



Pediatric Day Surgery: Evaluating Patient And Parental Anxiety.

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Abstract:

Objective: A child's pre-operative anxiety can result in adverse physiological reactions and postoperative maladaptive behavioral changes. We investigated the child and the parent's anxiety in response to day surgery and preoperative preparation, as a potential stressor during the surgical work-up.

Patients and methods : All pediatric patients (3-17 years), having day-surgery procedures (from September 2014 to February 2015) and their parents were enrolled. Patient anxiety was evaluated using the Modified Yale Preoperative Anxiety Scale at preoperative preparation (T0), before surgery (T1), and discharge (T2). Parental anxiety was assessed using the State-Trait Anxiety Inventory scale at T1 and T2.

Results 63: children (33F/30M; 6.98±3.24 years) and their parents were included. Children's anxiety levels at T0 were higher compared with T1 and T2 ($p < 0.001$). Parental anxiety state was higher at T1 in comparison with T2 (< 0.001). The difference between state and trait anxiety levels at T1 and T2 were noted in the mothers ($p < 0.001$) and fathers ($p = 0.01$ and $p = 0.02$). Patient anxiety was not linked to parental anxiety and/or to the type of surgery.

Conclusion Further efforts are needed to relieve children's anxiety during the perioperative period, with attention to preoperative evaluation. An appropriate understanding and management of anxiety is mandatory to ameliorate patient care in today's pediatric surgical practice.

Key words: children, anxiety, pediatric surgery, parents, perioperative, surgical care.

INTRODUCTION

Anxiety is a NATURAL adaptive reaction, that may become quantitatively pathological, emerging in acute situations and manifesting with autonomic nervous system components. Individuals exhibiting anxious behavior are generally nervous, more reactive, and alert to all kinds of stimuli [1-5].

Hospitalisation and surgery in a pediatric setting are undoubtedly one of the most difficult experiences a child and his/her parents have to face. The Anxiety occurring during the perioperative period is a common phenomenon [6,7]. It is a process that starts from the date of planning the operation and progressively intensifies up to the moment of the hospital admission. Preoperative anxiety can result in

adverse physiological and psychological reactions in the pediatric age [8]. Younger children (< 6 years) are primarily afraid of being separated from their parents; older children are anxious about the anaesthetic procedure and surgery, including pain and mutilation [9]. A high level of parental anxiety in the child's preoperative period has also been reported in the literature [10]. The parent's anxiety is easily transferred to child and is considered the most stressful element for the patient [11-13].

Children with high levels of preoperative anxiety are more likely to develop maladaptive postoperative behavioral changes which include general anxiety, nocturnal fears, bed-wetting, feeding problems, apathy, withdrawal, sleep disorders, aggression towards authoritative figures, and



signs of emergence delirium [13-16]. These children also present with more postoperative pain and require more pain control medication [7,8,17]. Very few studies have described patient and parental anxiety throughout the pre- and post-operative period in pediatric surgery.

We investigated the impact of surgery on patient and parental anxiety response in the pediatric day surgery setting. We considered three distinct periods: 1) preoperative evaluation; 2) before surgery; 3) discharge, in order to highlight the oscillations levels of anxiety during the surgical care. The correlation between patient and parental anxiety was also considered. Finally, we investigated the level of anxiety in relation to different types of pediatric surgical interventions.

PATIENTS AND METHODS

Patients

Children (both genders), aged 3 to 17 years, scheduled for day surgical procedures (including general, otolaryngology, orthopedic and minor plastic procedures) and their parents were asked to participate in this study. Participants were recruited between September 01, 2014 and February 01, 2015.

Surgery was performed under general anaesthesia, at our Pediatric Surgery Unit. Exclusion criteria were: previous surgical procedures, chronic illness, mental retardation, congenital malformations, neoplasia, non Italian-speaking families.

At admission, written and oral consent was obtained from all of the children and their parents.

The Institutional Review Board of the Fondazione IRCCS Policlinico S. Matteo, approved the study protocol and the researchers complied with the Helsinki Declaration.

DESIGN AND PROCEDURE

All children scheduled for elective procedures in the Pediatric Surgery Unit were seen by a multidisciplinary team (including surgeon, pediatrician, anesthesiologist, psychologist, nurse) with their families anywhere from a few months to a few days prior to the surgery (preoperative evaluation T0).

All children underwent systematic perioperative physical examination, complete blood cell count, and routine biochemical examination and an electrocardiogram in a comfortable friendly setting. Children and their families received information, from a team of experts, regarding the

surgical process in general as well as specific information on the particular surgical procedure their child was scheduled to have.

Following consent, one parent, usually the mother, was asked by the psychologist to complete a questionnaire that would provide details describing their family structure. The following confidential information was recorded: age; civil status: (1) single, (2) married, or (3) divorced; educational status: (1) primary education, or (2) high school or (3) university.

