

Improvement in the duration of pre-operative fasting in children.

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Abstract

Introduction: Source of discomfort and dissatisfaction, the rules of pre-operative fasting have evolved a lot in recent years.

Objective: To evaluate the duration of preoperative fasting in children and the degree of parental support for this strategy.

Materials and Methods: Prospective mono-centric study on the implementation of a preoperative fasting strategy in children. Pediatric surgery department of the Teaching University Hospital (TUH) of Sidi-Bel-Abbès over a period of three years from July 2015 to June 2018. Included were all children from 6 months-15 years, who are asked the indication of anesthesia for minor surgery. We gathered the respect and understanding of the parents of preoperative fasting.

Results: One thousand three children were included in the study, the mean age was: 62.01 ± 44.14 months, the sex ratio was 3.6/1 with male predominance. The majority of children were under six years old. The socio-cultural level of parents was medium to high in 88.4% of cases. The mean duration of preoperative fasting was 6.9 ± 4.16 hours and ranged from 2 hours to more than 11 hours. Almost 70% of children had a six-hour fast during the second year.

Discussion: In our work, the vast majority of parents respected the pre-op fasting of their children. The improvement in the duration of preoperative fasting was done through a follow-up protocol by the entire pediatric surgery team. The application of the rules of fasting by parents must be strict and simple.

Keywords: Preoperative fasting, Children, Liquids, Food, Preoperative information, Parents' understanding

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Introduction

The purpose of pre-operative fasting is to overcome the risk of pulmonary inhalation leading to a chemical pneumopathy according to Cote et al. [1], while avoiding a too prolonged period of fasting exposing to the risk of hypoglycemia and/or dehydration mainly in the small infant. As a source of discomfort and dissatisfaction, the rules of preoperative fasting have evolved considerably in recent years since the recommendations of the American Society of Anesthesiologists (ASA) of 1999, calling into question the dogma of strict fasting since midnight established arbitrary way dating from the end of the Second World War [2].

This liberation from the rules of preoperative fasting is integrated into the postoperative rehabilitation approach of patients, particularly in the context of outpatient management. The purpose of this work is to assess the duration of preoperative fasting in children and to determine if it is consistent with international recommendations.

Materials and Methods

We conducted a prospective monocentric study on the implementation of a preoperative fasting strategy in children. The study was conducted at the level of the pediatric surgery department of TUH Sidi-Bel-Abbès over a three-year period

from July 2015 to June 2018. Included were all children between 6 months and 15 years of age with an indication for minor surgical anesthesia. Parental approval was obtained prior to the day of admission to the hospital after explanation of the purpose and nature of the act to the parent/guardian accompanying the patient. Informed, consent was obtained.

Children were classified ASA I, II and III stabilized. Ex-premature babies, children with heart, neurological, endocrine or metabolic diseases have been excluded. Recruitment was done during specialized surgical consultation and anesthesia, by selection according to medical and socio-environmental criteria according to the recommendations of the French Society of Anesthesia Resuscitation (SFAR) 2009 [3] and the association of French-Speaking Pediatric Intensive Care Anesthetists (ADARPEF) and the National Council of Child Surgery (CNCE) 2008 [4].

Pre-operative fasting instruction was given to the parents/guardians of the patients during the anesthesia consultation as a fact sheet. In order to optimize information with the parents of our patients, we had introduced an information leaflet (written information) (Annexure 1), the content of which was inspired by that of the SFAR, and a second leaflet (Annexure 2) translated in Arabic to simplify parents understanding. Infants were allowed breast milk for up to 4 hours and clear fluids up to 2 hours of

type of sweet herbal tea before induction of anesthesia. All patients were admitted on the day of the surgery where they had outpatient surgery. On the day of the procedure, if the wait time for admission to the operating room is prolonged because of an unforeseen event or a deprogramming, a sweet tea was given to the child 2 hours before anesthetic induction.

Information on the time and nature of the patient’s last meal and last drink was collected. The ages, sex, of the child were recorded. We gathered the respect and understanding of the parents of preoperative fasting. We compared our data during the two years of study.

