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Clinical Psychology

Reconstructive surgery in strabismus patients and perceived quality of life

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Purpose: Data of the subjective assessment of strabismus-related quality of life from patients with manifest strabismus are important in order to obtain the best possible treatment recommendations for affected people. The aim of this study is the analysis of the quality of life based on squinting Austrians with and without reconstructive strabismus surgery.
Methods: The strabismus-specific AS-20 questionnaire was completed by 26 strabismus patients without reconstructive surgery, 27 strabismus patients with reconstructive surgery and 35 non-squinting people from Austria. These data were evaluated and analyzed.
Results: In the German version of the AS-20, clear evidence could be provided for group differences of perceived strabismus-related quality of life after reconstructive strabismus surgery. In the two psychosocial sub-scales (self-perception & interaction) significant differences were found in the comparison of the groups ($p < .001$). Also in the functional subcategories (reading function & general function), highly significant differences were determined ($p < .001$).
Conclusions: Untreated manifest strabismus leads to negative psychosocial effects on the quality of life of those affected. Reconstructive strabismus surgery reduces these discomforts and leads to a significant increase in the quality of life related to strabismus in both psychosocial and functional areas.

INTRODUCTION

The prevalence in manifest strabismus varies greatly depending on the population and the included strabismus forms. The values range from 0.5 percent to 5 percent. These data do not appear high. However, the effects of the affected persons are not limited to the ophthalmological symptoms, but rather are also strongly placed in the psychological domain (Mohney, 2007).

It takes only a split second to unconsciously analyze a strange face. An average and symmetrical face stands for good health, strong genes and intelligence. If, for example, this symmetry deviates through a visible strabismus, this automatic analysis leads to prejudices regarding health, genes, and intelligence (Durnian et al., 2011).

Against this background, numerous international studies have shown that a visible squint deviation from the age of five is brought into a negative context by peers. In advancing age, adolescents and adults suffer from a lack of self-awareness, avoid the view of their own face, have problems with work-seeking and interpersonal areas, and are prone to depression (Lukman et al., 2010; Menon et al., 2002; Mojon-Azzi et al., 2008, 2011; Mojon-Azzi & Mojon, 2009; Nelson et al., 2008; Paysse et al., 2001).

Studies on the influence of strabismus-directions vary in their results. Frequently, Esotropia, especially in women, was perceived as more negative (Durnian et al., 2011; Mojon-Azzi et al., 2008; Nelson et al., 2008). Independently to the age of the patients and the survey method, it has been shown that untreated manifest strabismus leads to negative psychosocial effects and to a reduced quality of life among the persons affected (Menon et al., 2002; Mojon-Azzi et al., 2008; Paysse et al., 2001).

Based on this data, investigations were carried out to answer the question of whether a reconstructive, rather well-known under the term of cosmetic strabismus surgery, in which no functional improvement is expected for those affected, leads to a reduction in the negative psychosocial effects and an increase in quality of life. The results of the studies show a clear improvement in the quality of life and a decrease in the negative psychosocial effects. The patients report to have increased self-esteem, higher self-worth, feel more attractive, and dare to get in touch with the opposite sex (Alpak et al., 2014; Durnian et al., 2011; Marsh, 2015).

In addition to the reduction of the cosmetically disturbing deviation of an eye, in some cases unexpected postoperative functional improvements could also be demonstrated. For the authors, another indication that the concept of cosmetic strabismus surgery should be rejected and replaced by the term reconstructive strabismus surgery (Mollenhauer & Haase, 2003, 2003).

The conclusion of these studies is that reconstructive

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strabismus surgery can result in both psychosocial and functional benefits in general, as well as in adulthood (Alpak et al., 2014; Durnian et al., 2011; Marsh, 2015; Mollenhauer & Haase, 2003). This knowledge is becoming increasingly widespread. In their study, Astle's team (Astle et al., 2016) found that a significant increase was seen in reconstructive strabismus surgery in the adult age. They hypothesize that this increase is associated with the improvement of evidence-based data for functional and psychosocial gain of an ocular correction.

Despite this pleasing development, the knowledge about the possibility for this procedure is still not widely spread. For the purpose of a health sciences perspective, a better explanation of the affected persons leads to a reduction of their suffering by a low-risk strabismus operation, which is usually taken over by the health insurances. Squinting people who are not given any information, but are suffering from the situation, may seek help in psychotherapeutic interventions, which can lead to a financial burden for those affected. If these therapies, for example, in the form of psychological resource activation or self-efficacy, do not lead to the anticipated psychological improvement, an inability to work can occur in an extreme case due to depression. This would lead to considerably higher costs from an economic perspective than a one-time strabismus surgery.

Although the data situation is relatively unambiguous, there are very few recent studies that relate reconstructive surgery and quality of life. Furthermore, to our knowledge there are no studies available in Central European countries. Therefore, we aimed to collect information from Austria on the strabismus-related quality of life of squinting people and already operated squinting people. With these data the question is examined, whether already operated squinting patients have a subjectively better strabismus-related quality of life than that of unoperated squinting patients.

