Pre-Operative Anxiety; Effect of Time to Induce General Anaesthesia After Entrance to Operating Theater

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ABSTRACT

Purpose: Anxiety is an important issue to deal with in patients scheduled for surgery. This study was directed to evaluate the effect of time that pass from the entrance of patients to the theater till induction of anaesthesia.

Patients and methods: This study was conducted on fifty adult female patients ASA 1 scheduled for major abdominal surgery. Twenty five patients were placed first on the operating list (group 1) and twenty five were given a time 4-5h later (group 2). Each patient was visited on the evening prior to surgery and again on the morning of surgery. Anxiety was measured at each visit by objective criteria and part 1 of the State-Trait Anxiety Inventory questionnaire and a blood sample was taken at each visit to measure serum cortisol level.

Results: The pulse rate, systolic blood pressure and the State-Trait Anxiety Inventory questionnaire scores were higher on the second visit than on the first (p < 0.001) in all patients. This increase was greater in group 2 than in group 1 (p < 0.05). The evening anxiety scores were not correlated with those on the morning visit and could not predict them. Serum cortisol level was significantly higher in second visit than first visit, and that increase was more in group 2 patients (p<0.0001).

Conclusion: Pre-operative anxiety on the evening prior to surgery is not a good predictor of anxiety in the immediate pre-operative period. Pre-operative anxiety tends to increase in all patients on the morning of surgery as compared to that on the evening prior to surgery. Also, placing the patient in a late part of the operating list increases the degree of anxiety in the patient awaiting surgery.

Keywords: psychological response pre-operative anxiety

INTRODUCTION

Most surgical patients have preoperative anxiety that is influenced by the uncertainty of anaesthesia and surgical procedures, experience, patient's personality, and coping style. Preoperative anxiety can have an adverse influence on anaesthetic induction and patient recovery(1).

Evaluation of preanaesthetic anxiety relies on subjective assessment tools such as State-Trait Anxiety Inventory score (STAI) or visual analogue scale (VAS)(2,3).

Patients undergoing surgical procedures often experience anxiety in anticipation of events that will be unfamiliar, uncomfortable, or have undesirable results. Even minor surgical procedures can produce anxiety in patients, which can affect their postoperative recovery and risk for physiological complications(4).

The most common concerns about anaesthesia include pain, death, intraoperative awareness, and postoperative nausea and vomiting(5-6), with the incidence of preoperative anxiety in adults ranging from 11% to 80% (7).

Pre-operative anxiety stimulates sympathetic, parasympathetic and endocrine systems leading to an increase in heart rate, blood pressure and cardiac excitability resulting in cardiac arrhythmias(8). It increases plasma adrenaline levels by 40% and causes electrolyte imbalance(9). Increased pre-operative anxiety has been found to correlate well with increased postoperative pain, analgesic requirement and prolonged hospital stay(10).

The factors that influence levels of pre-operative anxiety and the methods used to alleviate it have attracted considerable attention. Thus, this study was designed to assess the influence on pre-operative anxiety of the time to induce general anaestheisa after entrance to operating theatre.

PATIENTS AND METHODS

Fifty female patients, aged between 20 and 50 years, scheduled to undergo major abdominal surgery, were included in the study. Patients with major systemic or malignant disease, psychiatric illness, drug addiction or
previous exposure to anaesthesia were excluded from the study. A written informed consent for participation in the study was obtained from all patients, who were allocated into two groups. 25 patients were placed first on the operating list (group 1) and 25 in the later part, where surgery was expected to start 4-5 h after the commencement of the operating list (group 2).

All patients were informed about the average time that they will spend after entrance to the operating theatre till surgery commences; i.e. their position in the operating list.

Each patient was visited twice, once on the evening prior to surgery and the second on the morning of surgery before premedication was given. Anxiety was measured during each visit by objective criteria (Table I) and a self-evaluation psychological questionnaire consisting of part 1 of the STAI(3) to measure state anxiety, i.e. anxiety at that particular moment. Scoring of the questionnaire was done under the supervision of a qualified psychologist. Also, blood sample was withdrawn in each visit to detect blood cortisol level.

