Determinants of surgery related anxiety in cataract patients
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Background/aims: Not much is known about the relative importance of different determinants of anxiety in cataract patients. This study analysed the predictive value of factors related to surgery induced anxiety.

Methods: In 128 cataract patients, recruited from two hospitals (Medical Centre Maastricht Annadal (MCMA) and Rotterdam Eye Hospital (REH)), state anxiety was assessed at four different time points using the State-Trait Anxiety Inventory (STAI). The following predictive factors of anxiety were measured: trait anxiety, outcome expectancies, doctor-patient relationship, coping strategy, social support, information supply, sociodemographic variables, and previous cataract surgery. Repeated measures ANOVA, t-tests, multiple regression analysis, and correlations were used to analyse data.

Results: In general patients reported little anxiety. The level of anxiety (scale 1–4) was the highest before surgery, decreased immediately after surgery, and increased again after the postoperative visit. Patients with higher trait anxiety levels (r = 0.41; p < 0.01), and women (r = 0.30; p < 0.01) reported more anxiety. The REH patients showed lower anxiety scores than the MCMA patients.

Conclusion: Women and patients with higher trait anxiety were more likely to experience higher levels of state anxiety. Positive outcome expectancies and social support may decrease anxiety.

Patients and methods
Patients
This study was carried out among 128 cataract patients who had routine cataract surgery with intraocular lens implantation in the period from June to September 2001 at the Medical Centre Maastricht Annadal (MCMA, n = 50) or the Rotterdam Eye Hospital (REH, n = 78). The medical ethics committee approved the research proposal, and all patients signed an informed consent before inclusion in the study.

Data gathering
Cataract surgeons at both hospitals performed standard phacoemulsification with monofocal intraocular lens implantation and retrobulbar anaesthesia. Patients at the REH received 7.5 mg Dormicum (Roche, Netherlands) before local anaesthesia, unlike patients at the MCMA.

Surgical technique
Cataract surgeons at both hospitals performed standard phacoemulsification with monofocal intraocular lens implantation and retrobulbar anaesthesia. Patients at the REH received 7.5 mg Dormicum (Roche, Netherlands) before local anaesthesia, unlike patients at the MCMA.

Data gathering
Patients were followed during the entire healthcare process, and were asked to complete four different questionnaires at the hospital at four different points in time. The first questionnaire was administered immediately after the last preoperative visit 1 or 2 weeks before cataract surgery (T1). The second questionnaire was handed out a couple of minutes before surgery; at the MCMA before the retrobulbar...
block, and at the REH before sedatives were given (t2). Patients were asked to complete the third questionnaire immediately after surgery (t3). The last questionnaire was administered the day after surgery (t4). Questionnaires 1 and 4 took approximately 20 minutes for patients to complete, while questionnaires 2 and 3 took about 1 minute.

**Materials**

Most questions in the four questionnaires could be answered on four point scales varying from “No!” (1), “Not really” (2), “On the whole, yes” (3) to “Yes!” (4).16 On all scales, a higher score indicated a higher level of the factor measured. Anxiety was measured by the shortened Dutch version of the Spielberger State-Trait Anxiety Inventory (STAI), which distinguishes between state anxiety and trait anxiety and has shown good validity.11 71 8 State anxiety was measured by all four questionnaires, while trait anxiety was measured only by the first questionnaire, because it is assumed to be a stable factor over time. The variable “outcome expectancy” was measured by a three item scale at t1. The “doctor-patient relationship” was measured by a three item scale at t1, and a 14 item scale at t4, including questions like “The ophthalmologist treated me in a reassuring way.” The Utrecht Coping List (UCL), which has proved to be a valid and reliable instrument, measured “coping strategy” at t1.19 20 Patients were asked how often they used the specific coping strategies (that is, problem based or emotional coping): “seldom or never,” “sometimes,” “often,” and “almost always.” Social support (t1) was measured on a seven item scale and included questions like “I can talk about my feelings with regard to cataract surgery with people in my social environment.” Information supply (t4) was measured by 20 questions about various aspects of cataract—for example, questions concerning information about the risks of treatment. Patients were asked whether they received the information at all, and whether they understood this information. Moreover, five questions about music during surgery and perceived visual sensations were asked. At t1 patients could rate to what extent they felt anxious about the retrobulbar anaesthesia. Finally, a few open ended questions addressing what patients found most reassuring and fear arousing were included. At the REH, audiovisual patient education (that is, a live surgery video report) is presented in addition to oral/written information as given at the MCMA. Therefore, the REH patients were asked to answer a few additional questions (t4).