MATERIAL AND METHOD

AS-20 questionnaire

To translate the original English language AS-20 questionnaire (Hatt et al., 2009), the standard method of back translation was applied to the German language (Beaton et al., 2000).

This questionnaire consists of 20 questions divided into four subcategories: self-awareness, interaction, reading and general function. The responses are evaluated by a lookup table made available by the authors (www.pedig.net). In this free Microsoft Excel table the logit measurements are stored and the answers have only to be entered with a rating of 4 to 0. The results for the four sub-scales are calculated automatically in logit values as well as in points and can be read immediately (Leske et al., 2012).

STUDY DESIGN

It is a quantitative, monocentric, controlled questionnaire study in the Austrian area, in squinting patients with and without reconstructive strabismus surgery. All squinting participants are patients of the University Clinic Salzburg, Landeskrankenhaus, University Clinic for Ophthalmology and Optometry of the PMU, Sehschule. For the control group, persons from the work and private environment of the author were consulted. The surveys for this study were conducted between May 2016 and November 2016. The necessary approval of the Ethics Committee of the Province of Salzburg was obtained in advance (date of approval July 18, 2016).

STUDY POPULATION

The 60 participants with pathology are divided into 30 operated and 30 unoperated squinting patients. The age range in both groups ranges from 19 to 70 years. The gender distribution results from the appropriate pathology.

The group of non-operated squinting patients is divided into 18 women and 12 men. In 11 subjects one eye deviates inward, and in seven, one eye outward. In the men's group five people squint inward and seven outward.

There are 10 women and 20 men in the consecutive operated group. In three women Esotropia was operated, in seven, Exotropia. In the group of men, seven were treated for an inward squint and 13 for an outward squint. The strabismus operation should have taken place in a maximum of 28 months and a minimum of three months. The maximum timeframe required was necessary in order to be able to generate a corresponding number of participants but has no additional meaning. The minimum duration of three months was chosen in order to give time for the operated subjects to get used to the new situation.

Two non-operated subjects were questioned shortly before their reconstructive strabismus surgery. Both agreed to answer the questionnaire again via telephone interview from the perspective of the changed situation six weeks after the intervention. The analysis of these data allows a direct preoperative and postoperative comparison at least for two participants.

As this was the first application of the AS-20 for the Austrian region, the questionnaire was also completed by 35 test persons without manifest strabismus, in order to generate reference values. The subjects have a normal binocularity and have no other ophthalmological diseases. The control group consists of 17 women and 18 men, aged 18 to 60 years. Exclusion and inclusion criteria are presented in Table 1.

DATA PROTECTION

An exact evaluation of the determined data is ensured by the parameters: age, sex, operated / not operated, inward / outward strabismus and size of the strabismus angle. The participants are not named by name, and no subsequent assignment is possible.

DATA COLLECTION AND DATA ANALYSIS

The data was acquired exclusively with the German language version of the AS-20.

After receiving the completed questionnaires, the pseudonymized information was transferred to the free AS-20 lookup table (www.pedig.net). The answers were entered into the fields provided for this purpose and the logit values and point values are calculated automatically by the already stored data. The answers to item 14 (I have problems with depth awareness) and 19 (because of my eyes I cannot enjoy my hobbies) are excluded from the calculation of subscales. Thus, for each sub-scale, both a logit value and a point value were obtained.

In our study sample reliability of AS-20 can be regarded as high (Cronbach's $\alpha = 0.94$ for the whole scale). Subscales reached Cronbach's α values between 0.76 (General Function) and 0.94 (Self Perception). This indicates that AS-20 is a highly reliable instrument which is supported by previous evidence from different countries and languages (Ali et al., 2016; Hatt et al., 2009; Wang et al., 2013).

We calculated descriptive statistics and used multivariate analysis of variance to identify group differences. Post hoc multiple comparisons were analyzed by Bonferroni test.

Table 1. Inclusion (ic) and exclusion criteria (ec) of the study

	age	f/ m	diagnosis	binocularity
ic no surgery	18-85	f & m	congenital / over years existent visible eso- or exotropia	no/poor
ec no surgery			strabismus with pathological afflictions	unimpaired
ic surgery	18-85	f & m	surgery before max. 28 & min. 3 months before surgery same ic like no surgery	no/poor
ec surgery			strabismus surgery with focus on functional benefit reduction from pathological afflictions	unimpaired
ic control group	18-60	f & m	no visible strabismus	unimpaired
ec control group			visible strabismus St. p. strabismus surgery other ophthalmological diseases	no/poor

