Low Vision Aids: The Effectiveness of Low Vision Rehabilitation

Az Görenlere Yardım Cihazları: Görsel Rehabilitasyonun Etkinliğinin Değerlendirilmesi

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ABSTRACT Objective: To evaluate the efficaciousness and cost effectiveness of low vision aids (LVAs) for low vision rehabilitation. **Material and Methods:** The study included 100 patients that were examined at our LVA clinic. The patients were administered a phone-based questionnaire in order to collect data on the most commonly used type of LVA, the frequency and duration of LVA use, and benefit derived from LVA use. Each patient's sex, age, diagnosis, visual acuity before and after LVA use, and type of LVA prescribed were obtained from the clinical records. **Results:** The age range of the 100 patients (43 females and 57 males) was 12-97 years. Twenty five percent of the patients reported that they never took their prescribed LVA, and 29% of the patients reported that they took an LVA, but never used it. Among 46% of all patients who took and used their LVA, 30% were satisfied with the results. Forty of 46 patients who used the prescribed LVA recommended low vision rehabilitation to others. **Conclusion:** Twenty five percent of the prescribed LVAs were not taken by the patients, and 38.5% of the LVAs taken were never used. The treatment success and satisfaction rates were 46% and 65%, respectively. As such, we think that in order to improve the quality and effectiveness of low vision rehabilitation, additional patient follow-up and training in the use of LVAs must be provided by clinicians.

Key Words: Vision, low; audiovisual aids; patient satisfaction; rehabilitation

ÖZET Amaç: Az görenlere yardım cihazları ile yapılan görsel rehabilitasyonun başarısını ve etkinliğini değerlendirmek, ve bu başarının düşük görenlerin rehabilitasyonu için harcanan emek ve para ile uyumunu ortaya koymak. **Gereç ve Yöntemler:** Kliniğimiz Az Görenlere Yardım birimince az görenlere yardım cihazları kullanmasına gerek görülen olgulardan 100'üne telefon ile ulaşılarak bir anket yapıldı. Bu anket ile, reçetelendirilen az görenlere yardım cihazlarının kullanılma oranı ve sıklığı, hangi durumlarda kullanıldığı, yaşam kalitesine etkisi, beklentileri karşılama oranı sorgulandı. Bu cihazların kullanımına etki eden faktörleri araştırmak amacı ile olgulara ait yaş, cinsiyet, kullandıkları cihaz tipi ile rehabilitasyon öncesi ve sonrası uzak ve yakın görme keskinlikleri not edildi. **Bulgular:** Anket 12 ile 97 yaşları arasında 100 olguya (43 kadın, 57 erkek) uygulandı. Yüz olgudan 25'inin (%25) reçete edilen cihazı almadığı, 29'unun (%29) ise almasına rağmen kullanmadığı öğrenildi. Az görenlere yardım cihazlarını düzenli kullandığı saptanan 46 olgudan %30'u elde edilen sonuçtan memnun olduklarını belirttiler. Reçete edilen cihazı alan 46 hastanın %86,9'u, diğer hastalara bu cihazları tavsiye etmekteydi. **Sonuç:** Reçete edilen cihazların %25'inin alınmadığı, %38,5 oranında ise cihazın alınmasına rağmen kullanılmadığı saptandı. Başarı ve memnuniyet oranları sırasıyla %46 ve %65 idi. Sonuç olarak, az görme rehabilitasyonunun kalitesi ve etkinliğinin arttırılması için, az görenlere yardım cihazlarının kullanımında hastanın eğitimi ve düzenli takibi önemlidir.

