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Research Article

Multidisciplinary Outpatient Vision Care: Evidence from an Eye Stroke Clinic

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Abstract

Objectives: Outpatient care for patients with stroke affecting vision is complex, requiring a multidisciplinary approach. The objectives of this study were: (1) to describe the development of an innovative, multi-discipline, multi-specialty, outpatient clinic for patients with conditions that mainly included central retinal and branch artery occlusion (CRAO and BRAO), (2) report demographics of the patients served, including the clinical and management features of the clinic.

Methods: We performed a cross-sectional study on consecutive patients presenting to the clinic. There are three service providers available the same day for assessment and treatment; a neurologist, a neuro-ophthalmologist and an occupational therapist. Data were tabulated and described in narrative form.

Results: Between July 1, 2021 and July 1, 2022, 102 people were seen in the eye stroke clinic for initial visit. The mean group age was 67 years old (15.18 SD) and over half of our group (55 people) identified as female. There were 55 (53.9%) people with CRAO, 33 (32.4%) people with Amaurosis Fugax, 11 (10.8%) BRAO, and 3 (2.9%) people with other retinal vascular disease. A diagnostic change was effectuated in 34.3% of cases. A management change was effectuated in 89.2% of cases.

Conclusion: This clinic has successfully engaged people with eye stroke related vision impairment with coordinated, cross-disciplinary care. The high proportion of patients with a change in both diagnosis and management as a result of engagement with the clinic suggests a strong need for this mode of care delivery.

Keywords: Eye stroke; CRAO; Multidisciplinary; Clinical management of stroke

Introduction

Strokes that affect vision are some of the most disabling. This includes strokes affecting the visual pathways within the brain (e.g., strokes of the occipital, temporal or parietal lobes, the optic tracts, or the thalamus), those involving the retina (e.g., Central Retinal Artery Occlusion; CRAO or Branch Retinal Artery Occlusion; BRAO) and optic nerve (ischemic optic neuropathy) [1]. Retinal strokes are associated with serious systemic vascular risk factors [2], some of which are modifiable, and are associated with a risk of recurrent cerebral stroke [3]. Eye strokes can cause sudden and permanent blindness in one or both eyes [4]. Blindness is defined as either loss of peripheral visual field, or a significant decrease in visual acuity. Eye strokes are far more likely to be unilateral than bilateral and while the fellow eye is usually spared, the lack of binocular summation, depth perception, and spatial orientation can have tremendous, long-term impact [3] on activities of daily living and functional mobility [3,5]. Unfortunately, people who suddenly lose sight in one eye do not always receive comprehensive, detailed monocular vision loss educational information from multi-specialized health care providers about stroke prevention, preservation of residual vision, and function maximization. Neither are many vision rehabilitation programs prepared to treat clients with acquired monocular vision loss [5,6]. Our goal is to address this problem. We sought to develop an innovative, accessible, comprehensive, multi-disciplinary and multi-specialty center. We aimed to provide opportunities for comprehensive communication between providers, allowing multiple avenues for patients to gain the information and rehabilitation care they needed to address their visual impairment.

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The objectives of this study were: to describe the development of a novel, outpatient eye stroke clinic and (2) report the demographics of the patients served including the clinical and management features of the clinic.

Methods

This study was approved by the Duke University ethics committee (Institutional Review Board; IRB) and adhered to the tenets of the World Medical Association Declaration of Helsinki on ethical principles for medical research involving human subjects. This study was approved as exempt from informed consent because the clinical data was already de-identified and part of an observational registry separately approved by the IRB, which did require participants to complete full consent. It is a cross-sectional design analyzed retrospectively. The registry was started from the multi-disciplinary, multi-specialty outpatient clinic was developed at Duke University by a neurologist, neuro-ophthalmologist, and occupational therapist (OT; authors BMG, CJB and KH). The clinic is held on average once per month.

