Graefe's Arch Clin Exp Ophthalmol
(2006) 244: 330–335

CLINICAL INVESTIGATION

DOI 10.1007/s00417-005-0037-0

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A survey of satisfaction in anophthalmic patients wearing ocular prosthesis

Received: 19 October 2004
Revised: 19 April 2005
Accepted: 6 May 2005
Published online: 17 August 2005

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Abstract *Purpose:* The purpose of this study was to evaluate patient satisfaction with ocular prosthesis after evisceration or enucleation and to determine which variables were correlated to their satisfaction in order to find out how to increase patient satisfaction. *Methods:* A satisfaction questionnaire was given to consecutive anophthalmic patients who visited Korea University Hospital from March 2002 through August 2002. Many kinds of variables such as age, gender, type of implant, pegging, and postoperative ocular symptoms that might influence patient satisfaction were evaluated by correlation analysis and multivariate analysis to find the determinants of patient satisfaction. *Results:* The overall rate of satisfaction with ocular prosthesis was 71.8%. The variables significantly correlated to patient satisfaction were economic status, other people's response, and insertion of motility coupling post or motility peg. *Conclusion:* Patient satisfaction with ocular prosthesis was relatively high. Successful peg insertion to improve the prosthesis movement may be one way for surgeons to increase patient satisfaction.

Keywords Anophthalmos · Ocular prosthesis · Patient satisfaction

Introduction

Since Mules [22] first used an anophthalmic orbital implant in 1884 there has been a great advance in orbital implants. The first materials used were glass, plastic, cartilage, and silicone [9, 10, 28]. During the late 1940s and early 1950s many types of orbital implant were introduced. Although the motility of these implants proved to be excellent, the majority led to necrosis, infection, or exposure, and were ultimately removed [13]. Perry first introduced hydroxyapatite as a new implant material in 1985. It is biocompatible and nontoxic, and it contains 500-μm-diameter pores. This structure of hydroxyapatite allows fibrovascular ingrowth into the implant, which decreases extrusion and migration of the orbital implant [23, 24]. It also has the ability to be coupled to the prosthesis, thereby providing increased motility. High-density porous polyethylene (Medpor) was first used as an anophthalmic socket implant by Karesh and Dresner [14]. Although porous polyethylene was vascularized less rapidly than hydroxyapatite [26], it had some advantages over hydroxyapatite—a lower cost, it was easier to handle and there was no need for scleral wrapping because extraocular muscles could be directly secured to it [21]. These porous implants have been successful in improving prosthetic motility and thus have made anophthalmic patients look cosmetically better and more natural. However, due to the aesthetic nature of orbital implant surgery, patient satisfaction does not always accord with surgeon satisfaction. This discordance may be caused by unrealistic expectations or inaccurate information regarding surgical results.

Patient satisfaction has been regarded as a measure of the quality of treatment provided and a proven relationship exists between patient satisfaction and the utilization of a medical service [25]. Therefore, satisfaction studies can provide important feedback about the quality of care and

outcome, which in turn allows the medical provider to improve the service offered [8]. A better understanding of the determinants of patient satisfaction can also provide useful information for the improvement of the treatment [29].

Many articles reported patient satisfaction with ocular surgeries such as cataract surgery, corneal transplantation and laser in situ keratomileusis. To the best of our knowledge, however, there are no published articles assessing patient satisfaction with orbital implant surgery. The type of surgery was thought to be one of determinants of patient satisfaction in orbital implant surgery because evisceration can preserve orbital anatomy and offer more enhanced cosmesis and mobility than enucleation [5, 16]. Porous orbital implants and pegging were also considered to be determinants of patient satisfaction because they can decrease extrusion and migration of the orbital implant and provide increased mobility [7, 23, 24, 27]. Besides postoperative ocular symptoms, other people's response, and personal variables such as age, sex, and economic status, were thought to be able to influence patient satisfaction as they did in other ocular surgeries [1, 29]. Therefore, in the present study, we evaluated patient satisfaction with orbital implant surgery and determined which variables were related to their satisfaction in order to find out how to improve patient satisfaction. The complaints of anophthalmic patients and the ways of wearing and managing their ocular prosthesis were also evaluated.