The questionnaires 1 and 4 were pilot tested at both hospitals among 18 cataract patients before onset of the study. Cronbach’s alpha was used to calculate the internal consistency of the scales and showed satisfactory values, varying from 0.70 to 0.87.

**Statistical analysis**

Data analyses were performed using SPSS 10.0 (SPSS Inc, Chicago, IL, USA). Before the main analyses were carried out, data were screened and recoded. Repeated measures analysis of variance (RM ANOVA) was used to show differences in levels of anxiety over time between hospitals.

Independent and paired t tests showed differences between groups and between times of measurement. Multiple linear regression analysis (ENTER method) was used to indicate the relative importance of separate variables in predicting anxiety. Both Pearson correlations and regression coefficients were calculated for mean anxiety levels across the four measurement points. Patients who had peroperative or postoperative complications (n = 6) were excluded from

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**Table 1** Sociodemographic characteristics of the study population

<table>
<thead>
<tr>
<th>Variable</th>
<th>Setting</th>
<th>MCMA</th>
<th>REH</th>
<th>All patients</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td></td>
<td>75.4 (6.9)</td>
<td>71.9 (9.3)</td>
<td>73.2 (8.6)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Sex, No (%)</td>
<td></td>
<td>19 (38)</td>
<td>35 (45)</td>
<td>54 (42)</td>
<td>0.44</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>31 (62)</td>
<td>43 (55)</td>
<td>74 (58)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education, No (%)</td>
<td></td>
<td>24 (49.0)</td>
<td>31 (40.3)</td>
<td>55 (43.7)</td>
<td>0.69</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>16 (32.7)</td>
<td>28 (36.4)</td>
<td>44 (34.9)</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td></td>
<td>9 (18.3)</td>
<td>18 (23.4)</td>
<td>27 (21.4)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>21 (42.0)</td>
<td>32 (41.0)</td>
<td>53 (41.4)</td>
<td>0.91</td>
</tr>
</tbody>
</table>

MCMA, Medical Centre Maastricht Annadal; REH, Rotterdam Eye Hospital.

*If patients had second eye cataract surgery.
postoperative analyses, because complications may affect the level of anxiety.

RESULTS

Mean reported levels of state anxiety at the four time points were 1.8 (SD 0.81) (t1), 1.8 (0.75) (t2), 1.1 (0.34) (t3), and 1.3 (0.48) (t4), respectively. A RM ANOVA with state anxiety as within subjects factor and hospital site as between subjects factor showed a main effect of state anxiety over time (p<0.01). Paired samples t tests showed across hospital sites that state anxiety levels decreased immediately after surgery (t3) compared to the measure at t2 (p<0.001), and increased again the day after surgery (p<0.001, fig 2).

Although the main effect of hospital site was significant for state anxiety (p<0.01), no statistical support was found for the interaction between state anxiety and hospital site (p = 0.07). This finding indicates a similar course in time of state anxiety for both settings. Trait anxiety did not differ between the two hospitals (p = 0.66), nor between male and female patients (p = 0.26). Anxiety specifically related to local anaesthesia (mean 1.97 (1.18)) also showed no difference across hospital sites (p = 0.26). Anxiety related to local anaesthesia, the unknown, and failure of surgery were mentioned. What patients found most reassuring were patient education, the expertise and welcome of the ophthalmologist and assisting personnel, a quiet and restful atmosphere, Dormicium sedation, and to be accompanied by a relative/acquaintance during the visits at the hospital. At the REH, 54% of all patients watched the live cataract surgery video just before onset of surgery. Compared with patients who did not watch this video preoperatively, no difference was found in preoperative and postoperative anxiety levels (immediately before surgery p = 0.93; immediately after surgery p = 0.93). The live video was appraised as reassuring by 49% of all patients, 17% scored “not really.”

DISCUSSION

The average patient experienced little anxiety related to cataract surgery (mean 1.5 (SD 0.48)). Patients reported highest levels of anxiety preoperatively. Immediately after surgery, the level of anxiety dropped, probably because of the relief. These results agree with research by Foggitt. This finding emphasises the need for postoperative counselling by the ophthalmologist. It remains unclear compared to former studies why differences in anxiety related to anaesthesia did not exist between hospitals in advance of the retrobulbar block; keeping in mind that REH patients could anticipate sedation before local anaesthesia. To obtain a greater reduction of anxiety during the days before surgery, patients should be better informed about the calming effects of Dormicium. To our knowledge no reference data are published with respect to STAI scores, which limits the possibility to assess the representativeness of our study. Corresponding with literature on STAI studies, trait anxiety also seemed to be an important determinant of state anxiety among cataract patients. Specifically, patients with higher trait anxiety levels showed increased state anxiety levels. Higher trait levels were found among women in those