All data were recorded in the SPSS 20 software for simple analysis (median, range, interquartile range) to give numerical data e.g. fasting duration. Microsoft Excel was also used for the analysis of the results. In addition, the student's test was used, $P < 0.005$ was considered statistically significant.

Results

One thousand three children were included in the study, the mean age was: 62.01 ± 44.14 months, the sex ratio was 3.6/1 with male predominance. The majority of children were under the age of six, 92.3% were ASA I (American Society of Anesthesiologists I), and ASA II children had diabetes and bronchial asthma. The socio-cultural level of parents was medium to high in 88.4% of cases (Table 1). The majority of children had loco regional anesthesia combined with general anesthesia. The duration of the intervention did not exceed 2.5 hours (Table 1).

The mean duration of preoperative fasting was 6.9 ± 4.16 hours and ranged from 2 hours to more than 11 hours. More than 99% of patient’s parents have respected the preoperative

fasting of their children. More than 20% of children had a fasting duration of 2 hours. More than 30% of patients in the second year of study had a preoperative fasting duration of 2 hours. More than 50% of the patients had a preoperative fasting duration of six hours. Almost 70% of children had a six-hour fast during the second year of study with only 36.8% of children in the first year of study. Preoperative fasting time exceeded 11 hours in almost 24% of patients, including more than 41% during the first year of study, while the rate did not exceed 3% during the second year of study (Table 2). We did not observe cases of fast-acidosis and of bronchial inhalation even for short 2-hour preoperative periods for clear fluids.

Information about preoperative fasting was clear to more than 40% of patient’s parents. Less than 10% of patient’s parents found information unclear, and half of parents found it moderately clear ($P < 0.001$), 65.6% of high socio-cultural patient parents found it very clear information. More than 90% of low-level parents found the clarity of information to be poor (Table 3).

The impact of the socio-cultural level on the understanding of information: 26.7% of parents who understood the information were of a high sociocultural level. The majority of parents 47.3% of patients who understood the information moderately were of average level (Table 4). The impact of the geographic origin of parents understanding of information: 84.3% of parents of patients and their parents having understood the information lived in an urban area. 44.8% of parents who did not understand the information lived in rural areas (Table 4).

Only 54/794 patients experienced Post-operative Nausea (PONV) and 15/794 experienced postoperative pain.

Discussion

Previously, the subject of duration of preoperative fasting was controversial, compared to clear fluids, milk and solids. For

Table 1: Socio-demographic Characteristics of Patients.

Age n (%)	
(months)	moyen age : 62.01 ± 44.14 (6-180)
(years)	moyen age : 5.16 ± 3.67 (0.5-15)
Slice of age	
6 months à 6 year	837 (72)
More than 6 years	325 (28)
Sex n (%)	
Sex ratio	3.6/1
Male	912 (78.5)
Female	250 (21.5)
Class ASA (%)	
ASA I	92.3
ASA II	7.2
ASA III	0.4
Sociocultural level n (%)	
High	344 (29.6)
Middle	683 (58.8)
Low	135 (11.6)
Anesthesia type n (%)	
GA	88 (90.7)
LRA+GA	9 (9.3)
Duration of surgical intervention (minutes)	
Middle	54.53
Maximum	150

GA: General Anesthesia, LRA: Loco-regional Anesthesia.

Table 2: Characteristics of Pre-operative Fasting.

Respect of duration fasting			
Yes	996 (99.3)		
No	7 (0.7)		
Moyen fasting duration (h)			
	6.9 ± 4.16		
	First year	Second year	Total
2 h	67 (12)	145 (32.6)	212 (21.1)
3 h-4 h	78 (14)	69 (15.5)	147 (14.6)
5 h-6 h	60 (10.8)	90 (20.2)	150 (15)
7 h-8 h	76 (13.6)	117 (26.3)	193 (19.2)
9 h-10 h	47 (8.4)	14 (3.2)	61 (6.1)
11 h-12 h	110 (19.7)	10 (2.2)	120 (12)
13 h-14 h	71 (12.7)	0 (0)	71 (7.1)
More than 15 h	49 (8.8)	0 (0)	49 (4.9)
Total	558	445	1003

$p < 0.001$

Table 3: The Quality of Information Given to Parents.