Materials and methods

The first 78 consecutive anophthalmic patients who visited Korea University Hospital from March 2002 through August 2002 were enrolled. All patients recruited underwent evisceration or enucleation by a single surgeon (S.H. Baek) who had been involved with the clinical assessment and who had obtained the patient's consent. A simple anonymous questionnaire was completed by each patient at the time of their appointment, ensuring a 100% completion rate. Most of the patients filled out the questionnaire themselves, but when patients were too young to fill it out, their parents assisted them. The questionnaire included general information about the anophthalmic patients such as age (both at surgery and at present), gender, marital status, economic status, and educational status. The questionnaire also assessed patient characteristics such as the cause of anophthalmos, duration of wearing the ocular prosthesis, type of orbital implant, and other people's response. The complaints of anophthalmic patients and the ways of wearing and managing ocular prosthesis were also assessed in the questionnaire. Patient satisfaction was asked as the last question. The question on satisfaction was "Is the appearance and movement of the prosthesis satisfactory compared with your other eye?"

The satisfaction was divided into five groups; "very satisfied," "satisfied," "not sure," "dissatisfied," and "very dissatisfied." The satisfaction rate is a combination of the "very satisfied" and "satisfied" groups. The surgeon also evaluated surgical results and graded them by appearance and movement on the same day.

We collected data from the subject's medical chart and compared them with the answers from the questionnaire. The data from medical charts for each subject included type of surgery (evisceration or enucleation), complications, type of orbital implant, and insertion of a motility coupling post (MCP) or a motility peg (MP). Cases of mildly contracted or inadequate sockets were excluded from this study.

All the variables that may be related to patient satisfaction were divided into three categories. The first included personal variables such as gender, age, economic status, marital status, and cause of anophthalmos. The second included surgical variables such as type of surgery, type of implant, postoperative complications, and insertion of an MCP or an MP. The last included prosthetic variables including duration of wearing ocular prosthesis, the patient's symptoms (ocular discharge, foreign body sensation, tearing, itching sensation, and pain), and other people's responses.

Statistical Package for the Social Sciences (SPSS) software (version 10.1, SPSS, Chicago, IL, USA) was used for statistical analysis. Correlation analysis was performed to correlate patient satisfaction with each variable and then multivariate analysis was performed using multiple linear regression. The Chi-squared test was also used to compare categorical data. P values <0.05 were considered statistically significant.

Results

The total patient group consisted of 56 men or boys (71.8%) and 22 women or girls (28.2%). The mean age was 35.4 years (range 7 to 74 years) and the mean age at surgery was 32.3 years (range 2 to 66 years). Among the personal variables, the economic status of patients was high in none, medium in 62 (79.5%), and low in 16 (20.5%). Regarding marital status, 32 patients (41%) were single, 38 patients (48.7%) were married, and 8 patients (10.3%) were divorced or widowed. Concerning the causes of anophthalmos, trauma was most common. Forty-two patients (53.8%) lost their eyes because of trauma and 38 patients of these were male. Other causes of anophthalmos were congenital anomalies (16 patients, 20.5%), surgical complications (15 patients, 19.2%), ocular tumors (3 patients, 3.8%), corneal ulcer (1 patient, 1.3%), and uveitis (1 patient, 1.3%).

Among the surgical variables, the types of surgery were enucleation in 34 patients (43.6%) and evisceration in 44 patients (56.4%). The types of implants were Medpor in 52 patients (66.7%), hydroxyapatite in 14 patients (17.9%), acrylic sphere in 11 patients (14.1%), and dermis-fat graft in 1 patient (1.3%). Regarding implant size, the most common size was 20 mm, which was used in 58 patients

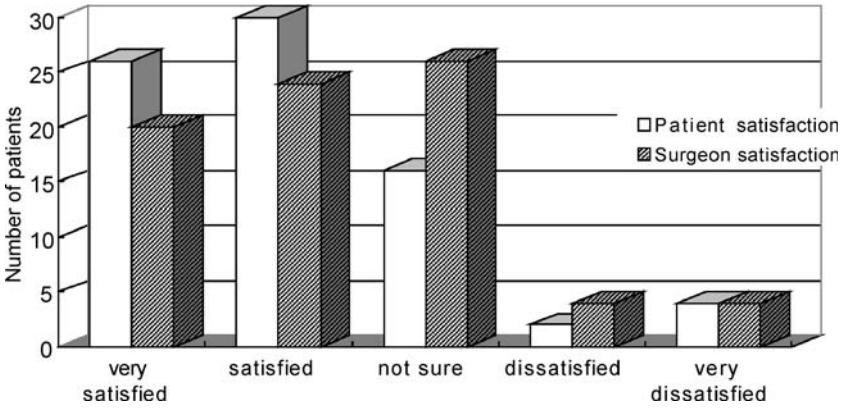

Fig. 1 The distributions of patient and surgeon satisfaction with surgical results

