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Premedication in children: what if it fails?

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Introduction

At least 60% to 70% of paediatric patients experience anxiety before surgery [1,2]. Preoperative anxiety in children is associated with adverse clinical (emergence delirium and increased analgesic requirements) and behavioural outcomes (sleep disturbances and enuresis) [2]. In addition, some children remain anxious for up to 14 days after surgery. Maladaptive behavioural changes, such as general anxiety, night crying, apathy, and temper tantrums, may last even longer [2]. Severe preoperative anxiety activates the stress response, resulting in significantly elevated cortisol levels and susceptibility to postoperative infections [3]. The aim of this short communication is to present crisis intervention techniques used by fire service crisis interventionists when working with children at the scene of tragic events. These techniques can also be effective in the operating theatre to calm the paediatric patient and gain cooperation for induction of general anaesthesia. However, the effectiveness of these interventions in anaesthesia has not yet been evaluated in clinical trials, and the information presented here is based solely on the authors' personal experience.

Preventive measures against preoperative anxiety in children

There are three main preoperative modalities to reduce anxiety in children: 1) behavioural preparation such as preoperative visits to the operating theatre, games, and various distraction techniques; 2) parental presence during induction of anaesthesia (PPIA); 3) anxiolytic premedication [2].

Non-pharmacological techniques should be preferred for all paediatric patients, consisting of preoperative education, games, and distraction techniques. Web-based preparatory programmes can be used to educate children and their parents about all perioperative procedures, such as the Anaesthesia Web (available at www.anaesthesiaweb.org) which provides clear and age-appropriate information. Another option is a preoperative visit to the operating theatre, either in real or virtual reality. However, the use of these techniques is not feasible in many institutions, and they also fail in very anxious children, especially those under 4 years of age and those with certain temperamental characteristics [4].

Although most parents prefer PPIA to reduce their child's preoperative anxiety, current evidence suggests that the effectiveness of this procedure is questionable. In addition, PPIA always causes some degree of disruption to the operating theatre routine, increases pressure on anaesthetists, and usually requires additional staff to supervise parents. On the other hand, PPIA increases parents' satisfaction with the perioperative process and respects their rights as well as those of their children [2].

Despite some shortcomings, pharmacological premedication remains the most effective method of preventing preoperative anxiety in children. Inappropriate dose, route, or time of administration are the most common reasons for failure of pharmacological premedication [2]. Midazolam, the most commonly used agent for sedative premedication in children, fails to achieve adequate quality of sedation in up to 20% of cases. Another option for premedication is the administration of the selective α2-adrenergic receptor agonists dexmedetomidine or clonidine which have sedative and anxiolytic effects comparable to midazolam. Some authors prefer the use of ketamine [2]. An algorithm for managing preoperative anxiety in children is shown in Fig. 1. If premedication fails in a child with vascular access, the desired level of sedation and anxiolysis can be achieved pharmacologically (intranasal or intramuscular administration is also possible), or induction of general anaesthesia can be started immediately.

Pathophysiology of stress response in the brain

Severe stress in the child leads to an activation of the archicortex, which is located mainly in the hippocampus and is functionally involved in the limbic system. In the most severe cases, the child experiences tonic immobility (TI), also known in the literature as the freezing response, in which the paleocortex is particularly active [6]. TI is induced in the event of imminent threat and is characterised by a reversible, profound state

