FUNDAL FLUORESCEIN ANGIOGRAPHIC LESION IN AGE-RELATED MACULAR DEGENERATION

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ABSTRACT

Objective: To assess the frequency of lesion types using fundal fluorescein angiography (FFA) in age-related macular degeneration (AMD). Design: Cross-sectional study. Materials and Methods: Fundal fluorescein angiography was performed in 934 patients using digital Kowa ophthalmic medical imaging technology at Undaan Eye Hospital Surabaya from January 2004 to September 2004. A number of 42 patients were enrolled for AMD study. Main Outcome Measures: Identification of (1) the frequency of AMD, (2) the frequency of dry AMD and wet AMD, (3) the frequency of the types of FFA, Classic choroidal new vessel (CNV) or predominantly classic CNV, minimally classic CNV and Occult CNV. Results: The frequency of AMD was 4.5% in retinal consultation patient. This study found that 57.14% of the patients were male and 42.86% were female with the youngest age was 51 years old and the oldest was 89 years old with the mean age 65 ± 4.6 years. This study showed 47.3% wet AMD and 52.7% dry AMD. Of the wet AMD, 5.4% was classic CNV, 17.57% predominantly classic CNV, 17.57% minimally classic CNV and 6.76% occult CNV. Conclusions: In retinal consultation patient the frequency of AMD was 4.5%, wet AMD was 47.3%, dry AMD 52.7%, 57.14% were male, 5.4% classic CNV and 17.57% predominant classic CNV that can be treated by photodynamic therapy

***Keywords**: Fundal Fluorescein Angiography, wet and dry AMD, classic CNV, predominantly classic CNV, minimally classic CNV and occult CNV*

INTRODUCTION

Age-related macular degeneration (AMD) is the leading cause of legal blindness among elderly in western country (Klein BE and Klein R, 1982). Age-related macular degeneration can be divided into 2 broad categories: neovascular AMD (also termed wet, exudative, disciform, or serous AMD) and non-neovascular AMD (also termed dry, non-exudative, geographic, or atrophic AMD). The neovascular (exudative or wet) AMD is characterized by the choroidal new vessel/neovascularization (CNV) and occurs in only approximately 20% of AMD patients, but it is a leading cause of blindness among people over 50 years of age in the western world (Bessler NM, Hyman L, 1992). The fundal fluorescein angiography of choroidal new vessel can be divided into classic or predominantly classic CNV, minimally classic and occult CNV (Berkow, 1997). The non-neovascular AMD is characterized by drusen and geographic atrophy of the retinal pigment epithelium (RPE). Approximately 10-20% of patients with non-neovasvascular AMD develop CNV and progress to the neovascular form. The time scale for this progression may vary from a few months to several years and depends on the composition of the CNV and the size and location of the lesions (Blesser NM, Blesser SB, Fine SL, 1988). Many new therapies for the treatment of AMD are now approved or under investigation. Photodynamic therapy (PDT) has been approved for treatment of predominantly classic AMD. Transpupillary thermotherapy is currently being investigated as possible treatment for occult CNV of AMD (Reichel, 1999). The multiple antiangiogenic pharmacotherapy treatments are currently under investigation for various forms of the neovascular and non-neovascular age-related macular degeneration. Fundal fluorescein angiography (FFA) has been used to define various lesion of AMD. Currently the FFA lesion type defines the best available treatment option. To our knowledge no population based prevalence data of various types of AMD in Indonesia. This study used a cross-sectional design to evaluate the fundal fluorescein angiography lesion in patients with AMD.

MATERIALS AND METHODS

This cross-sectional study reviewed the FFA from January 2004 to September 2004 retrospectively at Undaan Eye Hospital Surabaya. Fundal fluorescein angiography was performed by digital retinal camera of Kowa ophthalmic medical imaging technology. The fundal fluorescein angiography was performed and diagnosed by retinal expert. Of 934 FFA patients in retinal consultation, 42 patients were enrolled in this cross-sectional study. The frequency of AMD was 4.5% in patients examined in retinal consultation.

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The classification of AMD was made using fundal fluorescein angiography. The variable of classic CNV angiogram appears as well-demarcated area of uniform hyperfluorescence surrounded by a hypofluorescent margin in the early-phase frames of the angiogram, with fluorescein leakage that obscure the boundaries of the lesion through the mid-phase and late-phase frames. The predominantly classic CNV angiogram lesion was defined as those in which the CNV comprises 50% or more of the area of the entire lesion. The minimally classic CNV angiogram lesion was defined in which the CNV less than 50% of the entire lesion. Occult CNV was defined as no CNV of the entire area. There are two types of occult CNV. Type I occult CNV is characterized by a fibrovascular retinal pigment epithelium that appears as stippled and irregular elevation of this hyperfluorescence. Type II occult CNV has poorly demarcated boundaries with fluorescein leakage from an undetermined source at the level of the retinal pigment epithelium.

RESULTS

From 42 age-related macular degeneration patients found 74 eyes with 86.49% (64 eyes) binocular AMD and 13.51% (10 eyes) monocular AMD. The youngest patient was 51 years old and the oldest patient was 89 years old, mean age was 65 ± 4.6 years. This study found 57.14% male and 42.86% female. Fundal fluorescein angiography revealed that 47.30% of the patients had AMD (35 eyes) and 52.70% dry AMD (39 eyes). Of the 47.30% wet AMD this study found 5.4% classic CNV, 17.57% predominantly classic CNV, 17.57% minimally Classic CNV and a 6.76% occult CNV.