All patients received premedication (pethidine 1 mg.kg⁻¹) intramuscularly 45 min prior to surgery and after measurement of anxiety levels. Specific anxiolytic medication was avoided.

Analysis of the data was performed using paired and unpaired t-tests and Wilcoxon's rank sum test. A value of p <0.05 was regarded as the minimum level of statistical significance. Spearman's rank correlation analysis was performed to detect any relation between the STAI scores of the evening before and the morning of surgery.

**RESULTS**

The two groups were comparable in age [group 1: 36.7± 8.4 years, group 2: 33.1±10.0 years]. In both groups, the pulse rate, systolic blood pressure and respiratory rate were significantly higher on the morning of surgery than on the evening prior to surgery (p <0.001). The increase in pulse rate and systolic blood pressure was greater in group 2 than in group 1 (p <0.05) (Table II).

On the evening prior to surgery the median STAI score of group 2 patients was significantly higher than that of group I patients (p <0.01). On the morning of surgery both groups had higher STAI scores as compared to the previous evening (p < 0.001). The increase in STAI score in group 2 was significantly greater than in group 1 (p <0.001) (Table III). There was no correlation between the STAI scores on the previous evening and on the morning of surgery.

**Table I: Criteria used for measurement of anxiety.**

<table>
<thead>
<tr>
<th>Objective criteria</th>
<th>Pulse rate</th>
<th>Systolic blood pressure</th>
<th>Respiratory rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-evaluation questionnaire</td>
<td>Part I of Spielberger's State Trait Anxiety Inventory(6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table II: The values of the objective criteria on the evening before and on the morning of surgery and their mean rise inpatients placed early (group 1) and late (group 2) in the operating list. Values are expressed as mean±SD.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Previous evening</th>
<th>Morning of surgery</th>
<th>Mean rise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 1</td>
</tr>
<tr>
<td>Pulse; beat.min</td>
<td>80.33±</td>
<td>79.17±</td>
<td>88.87*±</td>
</tr>
<tr>
<td>Systolic blood pressure; mmHg</td>
<td>6.91</td>
<td>7.57</td>
<td>8.20</td>
</tr>
<tr>
<td></td>
<td>116.40±</td>
<td>112.70±</td>
<td>124.13*±</td>
</tr>
<tr>
<td></td>
<td>10.95</td>
<td>10.66</td>
<td>11.23</td>
</tr>
<tr>
<td>Respiratory rate; breath.min</td>
<td>20.07±</td>
<td>20.00±</td>
<td>23.97*±</td>
</tr>
<tr>
<td></td>
<td>4.08</td>
<td>3.75</td>
<td>4.07</td>
</tr>
</tbody>
</table>

*p<0.001 Student's paired t-test, compared to the value on the previous evening in the same group.
Serum cortisol level in group 1 patients in the first visit, ranged from 150-300 nmo/L with a mean of 218.7±30.8 nmo/L. In the second visit, blood cortisol level within the same group ranged from 300-500 nmo/L with a mean of 432.15±40.5 nmo/L which was statistically significantly higher than that of first visit (p=0.0325).

In group 2, in the first visit, serum cortisol level ranged from 170-280 µg/dl with a mean of 225.7±26.5 nmo/L which had no statistical difference than the values of cortisol level of group 1 patients in the first visit.

In the second visit, serum cortisol level ranged from 350-700 nmo/L and had a mean of 570.5±60.7 nmo/L and was significantly higher than serum cortisol of the first visit (p=0.0047) and was also statistically higher than serum cortisol level of group I at the first visit (p<0.0001).

**DISCUSSION**

Pre-operative anxiety is common in all patients listed for surgery. It is important to be aware of the multiple factors which influence the degree of anxiety and to take appropriate measures in order to maintain a stable haemodynamic status during induction of anaesthesia in the peri-operative period and to have a smooth and comfortable postoperative recovery.