Table 2. Strabismus related quality of life by study group

	No surgery	Surgery	Controls	F*	p*
	M (SD)	M (SD)	M (SD)		
Self Perception	62.4 (28.0)	71.5 (21.0)	97.3 (5.4)	$13.76^{2,3}$	<.001
Interaction	72.4 (20.3)	87.3 (16.2)	99.3 (2.8)	$14.85^{1,2,3}$	<.001
Reading	68.7 (29.1)	87.6 (13.6)	93.6 (10.0)	$16.57^{1,2}$	<.001
General	67.8 (22.3)	82.4 (18.8)	93.9 (7.8)	$12.27^{1,2,3}$	<.001

Note. M mean, SD standard deviation

Higher values indicate higher quality of life

* Multivariate analysis of variance included AS-20 subscales as dependent variables and group, gender and esotropy/exotropy as fixed factors. F and p values represent results from multivariate tests for group. Main effects of gender and esotropy/exotropy remained insignificant. Adjusted R^2 were calculated for all four models: Self Perception (0.34), Interaction (0.37), Reading (0.31), General (0.31).

[1,2,3] Superscripts indicate significant results (p<.05) for post hoc multiple comparisons by Bonferroni test: No surgery vs. Surgery[1], No surgery vs. Controls[2], Surgery vs. Controls[3]

For statistical data analysis we used IBM SPSS Statistics 21.

RESULTS

Multivariate ANOVA revealed significant differences between groups for all AS-20 subscales, i.e. self-perception, interaction, reading and general function. Post hoc multiple comparisons revealed significant differences between the *No surgery* and *Surgery* groups for interaction, reading and general function. The *Surgery* group and *controls* differed significantly in all subscales, with the exception of reading function. Standard deviations for the *No surgery* group were high, indicating relatively high differences within the group (see Table 2).

Main effects of gender and esotropy/exotropy revealed no significant results. Nevertheless, we observed a significant interaction effect of group-gender-esotropy/exotropy ($F(1, 78) = 9.86$, $p = .002$) in subscale reading function, indicating reading function score is lower in all subgroups of the *no surgery* group vs. *surgery* group – with the remarkable exception of men with exotropy ($M_{\text{no surgery}}=85.25$ vs. $M_{\text{surgery}}=79.45$).

DISCUSSION

The results of this study indicate that strabismus is clearly related to negative, self-rated quality of life. All subscales of the AS-20 questionnaire, used in this study, showed significantly lower ratings in *No surgery* group compared to healthy *Controls*. Especially in self-perception differences were strikingly huge. However, reconstructive surgery seems to be associated with higher quality of life scores: operated strabismus patients rated interaction, reading and general function significantly higher than not operated strabismus patients. Interestingly, these differences were larger in function scales of AS-20 than in psychosocial scales. For reading function, *Surgery* group reached values very close to the healthy *Control* group. This is in accordance with other studies that emphasize the reconstructive character of strabismus surgery and suggest not to use the term cosmetic, because of its potential impact on functions (Marsh, 2015; Mollenhauer & Haase, 2003).

Our findings are supported by available evidence. A recent study showed significant differences in AS-20 ratings before and after a reconstructive surgery, for both psychosocial and functioning scales (Glasman et al., 2013). Other authors found increases of nearly all psychosocial dimensions used in their study (Alpak et al., 2014). Marsh reports very similar results in his overview (Marsh, 2015).

Gender remained an insignificant factor for AS-20 scores in our analysis. Current evidence is not quite clear in this aspect. Some research did also not reveal significant gender differences regarding life quality in strabismus patients (Al-

pak et al., 2014). However, in our study, AS-20 values of *No surgery* group are lower for females than for males; these differences cannot be observed in *Surgery* group. Moreover we found an opposite than expectable difference between the male surgery vs. no surgery group with exotropy in reading function. This is in line with evidence of other studies: females' life quality scores seem to benefit more of strabismus surgery than males' (Coats et al., 2000; Glasman et al., 2013; Mojon-Azzi et al., 2008). More research is needed to clarify this aspect.

We used AS-20 in our study, a highly reliable and valid instrument to assess strabismus related life quality. Previous research has shown the benefits of this questionnaire and its methodological issues (Coats et al., 2000; Gothwal et al., 2016; Leske et al., 2012). Statistical analysis of our questionnaire data revealed a high reliability of AS-20 in our sample as well.

Due to the cross-sectional character of this study, it is not possible to draw conclusions regarding cause and effect relationships. Nevertheless, our results are clearly in line with international studies of the last 15 years in this area.

CONCLUSION

The analysis of the strabismus-related quality of life with and without reconstructive strabismus surgery in squinting Austrians shows significant improvements in the psychosocial as well as in the functional area. This leads to the explicit recommendation for ophthalmologists, orthoptists, health care workers, persons concerned and relatives that a reconstructive strabismus surgery at any age is recommended. An implementation in related guidelines could help to increase surgery rates, since the operation reduces negative psychosocial effects, improves functional areas and leads to a higher quality of life.

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