Of the 74 age-related macular degeneration found 21 eyes (28.38%) had a visual acuity of 6/60 or better, 37 eyes (50%) were 3/60 to 5/60, 12 eyes (16.22%) were 1/60 to 2/60 and 4 eyes (5.4%) were light perception to hand movement. This study showed 33 eyes (94.29%) of CNV in the subfoveal area and 2 eyes (5.71%) of CNV in the extrafoveal area. The atrophic or dry age-related macular degeneration was found in 37 eyes (94.87%) in the subfoveal area and 2 eyes (5.13%) in the extrafoveal area. This study showed the lesion of AMD 94.59% in the subfoveal area and 5.41% in the extrafoveal area.

Table 1. Demographic data

Age (years)	Sex	
	Male	Female
51 - 60	9	3
61 - 70	7	7
71 - 80	5	7
81 - 90	3	1
Total	24 (57.14%)	18 (42.86%)

Table 2. Classification of choroidal new vessel

Type of CNV	Frequency
Classic CNV	4 (5.4%)
Predominantly classic CNV	13 (17.57%)
Minimally classic CNV	13 (17.57%)
Occult CNV	5 (6.76%)
Wet AMD	35 eyes (47.3%)

DISCUSSION

Age-related macular degeneration presents as retinal macular disease and the diagnosis can be made by vision examination, such as deterioration of visual acuity and Amsler grid test. The exact diagnosis for treatment is established by fundal fluorescein angiography. The fundal fluorescein angiography can make identification become the best treatment of AMD. The classic CNV and predominantly classic CNV can be treated by photodynamic therapy, while occult CNV can be treated by transpupillary thermotherapy (Reichel, 1999).

The results of this study revealed that the frequency of AMD was higher in male than in female. According to Beaver Dam Eye Study (BDES), the Blue Mountain Eye Study (BMES), and the Rotterdam Study (RS) the frequency in female was higher than that in male (Sandra, Klein R, Mitchell, de Jong, 2004). The difference of sex in this study may be due to the fact that in Indonesian people cigarette smokers were found more in men than in women. The risk factors for incidence AMD are smoking status, blood pressure and cholesterol. Khan (1977) showed the age of AMD between 52 and 85 years old. Vingerling (1995) said that the age of AMD was from 55 to 85 years old. This result is similar to that of this study, in which the range of AMD was from 51 years to 89 years old. This study also found that the highest frequency of AMD was among the patients aged 61 - 70 years.

The etiology of AMD is largely unknown, but several risk factors have been identified such as smoker, cholesterol, blood pressure, and nutrition. Age is the only known definite risk factor for AMD. The older the patient the higher the risk of developing AMD (Blesser NM, Vinding T, Vingerling, de Jong, Sandra, 2004). The presence of AMD in one eye also predisposes people to developing the condition bilaterally. Five-year incidence estimates for bilateral disease range from 7% to 87% and are known to depend on patient characteristics and on the fellow eye; on average, 42% of patients with neovascular AMD in one eye will develop it in the other eye within 5 years (Macular Photocoagulation Study Group). This study showed the 86.49% binocular AMD and 13.51% monocular AMD. This result was similar to the study of macular photocoagulation study group.

The modality of AMD treatment is photodynamic therapy for classic CNV and transpupillary thermotherapy for occult CNV of AMD. Ophthalmologist can perform this currently proved treatment if they have a good FFA lesion of AMD. Due to this reason, this study explored the appearance of FFA lesion at Undaan Eye Hospital Surabaya. This study revealed a 4.5% patient of AMD. From 35 eyes with neovascular or wet age-related macular degeneration, this study found a 5.4% of classic CNV, a 17.5% of predominantly classic CNV, a 17.57% of minimally classic CNV and a 6.76% of occult CNV. This result was not similar to the result from Timothy W. Olsen (2004) with their study in university-based, tertiary retinal referral practice and community-based eye clinic at Minnesota. The Timothy's study found 75% of occult CNV and this study showed only 6.76% of occult CNV. This difference result of occult CNV may due to the complaint of patient, because this patient did not complain the visual acuity disturbance dramatically. The 17.57% of the classic and the predominantly classic of this study was similar to 18% of Timothy's study. The ophthalmologist did not refer the occult CNV to retinal consultation because we did not treat using laser and classic CNV showed good results after PDT. This study showed high frequency of wet AMD (47.30%), which was not similar to the Bessler's study, in which he found only 20% of AMD. The difference may be due to the methodology. This cross-sectional study was performed to the patients who consulted retinal problems. In contrast, Bessler's research was a clinical epidemiological study. According to Timothy, most lesions of AMD were in subfoveal area (78.5%), as he found that 94.59% of of AMD lesion was located in that area.

CONCLUSION

The cross-sectional study of the fundal fluorescein angiography of age-related macular degeneration showed the frequency of AMD was 4.5% from 934 FFA. From 74 eyes observed this study, 86.49% had binocular AMD and 13.51% had monocular AMD. The mean age was 65 ± 4.6 years and 57.14% occurred in male. Fundal fluorescein angiography found wet AMD in a 47.3% and dry AMD in 52.7%. This study showed classic CNV in 5.4% and predominant CNV in 17.57%, that could be treated by photodynamic therapy. Most the lesions of AMD were in the subfoveal area (94.59%).

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