Anxiety is difficult to measure accurately as it is an emotion. The incidence of pre-operative anxiety varies from 10-80% depending mainly on the method of assessment. Subjective criteria include the observer's impressions such as sweating, tremor, unsteady voice and lack of attention. Observer bias is inevitable in such a method of assessment. The objective criteria for assessing anxiety measure physiological variables such as pulse rate, blood pressure, respiratory rate and hormonal levels and hence are indirect methods of assessing anxiety through sympatho-adrenal activity. These are considered to be reasonably good indicators of pre-operative anxiety though they may be fallacious in patients suffering from systemic diseases such as hypertension, cardiac rhythm disturbances or some endocrine disorders.

**Table III: State Trait Anxiety Inventory scores in patients placed early (group 1) and late (group 2). Values are expressed as median (interquartile range).**

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evening prior to surgery</td>
<td>28 (25-34)</td>
<td>33*† (29-39.5)</td>
</tr>
<tr>
<td>Morning of surgery</td>
<td>48</td>
<td>59†</td>
</tr>
<tr>
<td></td>
<td>(41.5-58)</td>
<td>(51-63.5)</td>
</tr>
</tbody>
</table>

* p <0.01 intergroup comparison Wilcoxon's rank sum test
† p <0.001 iniragroup comparison Wilcoxon's rank sum test

![Fig 1. serum cortisol level in both studied groups.](image)
Self assessment by psychological questionnaire is considered a sensitive and accurate method of measurement of anxiety by many authors. In our study, we have used a standardised scale, Spielberger's State-Trait Anxiety Inventory, which has been used previously to demonstrate the heightened level of pre-operative anxiety. Part I of this questionnaire contains 20 questions phrased in simple English (translated to Arabic) and measures state anxiety.

We found that pre-operative anxiety, as assessed by both objective measures and STAI scores, tends to increase overnight in all patients listed for surgery. In addition, we did not find any correlation between the anxiety levels on the evening prior to surgery and on the morning of surgery, thus ruling out any estimation of immediate pre-operative anxiety from the prior assessment.

We also found that the increase in pulse rate, systolic blood pressure and STAI scores was significantly higher in group 2 patients i.e. those placed late in the operating list, (p <0.05). A number of factors may contribute to the higher anxiety in these latter patients. Soni and Thomas have also found a positive correlation between waiting time and the final linear analogue anxiety score. Fluid deprivation from midnight often results in a fluid fast of more than 10-12 h in patients listed in the later part of the operating list. This is another factor in increasing anxiety in patients posted later in the list.

Serum cortisol level was higher in group 2 patients in the second visit than serum cortisol level of group 1 in the second visit indicating a higher stress and anxiety of these patients.

This agrees with findings of Schedlowski et al who depicted that the serum cortisol level of all patients scheduled for elective surgery increased significantly in the immediate preoperative period.

In conclusion, pre-operative anxiety on the evening prior to surgery is not a good predictor of anxiety in the immediate pre-operative period. Pre-operative anxiety tends to increase in all patients on the morning of surgery as compared to that on the evening prior to surgery. In addition, placing the patient in the later part of the operating list increases the degree of anxiety in the patient awaiting surgery.

To control pre-operative anxiety we suggest that all patients should receive anxiolytic premedication on the night prior to surgery and on the morning of surgery. Patients should be told the approximate time of surgery during the pre-anaesthetic assessment. In case of a possibility of delay in surgery, the patient should be informed about it well in advance, along with the reasons. Patients listed in the later part of the operating list should not be asked to fast for more than 6 h, thus avoiding a dry mouth, thirst and excessive anxiety.

REFERENCES
8. Daniel LW, Paul JD, Peter MB, Steven RF, Ramon WM, Joseph C.


10. SONI JC, THOMAS DA. Comparison of anxiety before induction of anaesthesia in the anaesthetic room or operating theatre. Anaesthesia 1989; 44: 651-5.