At T0, the Modified Yale Preoperative Anxiety Scale (M-YPAS) evaluation was also scheduled for the patient.

On the day of the procedure, parental anxiety at admission to the Pediatric Surgery Unit before surgery (T1) and at discharge (T2) was assessed using the State-Trait Anxiety Inventory (STAI-Y) scale. At T1 and T2, the M-YPAS evaluation was repeated in the patient. All measurements were conducted by the same psychologist.

Anxiety scale

Modified Yale Preoperative Anxiety Scale (M-YPAS)

The Modified Yale Preoperative Anxiety Scale (mYPAS) is a validated observational measure of children's preoperative anxiety that is widely used in experimental protocols [18].

The mYPAS is an observational measure of children's preoperative anxiety consisting of 27 items divided into 5 categories: Activity, Vocalizations, Emotional Expressivity, State of Arousal and Use of Parent.

STATE-TRAIT ANXIETY INVENTORY (STAI-Y)

Parental anxiety prior to surgery was assessed using the STAI scale, a 20-question measure of anxiety that has been validated previously and has been extensively used in clinical practice [19, 20]. The STAI scale proposes statements to participants describing feelings and emotions; participants indicate on a scale of 1 (not at all) to 4 (very much so) how the statement applies to them. All questions on the STAI are converted to a scale of 1 to 4, with 1 representing the least anxiety and 4 the highest anxiety. Scores for all questions are summed to give an overall questionnaire score between 20 (least anxiety) and 80 (highest anxiety). A cut-off of 50 points on the STAI is considered as indicative of high anxiety as it represents the 90th percentile of score distribution in normal adults. All analyses used the score in its continuous form, and no categorization of STAI scores was attempted. The STAI has



two forms; the State form asks about situational anxiety, and leads with: "Indicate how you feel right now, that is, at this moment." The Trait anxiety asks about general anxiety and leads with: "Indicate how you generally feel"[19].

Anesthesia protocol

All subjects were in good physical condition. Anesthesia included propofol (2-2.5 mh/g) as a sedative-hypnotic agent and fentanyl (1-1.5 mcg/kg) as the analgesic. After laryngeal mask or tracheal tube positioning, patients underwent volume controlled mechanical ventilation with an inspired mixture of air and oxygen using a closed breathing system (fresh gas flow of 0.75 l min⁻¹ oxygen and 1.5 l min⁻¹ air during anesthesia) adjusted to achieve an end-tidal carbon dioxide concentration of 32–35 mmHg. Anesthesia was maintained via administration of Sevoflurane gas (0.75-1.25 MAC range). Twenty minutes before the end of the intervention, all patients received Paracetamol 15 mg/kg, as an analgesic. At the end of the operation, the patient was transferred from the operating theater to the recovery room and subsequently re-admitted to the Unit.

Statistical analysis

Continuous variables were described as the mean and standard deviation (SD) and categorical variables as counts and percentages. Data were compared between groups with the Student t test or the Mann Whitney U test if continuous and the Fisher exact test if categorical. To test the anxiety levels at different time points, the mean differences were verified with repeated measures of analysis of variance. Probability values less than 0.05 were considered statistically significant. All statistical analyses were performed using the SPSS statistical package (SPSS, Chicago IL, USA) and Stata 8.0

RESULTS

A total of 63 children (33 girls and 30 boys; mean age 6.98±3.24 years) and their parents, were included in our study. Demographical and clinical features of the participants are reported in table 1. No significant differences were found between the variables with respect to patient gender.

Table 1. Demographical and clinical features of the patients and their parents

Variable	Data (n=63)
Age of the child (yrs)	6.98±3.24
Age of the mother (yrs)	38.55±5.34
Age of the father (yrs)	41.76±5.97
Civil status of the parents	
-married	59 (93.65%)
-divorced	3 (4.76%)
-single	1 (1.59%)
Educational status of the parents	
- Primary education	19 (30.16%)
- High school	32 (50.79%)
-University	12 (19.05%)
Type of surgery	
-General surgery	15 (23.81%)
-ORL surgery	29 (46.03%)
-others	19 (30.16%)

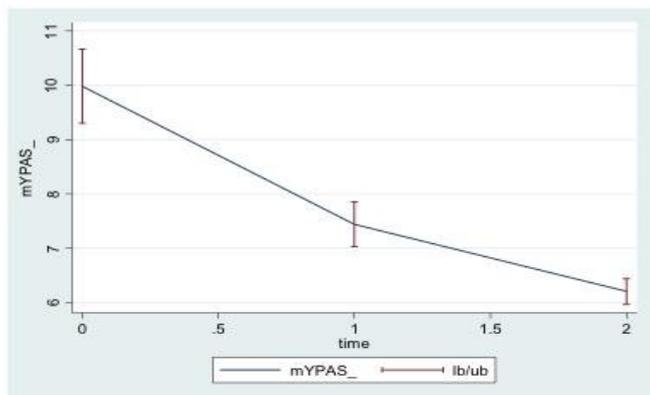
Children’s anxiety levels

Table 2. Anxiety levels (ALs) of the children according to the Modified Yale Preoperative Anxiety Scale (M-YPAS) at different time points (T0=preoperative evaluation; T1 before surgery; T2= at discharge).