	Effective	Percentage
Good	393	40.4
Middle	505	51.9
Bad	75	7.7
Total	973	100

Table 4: Impact of Geographic Origin and Socio-Economic Level on Information.

	Good	Middle	Bad	Total
Geographic origin				
Urban	294 (84.3)	316 (59.8)	35 (36.4)	645
semi urban	24 (6.9)	89 (16.9)	17 (17.7)	130
Rural	30 (8.6)	123 (23.3)	43 (44.8)	196
Sparse	1 (0.2)	0	1 (1.1)	2
Socio-economic level				
Good	260 (26.7)	26 (2.7)	1 (0.1)	287
Middle	81 (8.3)	460 (47.3)	5 (0.5)	546
Bad	8 (0.8)	42 (4.3)	90 (9.3)	140
Total	349	528	96	973

$p < 0.001$

decades, patients have been (and still are) deprived of eating and even drinking water before elective surgery, always accepting the beliefs of early practitioners. In this respect, the comfort and safety of the patient have been improved only with the questioning of Malt by and others of the fasting rule of "NPO": nil per os [5,6].

Their research led to the development of evidence-based recommendations that now allow patients to undergo a planned operation after a minimum of two hours of fasting (with ingestion of clear fluids) [7].

Already in the 1980, the Norwegian national recommendations on the duration of preoperative fasting for elective surgery were: 2 hours before anesthetic induction for clear liquids, 6 hours for solids and 4 hours for milk, 2 hours for chewing gum, and 75 mL of premedicated water is allowed in children [8].

For all these reasons, it is necessary to soften the duration of the fast which will allow a comfort for the child. The rules of pre-operative fasting are [9]:

- Solid foods and formula milk indicated within 6 hours of anesthesia.
- Breastfeeding allowed until 4 hours before induction (end of feeding).
- Taking clear liquids is allowed 2 hours before induction: sugar water, fruit juice without pulp.

Also, always to ensure comfort for the child, a fluid intake is desirable; the volume ingested must not exceed 10 mL/kg.

In our work, the vast majority of parents respected the pre-operative fasting of their children. The duration of the preoperative fast was calculated as the time between the last meal or bottle and the time of the anesthetic induction with an average duration of 7 hours with a minimum duration of 2 hours and a maximum of 15 hours.

The duration of preoperative fasting exceeding 11 hours was reported in more than 24% of patients; however this attitude completely disappeared during the second year of study. Half of the patients had a preoperative fasting duration of 6 hours. More than 20% of our patients had a preoperative fasting duration of two hours, this rate increased during the second year of study.

The improvement in the duration of pre-operative fasting was done through a follow-up protocol by the entire pediatric surgery team. Taking clear liquids such as sweet herbal tea and water (clear liquids) was allowed 2 hours before admission to the operating theater, depending on the order of passage in the operating room to fight against the durations preoperative fasting too long.

The age of the child was taken into account in the notion of pre-operative fasting, 70% of patients under the age of two had a preoperative fasting duration not exceeding six hours, compared with half in children older than two years, with more than 25% of them had a preoperative fasting duration of two hours.

A small percentage (0.7%) of our patients' parents did not observe the preoperative fasting of their child. Similar results were observed in an Australian retrospective study conducted between June 2004 and June 2005; Haana et al. [10] collected 16.559 cases, of which 42 (0.25%) patients failed to observe preoperative fasting.

On the other hand, our results are different from those described in the literature. In the United Kingdom, Cantellow et al. [11] conducted a three-month study in 2010 to assess parent's level of understanding and adherence to pre-operative fasting instructions for their children.

Of the 120 questionnaires sent to parents, 96% responded. 72% report having received pre-operative fasting instructions by letter. 13.5% of the children were not fasting on the day of the intervention because of the misunderstanding of the parent's interest in preoperative fasting [12].