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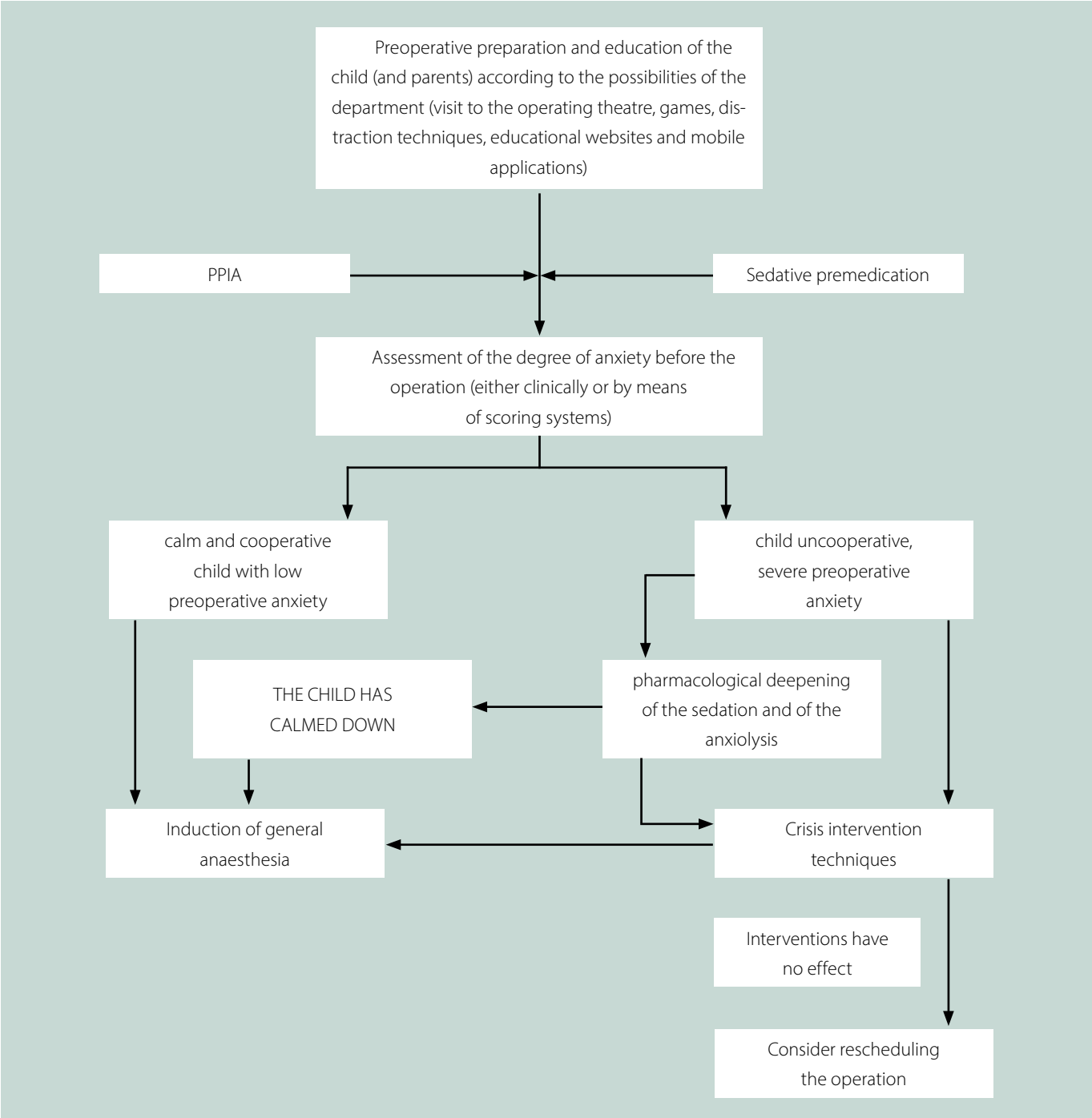
Fig. 1. *Algorithm for management of preoperative anxiety in children*



of physical inactivity and unresponsiveness to external stimuli. From an evolutionary perspective, TI is an adaptive response that increases the chance of survival. In humans, TI usually occurs as a result of intense life-threatening events. It is often described in rape victims as "rape paralysis" [7]. It can also occur in children in the operating theatre under conditions of overwhelming stress. From the perspective of crisis intervention, it is important to note that children in the state of tonic immobility have a significant reduction in neocortex activity, hindering their possible cooperation.

Preoperative crisis intervention

Our intervention aims to reconnect the neocortex, which, in children aged 2–3 years, consists of establishing communication by describing what is happening to them in the operating theatre. The anaesthetist describes the different parts of the child's body, giving a precise description of what they are doing: "Your little eyes are crying, telling me you don't want to be here. Your little legs want to run away, they are clever, and they want to run away to a better place. I think they want to play or kick a ball…" It is very important to work with the intonation of the voice to engage the child.

