Anophthalmic Patients Treated with Eye Prosthesis at a Maxillofacial Unit in Jordan

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ABSTRACT

Objective: To study the profile of anophthalmic patients regarding age, etiology gender, and the role of the ocular prosthesis in the psycho-social support of their wearers.

Methods: A total of 920 Jordanian artificial eye wearers who registered for ocular prosthesis maintenance, repair or replacement attended prosthetic eye sector referral center (King Hussian Medical Hospital), during the period from August 2009 to July 2014 were surveyed. They were divided into three age groups; 331 patients (35.98 %) were 1-13 years old children, 128 patients (13.92 %) were 14-20 years old adolescents and 461 patients (50.1 %) were 21 -75 years old adults and elderly. The group comprised 410 (38.91%) females and 510 (60.09%) males. A satisfaction questionnaire were completed by them or their close relatives using a simple Arabic language to elucidate their degree of satisfaction with several parameters including; appearance, comfort, fit, irritation, degree of self-consciousness, frequency of cleaning, and value of treatment. The percentage and frequency of mucoid discharge associated with ocular prosthesis wear was also studied.

Results: Accidents were the main cause of eye loss in children and pathological conditions were more prevalent among adolescent and adult groups. The ratio of males to females losing an eye from accidents was 2.4. The overall rate of satisfaction with ocular prostheses was 89.9%. The variables significantly correlated to patient satisfaction were other people's responses, and insertion of the orbital implant; 95% of the surveyed subjects claimed that the others couldn't notice that they are wearing an artificial eye, 99.5 % said that the lost eye affects their social well-being and using the artificial eye improved the condition which was also enhanced by peg insertion or surgical insertion of an orbital mass. Discharge affected 95.4% of wearers - 75.5% of these on a daily basis and negatively affected patient satisfaction.

Conclusion: Ocular prostheses play a significant role in psycho-social support and enhance treatment satisfaction of anophthalmic patients in Jordan. Mucoid discharge associated with wearing ocular prosthesis was prevalent and needs an evidence based treatment protocol. Further research into the cause and treatment of this condition is worthy and should be planned.

Key words: Anophthalmos, Artificial eye, Maxillofacial prosthesis, Ocular prosthesis,

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Introduction

Congenital absence or loss of the ocular globe can be a very traumatic event in a person's life. It causes psycho-social and cosmetic disorders and compromise the normal development of the orbital region.[1,2] It is the responsibility of ophthalmologists and maxillofacial prosthodontists, as they journey with patients through the process of eye removal and ocular prosthesis placement, to provide the best possible functional and cosmetic results.[3] In this way, they can help patients to begin to heal medically, and emotionally, as soon as possible. The literature relating to congenital or acquired etiology, due to trauma or disease, demonstrates the necessity of prevention and early detection in order to minimize the disturbances in orbital growth.[4,5]

Artificial eyes are usually constructed using two components. The first is the orbital implant, which is placed at the time of enucleation or evisceration and fills the anophthalmic socket.[6,7] The second component of the modern artificial eye is the ocular prosthesis, which is what makes the artificial eye appear life-like with iris color and conjunctival vessel markings.[8] It is placed 6-8 weeks after enucleation/evisceration and can be custom-made on an individual patient basis.[9] It is inserted anterior to the orbital implant, just behind the eyelids (Fig. 1). Common materials used to produce ocular prostheses are glass and poly (methyl methacrylate).

Patients' perceptions of outcome and satisfaction with treatment are key elements in evaluating quality of care but are often absent in clinical study.[2] Furthermore, mucoid discharge is the wearers' second highest concern after health of the remaining eye, but the incidence and severity of this problem in the anophthalmic population is unknown.[10]

This paper reports on a questionnaire-based retrospective study into patients treated with ocular prostheses. Data were collected on gender, age, causes of eye loss, other people's responses, insertion of the orbital implant (motility coupling post), ocular prosthetic maintenance, frequency of discharge associated with prosthesis wear. The investigation was intended to improve patients' satisfaction and help both them and their relatives to cope with this difficulty in their lives.

Methods

Patients who have had a missing eye and were using artificial eyes were sampled for this study and distributed according to age, gender and etiology of ocular globe loss. The study was conducted following the guidelines of the ethical review committee of the Royal Medical services-King Hussain Hospital in Jordan. A structured Arabic questionnaire was administered to 920 patients in prosthetic eye clinics in Amman, Jordan between August 2009 and July 2014. Patients were split into three age groups, Children (1-13), adolescents (14 to 20) and adults and the elderly (21-75).