Anahtar Kelimeler: Görme, düşük; odyovizüel araçlar; hasta memnuniyeti; rehabilitasyon

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Visual impairment, low vision, and partial sight are synonyms for reduced visual acuity, which even with the best optical correction provided via regular lenses still results in visual performance on

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standardized clinical tests which is less than that expected for a patient of that age. Regular lenses in this context include required distance refractive corrections and reading addition up to +4.00 DS.[1] Visual impairment can be used to classify low vision and to set a threshold visual standard that is considered normal, with any value below representing low vision; however, as far as patients are concerned, they are more likely to understand their visual difficulties in functional or dis/ability terms, complaining of an inability to perform everyday tasks. The problem is that it is extremely difficult to quantify such problems, or to relate them to a particular level of visual acuity. Functionally, partial sight is defined as substantially and permanently impaired vision caused by congenital defect, illness, or injury. [1]

The population is aging and there is a strong association between age and visual impairment due to largely untreatable ocular conditions. It was reported that low vision occurs in 10.3% of those aged >75 years, and that the risk of low vision increases rapidly with age, affecting 30% of those aged >90 years.[2] The demand for low vision rehabilitation is increasing along with the age of the population.[3]

Optical devices have long been used to augment both normal and subnormal vision.[4] Treatment should aim to use vision enhancement to make the best and most comfortable use of whatever vision remains, employing low vision aids (LVAs). Patients must be convinced that using their eyes will not hasten the deterioration of their vision and that visual tasks that cause eye fatigue do not cause permanent damage.[1] LVAs increase magnification at the expense of decreasing both the field of view and reading speed. Considerable manual dexterity and motivation are required by patients in order to gain the maximum benefit from LVAs.[4]

Low vision rehabilitation is associated with an increase in functional status and improved vision. These positive changes are associated with personal and social benefits, including increased autonomy and enhanced quality of life. It has been reported that there is a negative correlation between the ability to perform routine daily activities and the severity of depression. As an individual becomes more independent and is able to better perform routine daily activities, the severity of depression decreases.[1,5-7]

As the population of low vision patients continues to grow, patient satisfaction with the service provided and the number of individuals that use LVAs should be evaluated. Because low vision patients have the perception that their functional status and quality of life are markedly impaired, questionnaires may be useful for determining the treatment outcome of low vision services.[5] It is necessary to determine the effectiveness of low vision rehabilitation, the treatment success rate, and benefits gained, as well as the cost effectiveness of LVAs. In addition, every low vision clinic must have specific feedback about the effectiveness of their services. Numerous studies that aimed to measure the effectiveness of such clinical services reported treatment success rates ranging from 23% to 100%.[3,6,8,9] This wide range is due largely to differences in the criteria for success. Nilsson and Nilsson define success as, "when the patient finds an aid beneficial and uses it to solve one or more visual problems," which is the definition of treatment success used in the present study, that aimed to evaluate the efficaciousness and cost effectiveness of LVAs for low vision rehabilitation.[10]

MATERIAL AND METHODS

We enrolled 179 low vision patients that were seen at our LVA clinic between 2001 and 2008. Patients that were referred by various ophthalmologists were fully examined by an LVA expert during their first visit, and the use of LVAs were subsequently demonstrated to each patient, including supervision on use of the devices for 1 to 2 hours. Patients were lent an LVA for home practice, if they thought to get benefit from the aid and their visual function were significantly improved. They were advised to return to the clinic if they wanted additional training. Patients were followed-up until their needs were optimally satisfied.

The patients were contacted on the telephone 3 months after their examination and asked to complete a questionnaire on the phone; 100 patients agreed to answer the questionnaire. The questionnaire included multiple choice, close-ended, and open-ended questions (Table 1). All questionnaires were administered by the same researcher. Subjective treatment success was determined by asking the patients to what extent (if any) they benefited from coming to the LVA clinic.

Each patient's sex, age, diagnosis, and visual acuity before and after LVA use were noted. The types of LVA prescribed were also obtained from our clinical records. Since certain congenital defects or illnesses related to low vision are seen more frequently in certain age groups, we classified the causes of visual impairment for each age group. Moreover, we compared these age groups according to their LVA use rate and satisfaction, as the patients above the age of 65 are reported to attend an LVA clinic more often.