Establishing cooperation with older children is usually easy. It is useful to play various games before the induction to general anaesthesia. We try to engage preschoolers with a game of Indians where they imitate the Indian shout loudly while tapping their chest. Asking the child to roar like a tiger makes it easier to insert a venous catheter with the possibility of further pharmacological sedation or induction of anaesthesia.

For children between the ages of 6 and 12, more complex games need to be prepared. At our department, we have had a good experience with evoking the idea of a child's stay at the seaside. This game combines elements of imagination with a breathing exercise, asking the child whether they feel cool or warm air when they breathe in. Fun games such as: "make the worst face" or "show me what your dog would look like right now" can also help to calm the patient.

A very effective method of reducing preoperative anxiety in children over the age of 12 is the Butterfly Hug Technique. This method was originally developed as a therapeutic intervention for survivors of Hurricane Pauline in Mexico. Currently, the butterfly hug is part of the Eye Movement Desensitisation and Reprocessing Integrative Group Treatment Protocol, which is primarily used in the treatment of post-traumatic stress disorder. This grounding technique is also used to calm down and process unpleasant experiences, including a stay in the operating theatre. The butterfly hug technique begins with the anaesthetist asking the child to cross their arms over their chest so that the tips of their middle fingers are on their collarbones. The child then crosses their thumbs to form the body of a butterfly, while the remaining fingers form the wings of a butterfly. The technique continues with alternating hand movements that mimic the flapping of butterfly wings. To enhance the effect of the technique, deep breathing or positive affirmations can be added [8].

In adolescent patients, listening to favourite music before induction of general anaesthesia can be used to reduce preoperative anxiety. Patients' musical preferences are recorded during the pre-anaesthesia assessment, and their favourite music is played when they arrive in the operating theatre. However, this is not merely a distraction technique as several studies have shown that adolescents use music as an important means of modulating their mood and coping with negative emotions [9].

The basic rule of communication with a paediatric patient is to provide truthful information to the extent appropriate to the child's stage of neurobehavioural development. Children between 3 and 6 years of age are particularly fearful of physical harm. Explaining basic surgical and anaesthetic procedures to them can greatly help to reduce preoperative anxiety. Children aged 7–12 years need much more information and their participation in the operating theatre increases their sense of control, thus reducing anxiety. Children can choose or hold a face mask during inhalation anaesthesia. For adolescents, in addition to their involvement in the operating theatre, their sense of shame and need for privacy must be respected [5].

In a restless child who develops severe preoperative anxiety despite preventive measures, immobilisation on the operating table is the usual intervention. Although the primary aim of restricting movement is to ensure the patient's safety, this method usually results in further aggravation of the child's anxiety. This is because immobilisation interferes with the natural response to danger, as described above, making it impossible for the child to fight or flee. If immobilisation is necessary, it can be used to play with the child, partially distracting them. Ask the child to shake like their dog at the vet or cross the fingers as hard as possible and count to five.

Postoperative anxiety

In clinical practice, very little attention is paid to the prevention of postoperative anxiety, which can also negatively influence patient outcomes. After emergence from anaesthesia, the child may feel dizzy and have blurred vision or chills. Children may not have experienced these symptoms before and may interpret them as a feeling of dying or of being already dead. From an early age, children are introduced to death, often unconsciously through fairy tales and stories. Although, according to Piaget's theory, they are not yet fully aware of its universality and finality, the idea of death can trigger intense postoperative anxiety [10]. An effective method of prevention is to make children aware of these symptoms before the operation, explain them, and reassure them that they will dissipate promptly.

Points to remember

1. Preoperative anxiety is common in children and is associated with adverse clinical outcomes.
2. Crisis intervention aims to reconnect the neocortex.
3. The butterfly hug technique can be an effective intervention to reduce preoperative anxiety in children older than 12 years.
4. Prevention of postoperative anxiety in children is often neglected.

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