R2 (explained variance): 0.369

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Pearson correlation</th>
<th>Standardised regression coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.004</td>
<td>-0.025</td>
</tr>
<tr>
<td>Sex</td>
<td>0.304†</td>
<td>0.243†</td>
</tr>
<tr>
<td>Education</td>
<td>-0.030</td>
<td>0.131</td>
</tr>
<tr>
<td>2nd eye surgery</td>
<td>-0.100</td>
<td>-0.076</td>
</tr>
<tr>
<td>Hospital</td>
<td>0.237†</td>
<td>0.305†</td>
</tr>
<tr>
<td>Trait anxiety</td>
<td>0.410†</td>
<td>0.381†</td>
</tr>
<tr>
<td>Outcome expectancy</td>
<td>-0.221†</td>
<td>-0.007</td>
</tr>
<tr>
<td>Doctor-patient relationship</td>
<td>-0.166</td>
<td>-0.059</td>
</tr>
<tr>
<td>Problem based coping</td>
<td>-0.012</td>
<td>0.021</td>
</tr>
<tr>
<td>Denial coping</td>
<td>0.089</td>
<td>-0.034</td>
</tr>
<tr>
<td>Emotional coping</td>
<td>0.119</td>
<td>0.043</td>
</tr>
<tr>
<td>Social support</td>
<td>-0.265‡</td>
<td>-0.075</td>
</tr>
<tr>
<td>Information supply</td>
<td>-0.158</td>
<td>-0.061</td>
</tr>
</tbody>
</table>

*State anxiety at t2.
†Significant at the 0.05 level.
‡Significant at the 0.01 level.
studies, although we could not support that in our study. As expected, patients with higher outcome expectancies reported lower state anxiety levels. Unlike expected, the doctor-patient relationship was not identified as a determinant of state anxiety, which was paradoxically mentioned as a runner up reason for the most reassuring aspect. Interestingly, coping strategy was also not related to anxiety. This may be a result of the expressed difficulties patients had in answering these questions. Questions were raised about the usefulness of coping measurements by means of checklists before surgery.22

Although the overall information supply did not show a significant correlation with anxiety, patients marked information most frequently as being the most reassuring. Morrell showed that structured preoperative teaching reduces anxiety in cataract patients, especially information regarding safety of cataract surgery.23–24 Other studies focusing on patient education showed rather low levels of knowledge with respect to cataract, and misperceptions in cataract patients who needed surgery, in addition to limited information retention.24–26 Those poor information retention percentages were related to advanced age and lower educational level.26 This may have led to the non-significance between the mean information score and state anxiety in our study.

In accordance with former studies, music did not influence anxiety levels.10–12 As reported before, most visual sensations during cataract surgery do not appear to be very frightening.27 However, patient education should include information about visual perception during the procedure relieving the patients of unnecessary distress. Although not significant, patients undergoing their second cataract surgery reported less anxiety preoperatively, but postoperatively they reported more anxiety compared to first eye surgery patients. This was also found by Foggitt, and may be explained by the fact that not a single cataract surgery is performed in exactly the same way; so things are not always going as expected, which could increase feelings of anxiety.28–30 Age and education showed no relation to state anxiety, while sex was shown to be an important determinant. In accordance with former studies women experienced higher state anxiety levels than men.31

The analyses of this study showed that hospital setting is an important determinant of reported levels of state anxiety. Future research should therefore illustrate which specific hospital characteristics are predictive of differences in anxiety between the settings. Maybe information about complications differed between the two hospitals, which may induce these differences in reported state anxiety. Another explanation may be that the Rotterdam patients are more reserved in expressing their surgery related fear than the patients from Maastricht, which would indicate regional differences in expressing emotions. However, no data are available to confirm or reject this hypothesis.

The possibility that patients reported low state anxiety levels may be affected by artefacts (for example, social desirability). These should temper a conclusion that patients are not very anxious about cataract surgery, although measurements were taken to prevent these artefacts (for example, guaranteed anonymity). In addition, it may not be useful to attempt to reduce anxiety completely, because a low level of anxiety can be beneficial by promoting effective preparation and accurate expectations of discomfort, and thus preventing disappointment.32

In conclusion, to decrease anxiety, more emphasis should be focused on reassuring determinants by paying more attention to outcome expectancies and social support, especially for women and patients with a noticeably higher trait anxiety levels. The routine aspect of cataract surgery may be emphasised to increase positive outcome expectancies. Furthermore, patients should be recommended to bring relatives or friends with them during hospital visits for social support.

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