Times	All (n=63)	F (n=33)	M (n=30)	p_value F vs M
ALs T0	9.98±5.42	9.94±5.54	10.03±5.38	0.94
ALs T1	7.44±3.27	7.48±3.36	7.4±3.21	0.92
ALs T2	6.21±1.89	6.24±2.19	6.17±1.51	0.87

Figure 1. Graphical representation of the patient Anxiety levels according to the Modified Yale Preoperative Anxiety Scale (M-YPAS) at the different time points

(T0=preoperative evaluation; T1 before surgery; T2= at discharge).



As reported in table 2 and figure 1, at T1 and T2 patient anxiety levels (ALs) decreased compared with T0 ($p<0.001$), without any differences between females and males. No correlation between parental and child anxiety was noted (table 3).

Table 3. Correlation between parental and child anxiety at the different evaluation times points

	Anxiety levels of the children (r)		
	T0	T1	T2
Paternal State Anxiety at T1	0.0545	-0.0542	-0.1257
Paternal Trait Anxiety at T1	-0.1144	-0.1117	0.0959
Paternal State Anxiety at T2	0.2694	0.1625	0.0013
Paternal Trait Anxiety at T2	-0.0869	-0.0721	0.1440
Maternal State Anxiety at T1	0.1125	0.0717	0.0926
Maternal Trait Anxiety at T1	0.0273	-0.0427	-0.0391
Maternal State Anxiety at T2	-0.1749	-0.1731	-0.0736
Maternal Trait Anxiety at T2	0.0530	0.0894	0.2009

The type of surgical intervention had no influence on the anxiety levels at different times (T1 $p=0.8$; T2 $p=0.5$).

Parental anxiety level

The state (SA) and trait anxiety (TA) of the parents at T1 and T2 are reported in table 4.

Table 4. The state anxiety (SA) and trait anxiety (TA) of parents at the different time points (T1=prior to surgery; T2= at discharge).

Variable	Score (n=63)
Paternal SA at T1	51.04±7.45
Paternal TA at T1	45.61±7.91
Paternal SA at T2	42.87±5.74
Paternal TA at T2	45.57±7.64
Maternal SA at T1	53.82±9.02
Maternal TA at T1	45.16±7.36
Maternal SA at T2	41.76±5.97
Maternal TA at T2	44.89±7.91

Data are expressed as mean ±(SD). SA= state anxiety, TA=trait anxiety; T1= pre-operative, T2= at discharge

The parent's anxiety levels were not influenced by the child's gender.

Maternal and paternal state anxiety was higher at T1 in comparison with T2 (mother 53.82±9.02 vs 45.16±0.93, $p<0.001$; father 51.04±7.45 vs 42.87±5.74, $p<0.001$). No significant difference in the trait anxiety levels between two the time points was noted (mother 45.16±7.36 vs 44.89±7.91, $p=0.74$; father 45.61 ±7.91 vs 45.57±7.64, $p=0.89$).

The difference between state and trait anxiety levels at T1 and T2 were significant in the mothers (53.82±9.02 vs 45.16±7.36, $p<0.001$ and 41.08±0.61 vs 44.89±7.91, $p<0.001$, respectively) and fathers (51.04±7.45 vs 45.61±7.91, $p<0.001$ and 42.87±5.74 vs 45.57±7.64, $p=0.02$ respectively).



Parental anxiety levels did not correlate with civil or educational status.

DISCUSSION

The purpose of this study was to investigate the patient's and parent's anxiety response during pre and post-operative periods in a pediatric day surgery setting. Results indicate that higher anxiety scores were recorded at preoperative evaluation; the child's anxiety decreased when assessed before surgery and at discharge. The level of anxiety in children is not linked to parental anxiety and not influenced by the type of surgery.

Severe preoperative fear and anxiety affects 40-60% of young children [9, 17, 21]. The aforementioned reactions are thought to be a reflection of the child's fear of separation from his/her parents and home environment, loss of control, unfamiliar routines, surgical instruments and hospital procedures [7, 9, 16-18, 22].

An appropriate understanding and management of anxiety during surgery have an important impact on the surgical outcome. High preoperative anxiety levels can lead to adverse psychological and physiologic outcomes [6, 16]. Up to 60% of all children undergoing outpatient surgery may present with negative postoperative behavioral changes at 2 weeks post surgery [6, 22].