In the United States, Tait et al. [13], observed 3.5% of cases of non-compliance with pre-operative fasting in a population of 200 children.

In Jordan, at the university hospital recourse center, on an exclusively adult series, Mesmar et al. [14], found in a prospective study based on patient records, 2.6% of patients did not reach fasting.

The duration of preoperative fasting

In our work, the mean duration of preoperative fasting was 6.9 ± 4.16 hours. This result is not similar to that found in the Adenekan study [15] which was 13.3 ± 3.5 hours.

Long duration of pre-operative fasting

The duration of preoperative fasting in excess of 11 hours was greatest for children over 10 years of age (25.6%) versus 33 (11.2%) of infants under two years of age. The preoperative fasting duration exceeding 11 hours was 41.2% during the first year of study versus 2.2% during the second year of study (Table 2).

Our results are different from those of the Adenekan AT study [15] where preoperative fasting duration was higher. In 65% of the cases the duration of preoperative fasting was 12 to 16 hours versus 12% in our study. In front of the discomfort that the children lived when the duration of the fast was too long up to 16 hours: type of thirst, hunger, weakness, nausea, anxiety, irritability, pain, and discomfort according to Hausel [16]. For fear of bronchial inhalation of gastric contents, practitioners have remained on their old habit of prolonging the duration of preoperative fasting that causes discomfort. For many years, a fasting night was recommended for any patient undergoing elective surgery "nothing by mouth from midnight" [7].

Faced with this practice, we find ourselves in front of hungry, irritable children. Preoperative fasting has always been advocated to reduce gastric volume and acidity, yet what practitioners had believed until a few years ago, Malthy [5] and others had questioned it.

At Riley Hospital in Indianapolis for children, Emhart et al. [1] divided the duration of preoperative fasting according to the nature of the food: clear liquids 2 hours, solids up to 8 hours.

Short duration of preoperative fasting

The myth of preoperative fasting of planned patients has been debunked by clinical trials and extensive systematic reviews of the literature.

Our results and our attitude towards pre-operative fasting for the ingestion of clear liquid (sweet herbal tea type) 2 hours before the anesthetic induction are in agreement with the literature. The percentage of patients who remained fasting for two hours increased from 12% in the first year of study to 32.6% in the second year of study. We complied with international literature and recommendations for the two hours of preoperative fasting and it was respected. This improvement in the management of preoperative fasting duration is due to a number of rules that were introduced and accepted by the entire team:

1. Allow bottle-feeding or nursing for infants less than two years old, 6 hours before the time they are in the operating room, plus one dose of sweetened tea two hours before anesthetic induction.
2. Allow older children to have breakfast at 6 am or 7 am if scheduled early in the afternoon.
3. No longer tolerate prolonged fasting times unless the patient is tall and his or her passage through the operating room is early morning.

In one study, Splinter [17] measured pH and gastric volume by placing a gastric tube, in two groups of children, the first *Anaesthesiol Clin Sci Res 2018 Volume 2 Issue 2*

group took a clear fluid 2 hours before anesthesia and the second group took a clear liquid 3 hours before. His results show that apart from risk factors such as gastrointestinal pathology, children can take a clear liquid 2 hours before anesthetic induction safely.

In 1990, in an exclusively pediatric study, Crawford [18] confirmed the results found in adults, on the effect of preoperative fasting time on the variations of pH and gastric volume on the child. Crawford, showed in his study that healthy children can receive 2 mL/kg of water 2 hours just before anesthetic induction without lowering the pH of the gastric fluid or increasing its volume, beyond the values obtained after a fasting 6 hours.

Meta-analyzes of adult series [19,20] concluded that fasting was shorter than two hours prior to anesthetic induction (in terms of gastric volume and pH, and by extension occurrence of inhalation).

A Turkish study of Yurtuc [21], 80 children, aged 1 to 10 years to be operated for inguinoscrotal hernia, groups taking a normal diet, other groups take a high calorie diet, he has measured the blood sugar, the pro albumin and cortisol.

