EPIDEMIOLOGICAL ANALYSIS OF PATIENTS WITH VITREORETINAL DISEASES UNDERGOING INTRAVITREAL THERAPY AT A REFERRAL HOSPITAL IN THE STATE OF PARÁ

ABSTRACT

Introduction: The intravitreal injection has become one of the most frequently performed invasive procedures in ophthalmology in the last few years. The intravitreal therapy with antiangiogenics is considered the first line of treatment for several retinal diseases through the inhibition of messenger RNA synthesis, transcription or direct blockade of action of vascular endothelial growth factor (VEGF). The most commonly used antiangiogenic agents today are: ranibizumab, bevacizumab, aflibercept and faricimab.Triamcinolone, a potent steroid, is also used in refractory cases. According to the Brazilian Retina and Vitreous Society, the pathologies most treated with anti-VEGF were Age-Related Macular Degeneration (AMD), followed by Diabetic Macular Edema (DME) and RVO. **Objective**: To analyze the epidemiological impact of intravitreal therapy on patients with vitreoretinal diseases treated at the Hospital Universitário Bettina Ferro de Souza in Belém, Pará. **Methods:** An observational, cross-sectional, descriptive study with a quantitative approach was carried out. The medical records of 419 patients with vitreoretinal disease and indication of intravitreal therapy were analyzed between January 2018 and August 2023 in an Ophthalmological Reference Centre, evaluating visual acuity, sex, origin, age, injected eye, number of injections, substance injected and underlying disease, using the Chi-Square test of independence with the help of Excel (Microsoft Office) and Epi Info programs. **Results**: Among the 419 patients evaluated and 540 eyes injected, the average age observed was 66.6 years, there was no predominance of sex and the majority of patients came from the State of Pará. Diabetic retinopathy (DR) was the most prevalent disease, followed by AMD and retinal occlusion. 68.3% at least started treatment and received one or more substances. AMD and DR correspond to 81.6% of injections administered and Ranibizumab is the most used drug, corresponding to 93% of injections. Considering visual acuity, an improvement was evident after therapy. **Conclusion**: This work reinforced the difficulty in accessing ocular health and availability ofintravitreal treatment with antiangiogenic drugsfaced by these patients, worsening their visual prognosis. These medicationshave a high financial cost and a major impact on vitreoretinal diseases, therefore it is necessary to manage these patients, as well as the early diagnosis of different vitreoretinal disorders that can be treated with these medications, allowing the identification of the main etiologies prevalent in the Amazon region and helping to prevent these diseases.

Keywords: Ophthalmology; vitreoretinal diseases; intravitreal injections; antiangiogenics; VEGF.

INTRODUCTION

Intravitreal injection has become one of the most commonly performed invasive procedures in ophthalmology in recent years, due to the lower risk of

complications compared to other invasive procedures and well-established pharmacodynamics[1-5], since the blood-retinal barrier prevents adequate intraocular concentration of various drugs[6-8]. With the increase in drugs available to treat a growing number of pathologies and patients, interest in studying the best techniques for administering medications has grown[8].

Antiangiogenic therapy is considered one of the greatest revolutions in modern medicine[2] and has been considered the first line of treatment for several retinal diseases of worldwide relevance, such as age-related macular degeneration (AMD), retinal vein occlusion (RVO), neovascular glaucoma and diabetic retinopathy (DR)[1,3].

Brazil is a participating country in the *VISION 2020: The Right to Sight: a global initiative to eliminate avoidable blindness* project, and in order to be able to plan and monitor actions to eliminate avoidable blindness, it is essential to have accurate data on the profile of blindness and visual impairment in the population[4]. The use of anti-angiogenic drugs in retinal diseases began in 2014offering promising outcomes in the management of conditions such as AMD and DR. Studies have shown that these therapies have contributed to reducing the progression of vision loss and preserving visual function, therefore, had a positive impact on important causes of blindness in adults[5-9].

Vascular endothelial growth factor (VEGF) plays an important role in physiological angiogenesis and pathological neovascularization, as well as being a potent endothelial cell mitogen and having a pro-inflammatory effect. The VEGF family includes VEGF-A, VEGF-B, VEGF-C, VEGF-D and placental growth factor (PIGF) 1 and 2[10]. Its synthesis is increased in various chorioretinal vascular conditions[6], which generate hypoxia and release these growth factors and nitric oxide (NO), stimulating receptors located on the vascular endothelium of the cells, generating a cascade of regulation and thus allowing retinal neovascularisation[10].

Anti-vascular endothelial growth factor (anti-VEGF) is the first-line treatment for manyretinal diseases. Anti-angiogenic drugs act by inhibiting the synthesis of their messenger RNA (mRNA), by inhibiting transcription or by directly blocking the action of the protein[7], preventing their potential damage to vascular permeability and the biochemical cascade involved in the pathology of retinal diseases[9].

Among the most commonly used medications currently four anti-angiogenic agents are cited: ranibizumab, bevacizumab, aflibercept and faricimab. Triamcinolone is also used as a drug therapy for various retinal pathologies. All are administered via pars plana with 27 to 31 gauge needles[8] .

Ranibizumab (Lucentis®) is a humanized recombinant Fab fragment that inhibits angiogenesis by selectively inhibiting VEGF-A[10] . Aflibercept (Eylea®) is a soluble protein composed of VEGF receptors 1 and 2 fused to the Fc portion of an IgG1. In addition to inhibiting VEGF A, it also binds to VEGF B and placental growth factor (PIGF)[10] . Bevacizumab (Avastin®) is a humanized monoclonal antibody that selectively inhibits VEGF-A[10] . It was initially approved by the Food and Drug Administration (FDA) as a treatment for metastatic colorectal cancer and trials were started for the treatment of exudative AMD with systemic bevacizumab with good results[11-16] , allowing the use of this drug, albeit off-label .[11-20]

Triamcinolone Acetate, a potent steroid corticosteroid with anti-inflammatory action, has been widely used in various retinal pathologies with excellent results[21-22] . It is a hydrophobic solution, maintaining therapeutic levels in the vitreous for more than 3 months[23] and stabilizing the blood-retinal barrier[24] .A few complications include cataracts and glaucoma .[23]

With regard to retinal diseases treated with anti-VEGF, age-related macular degeneration (AMD) in developed countries is considered the main cause of irreversible blindness and has a prevalence of approximately 6.5 per cent of the population over 40[13] . AMD can be classified as dry and exudative. The exudative form is characterized by a neovascular membrane, corresponding to neovascularization below the retinal pigment epithelium (RPE), which can penetrate Bruch's membrane[14] . The use of anti-VEGF is considered the gold standard for treating exudative AMD, showing a similar effect between drugs[12,15].

Diabetic retinopathy is a major cause of blindness, accounting for 2.6 per cent of all blind people worldwide[16]. Diabetic macular edema occurs in around 12% of patients with diabetic retinopathy. In patients with type 1 diabetes, the prevalence of edema rises progressively with years of diabetes, reaching 40% with 30 years of the disease. In type 2 diabetics, 5% already have edema at the time of diagnosis[17] .

Retinal venous occlusions are the second most common cause of retinal vascular disease[18] , and can occur at the level of the central retinal vein or focally at an arteriovenous junction[19] and accompany macular oedema[19] .