(76.3%), followed by 18 mm in 14 patients (18.4%), and 16 mm in 4 patients (5.3%). Of the 66 patients with porous implants, 22 (33.3%) underwent MCP insertion and 12 (18.2%) had MP insertion, but 32 patients (48.5%) underwent neither MCP nor MP insertion.

Concerning the duration of wearing ocular prosthesis, which was one of the prosthetic variables, 24 patients (30.8%) had been wearing it for less than 6 months, 12 patients (15.4%) between 6 and 12 months, 14 patients (18.0%) between 1 and 2 years, and 28 patients longer than 2 years. Of all 78 patients, 30.8% (24 patients) answered that they usually kept their ocular prosthesis in their eyes during sleep whereas 69.2% (54 patients) answered that they did not. As to the management of ocular prosthesis, 84.6% (66 patients) answered that they cleaned their ocular prosthesis daily while 6 patients answered three to four times a week, and 5 patients once a week. Surprisingly, 1 patient answered once in a month. With regard to the other people's response, 48.7% (38 patients) answered that people could hardly recognize that they were wearing ocular prosthesis, 46.2% (36 patients) answered people occasionally suspected, and 5.1% (4 patients) answered that people easily knew. Of all the subjects, 74.4% (58 patients) had some ocular symptoms and 48 patients complained about ocular discharge, which was the most common symptom. Sixteen patients complained of two or more symptoms. There is no significant difference in ocular symptoms between patients with MCP or MP insertion and patients without MCP or MP insertion on chi-squared testing ($P>0.1$).

Regarding the satisfaction with surgical results, the percentage of patient satisfaction was 71.8 and surgeon satisfaction was 56.5%. The percentage of "very satisfied" and "satisfied" groups was higher in patient satisfaction, and that of "not sure" and "dissatisfied" groups was higher in surgeon satisfaction (Fig. 1).

While there was no significant correlation between patient satisfaction and most variables, three variables, economic status, other people's response and insertion of an MP or an MCP were correlated to patient satisfaction

Table 1 Results of correlation analysis between patient satisfaction and each variable (Pearson correlation coefficient [r], *P* value)

Variables correlated to patient satisfaction	Variables not correlated to patient satisfaction
Economic status (r=0.45, $P<0.01$)	Gender (r=−0.21, $P=0.89$)
Other people's response (r=0.55, $P<0.01$)	Age at surgery/at present (r=0.26/0.24, $P=0.11/0.15$)
Insertion of an MP or an MCP (r=0.38, $P=0.03$)[a]	Education status (r=−0.04, $P=0.20$)
	Type of surgery (r=0.10, $P=0.62$)
	Ocular symptoms (r=0.23, $P=0.44$)
	Duration of wearing (r=−0.11, $P=0.44$)
	Cause of anophthalmos (r=0.06, $P=0.74$)
	Type of implant (r=0.15, $P=0.91$)
	Marital status (r=0.19, $P=0.34$)[b]

MP motility peg, *MCP* motility coupling post
[a]The variable was evaluated for the patients with porous implants
[b]The variable was evaluated for the patients over 20 years old

Table 2 Results of multiple linear regression analysis between patient satisfaction and each variable except for marital status and peg insertion (*P* value)

Variables correlated to patient satisfaction	Variables not correlated to patient satisfaction
Economic status ($P=0.01$)	Gender ($P=0.74$)
Other people's response ($P<0.01$)	Age at surgery/ at present ($P=0.30/0.63$)
	Education status ($P=0.71$)
	Type of surgery ($P=0.68$)
	Ocular symptoms ($P=0.51$)
	Duration of wearing ($P=0.59$)
	Cause of anophthalmos ($P=0.77$)
	Type of implant ($P=0.86$)