The satisfaction questionnaires were collected in the prosthetic eye clinic by interview at least three months after completion and adjustment of their ocular prostheses. The questions were provided to the subject or close relative in written form for review, and the questionnaire was read to the participant by the investigator who recorded each response. The questionnaires were composed of two parts which addressed different topics. The first part (P1) requested information about patient satisfaction, perception of appearance, comfort, fit, irritation, level of self-consciousness, and value of treatment with an ocular prosthesis (Table I).

The second part (P2) asked participants to describe frequency of any discharge they were currently experiencing since wearing the ocular prosthesis. As suggested by Pine *et al* (2012),[11] the responses to these questions were obtained as values from zero to ten using visual analogue scales (VAS) shown in Fig. 2. The responses were collected and analyzed using SPSS 16.0 to find the determinants of patient satisfaction. To investigate factors related to the frequency of discharge, a general linear model was used with explanatory variables of age, satisfaction, reason for eye loss (accident, pathological, congenital), cleaning frequency (at least once per day [1], at least once per week [2], at least once a month [3], at least once a year [4], never [5]). Chi square test and statistical significance was taken at $P<0.005$.

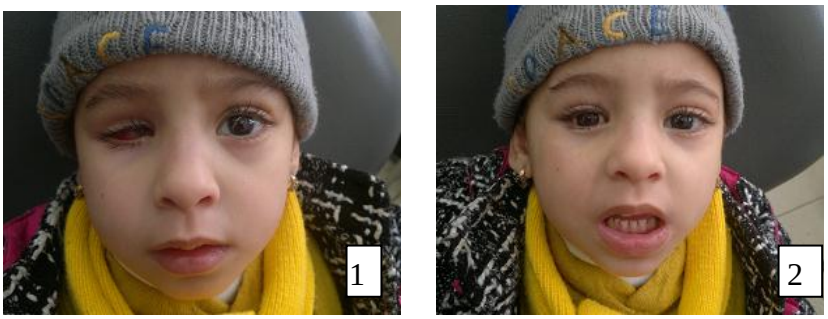

Fig. 1: Photograph showing anophthalmic patient before (1) and after insertion of the ocular prostheses

Never	Monthly		Weekly	Twice weekly		Daily	Twice daily		Continuously	
0	1	2	3	4	5	6	7	8	9	10

Fig. 2: Visual analogue scales for self-measuring discharge characteristics

Table I: Questions and example response scale

Question for all subjects
Are you satisfied with your ocular prosthesis?
How satisfied are you with the appearance of the prosthesis?
Very satisfied Moderately Very unsatisfied
1 2 3 4 5
Do you think others could notice that you are wearing an artificial eye?
Do you think that lost eye affect social well-being?
Do you think that surgical insertion of the orbital mass (i.e; peg insertion to improve the prosthetic eye movement) improved esthetics?
How comfortable is your artificial eye?
How well or poor did your artificial eye fit?
Does the artificial eye ever cause any type of irritation or mucoid discharge?
How well or poorly does your artificial eye stay on during your day activities?
How many hours do you wear your prosthesis each day?
Without any prosthesis, does your facial defect make you self-conscious?
In public, does wearing the prosthesis reduce your feeling of self-consciousness?
Was the prosthesis treatment very worthwhile for you or not?
Would you recommend this treatment to others?

The questionnaire was pretested and validated. The patients were assured that the information was for research purposes that would provide better understanding and improved management of anophthalmic patients with the artificial eyes.

Each patient was interviewed in a room in the presence of an assistant (nurse). Verbal appreciation was conveyed to each patient at the close of the interview.

Results

A total of 920 patients registered from the section of ocular prosthesis pertaining to the period included in this work consisted of 331 children (35.98%), 128 adolescencts (13.92%) and 461 adults and elderly (50.1%), with 510 males and 410 females (Fig. 3). The mean age of the subjects was 41.5 years (SD=20), 46 (5%) reported being depressed.

The distribution and percentages of occurrences that entailed different modalities of ocular prosthesis were tabulated according to age, gender and etiology of loss of the ocular globe for the two age groups (Table II and Fig. 3). The distribution of the studied population according to etiology between males and females are presented in Table III and Fig. 4.

The statistical analysis revealed that the variation of occurrences in the males and females gender in the studied ages was not significant ($p = 0.079$). However, the etiology of loss of the ocular globe varied according to the age groups, with a highly significant level of 0.01 ($p = 0.000$). At the same time, the etiologies varied according to genders, presenting a significance level of 0.05.