According to the Brazilian Retina and Vitreous Society, the pathologies most treated with anti-VEGF were AMD, followed by Diabetic Macular Edema (DME) and RVO[20] . Furthermore, the main pathologies requiring anti-angiogenic therapy in Brazil are a serious social, economic and public health problem. Therefore, the main etiological determinants in the country are AMD, OVR, neovascular glaucoma and DR. In addition, the use of anti-angiogenic drugs to treat retinal diseases has had a positive impact on important causes of blindness in adults[5-9].

In this context of treatment for vitreoretinal diseases, the Bettina Ferro de Souza University Hospital, located in Belém-Pará, is a tertiary reference center in the region, providing ophthalmological care to the entire population of the region and even neighboring states such as the state of Amapá.

It was therefore important to carry out this research to add knowledge in the field of ophthalmology and improve the therapeutic process in the training of new residents in order to optimize therapy and facilitate and speed up access for patients who need it.

MATERIALS AND METHODS

TYPE OF STUDY

This was an observational, cross-sectional, descriptive study with a quantitative approach. The observational study makes it possible to passively assess the magnitude and prevalence of a particular condition or pathology at a given moment in time[25] .The research employs quantitative methods to analyze numerical data and, as descriptive research, only aims to observe, record and describe the characteristics of a particular phenomenon[26] .

STUDY SITE

The Bettina Ferro de Souza University Hospital is located in the city of Belém, capital of the State of Pará in the Eastern Amazon, and is a reference centerof Ophthalmology in the State of Pará. All procedures and consultations carried out at the hospital are exclusively linked to the Sistema Único de Saúde (SUS). This hospital is the only SUS site where this treatment is carried out in the state of Pará, receiving patients from many locations, including several neighboring states. The study was carried out in the Retina Department at the Vision Unit of the Bettina Ferro de Souza University Hospital. This sector is where vitreoretinal diseases are treated.

STUDY PARTICIPANTS

Patients with vitreoretinal diseases with a clinical indication for intravitreal therapy with anti-angiogenic drugs or Triamcinolone Acetate registered at the hospital for the treatment of vitreoretinal diseases.

Inclusion criteria: The study included all patients with retinal diseases and a clinical indication for intravitreal therapy with antiangiogenic drugs or Triamcinolone Acetate, regardless of age, gender, race or length of treatment, from January 2018 to August 2023, seen in the Retina Department at the Vision Unit of the Bettina Ferro de Souza University Hospital.

Exclusion criteria: Patients who died, those without a clinical indication for intravitreal antiangiogenic therapy or who were lost to clinical follow-up for any reason were excluded from the study.

DATA COLLECTION

The study was based on the medical records of patients treated at the Retina Department of the Vision Unit of the Bettina Ferro de Souza University Hospital, in accordance with the inclusion criteria. As a data collection tool (Appendix A), data available in the participants' medical records was collected, such as: gender, origin, age, eye and/or eyes injected, number of injections, underlying disease, substance injected, visual acuity with correction before the first dose and at the end of intravitreal treatment, using the Snellen or Light

House chart (if illiterate). Also included is a biomicroscopic examination to assess the anterior and posterior segments (with the aid of a Volk 78 D condenser lens), as well as a fundus examination carried out using indirect binocular ophthalmoscopy (with the aid of a Volk 20 D condenser lens).

Complementary examinations and specialist assessment were required for a final visual diagnosis for the patients. An optical coherence tomography (OCT) was used as a complementary test to help with the clinical indication for antiangiogenic therapy, which measures the thickness of the retina using a Cirrus 5000 tomograph (*Carl Zeiss®*) in the macular region. All patients with a clinical indication for antiangiogenic therapy underwent OCT to decide whether or not to continue treatment. Data was collected between July and August 2023.

ANALYSING THE DATA

After collecting data based on the research protocol, the data obtained was analyzed and applied to the Microsoft Office Excel program to make charts, graphs and tables. The Chi-Square test of independence was used for statistical analysis with the aid of the *Epi Info* program. The data was analyzed by a professional statistician with the program GraphPad Prism version 10.1.1.

A total of 419 medical records of patients undergoing intravitreal injection treatment for retinal diseases at the Ophthalmology Unit of the Bettina Ferro de Souza University Hospital between January 2018 and August 2023, in one eye or both eyes, were included for analysis.

ETHICAL ASPECTS OF THE STUDY

In accordance with Resolution 466/12 of the National Health Council, this study was submitted to the Brazil Platform and was assessed by the Research Ethics Committee (CEP) of the Bettina Ferro de Souza University Hospital of the Federal University of Pará, and was approved under process no. 6.165.215. After approval by the CEP, data was collected.

RESEARCH RISKS AND BENEFITS

The risk inherent in the research is the loss of patient confidentiality. In order to minimize this risk, by using medical records, there was no direct contact with the patients, but rather with their existing records in the medical archives of the Bettina Ferro de Souza University Hospital, which is why it was not necessary to draw up an Informed Consent Form (ICF). However, the Term of Commitment for the Use of Data (TCUD) was used, which is a term of commitment from the researcher responsible and the institution to comply with the provisions of Resolution 466/12. The information collected from the patients' medical records was used exclusively for the purposes of this study, and the privacy of the medical records used in the study was guaranteed.

After statistical analysis, a database was created based on the information obtained from this study, based on the etiological profile of the participants during the study period, with the aim of prevention and improving access to eye health care for patients undergoing intravitreal therapy with antiangiogenic drugs at this reference center in the state of Pará. Another benefit is that it will make health professionals aware of the research carried out through publication in the form of a scientific article.

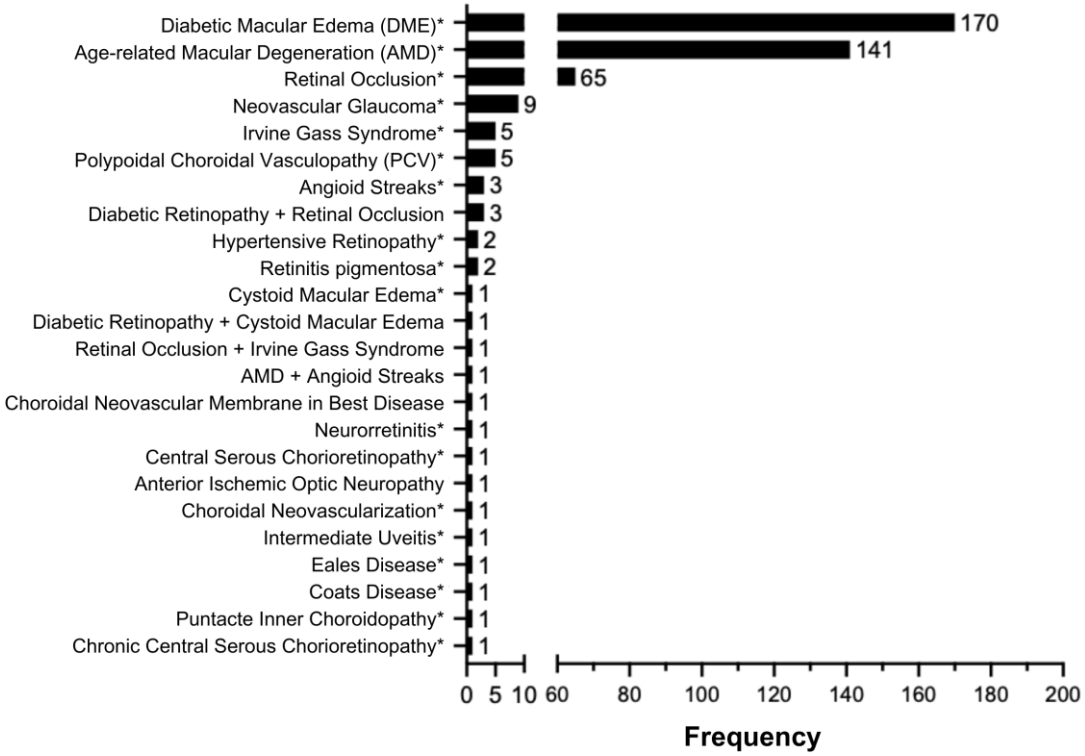
RESULTS

The study included 419 patients seen at the Retina ambulatory of the Vision Unit of the Bettina Ferro de Souza University Hospital at the Federal University of Pará between January 2018 and August 2023, whose mean age was 66.6 years (95%CI: 65.4 - 67.7), ranging from 17 to 100 years, with no predominance in relation to gender (female: 51.8% and male: 48.2%; p=0.4941).