Study Setting

The growth of the clinic involved referral outreach, hospital buy-in (to provide the time for the three practitioners to be in the room at the same time with each patient), and networking initiatives. For example, multiple centers, departments, programs, and hospital networks all participate in the process of development. These stakeholders include: (1) our comprehensive stroke center, (2) neuro-ophthalmology, (3) optometry, (4) our low vision rehabilitation clinic, (5) subspecialty input (retina, glaucoma), (6) our multi-disciplinary clinical research program, and (7) the neurology and ophthalmology residency program leads. These stakeholders were also educated about our clinic goals, how to complete referrals to the clinic, the assessments we planned to use as well as the treatment protocols in place. Marketing the multidisciplinary clinic was another important effort prior to seeing our first patients. These activities included using the eye center website, sharing patient stories via social media, hosting virtual seminars to local practitioners in the area, and presenting information at internal and external conferences. Also, the clinic created a standardized process for treating eye stroke to ensure that consistency would occur over time and clinical care would be coherent.

The flow of the clinic was as follows. First, the patients were seen by the ophthalmic technicians who performed advanced imaging including Optical Coherence Tomography (OCT), automated or semi-automated visual field testing, Fluorescein Angiography (FA), and/or Electroretinography (ERG) depending on the patients' needs. Next, the resident physician, fellow, or physician assistant saw the patient to collect the medical history and determine the reason for the visit. They also dilated the patients' patient's eyes and gathered any test results for the physicians to interpret. Then, simultaneous consultation with neurology and neuro-ophthalmology was performed, including a discussion of the patient's diagnosis, whether additional testing or referrals were needed, review of treatment options, education regarding stroke prevention and eye protection, and planning follow up care. The occupational therapist was also present and made recommendations for maximizing function. They also made themselves available for a full evaluation and treatment plan as necessary (occurred immediately after the physician exam).

Study Population

The cohort was a group of people seen at Duke University's Eye Stroke Clinic between July 1, 2021 and July 1, 2022. We categorized individuals as either CRAO, BRAO [7], transient monocular vision loss (TMVL, or "amaurosis fugax" - a transient ischemic attack thought to be high risk for future stroke), or other retinal vascular disease. For the purposes of this paper, we did not include data from people who had a stroke affecting the optic nerves, chiasm, or posterior visual pathways, though these types of cases are occasionally seen in this clinic.

Statistical Analysis

We retrospectively collected data using a pilot pro forma implement through Microsoft Excel and included demographic information (e.g., age, sex, ethnicity, race, ophthalmic history), examination findings, diagnostic tests performed, treatment provided, and referrals made. Summary statistics of median, mean, and frequency were calculated using SPSS and data were also reported in narrative and tabular form.

Results

One hundred and two people were seen in the eye stroke clinic during its first year. The mean age was 67 years old (15.18 SD) and over half of our group (55 people) identified as female. There were 55 (53.9%) patients with CRAO, 33 (32.4%) with TMVL, 11 (10.8%) with BRAO, and 3 (2.9%) with other retinal vascular disease. See Table 1 for additional demographics.

Table 1: Demographic Characteristics of Eye Stroke Clinic Cohort.

Variables	Central Retinal Artery Occlusion N=55 (53.9%)	Amaurosis Fugax N=33 (32.4%)	Branch Retinal Artery Occlusion N=11 (10.8%)	Other Retinal Vascular Disease N=3 (2.9%)	Total cohort N=102
Age, Mean (SD)	68.87 (15.26)	67.58 (12.30)	57.09 (19.98)	63.03 (16.23)	67.03 (15.18)
Sex (count, %)					
Male	24 (43.6%)	18 (54.5%)	4 (36.3%)	1 (33.3%)	47 (46.1%)
Female	31(56.3%)	15 (45.4%)	7 (63.6%)	2 (66.6%)	55(53.9%)
Race (count, %)					
White	36 (65.4%)	28 (84.8%)	9 (81.8%)	2 (66.6%)	75 (73.5%)
Black/African American	15 (27.2%)	5 (15.1%)	2 (18.1%)	1(33.3%)	23 (22.5%)
American Indian	3 (5.4%)	0	0	0	3 (2.9%)
Asian	1 (1.8%)	0	0	0	1 (1%)
Ethnicity					
Non-Hispanic	55 (100%)	33 (100%)	10 (90.9%)	3 (100%)	101 (99%)
Hispanic	0	0	1 (9.1%)	0	1 (1%)

Table 2: Initial Outcomes by Diagnostic Group.