The overall rate of satisfaction was 827 (89.9%), the majority of the participants reported positive

Table II: Distribution of participants according to age, gender and etiology of ocular globe loss (number (n) and percentage (%).

Age group n (%)	Gender		X^2	Etiology			X^2
	Male n (%)	Female n (%)	Sig.	Pathological n (%)	Traumatic n (%)	Congenital n (%)	Sig.
1-13 331 (35.98%)	184 (55.59%)	147 (44.41%)	NS	121 (36.56%)	165 (49.85%)	45 (13.60%)	0.01
14-20 128 (13.92%)	82 (64.62%)	46 (35.94%)		46 (35.94%)	71 (55.47%)	11 (8.59%)	
21-75 461 (50.10%)	296 (64.21%)	165 (35.79%)		322 (69.85%)	120 (26.03%)	19 (4.12%)	
Total	562 (61.09%)	358 (38.91%)		489 (53.15%)	356 (38.70%)	75 (18.15%)	

Sig.: significance; NS.: not significant.

Table III : Distribution of the etiologies of the ocular globe loss according to male or female genders (number (n) and percentage (%)

Gender n (%)	Etiology			X^2
	Pathological n (%)	Traumatic n (%)	Congenital n (%)	Sig
Male 562 (61.09%)	261 (28.37%)	256 (27.83%)	45 (4.89%)	0.05
Female 358 (38.91%)	228 (24.78%)	100 (10.87%)	20 (2.17%)	

sig.: significance

Table IV: Percentage of positive responses to questions of satisfaction, comfort, appearance, self-consciousness, fit and irritation of the ocular prostheses

Question	Positive responses (n = 920)
Satisfaction	828 (90%)
Comfortable	819 (89.02%)
Appearance	874 (95%)
Good fit	828 (90%)
Reduces self-consciousness	93%
Self consciousness without prosthesis	35%
No irritation	681 (74.02%)

Significant $P < 0.05$

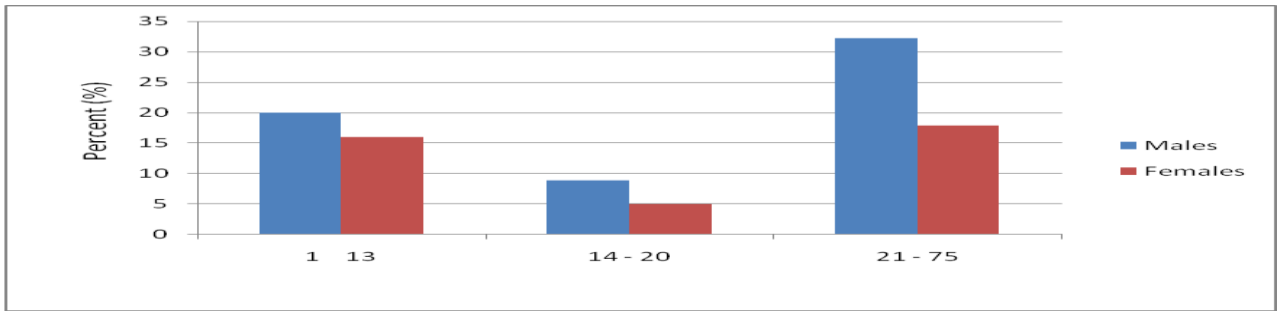

Fig. 3: Gender distribution of eye loss

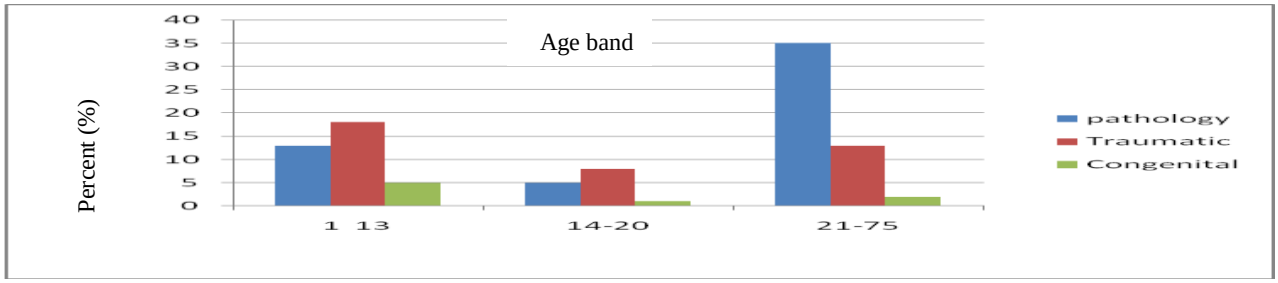

Fig. 4: Main causes of eye loss

Table V: Distribution of the subjects according to the frequency cleaned.