As for underlying diseases, whether they occurred alone or in association with another, the most common wasdiabetic macular edema (174/419, 41.5%; 95%CI: 36.9 - 46.3), followed by AMD (142/419, 33.9%; 95%CI: 29.5 - 38.6) and retinal vein occlusion (69/419, 16.5%; 95%CI: 13.2 - 20.3). Six patients (1.4%; 95%CI: 0.7 - 3.1) had associated eye diseases: three had both diabetic macular edema and retinal vein occlusion, one had a diagnosis of AMD and angioid streakes, one had retinal vein occlusion and Irvine Gass Syndrome concomitantly and one had diabetic macular edema and cystoid macular

edema. Figure 1 illustrates the distribution of underlying diseases diagnosed in isolation or in association.

Figure 1. Eye diseases diagnosed in patients treated at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital. Belém, 2018-2023



The (*) indicates an isolated diagnosis.
Source: Patient records evaluation form, 2018-2023.

All 419 patients were referred for anti-angiogenic therapy at the Retina Outpatient Clinic of the HUBFS Vision Unit, according to the following clinical indications: 140 patients with an indication for therapy for the right eye only, of whom 68.6% (96/140) at least started therapy; 156 patients with an indication for therapy for the left eye only, of whom 64.1% (100/156) started therapy and 123 patients with an indication for therapy for both eyes, of whom 73.2% (90/123) carried out at least one application, totaling 286 (68.3%; 286/419) patients who started treatment and received one or more substances. Selected cases– Irvine Gass Syndrome, Intermediate Uveitis, Cystoid Macular Edema or

refractory cases – received intravitreal injection with triamcinolone and were included in the sample.

Table 1 shows the distribution of patients who started treatment, according to the eye and the type of substance injected.

Table 1. Distribution of patients who started treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to eye and type of substance injected. Belém, 2018-2023.

Eye andinjectedsubstance	Numberof patients	Injections administered	
		Minimum - Maximum	Average (Median)
Right eye only	**n=96**	**1 - 9**	**3,0 (3,0)**
Ranibizumab	85	1 - 9	2,9 (3,0)
Ranibizumab + Aflibercept	4	4 - 9	5,8 (5,0)
Aflibercept	7	1 - 3	2,7 (3,0)
Left eye only	**n=100**	**1 - 17**	**3,7 (3,0)**
Ranibizumab	81	1 - 11	3,4 (3,0)
Aflibercept	9	1 - 3	2,6 (3,0)
Ranibizumab + Bevacizumab	2	4 - 17	10,5 (10,5)
Ranibizumab + Aflibercept	5	4 - 9	6,6 (7,0)
Ranibizumab + Triamcinolone	2	4 - 8	6,0 (6,0)
Bevacizumab	1	3 - 3	3,0 (3,0)
Both eyes			
Right eye	**n=90**	**1 - 25**	**3,6 (3,0)**
Ranibizumab	72	1 - 25	3,3 (3,0)
Ranibizumab + Bevacizumab	2	1 - 4	2,5 (2,5)
Ranibizumab + Aflibercept	13	1 - 12	5,2 (4,0)
Ranibizumab + Triamcinolone	3	4 - 6	4,7 (4,0)
Left eye	**n=90**	**1 - 25**	**3,5 (3,0)**
Ranibizumab	72	1 - 25	3,3 (3,0)
Ranibizumab + Bevacizumab	2	4 - 5	4,5 (4,5)
Ranibizumab + Aflibercept	13	1 - 8	4,2 (3,0)

Ranibizumab + Triamcinolone	3	4 - 5	4,3 (4,0)

Source: Patient records evaluation form, 2018-2023.

Table 2 summarizes the substances injected into the patients who started treatment and Table 3 shows the distribution of these patients according to age group and number of eyes injected. The eyes of patients aged between 60 and 79 together accounted for 62.4 per cent (n=337) of the 540 eyes injected.

Table 2. Substances injected into patients who started treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital. Belém, 2018-2023.

Substance injected alone or in combination	Frequency (n; %)		Injections administered	
	Patients n=286	Injections	Minimum - Maximum	Average (Median)
Ranibizumab	269; 94,1	1182; 91,1	1 - 50	4,4 (3,0)
Bevacizumab	5; 1,8	12; 0,9	1 - 3	2,4 (3,0)
Aflibercept	38; 13,3	94; 7,3	1 - 6	2,5 (3,0)
Triamcinolone	5; 1,8	9; 0,7	1 - 2	1,8 (2,0)
Total		**1297; 100**	**1 - 50**	**4,1 (3,0)**

Source: Patient records evaluation form, 2018-2023.

Table 3. Age group of patients who started treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital and number of eyes injected. Belém, 2018-2023.

Age group (years)	Injected eyes	%
< 40	18	3,3
40 - 49	24	4,4
50 - 59	99	18,3
60 - 69	177	32,8
70 - 79	160	29,6

80 - 89	53	9,8
90+	9	1,7
Total	**540**	**100**

Source: Patient records evaluation form, 2018-2023.

Table 4 shows the frequency of injections given to patients who started treatment at the Retina Outpatient Clinic of the Vision Unit at the Bettina Ferro de Souza University Hospital, according to the underlying disease. AMD and diabetic macular edema together accounted for 81.6% (1058/1297) of the injections administered.

Table 4 Frequency of injections given to patients who started treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease. Belém, 2018-2023

Baseline disease	Numberofinjections	%
AMD	569	43,9
Diabeticmacular edema	489	37,7
Retinalocclusion	143	11,0
Neovascular glaucoma	11	0,8
Polypoidalchoroidalvasculopathy	11	0,8
Irvine Gass Syndrome	11	0,8
Angioid Streaks	11	0,8
Irvine Gass syndrome + retinal occlusion	8	0,6
Coats' disease	7	0,5
Hypertensiveretinopathy	7	0,5
CME + diabeticretinopathy	7	0,5
Angioid Streaks + AMD	6	0,6
Intermediateuveitis	4	0,3
Diabeticmacular edema+ retinalocclusion	4	0,3
Anterior ischemic optic neuropathy	3	0,3
Eales Disease	3	0,3

CME	2	0,2
PuntactaInnerChoroidopathy	1	0,1
Total	**1297**	**100**

AMD: Age-Related Macular Disease. **CME:** Cystoid macular oedema. **Source:** Patient records, 2018-2023.

Of the 286 patients who started treatment, complete follow-up data was available for 86.4% (247/286) of the patients, corresponding to 59.0% (247/419) of the patients initially included in the study. Table 5 shows the substances injected into these patients and the frequency of each, and Table 6 shows the substances injected into these patients according to their underlying disease.