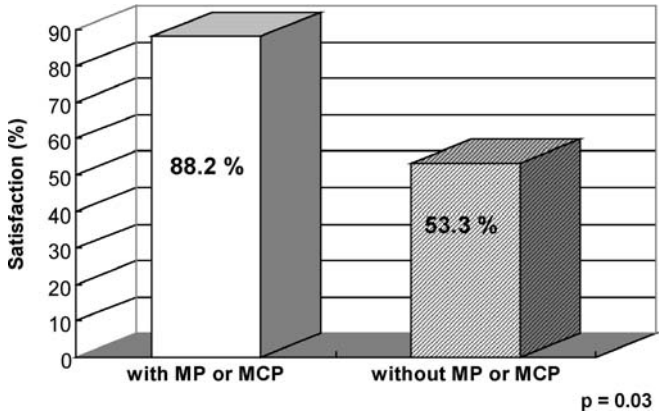

Fig. 2 The percentage of patient satisfaction in patients who underwent MCP or MP insertion and in patients who did not. *MP* motility peg, *MCP* motility coupling post

(Table 1). All variables except for two variables, marital status and insertion of an MP or an MCP, were evaluated for all recruited patients using Pearson correlation analysis. Economic status and other people's response were significantly correlated to patient satisfaction and these results were reconfirmed by multivariate analysis using multiple linear regression (Table 2). The adjusted r^2 of the linear regression model was 0.502. The patients of medium economic status were more satisfied with surgical results than patients of low economic status ($p<0.01$). The patients who answered that people could hardly recognize that they were wearing ocular prosthesis were more satisfied than those who answered otherwise ($p<0.01$). The type of implant and the type of surgery were not correlated to patient satisfaction.

Marital status was only evaluated for patients over 20 years old. It was not correlated to patient satisfaction ($P=0.34$). Of the patients with porous implants, the patients who underwent MCP or MP insertion were more satisfied than those who did not ($P=0.03$; Fig. 2).

Discussion

There are many causes of anophthalmos. The eyeballs are often enucleated for saving life in cases of malignant ocular tumors such as retinoblastoma and choroidal melanoma. The eyeballs may be removed to prevent sympathetic ophthalmia following irreparable intraocular trauma. Other indications for enucleation or evisceration include painful blind eye such as neovascular glaucoma and disfigured blind eye such as buphthalmos and phthisical eye [2, 4, 6, 21]. Although the causes are very different, all patients hope to improve their cosmetic appearance after surgery. They want to have a natural appearance that portrays normal eyes. Considering this aspect, orbital implant surgery is a cosmetic surgery as well as an essential surgery. In such cosmetic surgeries, sometimes patients are not satisfied with their postoperative appearance in spite of good surgical results. This dissatisfaction may be due to exorbitant expectation or improper information about surgical results.

There are some articles dealing with patient satisfaction after ocular surgeries [1, 12, 17, 19, 29]. Most of them reported patient satisfaction with cataract surgery, corneal transplantation or corneal refractive surgery. After cataract surgery, about 80% of patients were satisfied with the results and the satisfaction with vision was better after second-eye surgery than after first-eye surgery [17]. Approximately 75% of patients were satisfied after corneal transplantation [29] and more than 90% of patients were satisfied after corneal refractive surgeries such as photorefractive keratectomy (PRK) and laser in situ keratomileusis (LASIK) [1, 19]. A few articles reported patient satisfaction after oculoplastic surgery [3, 15]. One of them was patient satisfaction after endoscopic brow lift and 70% of patients were satisfied with the results [3]. Another was patient satisfaction after transconjunctival laser blepharoplasty of the lower lid. Eighty-two percent of the patients were satisfied [15]. In this current study, 71.8% of patients were satisfied with the surgical results. This percentage is less than that for cataract and corneal refractive surgeries, but it does not seem to be so low because orbital implant surgery is one type of oculoplastic surgery. Moreover, the percentage of patient satisfaction was higher than that of surgeon satisfaction. The distribution patterns of patient and surgeon satisfaction was somewhat different. While the number of patients in "very satisfied" and "satisfied" groups was higher in the patient satisfaction pattern, the number of patients in "not sure" groups was higher in the surgeon satisfaction pattern. It is difficult to explain the exact reasons for this finding. However, strict self-assessment of surgeons might be one reason.