At least once per day [1]	230	25%
At least once per week [2]	394	42.83%
At least once a month [3]	233	25.33%
At least once a year [4]	46	5%
Never [5]	17	1.84%

Table VI: Responses to items related to treatment value

Question	**Positive responses (n = 920)**	**%**
Treatment worthwhile		
Positive	800	86.95
Moderate	102	11.09
Negative	18	1.96
Insertion orbital implant worthwhile		
Positive	778	84.57
Moderate	120	13.04
Negative	22	2.39
Recommend treatment to others		
Positive	846	91.95
Moderate	56	6.09
Negative	18	1.96

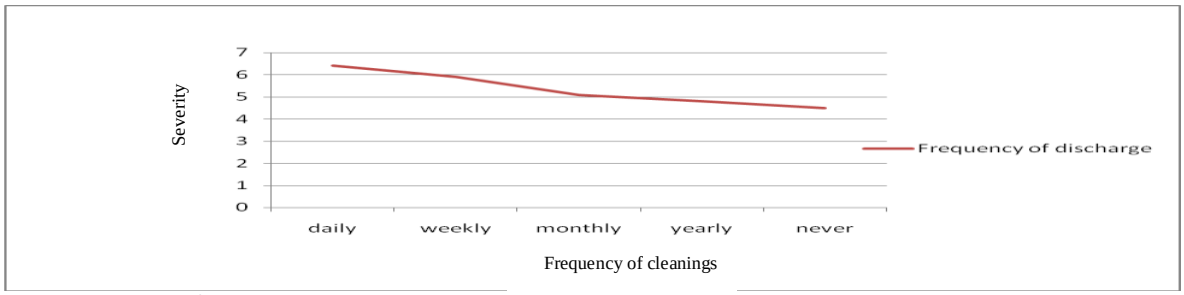

Fig. 5: Frequency of discharge

ratings of their ocular prosthesis for comfort (89%), appearance (95%), fit (90%), and lack of irritation (74%) (Table IV).

Seven hundred eighty two (85%) affirmed that the artificial eye could not see, 166 patients (18%) reported that lost eyes affected their social well-being (e,g; work, school…ect.).

Fewer subjects reported the feeling that others noticed their ocular prosthesis. And more indicated that reduced self-consciousness (93% vs 80%). All patients would recommend the use of an artificial eye.

Discharge is the second most important concern for experienced prosthetic eye wearers after health of their remaining eye and affects 95.4% of wearers - 75.5% of these on a daily basis.

Of the wearers who completed this section of the questionnaire, 25% removed and cleaned their prosthetic eyes daily, 43% once weekly, 25% monthly, 5% once a year and 2% claimed that they didn't remove and clean their ocular prosthesis (Table V). There was strong evidence of an association of frequency of cleaning with frequency of discharge (P, 0.0001) with those cleaning less often reporting a lower frequency of discharge (Fig. 5).

Responses to items related to treatment value are summarized in Table VI, with 87% considering the treatment valuable and 92% recommending it to the others.

Discussion

The Prosthetic Eye sector in the dental department at King Hussein Medical Hospital, (KHMC) Jordanian Royal Medical services is the only provider of artificial eyes that offers a local service in Jordan, a region which has a mixed rural/urban population, roughly representative of Jordanian's overall anophthalmic population.

The balance between the age groups of children, adolescents and adults suggests that the search for prosthetic rehabilitation had been made at an early stage.

The higher occurrence of pathological etiology between children may also be explained by the many cases of retinoblastoma,[3,12] the major cause of ocular globe enucleation in early childhood not specified in this study but included in the pathological category.

Fabrication of an ocular prosthesis in heat-polymerizing acrylic resin material for an ocular defect is undoubtedly a challenging attempt as we have to replace a vital organ with an artificial prosthesis so as to improve the psychological and social well-being of the patient.[13] Patient acceptance of an ocular prosthesis can be significantly enhanced by successful surgical insertion of an orbital implant to improve the prosthesis's movement and ocular prosthesis fabrication.[14] Therefore, a questionnaire had been developed for this study to answer specific questions related to the outcome assessment of ocular prostheses. This questionnaire was based, in part, on questionnaires evaluating similar factors in patients receiving removable dentures.[15-17] The questions were also based on the authors' previous experience with patients treated with various types of facial prosthesis and the issues reported.