Table 5: Substances injected in patients who started treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital and have registered follow-up. Belém, 2018-2023.

Substance injected alone or in combination	Frequency (n; %)		Injections administered	
	Patients n=247	Injections	Min. - Max.	Average (Median)
Ranibizumab	232; 93,9	1054; 91,3	1 - 50	4,5 (3,0)
Bevacizumab	3; 1,2	7; 0,6	1 - 3	2,3 (3,0)
Aflibercept	36; 14,6	87; 7,5	1 - 6	2,4 (3,0)
Triamcinolone	4; 1,6	7; 0,6	1 - 2	1,8 (2,0)
Total		**1155; 100**	**1 - 50**	**4,7 (3,0)**

Source: Patient records evaluation form, 2018-2023.

Table 6. Substances injected in patients who started treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital and have registered follow-up, according to underlying disease. Belém, 2018-2023

Baseline disease and substance used	Patients (n; %)	Injections (n; %)	Injections administered	
			Min. - Max.	Average (Median)
AMD	**n=97**	**n=534**	**1 - 50**	**5,5 (4,0)**
Ranibizumab	90; 92,8	486; 91,0	1 - 50	5,4 (4,0)
Bevacizumab	1; 1,0	3; 0,6	3 - 3	3,0 (3,0)

Aflibercept	21; 21,7	45; 8,4	1 - 3	2,1 (2,0)
Diabetic macular Edema (DME)	**n=90**	**n=409**	**1 - 14**	**4,5 (4,0)**
Ranibizumab	87; 96,7	382; 93,4	1 - 12	4,4 (3,0)
Bevacizumab	2; 2,2	4; 1,0	1 - 3	2,0 (2,0)
Aflibercept	7; 7,8	21; 5,1	1 - 6	3,0 (3,0)
Triamcinolone	1; 1,1	2; 0,5	2 - 2	2,0 (2,0)
Retinalocclusion (RO)	**n=36**	**n=131**	**1 - 8**	**3,7 (3,0)**
Ranibizumab	33; 91,7	121; 92,4	1 - 8	3,7 (3,0)
Aflibercept	4; 11,1	10; 7,6	1 - 3	2,5 (3,0)
Neovascular glaucoma	**n=5**	**n=8**	**1 - 3**	**1,6 (1,0)**
Ranibizumab	5; 100	8; 100	1 - 3	1,6 (1,0)
Irvine Gass Syndrome (IGS)	**n=3**	**n=11**	**1 - 8**	**3,7 (2,0)**
Ranibizumab	3; 100	9; 81,8	1 - 6	3,0 (2,0)
Triamcinolone	1; 33,3	2; 18,2	2 - 2	2,0 (2,0)
Hypertensiveretinopathy	**n=2**	**n=7**	**1 - 6**	**3,5 (3,5)**
Ranibizumab	2; 100	7; 100	1 - 6	3,5 (3,5)
Polypoidalchoroidalvasculopathy (PVC)	**n=2**	**n=6**	**3 - 3**	**3,0 (3,0)**
Ranibizumab	2; 100	6; 100	3 - 3	3,0 (3,0)
DME + OR	**n=2**	**n=4**	**1 - 2**	**2,0 (2,0)**
Ranibizumab	2; 100	4; 100	1 - 2	2,0 (2,0)
AngioidStreaks (AS)	**n=2**	**n=11**	**4 - 7**	**5,5 (5,5)**
Ranibizumab	2; 100	10; 90,9	3 - 7	5,0 (5,0)
Aflibercept	1; 50	1; 9,1	1 - 1	1,0 (1,0)
AMD + AS	**n=1**	**n=6**	**6 - 6**	**6,0 (6,0)**
Ranibizumab	1; 100	6; 100	6 - 6	6,0 (6,0)
Choroidopathy puntata	**n=1**	**n=1**	**1 - 1**	**1,0 (1,0)**
Ranibizumab	1; 100	1; 100	1 - 1	1,0 (1,0)
Coats' disease	**n=1**	**n=7**	**7 - 7**	**7,0 (7,0)**
Ranibizumab	1; 100	3; 42,9	3 - 3	3,0 (3,0)
Aflibercept	1; 100	4; 57,1	4 - 4	4,0 (4,0)
Eales disease	**n=1**	**n=3**	**3 - 3**	**3,0 (3,0)**

Aflibercept	1; 100	3; 100	3 - 3	3,0 (3,0)
Cystoid macular edema	**n=1**	**n=2**	**2 - 2**	**2,0 (2,0)**
Ranibizumab	1; 100	2; 100	2 - 2	2,0 (2,0)
Anterior ischemic optic neuropathy	**n=1**	**n=3**	**3 - 3**	**3,0 (3,0)**
Aflibercept	1; 100	3; 100	3 - 3	3,0 (3,0)
DME + IGS	**n=1**	**n=8**	**8 - 8**	**8,0 (8,0)**
Ranibizumab	1; 100	6; 75	6 - 6	6,0 (6,0)
Triamcinolone	1; 100	2; 25	2 - 2	2,0 (2,0)
Intermediateuveitis	**n=1**	**n=4**	**4 - 4**	**4,0 (4,0)**
Ranibizumab	1; 100	3; 75	3 - 3	3,0 (3,0)
Triamcinolone	1; 100	1; 25	1 - 1	1,0 (1,0)

AMD: Age-related macular disease. **Source:** Patient records, 2018-2023.

Table 7 shows the distribution of the 286 patientswho started treatment followed up at the Retina Outpatient Clinic of the HUBFF Vision Unit, according to age group, gender and frequency of eyes injected.

Table 7. Distribution of patients with follow-up registered at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to age group, gender and frequency of eyes injected. Belém, 2018-2023.

Variable	Patients (n; %)	Injected eyes (n; %)
Age group (years)*		
< 40	3; 1,2	3; 0,9
40 - 49	11; 4,5	11; 3,4
50 - 59	45; 18,3	61; 19,1
60 - 69	73; 29,7	96; 30,1
70 - 79	80; 32,5	106; 33,2
80 - 89	29; 11,8	37; 11,6
90+	5; 2,0	5; 1,6
Total	**246; 100**	**319; 100**

Sex		
Female	133; 53,9	172; 53,6
Male	114; 46,1	149; 46,4
Total	**247; 100**	**321; 100**

*No data on a patient's age.

Source: Patient records evaluation form, 2018-2023.

Table 8 and figure 2 show the distribution of these patients according to visual acuity before and after injections, by laterality of the treated eye. No statistical difference was observed, although the frequency of eyes with acuity ≥ 20/400 after injections was higher for both right and left eyes.