SPSS v.15 for Windows was used for statistical analysis. Data were analyzed using the Mann-Whitney U, chi square, and Fisher's exact tests. The level of statistical significance was set at $p < 0.05$.

Each participant was informed about the study during the telephone call.

TABLE 1: The questionnaire items.

1) Have you received your prescribed LVA? Yes/No
2) Have you used the LVA? Yes/No
3) How often have you been using the LVA?
Rarely/Sometimes/Often/Frequently
4) During what kind of tasks have you been using your LVA more often?
(reading newspaper headlines/large print books/ordinary books/
bank statements/bills/price tags, identifying money,
watching television, etc.)
5) How was your life quality affected after having received your LVA?
Better/No difference/Worse
6) What have you been thinking about the service?
Very bad/Bad/No opinion/Good/Very good
7) Did you feel that you got benefit of the LVA?
Yes/No
8) Do you recommended low vision rehabilitation to other people?
Yes/No

RESULTS

Initially the medical records of 179 patients were identified. Due to lack of participants' interest and refusal, the researcher's inability of contact or the loss of follow-up, in total, only 100 (55.9%) of 179 patients completed the questionnaire on the phone. Median age of the 100 patients included in the study [43 females (43%) and 57 males (57%)] was 70 years (range: 12-97 years) (Table 2). Visual acuity ranged from Counting Fingers (CF) from 10 cm to 0.6 (median: 0.15) for distance vision, and from 0.1 to 0.8 (median: 0.2) for near vision, based on Snellen acuity charts.

Evaluation of the questionnaires showed that only 46% (n=46) of the patients took and used their prescribed LVA, whereas 25% (n=25) of the pa-

TABLE 2: The causes of visual impairment in each age group.

	Age Groups (n=100)				
Diagnosis	**0-29 years**	**30-49 years**	**50-65 years**	**>65 years**	**n**
ARMD	-	-	17	44	61
Hereditary dystrophies (retinitis pigmentosa, rod-cone, Stardgardt, Sorsby, albinism)	2	9	5	1	17
Optic atrophy	2	4	2	1	9
Chorioretinal diseases (atrophy, chorioretinitis scar, degenerative myopia)	-	-	2	4	6
Maculopathy (diabetic, chronic CME, hole)	-	2	1	2	5
Ambliopia	1	1	-	-	2
Total:	5	16	27	52	100

ARMD: Age-related macular degeneration; CME: Cystoid macular edema.

tients reported that they never took their LVA, and 29% (n=29) reported that despite taking the device, they never used it. The patients that never took their prescribed LVA (n=25) reported that they did not think the LVA would help to improve their vision. The patients who took an LVA, but never used it (n=29, 29%) reported that LVAs were not practical to use and did not meet their needs.

Of the LVAs prescribed, 3 (3%) were for distance vision only, whereas 68 (68%) were for near vision only. Twenty nine patients (29%) used LVAs for both near and distance vision. Among the aids for near vision, 43 were spherical lens additions greater than +4.00 diopters. The other LVA types prescribed were spectacle-mounted magnifiers, Galilean and Keplerian system monocular/binocular telescopes, and hand held magnifiers.

Age was a risk factor for not using an LVA. Among the 75 patients who took an LVA, the median age of the patients who used the aid (66 years; range: 12-83 years) was lower than who did not use the it (median age: 72; range: 37-97 years) (p = 0.017). In total, 8 (21%) of 38 patients aged <65 years did not took their LVA. Of the 30 patients aged <65 years that took their LVA, 22 (73%) used the aid. In contrast, 17 (27%) of the 62 patients aged >65 years never took the aid, and only 21 (47%) of the 45 patients that took the aid used it (Figure 1).

Among 75 patients that took their prescribed LVA, there was not a statistically significant relationship between use of the aid and visual acuity (p= 0.765). Median visual acuity in the patients who used an LVA (range: CF from 10 cm-0.5) and did not use an LVA (range: CF from 50 cm-0.6) was 0.15. Among 30 female patients who took their LVA, 18 (60%) used the aid, whereas of the 45 male patients who took their LVA, 28 (62.2%) used the device. There was not a statistically significant relationship between gender and use of a prescribed LVA (p= 1.00).

