first application are given in Table 3.

Follow-up Treatments

During follow-up, 7 (20.5%) patients received CSA, 8 (23.5%) patients received AZA, and 2 (5.8%) patients received both AZA and CSA. Sixteen (47.05%) patients with uveitis resistant to DMARDs were initially treated with ADA, while two (5.8%) received IFX. One patient on IFN was switched to ADA due to unavailability of the medication.

Five patients who were on ADA 40 mg every 2 weeks at the time of initial presentation did not achieve remission; therefore, the dosage was increased to weekly ADA. One patient on IFX developed an infusion reaction, and the other did not achieve remission; and therefore, both were switched to ADA. Due to recurrence, one patient on AZA, CSA, and ADA 40 mg every week was switched to IFX; and another patient on AZA and ADA 40 mg every week was switched to TCZ. One patient on IFX 5 mg/kg every 6 weeks and AZA had clinical and angiographic flare-ups; therefore the infusion frequency was increased to every 4 weeks, and CSA was added (Figure 4). Nine (26.4%) patients did not have any changes in their biological therapy (Table 3).

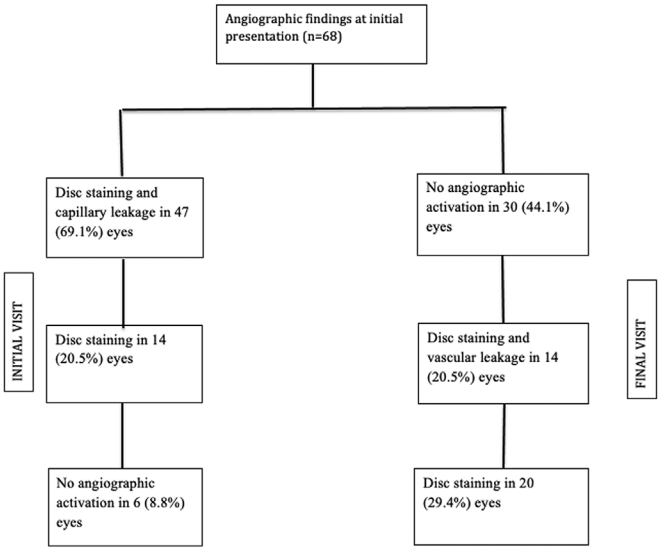

Figure 2. Consort flow diagram showing angiographic findings of the patients

Figure 3. Vascular leakage due to disc neovascularization and severe inflammation is observed under interferon therapy in a male patient

Final Examination Findings

At the final examination, the BCVA was 0.92 (0-1.0), showing a significant improvement from baseline (p=0.01). Clinical findings detected at the final visits are given in Table 2. At the final examination, 58 eyes (85.2%) of 29 patients were in clinical remission. FFA showed angiographic remission in 30 (44.1%) eyes from 15 patients (p=0.018). Disc staining and vascular leakage were observed in 14 (20.5%) eyes, and disc staining alone was noted in 20 (29.4%) eyes, leading to adjustments in treatment. OCT findings showed: of the eyes, 54 (79.4%) were normal, 4 (5.8%) had ERMs, 6 (8.8%) had foveal atrophy, 2 (2.9%) had macular holes, and 1 (1.4%) had central serous chorioretinopathy.

Demographic data, BCVA at initial and final examination, and clinical and angiographic remission rates by gender are given in Table 4.

Adverse Effects

Among patients receiving DMARDs, two CSA-treated patients experienced elevated blood pressure, and three developed

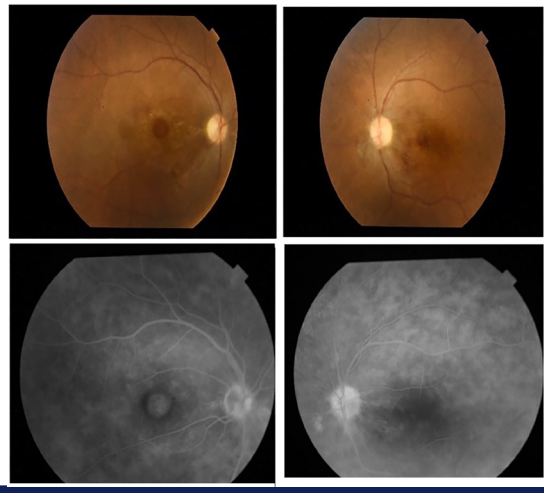

Figure 4. A 29-year-old male patient under infliximab 5 mg/kg/6 weeks and azathioprine 100 mg/day treatment has a hole in the macula in the right fundus photo; bilateral disc staining and vascular leakage in the posterior pole are observed in the taken angiography