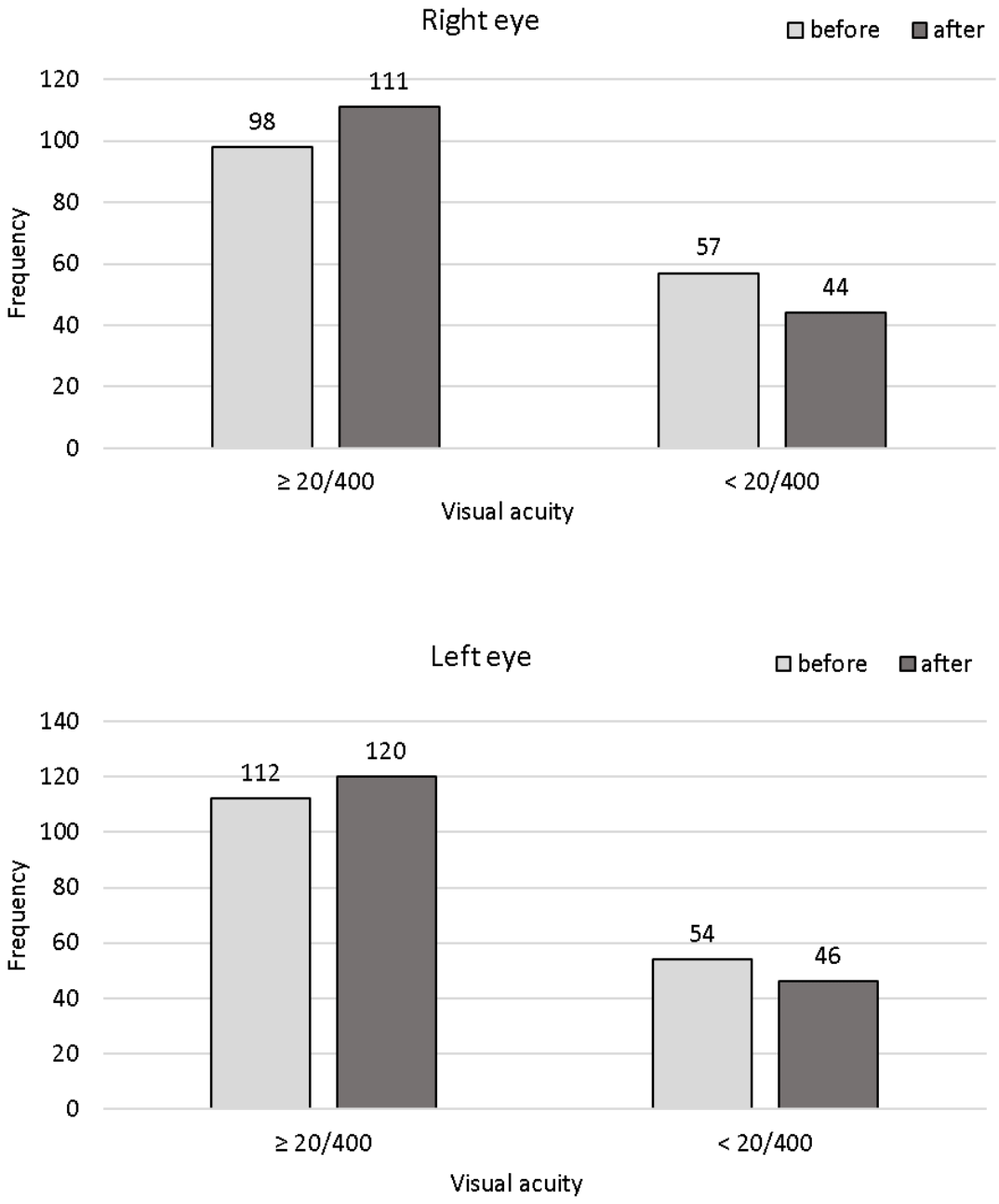
Table 8. Distribution of patients followed up at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to visual acuity before and after injections, by laterality of the treated eye. Belém, 2018-2023.

Before	After		Total before	p-value (McNemar)
	≥ 20/400	< 20/400		
Right eye				
≥ 20/400	85	13	**98; 63,2%**	0,0547
< 20/400	26	31	**57; 36,8%**	
Total after	**111; 71,6%**	**44; 28,4%**	**155; 100%**	
Left eye				
≥ 20/400	96	16	**112; 67,5%**	0,2684
< 20/400	24	30	**54; 32,5%**	
Total after	**120; 72,3%**	**46; 27,7%**	**166; 100%**	

Source: Patient records evaluation form, 2018-2023.

Figure 2. Distribution of patients with follow-up recorded at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital,

according to visual acuity before and after injections, by laterality of the treated eye. Belém, 2018-2023.



Source: Patient records evaluation form, 2018-2023.

However, considering the evolution of visual acuity without setting the cut-off point at 20/400, it was observed that the frequency of eyes that evolved with some kind of improvement after treatment was significantly higher than the cases without alterations or with worsening for both the right and left eyes,

although there was no significant difference in relation to the number of applications administered (Table 9).

Table 9. Visual acuity evolution of patients followed up at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital after intravitreal therapy, according to the laterality of the treated eye. Belém, 2018-2023.

Variable	Eyes (n; %)	95% CI	p-value*	Average (Median) number of injections	p-value**
Right eye (n=155)					
No change	29; 18,7	13,3 - 25,6		3,2 (3,0)	
It getsbetter	91; 58,7	50,9 - 66,2	<0,0001	3,5 (3,0)	0,2267
It getsworse	35; 22,6	16,7 - 29,8		3,7 (3,0)	
Left eye (n=166)					
No change	36; 21,7	16,1 - 28,6		3,6 (3,0)	
It getsbetter	91; 54,8	47,2 - 62,2	<0,0001	3,6 (3,0)	0,2244
It getsworse	39; 23,5	17,7 - 30,5		4,0 (3,0)	

* Chi-Square test of adherence. **Kruskall-Wallis test.

Source: Patient records evaluation form, 2018-2023.

Table 10 shows the frequency of injections given to patients according to the underlying disease and Table 11 shows the distribution of patients after intravitreal therapy according to the substance used, the underlying disease and the outcome, with no significant association being observed in the outcome considering the substance used and the underlying disease.

Table 10. Frequency of injections given to patients seen at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease. Belém, 2018-2023.

Baseline disease (isolated or associated)	Numberofinjections	%

Startedtreatment (N=286)		
Age-related macular disease (n=110)	575	44,3
Diabeticmacular edema(n=111)	500	38,6
Retinalveinocclusion (n=44)	155	12,0
Other (n=26)	92	7,1
Total	**1297**	
Finishedtreatment (N=247)		
Age-related macular disease (n=98)	540	46,8
Diabetic macular edema (n=92)	413	35,8
Retinalveinocclusion (n=39)	143	13,4
Other (n=22)	77	6,7
Total	**1155**	

Source: Patient records evaluation form, 2018-2023.

Table 11. Distribution of patients with follow-up recorded at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital after intravitreal therapy, according to the substance used, underlying disease and outcome. Belém, 2018-2023.

Substance used and underlying disease	Outcome			p-value*
	Unchanged	It getsbetter	It getsworse	
Ranibizumab				
Age-Related Macular Disease	30	64	28	
Diabetic macular edema	27	71	25	0,3122
Retinalocclusion	3	26	11	
Other	4	14	6	
Bevacizumab				
Age-Related Macular Disease	1	0	0	
Diabetic macular edema	0	3	0	1,0000
Retinalocclusion	0	0	0	

Other	0	0	0	
Aflibercept				
Age-Related Macular Disease	12	16	3	
Diabetic macular edema	4	5	0	0,6956
Retinalocclusion	1	5	0	
Other	1	3	0	
Triamcinolone				
Age-Related Macular Disease	0	0	0	
Diabetic macular edema	2	0	0	1,0000
Retinalocclusion	1	1	1	
Other	1	2	1	

*G-test for independence.

Source: Patient records evaluation form, 2018-2023.

Tables 12 and 13 show the frequency of injections given to patients who started (table 12) and finished (table 13) treatment with intravitreal injections according to the underlying disease, shown both by patient and by eye.

Table 12. Frequency of injections given to patients who started treatment with intravitreal injections (n=286) at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease. Belém, 2018-2023.