	Central Retinal Artery Occlusion (N=55)	Amaurosis Fugax (N=33)	Branch Retinal Artery Occlusion (N=11)	Other Retinal Vascular Disease (N=3)
Diagnostic changes N (%)	19 (34.5%)	12 (36.3%)	2 (18.1%)	2 (66.6%)
Management Changes N (%)	50 (90.9%)	29 (87.8%)	10 (90.9%)	2 (66.6%)
New test ordered total counts	7	12	4	0
New medication ordered total counts	5	7	3	0
New visual rehabilitation strategy made total counts	20	2	2	2
Referral to outside specialist total counts	21	8	2	0

The entire cohort was seen by both neurology and neuro-ophthalmology on the first visit. Both providers were in the same room for the consultation and worked together to address the plan of care. These visits lasted 3.5 hours on average, including the time with ophthalmic technicians prior to the physicians' arrival. If the patients had significant functional goals or concerns warranting further recommendations by the OT, they were offered to the opportunity to see the OT that same day. Twenty-six people (25.5%) were seen for an OT visit, which lasted an average of one hour. Typically, the session was tailored to the patient's individual goals but also addressed the monocular or visual field loss via discussions about: (1) safety strategies related to loss of depth perception, (2) driving considerations, (3) scanning strategies, (4) using high contrast filters and lighting during daily tasks, (5) discussing /completing workers' compensation letters and forms, (6) devices, and (7) educational strategies for stroke prevention.

We investigated outcomes which included diagnostic and management changes. A diagnostic change was effectuated in 34.3% of cases. This meant that a new diagnosis given as compared to the original reason for the referral. A management change was made in 89.2% of cases. This meant that a new test was ordered, a new medication was ordered, a new visual rehabilitation strategy was employed, or a referral was made to an outside specialist (Table 2).

Discussion

This manuscript reports a cross-sectional study of individuals who were seen in a multidisciplinary eye stroke clinic. The clinic seeks to engage people with eye stroke related vision impairment with coordinated, cross disciplinary care in order to reduce the risk of subsequent stroke, provide education on preserving residual vision, improving function with their current visual capabilities. There is a body of literature in support of coordinated care for eye stroke patients is [8]. However, the multi-disciplinary and simultaneous nature of our clinic is unique. A major benefit of our clinic is that it reduces the travel burden, time burden, and cost (transportation, co-pays, etc.) to patients, as they visit one clinic instead of three.

Similarly to others, a major focus of our clinic visits is education [9,10]. Each professional's educational topics were different. For example, the occupational therapist usually focused on functional challenges. If the patient stated that driving was challenging, then driving strategies would be given (i.e. how to manage the loss of depth perception and scanning toward the side of visual field loss). The neurologist provides detailed education about what an eye stroke is and stroke prevention strategies, an attempt to reduce the risk of recurrent stroke. The neuro-ophthalmologist often focused education efforts around eye protection. There are two limitations to this study. First, we did not assess the impact of our clinic on outcomes other than diagnostic and management changes. Second, this is a retrospective review limiting the conclusions that can be made.

In conclusion, these data suggest that the medical and educational needs of cohort of eye stroke patients can be facilitated with a multi-disciplinary, multi-specialty clinic. The high proportion of visits resulting in a change in diagnosis or management plan suggests a strong need for this mode of care delivery. Future research should include tracking patients over time to better understand trends in prevention and recovery.

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