Table 3. Medications used at the time of initial visit and at the last follow-up

Patient number	Medications used at the time of initial visit	Medications used at the last follow-up visit
1	AZA, CSA	-
2	AZA	AZA, ADA 40 mg/2 weeks
3	AZA	AZA, ADA 40 mg/2 weeks
4	AZA,ADA 40 mg/2 weeks	AZA, ADA 40 mg/1 week
5	AZA,ADA 40 mg/2 weeks	AZA, ADA 40 mg/1 week
6	-	AZA
7	AZA	AZA, CSA, ADA 40 mg/1week
8	AZA	AZA, ADA 40 mg/1 week
9	AZA, ADA 40 mg/2 weeks	AZA, TCZ 162 mg/1 week
10	AZA	AZA, ADA 40 mg/2 weeks
11	AZA	AZA
12	-	AZA, ADA 40 mg/2 weeks
13	-	AZA, ADA 40 mg/1 week
14	AZA	AZA, ADA 40 mg/1 week
15	AZA, ADA 40 mg/2 weeks	AZA, ADA 40 mg/2 weeks
16	AZA	AZA, ADA 40 mg/1 week
17	AZA, IFX 5 mg/kg/6 weeks	AZA, CSA, IFX 5 mg/kg/4 weeks
18	-	AZA, CSA, IFX 5 mg/kg/4 weeks
19	-	AZA, ADA 40 mg/2 weeks
20	AZA, CSA	AZA, ADA 40 mg/2 weeks
21	AZA, CSA	AZA, ADA 40 mg/2 weeks
22	AZA, ADA 40 mg/2 weeks	-
23	AZA, ADA 40 mg/2 weeks	ADA 40 mg/2 weeks
24	ADA 40 mg/2 weeks	AZA, ADA 40 mg/2 weeks
25	IFN	AZA, ADA 40 mg/2 weeks
26	ADA 40 mg/2 weeks	AZA, ADA 40 mg/2 weeks
27	AZA	AZA, CSA, ADA 40 mg/1 week
28	ADA 40 mg/2 weeks	AZA, ADA 40 mg/2 weeks
29	ADA 40 mg/2 weeks	ADA 40 mg/2 weeks
30	AZA, ADA 40 mg/2 weeks	AZA, ADA 40 mg/1 week
31	AZA, ADA 40 mg/2 weeks	AZA, ADA 40 mg/2 weeks
32	AZA, ADA 40 mg/2 weeks	AZA, ADA 40 mg/1 week
33	AZA, ADA 40 mg/2 weeks	AZA, ADA 40 mg/2 weeks
34	-	ADA 40 mg/2 weeks

AZA: Azathioprine, CSA: Cyclosporine, ADA: Adalimumab, IFN: Interferon, IFX: Infliximab, TCZ: Tocilizumab

Table 4. Distrubition of findings by gender

	Female	Male	p-value
Age	32.25	31.73	$0.082^{t\text{-test}}$
Age at the time of diagnosis	26.88	24.08	$0.39^{t\text{-test}}$
BCVA at initial visit	0.61	0.53	$0.65^{t\text{-test}}$
BCVA at final visit	0.76	0.76	$0.99^{t\text{-test}}$
Angiographic remission (n) (absent/present)	4/12	31/18	0.017^{x2}
Clinical remission (n) (absent/present)	0/16	10/42	0.134^{x2}

^{x2}: Chi-square test, $^{t\text{-test}}$: Welch t-test, BCVA: Best corrected visual acuity

neurotoxicity. Among AZA users, 2 patients developed hepatotoxicity, and 1 experienced drug intolerance, leading to discontinuation of the drugs. Of the two female patients who received ADA 40 mg/2 weeks and AZA 100 mg/day, one developed tuberculosis, and the other developed breast cancer. Their treatments were terminated. One patient underwent vitrectomy for rhegmatogenous retinal detachment, which resulted in foveal atrophy. Two patients receiving AZA and ADA 40 mg every 2 weeks had at least 2 years of clinical and angiographic remission; therefore, ADA therapy was discontinued, and AZA was continued without recurrence. Three patients on biological therapy received isoniazid, and 1 patient, who was a hepatitis B carrier, received antiviral prophylaxis.