Baseline disease (isolated or associated) and substance used	Patients (n; %)	Eyes (n; %)	Injections administered		
			n; %	Min. - Max.	Average (Median)
Age-Related Macular Disease	**n=110**	**n=143**	**n=575**	**1 - 50**	**5,2 (3,0)**
Ranibizumab	102	135	524	1 - 50	5,1 (3,5)
Bevacizumab	1	1	3	3 - 3	3,0 (3,0)
Aflibercept	22	32	48	1 - 3	2,2 (2,5)
Diabetic macular	**n=111**	**n=162**	**n=500**		

edema					
Ranibizumab	108	159	467	1 - 12	4,3 (4,0)
Bevacizumab	3	5	6	1 - 3	2,0 (2,0)
Aflibercept	8	11	25	1 - 6	3,1 (3,0)
Triamcinolone	1	2	2	2 - 2	2,0 (2,0)
Retinalocclusion	**n=44**	**n=49**	**n=155**		
Ranibizumab	41	46	141	1 - 8	3,4 (3,0)
Aflibercept	4	4	10	1 - 3	2,5 (3,0)
Triamcinolone	4	4	4	2 - 2	2,0 (2,0)
Other	**n=26**	**n=31**	**n=92**		
Ranibizumab	23	28	73	1 - 7	3,2 (3,0)
Bevacizumab	1	1	3	3 - 3	3,0 (3,0)
Aflibercept	4	4	11	1 - 4	2,8 (3,0)
Triamcinolone	3	4	5	1 - 2	1,7 (2,0)

Source: Patient records evaluation form, 2018-2023.

Table 13. Frequency of injections given to patients who completed treatment with intravitreal injections (n=247) at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease. Belém, 2018-2023.

Baseline disease (isolated or associated) and substance used	Patients (n; %)	Eyes (n; %)	Injections administered		
			n; %	Min. - Max.	Average (Median)
Age-Related Macular Disease	**n=98**	**n=129**	**n=540**		
Ranibizumab	91	122	492	1 - 50	5,4 (4,0)
Bevacizumab	1	1	3	3 - 3	3,0 (3,0)
Aflibercept	21	31	45	1 - 3	2,1 (2,0)
Diabetic macular edema	**n=92**	**n=129**	**n=413**		
Ranibizumab	89	126	386	1 -12	4,3 (3,0)
Bevacizumab	2	3	4	1 - 3	2,0 (2,0)
Aflibercept	7	9	21	1 - 6	3,0 (3,0)
Triamcinolone	1	2	2	2 - 2	2,0 (2,0)
Retinalocclusion	**n=39**	**n=43**	**n=143**		

Ranibizumab	36	40	131	1 - 8	3,6 (3,0)
Aflibercept	4	4	10	1 - 3	2,5 (3,0)
Triamcinolone	1	2	2	2 - 2	2,0 (2,0)
Other	**n=22**	**n=26**	**n=77**		
Ranibizumab	20	24	61	1 - 7	3,1 (3,0)
Aflibercept	4	4	11	1 - 4	2,8 (3,0)
Triamcinolone	3	4	5	1 - 2	1,7 (2,0)

Source: Patient records evaluation form, 2018-2023.

The following table shows the frequency of intravitreal injections applied according to the condition (patients who started or finished treatment), the underlying disease and the substance used; it can be seen that ranibizumab was the most frequently used substance, alone or in combination, regardless of the underlying disease or condition (Table 14), as can also be seen in figure 03.

Table 14. Frequency of intravitreal injections given to patients seen at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital according to condition, underlying disease and substance used. Belém, 2018-2023.

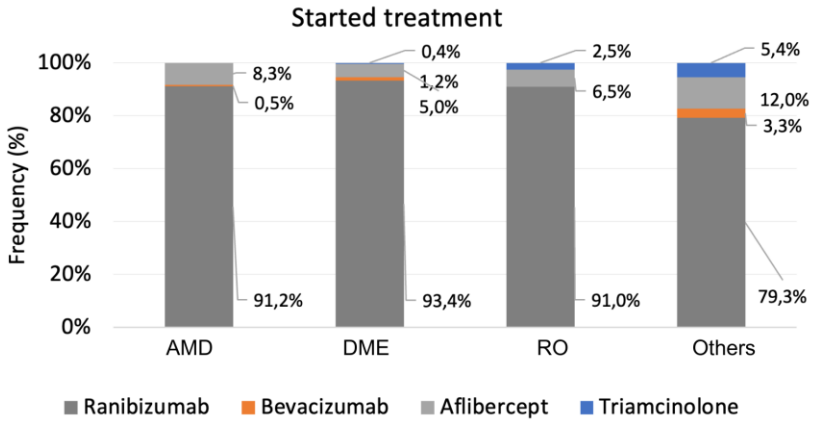
Substanceusedandcondition	Frequency (n; %)				Total
	AMD	RDM	OR	Other	
Startedtreatment					
Ranibizumab	524; 43,5	467; 38,8	141; 11,7	73; 6,0	**1205**
Bevacizumab	3; 25,0	6; 50,0	-	3; 25,0	**12**
Aflibercept	48; 51,1	25; 26,6	10; 10,6	11; 11,7	**94**
Triamcinolone	-	2; 18,1	4; 36,4	5; 45,5	**11**
Finalisedthetreatment					
Ranibizumab	492; 46,0	386; 36,1	131; 12,2	61; 5,7	**1070**
Bevacizumab	3; 42,9	4; 57,1	-	-	**7**
Aflibercept	45; 51,8	21; 24,1	10; 11,5	11; 12,6	**87**

Triamcinolone	-	2; 22,2	2; 22,2	5; 55,6	**9**

AMD: Age-Related Macular Disease. **DRM:** diabetic retinopathy. **RO:** retinal occlusion.

Source: Patient records evaluation form, 2018-2023.

Figure 3: Frequency of intravitreal injections given to patients treated at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease and substance used. Belém, 2018-2023.



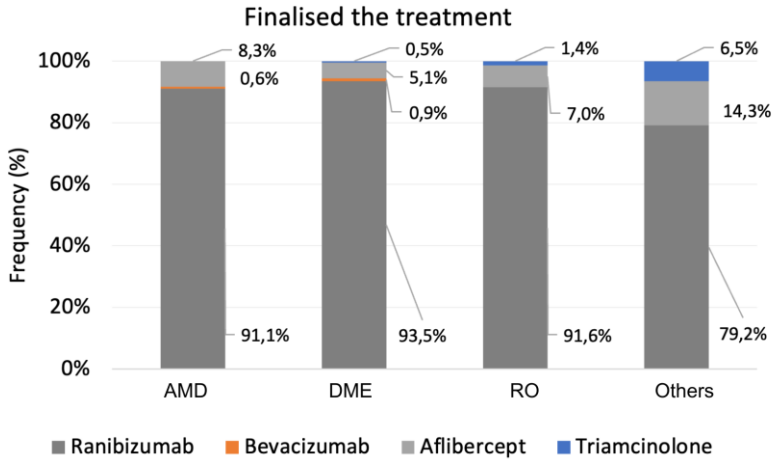


Table 15 shows the number of patients who started treatment and eyes, according to the underlying disease, according to the number of intravitreal injections of each substance administered, alone or in combination with the others, and Table 16 shows this data for those who finished treatment at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital.

Table 15. Number of patients and intravitreal injections given to patients who started at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease. Belém, 2018-2023.