Among 75 patients who took their prescribed LVA, 51.2% were diagnosed with age-related macular degeneration (ARMD), 60% were diagnosed with maculopathy, 63.3% were diagnosed with optic atrophy, 66.7% were diagnosed with hereditary dystrophies, 100% were diagnosed with chorioretinal diseases, and 100% were diagnosed with amblyopia used their LVA. There was not a statistically significant difference in the rate of LVA use according to diagnosis. Although the smallest use rate was seen in ARMD patients, we did not find any statistically significant relationship between the use rate and the diagnosis (p= 0.226). The frequency of LVA use was a good indicator of the perceived benefit gained from the use of the aid (Table 3).

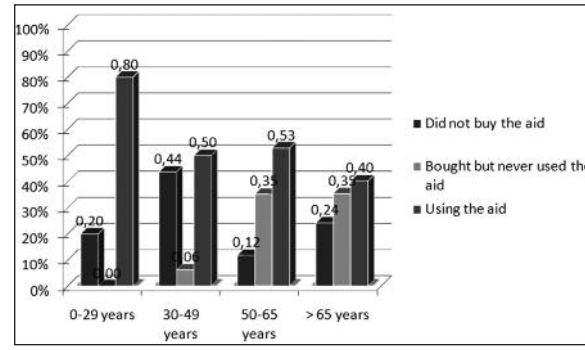

FIGURE 1: The distribution of patients who used their prescribed low vision aids according to their age group.

TABLE 3: The frequency of low vision aid use.

Frequency	n	%
Very often	19	41.3
Often	10	21.7
Sometimes	12	26.0
Rarely	5	11.0
Total	46	100.0

Reading the newspaper was the most common activity (n= 36, 78.3%) for which an LVA was used. Furthermore, 87.1% (n= 40) of the patients used an LVA for reading-related tasks, versus 10.8% (n= 5) for watching television, and 2.1% (n= 1) for sewing. Of the 46 patients who used an LVA, 56.5% (n= 26) reported an improvement in their quality of life, 41.3% (n= 19) reported no change, and 2.1% (n=1) reported a decline. Patient perception of the benefit from the LVA was very good in 23.9% (n= 11), good in 41.3% (n= 19), and poor in 6.5% (n= 3), whereas 13 patients (28.3%)

had no opinion.

When we evaluated 46 patients who used their prescribed LVA as a subgroup, 30 of them (65%) reported satisfaction with the device. On the other hand, 86.9% (n= 40) of the 46 patients who used the LVA reported that they would recommend low vision rehabilitation to others, whereas 13.1% (n= 6) reported that they would not.

DISCUSSION

The major concern with regard to low vision patients is making use of residual vision. Low vision services, including assessment of vision and patient needs, provision of LVAs and training lead to improved visual function.[5] A study that included 185 visually impaired patients reported that 77% of the patients benefited from an LVA prescription.[9] Another study reported that 54.8% of patients effectively used optical aids.[6] Based on a large number of surveys carried out in several countries over the last 30 years, it is clear that the prescription of LVAs cannot result in a 100% success rate. Despite clinicians' best efforts, not all patients can be helped. Research on selected patient groups suggests that long-term benefit is gained by 60-80% of patients that use an LVA.[8,9] One must consider the positive and negative factors associated with the use or non-use of LVAs, including level of visual acuity, visual demands, advanced age, sociocultural variables and lack of interest in reading.