There was remarkable advancement in orbital implant surgery during the later part of the 20th century. The most important improvement was the introduction of new implant materials such as hydroxyapatite and porous polyethylene [14, 23, 24]. These porous orbital implants have been widely used throughout the world [11]. In a survey for membership of the American Society of Ophthalmic Plastic and Reconstructive Surgeons (ASOPRS), silicone spheres were used as orbital implants in nearly 60% of cases of primary enucleation in 1989 and hydroxyapatite was only used in 1%. However, only 3 years later, the percentage of silicone spheres decreased to 27% and the percentage of hydoxyapatite increased to 56% [11]. Since synthetic porous polyethylene was introduced as an alternative, integrated porous orbital implants seemed to have been used more frequently.

Although hydroxyapatite and Medpor have been used worldwide because of their advantages, the researchers tried to determine whether the use of porous integrated orbital implants increased patient satisfaction in the present study. Shields et al. [27] compared prosthetic motility between pegged and unpegged implant groups after hydro-

xyapatite implantation. Small-amplitude saccade was good in both groups, but large-amplitude saccade was better in pegged implants than unpegged implants. Guillinta et al. [7] quantitatively assessed pegged and unpegged prosthetic eye motility using infrared oculography. For horizontal excursions, the average prosthetic motility in unpegged implants was 49.6% of measured motility of the contralateral normal eye. This prosthetic motility increased to 86.5% after peg placement. For vertical excursions, the prosthetic motility did not differ significantly between unpegged and pegged implants. In the present study, although the type of orbital implant and the type of surgery were not related to patient satisfaction, the satisfaction in the pegged group was significantly higher than in the unpegged group. Economic status and other people's response were also correlated to patient satisfaction, but the sole way for surgeons to increase patient satisfaction was successful peg insertion, which can improve the horizontal excursion of the prosthesis.

The anophthalmic patients wearing ocular prosthesis complained of various symptoms. About 60% of the patients complained of ocular discharge and it was the most common symptom. However, the presence of ocular sym ptoms was not correlated to patient satisfaction. It may mean that patient satisfaction is not influenced by ocular symptoms and anophthalmic patients can tolerate mild symptoms such as ocular discharge. The causes of ocular discharge are diverse. Generally, the most common underlying disease of ocular discharge in anophthalmic patients is giant papillary conjunctivitis (GPC) [18, 20]. It is an inflammatory reaction of the tarsal conjunctiva, which can result in edema and hypertrophy of the conjunctiva, leading to excessive discharge and discomfort. The pathogenesis of GPC is a combination of immunologic response to the surface coating on the prosthesis and mechanical trauma inflicted on the conjunctiva by the prosthesis. The risk of development or exacerbation of GPC increases with increased deposits on the prosthesis, the length of time patients have worn the prosthesis, the reactivity of the patient to the material construction of the prosthesis, and an allergic history [18]. In this study, 30.8% of patients usually kept the prosthesis in their eyes while asleep and although 84.6% of the patients answered that they cleansed their prosthesis with water daily, most patients did not know exactly how to disinfect it. Therefore, anophthalmic patients should be fully aware of how to wear and how to manage their ocular prosthesis in order to reduce GPC incidence, and they have to be examined regularly for early diagnosis as well as for early management of ocular diseases associated with ocular prosthesis.

There were methodological limitations to the present study. First, we used only one single item to assess patient satisfaction instead of a validated inventory. This item combines information about the appearance and the movement of their prosthesis. Therefore, it was not a sound approach to accurate evaluation. However, the surgeon also graded surgical results in five categories after considering the appearance and the movement of the prosthesis, and these grades could be compared directly with that of patient satisfaction. Nevertheless, a validated inventory is thought to be the best approach to assessing both patient and surgeon satisfaction, and it is a main limitation in this study. Second, psychological variables were omitted in the categories, although patient satisfaction might be closely related to psychological factors. It is thought to be very useful to investigate patient satisfaction and psychological variables using standardized psychometric questionnaires.

In conclusion, although the variables significantly correlated to patient satisfaction were economic status, other people's response, and insertion of an MP or an MCP, successful peg insertion is thought to be the only way for surgeons to increase patient satisfaction by means of improving the movement of the prosthesis. Strict instruction about how to manage prosthesis is essential for anophthalmic patients to reduce their symptoms.

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