Substance used and number of injections	Baseline disease and frequency (n)							
	AMD		DME		OR		Other	
	Pcts	Eyes	Pcts	Eyes	Pcts	Eyes	Pcts	Eyes
Ranibizumab								
1	7	8	10	10	7	7	7	7
2	7	8	3	5	-	-	3	3
3	37	37	40	43	23	24	6	6
4	6	7	7	12	2	2	1	1
5	6	12	9	15	-	-	-	-
6	21	34	31	58	7	11	4	7
7	4	7	3	6	1	1	2	4
8	6	9	1	2	1	1	-	-
9	1	1	1	2	-	-	-	-
10	-	-	1	2	-	-	-	-
11	2	3	-	-	-	-	-	-
12	1	2	2	4	-	-	-	-
14	2	3	-	-	-	-	-	-
15	1	2	-	-	-	-	-	-
50	1	2	-	-	-	-	-	-
Bevacizumab								
1	-	-	1	1	-	-	-	-
2	-	-	1	2	-	-	-	-
3	1	1	1	2	-	-	1	1
Aflibercept								
1	7	10	1	1	1	1	1	1
2	4	8	1	2	-	-	-	-
3	11	14	4	4	3	3	2	2
4	-	-	1	2	-	-	1	1

6	-	-	1	2	-	-	-	-
Triamcinolone								
1	-	-	-	-	-	-	1	1
2	-	-	1	2	2	4	2	3

AMD: Age-Related Macular Disease. **DRM:** diabetic retinopathy. **RO:** retinal occlusion. Pcts: patients

Source: Patient records evaluation form, 2018-2023.

Table 16. Number of patients and intravitreal injections given to patients who ended up in the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital, according to underlying disease. Belém, 2018-2023.

Substance used and number of injections	Baseline disease and frequency (n)							
	AMD		DME		OR		Other	
	Pcts	Eyes	Pcts	Eyes	Pcts	Eyes	Pcts	Eyes
Ranibizumab								
1	3	4	7	7	3	3	6	6
2	5	6	2	3	-	-	3	3
3	35	35	37	39	23	24	6	6
4	6	7	5	8	1	1	-	-
5	5	10	7	11	-	-	-	-
6	20	32	24	44	6	9	4	7
7	3	6	2	4	1	1	1	2
8	6	9	1	2	1	1	-	-
9	1	1	1	2	-	-	-	-
10	-	-	1	2	-	-	-	-
11	2	3	-	-	-	-	-	-
12	1	2	2	4	-	-	-	-
14	2	3	-	-	-	-	-	-
15	1	2	-	-	-	-	-	-
50	1	2	-	-	-	-	-	-
Bevacizumab								
1	-	-	1	1	-	-	-	-
3	1	1	1	2	-	-	-	-

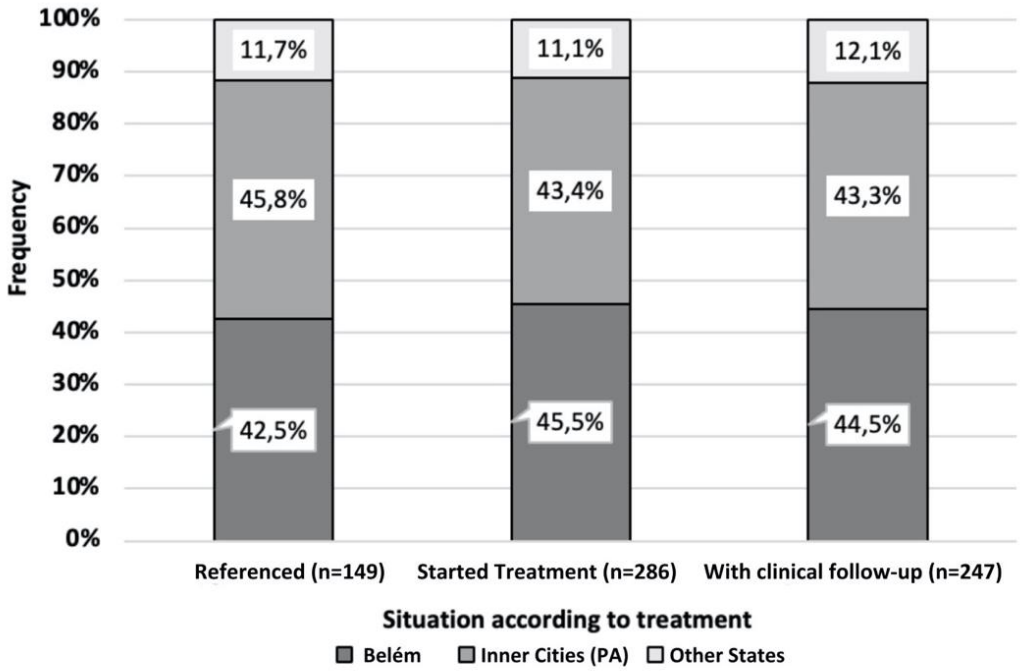
Aflibercept								
1	7	10	1	1	1	1	1	1
2	4	8	1	2	-	-	-	-
3	10	13	4	4	3	3	2	2
4	-	-	-	-	-	-	1	1
6	-	-	1	2	-	-	-	-
Triamcinolone								
1	-	-	-	-	-	-	1	1
2	-	-	1	2	1	2	2	3

AMD: Age-Related Macular Disease. **DRM:** diabetic retinopathy. **RO:** retinal occlusion. **Pcts:** patients.

Source: Patient records evaluation form, 2018-2023.

With regard to origin, figure 04 illustrates the distribution of patients seen at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital according to origin and treatment status, showing that the proportion of patients according to origin remained similar considering their treatment status, with the majority coming from the state of Pará.

Figure 4: Distribution of patients seen at the Retina Outpatient Clinic of the Vision Unit of the Bettina Ferro de Souza University Hospital according to origin and treatment status. Belém, 2018-2023



DISCUSSION

According to the data found in this study, among the 419 medical records of patients treated at the Retina's ambulatory of this Reference Ophthalmological Center, the average age of vitreoretinal diseases was 66.6 years (95%CI: 65.4 - 67.7), ranging from 17 to 100 years, with no predominance in relation to gender (female: 51.8% and male: 48.2%; p=0.4941).

The results of our study are consistent with previous literature, corroborating the findings of Klein et al.[13] and Clemons et al.[27] when discussing the epidemiology of Age-Related Macular Disease (AMD) agree that it is more prevalent in elderly, white, smoking patients with a high body mass index (BMI).

In Diabetic Retinopathy (DR), based on data from the Ministry of Health's Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel)[28] ,it was observed an increase of 54 per cent in cases among men and 28 per cent among women, with a 24 per cent increase in patients over 65 years of age. According to the study by Solomon*et al.*[15] , DR is one of the main causes of irreversible visual loss in the world and is considered the biggest cause of blindness in the population aged between 16 and 64.

According to Gutman and The Eye Disease Case-Control Study Group, retinal venous occlusions (RVO) are the second most common cause of retinal vascular disease, second only to DR[19,29] , affecting individuals of both sexes, and are most common between the ages of 60 and 70[30] .

As for the underlying diseases assessed in this study, whether occurring alone or in combination with others, the most common was Diabetic Macular Edema (DME) followed by AMD and retinal vein occlusion. Evidence reinforced by the study by Bourne*et al.*[16] , Silveira*et al.*,[30] Alves*et al.*[31] and Mendanha*et al.*[32] , who consider DR as an important cause of blindness, contributing 2.6% of all blind people worldwide and affecting around 35% to 40% of diabetics, being present after 20 years of the disease in around 90% of patients with insulin-dependent DM and in approximately 60% of patients with non-insulin-dependent DM.