Although distance visual acuity is not always a reliable predictor of visual function, it was reported that patients with moderate visual loss are more likely to be helped by LVAs.[3,11] On the other hand, there was not a strong association between distance/near visual acuity and the LVA use rate in the present study. Inability to read is the primary complaint in patients with impaired vision.[12] Based on a survey, Shuttleworth et al. reported that the most frequent tasks performed with LVAs were reading correspondence (83%), mainly reading newspapers, magazines, or books (73%) and writing (39%), which is similar to the present study's findings that 78.3% of LVAs were used principally for reading newspapers and 85% were used for all reading-related tasks.[13] Margrain reported that following low vision assessment and provision of a suitable LVA, reading ability improved in 88% of 168 new patients.[12] In another study of 530 cases with ARMD, 94% of patients were able to read after obtaining LVAs, but it is clear that satisfying acuity does not guarantee efficient reading in practical life.[14] Leat et al. reported that although 75% of the patients surveyed could read 1M (approximately newsprint size) print in the clinic, only 35% reported that they could read normal print at home, which indicated that patients that can "see to read" do not necessarily read regularly at home.[3]

It is well known that visual acuity is not a good measure of patient's satisfaction with low vision rehabilitation. Steinberg et al. reported that there is no correlation between visual acuity and satisfaction.[15] What is required is to show that visual improvement produces a proportional increase in functional status and quality of life. As well as functional ability, quality of life is also indicative of the emotional impact that poor vision has on patients' perceptions of well-being.[1] It was reported that in addition to increasing in severity of depressive symptoms and social isolation, visual impairment also negatively effects cognitive functions and self-confidence; as a result, hospitalization and referral to emergency services increase.[16,17]

Another factor associated with LVA use is age; elderly patients are more likely to have slow reactions, general health problems, and restricted manipulative skills ↓ all of which can impede the use of LVAs. Additionally, lack of sufficient motivation, which is essential for the success of low vision rehabilitation, is more common in elderly patients. It could be depressive for those, who are previously normal sighted and not young enough to be adapted for the new situation. McIlwaine et al. reported that patients aged <65 years are more likely to use LVAs compared to those aged >65 years, though the difference was not significant.[4] The present findings also indicate that advanced age is a poor prognostic factor for use of LVAs.

A survey study conducted by the Glaskow Eye Infirmary reported that 33% of patients never used

their LVAs.[4] Humpry and Thompson noted that among the 72% of patients that were provided with a spectacle mounted LVA, only 23% reported that it was useful at home.[8] To examine the association between training and treatment success, Shuttleworth et al. administered the patient satisfaction questionnaire used by McIlwaine et al. to the patients at a low vision clinic in which training was an integral part of the service.[4,13] In total, 92% of patients reported that the service was sufficient to meet their needs, which is higher than the 55% of patients in the original survey study.[13] As Nilsson and Nilsson reported, improvement in distance and near visual acuity obtained with aids cannot be translated directly into improvements in visual performance in daily life; training is necessary.[10] We think that low vision clinics must provide training, and motivate patients to use LVAs, which requires additional time and skilled staff. If visual rehabilitation is to be successful, patients must accept the diagnosis of visual impairment and use their prescribed LVA in public, as necessary. Better psychological status and motivation at the time of rehabilitation has been shown to be associated with better outcome.[7]

There are significant negative individual, public health, and community consequences of reduced vision, including an increase in the cost of education, reduction in personal income, and loss of productivity of those that care for or assist the visually impaired.[18] In addition, a high percentage (in our study: 38.5%) of LVAs that are provided via government health insurance are neither used nor returned, and they account for an unnecessary economic loss. We think the present findings may help to clarify and facilitate the work of physicians for prescribing optimally effective optical aids and improving the quality and effectiveness of low vision rehabilitation via additional patient follow-up and training in the use of LVAs.

The main limitation of the study is that, we did not evaluate the patients who refused to participate in the study. Therefore, there could be selection bias, since we cannot rule out the probability that elderly or dissatisfied patients declined to participate.

In conclusion, an increase in the awareness of visual deficit and its effects are needed, together with efforts to improve the treatment of visually impaired patients via the provision of quality information and support, improved rehabilitation facilities, and long-term evaluation of interventions based on measures of quality of life, patient satisfaction and psychological well being, and vision.

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