Increased preoperative anxiety in children has been shown to correlate with increased postoperative pain, analgesic requirements [23] and long-lasting psychological effects on the child's response to subsequent medical care and interference with normal development [17]. Our study confirms the data of Fortier [24-26], that all preoperative evaluations are determinant to influence anxiety in children undergoing surgery, also day surgery. In addition to the surgical procedure, systematic preoperative interventions, such as the venipuncture procedure, can be extremely stressful for children, particularly in those with no previous hospitalization experience. Fear of pain, fear of not being in command of their own emotions and behaviours [20, 27-30] and fear of an unfamiliar environment can all occur during the preoperative period. Even if some children are able to tolerate the procedure, most children frequently display high levels of pain, anxiety and fear [31]. Preparation of the child regarding painful procedures in accordance with their cognitive development should be considered to reduce anxiety and pain [32].

Numerous reports suggest that preoperative preparation programs and perioperative information reduce anxiety levels and help the child cope with new and difficult situations [1, 33, 34-35]. The presentation of suitable

information by competent individuals to both the child and the parents has long been considered essential for pediatric surgery preparation [12]. It is important to realize that psychological preparation programs must be individualized and targeted to the needs of each child. That is, a preparation program that is appropriate for a 3-year-old is not appropriate for a 12-year-old. The timing of the preparation in relation to the day of surgery is also a significant factor. For example, children 6 years old and older benefit most if they participate in the program more than five to seven days before surgery and benefit the least if the program is started one day before surgery [6, 14, 36, 37]. This longer interval between the preparation and surgery is needed for older children to allow them adequate time to process the new information [6, 14, 36].

It should be noted that the preparation programs in question might be expensive, if additional equipment, facilities, child life specialists or play specialists need to be involved. The future will be characterized by the development and implementation of computerized multimedia presentations and interactive technology. This multimodal capability would also provide specific interventions for individuals with a wide range of medical problems and coping styles [16, 22].

Many authors have indicated anxiety as the main cause of post-operative pain that does not respond to common analgesics. Postoperative anxiety levels in our study were lower compared to anxiety during preoperative evaluations; in our children, analgesia post-surgery probably protected patients from postoperative state-anxiety.

Parental anxiety has been identified as a significant risk factor for increased preoperative anxiety in children [6, 10-12, 13, 37-39]. Mothers are more prone to experience anxiety before their child's surgery than fathers are [10] and divorced parents and parents with lower educational levels rate themselves as significantly more anxious preoperatively [6, 7, 16]. The parental state (or contextual) anxiety, trait (or baseline) anxiety, and monitoring and coping styles have all been linked to heightened children's anxiety [6, 14, 16]. However in our study, the child's anxiety was not correlated to parental anxiety, independently of the civil and educational status of the parents. These data may have been influenced by the timing of the parental anxiety state assessment before surgery only. Further research on the relation between parental and child pre and perioperative anxiety is warranted.

The effect of the type of surgery on pre- and post-operative anxiety remains unresolved [40]. Our Pediatric Surgery Unit includes a multidisciplinary surgical team and we demonstrated that the children's anxiety was not influenced by



the type of surgical intervention. All of the patients in this study were undergoing day surgery procedures and this might explain the lack of differences. In the literature, anxiety levels in relation to different types of surgery have been described when day surgery, minor surgery and major surgery were considered, children undergoing one-day surgical procedures demonstrated markedly lower levels of anxiety compared to those staying over night in the hospital. In contrast, difference according to operation type at the same level of the hospitalization is not reported in pediatric surgery.

The women were usually more anxious than men. This may be explained by the fact that females are more sensitive and have more tendencies toward generalized anxiety and indeed focused more on the emotional aspects when dealing with pain [41]. In our cohort of pediatric patients no difference in anxiety between male and female anxiety was noted during distinct surgical phases. This result supports the data presented by Chieng, that in children and adolescents undergoing elective surgery, differences in children's preoperative and postoperative anxiety between gender subgroups are inconclusive [42]; only one study showed that girls had significantly higher levels of pre-operative state anxiety than boys [41].

This report should be viewed in light of its limitations. The children in our sample only underwent routine surgeries. Our sample size is limited; a larger number of children are mandatory to confirm these results and to analyze anxiety levels at different ages. Additional information on parental anxiety at different time points, including the perioperative period, is necessary to confirm the lack of a correlation between the child and the parent's anxiety. Finally, the long-lasting psychological effects affecting children's responses to subsequent surgery and interference with normal development were not considered. Despite these limitations, this study may be useful to ameliorate care during pediatric day surgery.

CONCLUSIONS

Continued efforts are needed to decrease children's anxiety during the perioperative period, with attention to systematic preoperative interventions. In today's pediatric surgical practice, an appropriate understanding and management of anxiety is mandatory to ameliorate surgical care.

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