The average duration of ADA therapy was 31.88±20.24 months (range 3-68). The average time to switch to weekly ADA administration was 27.41±26.3 months (range 3-98).

DISCUSSION

In our study evaluating the effectiveness of biological agents in BU, 79.4% of the patients were male, and the male-to-female ratio was 3.8. Although clinical remission rates were similar across genders, angiographic remission rates were higher in women. Studies conducted in our country have shown that ocular involvement is at least twice as common in males compared to females, and uveitis tends to be more aggressive in males (18-20). Considering that biological treatments are used in patients with aggressive disease courses, the high rate of biological agent use and the low angiographic remission rate prove that the disease has a worse prognosis in men.

BU is often diagnosed in the second or third decade of life, and the prognosis tends to be better in females and in cases of the disease with later onset. In our study, the age range at which the patients were diagnosed with BU was similar to that reported in the literature, with the second decade being most common (18-22). The average age at diagnosis was similar in females,

compared to males, and there was no difference between the initial and final BCVA. However, considering the small number of cases in our study, larger cohort studies are needed to obtain more definitive conclusions.

BU is also observed in the pediatric age group, with symptoms often starting in late childhood. Uveitis is more common in male children. The clinical manifestations usually present in the form of pan-uveitis, and aggressive immunosuppressive treatment is required for remission (22,23). In a study conducted by Tugal-Tutkun and Urgancıoğlu (22) in 2003, a high incidence of cataracts, maculopathy, and optic atrophy was reported in pediatric cases of BU, along with serious side effects from systemic steroids. Additionally, 22.7% of affected eyes had a BCVA of 0.1 or worse (21). In our study, two male patients were diagnosed with pediatric BU at the age of 14, and both developed frequent pan-uveitis flares despite being treated with AZA and systemic steroids. As a result, ADA 40 mg every 2 weeks was initiated in their treatment regimen. Remission was achieved in one patient with this treatment, while the other patient was switched to a combination of IFX 5 mg/kg, every month, along with AZA and CSA, which also resulted in remission. At the final examination, both patients had complete visual acuity and were in clinical remission. The anatomical and functional success achieved demonstrates the progress made in the treatment of BU with biological therapies in recent years, allowing for the prevention of blindness in these patients.

At the initial examination, all patients had bilateral uveitis based on clinical and angiographic findings. At the first consultation, 38% of the patients had a pan-uveitis attack. All these patients received 1 gram of intravenous steroids for 3 days, followed by a transition to the maintenance dose. Their immunosuppressive treatments were revised. At the final examination, there was a statistically significant increase in the average BCVA. In 16 eyes (23.5%), the initial BCVA was 0.1 or worse. After the treatment revision, BCVA improvement was achieved in only 7 of these eyes. In eyes where BCVA showed no improvement, major causes of blindness due to BU included optic atrophy, foveal atrophy, retinal detachment, and macular hole. These results emphasize the importance of initiating effective and aggressive treatment before permanent damage occurs in BU.

The classic angiographic finding in BU is fern-like capillary leakage, and the extent of this leakage correlates with the severity of the disease. The presence of optic disc leakage and capillary leakage in BU is an important prognostic indicator for active inflammation and recurrence (6,7,23). Kim et al. (24) demonstrated that the severity of retinal vascular leakage in FFA in BU patients, is associated with poor visual acuity as well as macular leakage and disc staining. The persistence of vascular leakage despite the decrease in attacks is an important sign that the treatment is still inadequate. In this patient group, the most important goal is to eliminate angiographic activation by strengthening the treatment to reduce recurrences and ocular morbidity. In our study, at the time of initial presentation, fern-like leakage and disc staining were present in 69.1% of eyes. At the final visit, although the clinical remission rate was 97.05%, the angiographic remission rate was only 44.1%. The lower angiographic remission rate compared to clinical remission suggests that the administered treatment needs to be reevaluated. Furthermore, these results support the idea that angiographic monitoring is an invaluable method in preventing uveitis recurrence and ocular morbidity.

It is known that the presence of ellipsoid zone damage and foveal thinning detected by OCT are associated with poor visual prognosis (23-25). In our study, at the final visit, OCT showed foveal thinning in 6 eyes and macular holes in 2 eyes. In all of these eyes, BCVA was 0.1 or worse, and no improvement in vision was observed during follow-up. Cystoid macular edema, which was observed in approximately 10% of the eyes at baseline, regressed with treatment. The ellipsoid zone remained intact, and BCVA increased.