The statistical analysis indicated that a variation in patients of the male and female genders in the considered age groups was not significant ($p = 0.069$), although existent, indicating that males and females seek treatment in the same way. The significant variation in etiologies in the age groups, with prevalence of the traumatic etiology in children (1 to 13 years old), was expected and also indicates that these children look to the service near to the time of occurrence of the lesion.

This study also shows a significant increase in loss of the ocular globe due to trauma during adolescence, with the 14 to 20 years group presenting the highest percentage of loss (56%); however, in the 21 to 75 years group the highest cause of loss (70%) was due to pathological causes.

In agreement with a previous study,[3] the results show that females were 2.4 times less subjected to traumatic etiologies, probably because they did not engage in as many high risk activities as males.

A majority of the participants in this study reported positive ratings of their ocular prosthesis for comfort (89%), appearance (95%), fit (90%), and lack of irritation (74%). Similar findings were reported by Markt and Lemon (2001) during evaluation of general satisfaction with non–implant-retained facial prostheses, based on 76 responses to a mailed questionnaire.[4] Schoen *et al* (2001) also reported that patient satisfaction with orbital prostheses is high and offered an improved quality of life.[18]

It was not surprising that the reduction in satisfaction and the irritation ratings in some studied cases were related to the difficulties in fabrication of an esthetic ocular prosthesis that matched the color, position, and direction of vision of the opposite eye in the non-defect side. The dynamic movement of the remaining normal eye and the adjacent orbital structure increases the level of difficulty in creating a natural-looking orbital prosthesis. Hygiene procedures are also more difficult for patients with orbital defects due to the compromised depth perception from monocular-vision.[1]

In this study, 87% of the group stated their prosthetic treatment was worthwhile. It is important to understand that the criteria for providing successful ocular prostheses are multifaceted. The provider must not only note the clinical indicators of success from the treatment team point of view, but also be sensitive to the patient's psychological responses to treatment. Patients' perceptions of their ocular prostheses in terms of esthetics, comfort and fit affect their level of compliance in wearing their prostheses.[19]

Discharge is the second most important patient's concern and frequency of discharge has been considered as the most important characteristics for wearing comfort of ocular prosthesis.[10,11] Pine *et al* (2012) reported that 47% of ocularists' websites advised that mucoid discharge was caused by surface deposits that build up on the prosthetic eye, 29% that it was caused by excessive handling of the prosthesis, and 24% gave other causes, such as dust and dirt in the socket, but the sites appear to contradict this with a majority (82%) recommending that prosthetic eyes (with deposits) should never be removed and cleaned and only be removed and cleaned if causing discomfort or discharge.[20] Therefore further studies need to be conducted so a consensus can be achieved by ocularists and a

standardized set of treatment protocols developed.[21]

The opinion of Pine (2013) that a "properly designed, perfectly polished prosthesis is all that is required for total comfort with no excess secretions.[22] The NHS website suggests that cleaning the prosthetic eye removes the main cause of discharge, which is a buildup of dirt and dust from the environment.[11]

It is important to understand that the criteria for providing successful ocular prosthesis treatment are multifaceted. The clinician must not only note the clinical indicators of success from the treatment team point of view, but also be sensitive to the patients' psychological responses to treatment. Patients' perceptions of their ocular prosthesis in term of esthetics, comfort, fit affect their level of compliance to wear the prosthesis.[19,23] The benefits of the ocular prosthesis can be validated only if patients wear the prostheses.

The results of this study were particularly evident in terms of the patients' own perceptions of their social relationships, which were affected by their use of ocular prostheses. Such perceptions reduced their quality of life and heightened their anxiety and depression. Therefore, it is important to evaluate both the physical, psychological and emotional well-being of anophthalmic patients to identify those patients who will need additional physical, psychological and mental support to cope with his/ her life.

Conclusion

Within the limitations of this study, the followings can be concluded:

- Traumatic, pathological or congenital absence or loss of the ocular globe causes psycho-social and cosmetic disorders.
- Variation of the males and females in different age groups was not significant, indicating that both seek replacement in the same way.
- The etiology of the lesions varied according to age and gender.
- Ocular prosthesis provided subjects improved perceptions of treatment satisfaction, value and use.
- More frequent prosthesis removal and cleaning was associated with more frequency of discharge, but the direction of cause and effect has not been established.
- Further research is needed to investigate the effect of mucoid discharge on eye health, postulated an evidence based treatment protocol for discharge associated with ocular prosthesis wear and identifies the safest method for cleaning the artificial eye.

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