About AMD, Klein*et al.*[13]emphasize that in developed countries it is considered the main cause of irreversible blindness and has a prevalence of approximately 6.5% of the population over 40. According to Gutman[19] , retinal venous occlusions are the second most common cause of retinal vascular disease, just behind the DR, and according to Rosa[33] they are correlated with high intraocular pressure, systemic arterial hypertension, high BMI, diabetes, cardiovascular disease and dyslipidemia, risk factors that are also directly correlated with DR, showing their high prevalence, especially in this population.

This work showed a higher prevalence of DR than AMD, contradicting AMD's global prevalence, which always occupies the top of the prevalences[13]. This finding may be related to poor control of this disease[28], as well as the different habits and alimentation that varies according to each region, being related to cultural, economic and genetic factors of each specific population, requiring further investigation.

Six patients had associated eye diseases: three had both Diabetic macular edema and retinal vein occlusion, one had a diagnosis of AMD and angioid streaks, one had retinal vein occlusion and Irvine Gass Syndrome concomitantly and one had Diabetic macular edemaand cystoid macular edema. In this study, even the patients who had associated diseases in their

diagnosis had one of the most prevalent pathologies. This is in line with Shiroma[20] , in an analysis by the Brazilian Retina and Vitreous Society, which states that the most prevalent pathologies treated with anti-angiogenic drugs were AMD, followed by DR with Diabetic Macular Edema (DME) and OVR.

In this study, of all the 419 patients who were referred for antiangiogenic therapy at the Retina Outpatient Clinic of the HUBFS-UFPA Vision Unit, the following clinical indications were given: 140 patients with an indication for therapy for the right eye only, of whom 68.6% (96/140) at least started therapy; 156 patients with an indication for therapy for the left eye only, of whom 64.1% (100/156) started therapy and 123 patients with an indication for therapy for both eyes, of whom 73.2% (90/123) carried out at least one application, totaling 286 (68.3%; 286/419) patients who started treatment and received one or more substances. Intravitreal therapy has been widely used due to the ease of surgical access to the eye and well-defined pharmacology[34] . Furthermore, according to an analysis by Kurz*et al.*[61] , the drugs injected into the vitreous, due to the blood-retinal barrier, remain at constant therapeutic levels, minimizing systemic adverse effects. Classic ocular treatment routes include topical, periocular and systemic. Aiello*et al.*[24]emphasize that the greater use of the intravitreal route is due to its lower risk of complications compared to other invasive procedures and greater safety.

Lucena and Yamane[36]emphasize that intravitreal treatment with anti-angiogenic drugs aims to reduce VEGF, which is responsible for vascular alterations due to retinal ischemia, by blocking this protein that is essential to the pathological neovascularization process. According to studies by Aiello*et al.*[24] and Adamis*et al.*[37] , of all the forms of VEGF, VEGF-A and its isoforms - especially the $VEGF_{165}$ isoform according to studies by Ferrara*et al.*[38] , Park*et al.*[39] and Ishida*et al.*[40] - were considered to be the most closely related to pathological angiogenesis, because in addition to increasing vascular permeability and inducing the formation of neovessels, VEGF-A inhibits the apoptosis mechanism of these cells, and has therefore become the most important target of this therapy. Of the 286 patients who started treatment in this study, complete follow-up data was available for 86.4% (247/286) of the

patients, corresponding to 59.0% (247/419) of the patients initially included in the study, reinforcing the difficulty of access to this therapy.

As for the substances injected into these patients, there was a predominance of Ranibizumab (232/247), the frequency of which totaled 1054/1144 injections. Ranibizumab continued to prevail according to the underlying disease and the substance injected, with a total of 90% of injections carried out for the treatment of AMD, 87% for the treatment of DR, 33% for the treatment of Retinal Vein Occlusion and 100% of cases for the treatment of Neovascular Glaucoma, Hypertensive Retinopathy, Polypoidal Choroidal Vasculopathy (PCV) and Cystoid Macular Edema (CME). This finding corroborates several studies that classify Ranibizumab as the drug of choice for various widely prevalent pathologies such as exudative AMD through the Marina, Anchor and Pier studies, for example. According to Garcia*et al.*[41] , Rosenfeld*et al.*[42] and Brown*et al.*[43] this drug is considered the gold standard for treatment due to its greater ease in crossing the vitreoretinal interface as it has a molecular weight of less than 48 kDa.

A proportion of patients used Aflibercept (36/247), characterizing the total of 87/1144 injections. It was considered the second most used drug in this study. According to studies by Chappelow*et al.*[10] , Papadopoulos*et al.*[44] and Stewart*et al.*[45] , this drug, considered a fusion protein, is highly specific in inhibiting VEGF A, VEGF B and placental growth factor (PIGF) 1 and 2 with high affinity. Due to higher molecular weight, it has a longer biological effect and lower retinal clearance.

In this study, only a small proportion used Triamcinolone Acetate (4/247). This drug is used as an adjuvant in the treatment of various proliferative and edematous intraocular diseases, or in cases of refractoriness to anti-angiogenic drugs according to Fialho*et al.*[46] and Schwartz*et al.*[47] , which is why it was used in the treatment of Irvine Gass Syndrome, Intermediate Uveitis and an isolated case of an association of Diabetic Retinopathy and Irvine Gass, reinforcing the indications described in the literature.

Of the 286 patients followed up at the Retina Outpatient Clinic of the HUBFS-UFPA Vision Unit, according to the frequency of eyes injected, the "Treat and Extend" regime for intravitreal injections with anti-angiogenic drugs

was followed, based mainly on the OCT of these patients. This regimen, highlighted by Engelbert[48] and Spaide[49] , corresponds to extending the interval of injections as long as there is no macular fluid or at a fixed maximum interval of 3 months, with the aim of reducing recurrences and improving long-term prognosis. This scheme reduces patient costs, but also the consequences of excessive use of anti-angiogenic drugs, such as macular atrophy[50] .

According to visual acuity before and after injections, by laterality of the treated eye, no statistical difference was observed, although the frequency of eyes with acuity ≥ 20/400 after injections was higher for both right and left eyes, reinforcing the efficiency of intravitreal injections with antiangiogenics as the gold standard for treating retinal diseases[12,42,43, 46,47] .

CONCLUSION

After analyzing 540 eyes injected, the epidemiological profile showed that the proportion of men and women was similar, with no gender predominance. Most of the patients were over 60 years old and had DME, AMD or RO. Just 286 started intravitreal treatment indicated with anti-angiogenic drugs (286/419) and 86.4 per cent were followed up.

Most of the patients referred were from the interior of Pará (45.8%) and among those who started treatment with intravitreal therapy with antiangiogenics, the majority were from Belém - Pará, as were those who remained in clinical follow-up. Ranibizumab was the drug with the highest number of injections (1182/1297), and the AMD and DME portion accounted for 81.6% of the injections administered (1058/1297).It was observed that the frequency of eyes that evolved with some kind of improvement after treatment was significantly higher than the cases without alterations or with worsening.

This data reinforces the difficulty faced by these patients in accessing eye care and available treatment, especially in towns outside the state capital, which consequently worsens their visual prognosis. In addition, as this is a medication with a high financial cost, there is a need for greater targeting of these patients, as well as early diagnosis of various vitreoretinal pathologies that can be treated with these medications, allowing the identification of the

main etiologies prevalent in the Amazon Region and thus helping to prevent them.

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