In patients with aggressive uveitis, ADA and IFX are frequently used biological agents, and are the first-line treatment in selected cases. ADA is the only biologic agent approved by the United States Food and Drug Administration for the treatment of non-infectious uveitis is a humanized monoclonal antibody. For this reason, ADA is commonly the first-line biologic agent in clinical practice, for uveitis patients (6,13,26-31). On the other hand, IFX is known to be as effective as pulse steroid therapy and provides rapid inflammation control (32). A study comparing ADA and IFX as first-line biological therapies in resistant BU patients found that after one year, ADA-treated patients had better BCVA; however, IFX provided faster inflammation control. The study also showed that the continuation rate of ADA therapy was higher than that of the IFX group. The authors attributed this difference to the potential for infusion reactions due to the chimeric structure of IFX, the risk of anti-drug antibody formation, and the greater ease of ADA administration (13). In our clinic, at first presentation, 10 patients were receiving ADA 40 mg every 2 weeks in combination with AZA, 4 patients were receiving ADA 40 mg every 2 weeks alone, and 1 patient was on a combination of AZA and IFX 5 mg/kg every 6 weeks. Following clinical and angiographic evaluations, ADA was initiated in the treatment of 16 patients. IFX was initiated in 2 patients. In these patients, severe ocular complications and intense pan-uveitis

flare were present at first presentation, and our primary goal was to control the flare rapidly. Therefore, IFX was initially preferred among these 2 patients. However, in one patient, an infusion reaction occurred, and in the other, resistance developed, leading to a switch to ADA therapy.

The most undesirable side effects of anti-TNF agents are the development of malignancies and infectious diseases such as tuberculosis and hepatitis. In the follow-up of these patients, it is crucial to not only systematically query for symptoms but also to monitor viral markers, perform PPD tests, or QuantiFERON-TB Gold tests. Hematological malignancies are most commonly associated with these agents (33). In one female patient who started ADA and had a negative QuantiFERON-TB test, complaints of myalgia, fever, and night sweats developed after the second injection. Subsequent tests revealed the development of tuberculosis. The patient's current treatment was discontinued, and she was directed to tuberculosis treatment. In another patient who had been on ADA for at least 2 years, a suspicious mass was detected in the breast. A biopsy result confirmed malignancy, and the patient's treatment was terminated. Both patients were withdrawn from follow-up. These two cases highlight the importance of conducting a thorough systemic review at every visit, considering the extraocular symptoms and promptly initiating necessary consultations.

In our clinical practice, we aim to achieve not only clinical remission but also angiographic remission in patients with BD. We initiate treatment reduction after at least two years of remission in patients; instead of abruptly discontinuing biological agents, we reduce their frequency and continue with follow-ups. After an average follow-up period of 36 months, only two patients (5.8%) achieved two years of remission, during which biological agents were tapered and discontinued. The longest follow-up period was 78 months. The fact that such a small number of patients reached the target remission duration at the last visit indicates that the disease follows an aggressive course and requires long-term treatment.

Study Limitations

One of the limitations of our study is the small number of patients. This limitation reduces our ability to create subgroups for comparisons and affects the generalizability of the results we obtained. Additionally, the study being single-centered and retrospective in design is another limitation. Because the study was retrospective, clinical and angiographic examinations could not be performed at the same time schedule during follow-up. Both the small number of patients and the fact that angiography was not performed at fixed intervals prevent subgroup comparisons among biological agents. Multi-center studies with larger patient numbers are needed to perform more detailed statistical analysis and obtain more accurate results.

CONCLUSION

The present study supports the idea that remission may be achieved with biological agents in cases resistant to and complicated by DMARDs, and that an increase in the BCVA was observed. Although no recurrences were noted during follow-up, angiographic evaluation remains an important step in preventing blindness, as it helps detect subclinical inflammation that may persist or worsen, necessitating treatment adjustments.

Ethics

Ethics Committee Approval: This retrospective, single-center study was approved by the Clinical Research Ethics Committee of the University of Health Sciences Türkiye, Diyarbakır Gazi Yaşargil Training and Research Hospital (approval number: 226, date: 11.10.2024).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: D.Y.E., L.A., Concept: D.Y.E., L.A., Design: D.Y.E., L.A., Data Collection or Processing: D.Y.E., Analysis or Interpretation: D.Y.E., L.A., Literature Search: D.Y.E., Writing: D.Y.E.

Conflict of Interest: The authors have no conflicts of interest to declare.

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