His results show that there is no benefit or benefit in extending preoperative fasting for more than two hours, and he has shown that the stress of surgery is best tolerated when children are fed 2 hours before the procedure.

A Finnish study by Klemetti [22] in 2 years (2006-2008) on 134 children aged 4 to 10 years requiring ambulatory tonsillectomy. It showed that preoperative fasting reduces postoperative pain but has no effect on the occurrence of PONV after ambulatory tonsillectomy.

Parent's understanding of preoperative fasting

For fear that parents confuse between strict fasting "nothing goes through the mouth" and clearance of clear liquids 2 hours before anesthetic induction, we preferred to give clear fluids 2 hours or 3 hours before anesthetic induction at the level of service and in the presence of a doctor or nurse.

This confusion and non-understanding of preoperative fasting instructions were noted by Cantellow [23] at the Bristol Children's Hospital in the UK. Children were aged 1 to 15 years, 120 parents consented to this study, for a period of three months in 2010. The results show that the majority of parents do not understand the reasons for fasting preoperatively and the duration of fasting which is often prolonged by fear. Unfortunately, this lack of understanding of preoperative fasting is noted even at the level of health professionals.

A Mexican study, conducted among anesthesiologists through a questionnaire in 2000, (31.4%) responded. The results show 23% of respondents considers that fruit juice is a clear liquid, milk is allowed 1 hour before the procedure. In view of this poor definition of the notion of preoperative fasting by anesthetists, it has been preferable to leave children fasting for long periods of time [24].

For ambulatory anesthesia, to avoid all the risks that

parenteral fluids can cause [25], the solution is simple. Tolerate clear liquids 2 hours before anesthetic induction even in case of deprogramming. In the future, with the information optimization and parenting education, we will allow clear fluid intake at home prior to arrival at the facility.

In our work, post-operative nausea and postoperative pain were reduced, which is comparable to the Finnish study conducted by Klemetti [22] in 2 years (2006-2008) on 134 children aged 4 to 10 years requiring tonsillectomy outpatient. It showed that preoperative fasting reduces postoperative pain but has no effect on the occurrence of PONV after ambulatory tonsillectomy.

Information system

Factors influencing the quality and understanding of information

All of the parents in our study population received the information before the day of the intervention, which is different from the Tait study [26] where only 54.8% received it.

- Socio-cultural level:

In our study, the information was of average quality or good quality in the majority of cases. The factors associated with a misunderstanding of information are the low sociocultural level which is comparable to the Galéano study [27]. We note a strong correlation between socio-cultural level and information, both in terms of quality, where the majority of parents of high sociocultural class found the information good, unlike low socio-cultural parents. There seems to be a link between the understanding of information and the socio-cultural level. This is similar to the American study of Tait [26], where parents of a high socio-cultural level understand better and remember better the information given especially if this information is obtained the day of the intervention by a professional anesthesia. In the French study [27], Galéano notes the existence of a relationship between the socio-professional level, the understanding of information and parental anxiety.

- Geographic origin and understanding of information:

In our experience, 44.8% of parents living in rural areas had a problem understanding the information (Table 4). On the other hand, 84.3% of urban parents understood the information correctly.

Some authors [28] recommend adapting the way in which preoperative information is delivered on the basis of ethnicity, mother language and socio-cultural level. Thus Noll [29] has shown the need to improve the training of medical personnel including pediatric surgeons in communication with parents. The role of nurses can be important in optimizing information.

Optimization of the information system

It has been reported that the majority of adults forget most of the verbal information given because of education level, and anxiety [30]. The child and his parents are the major player in his care. Also, clear, early and repeated information, at each stage of its care, is essential.

Information on preoperative fasting is a right for the patient and a duty for the doctor, Article 43 of the Algerian Code of Ethics stipulate that the doctor must endeavor to enlighten his patient by intelligible and fair information on the patient's reasons for any medical procedure [31].

It has a medico-psychological aspect because it is essential to obtain free and informed consent from parents to anesthesia and surgery. Psychological, because the quality and nature of the information can influence the level of preoperative anxiety of the parents and therefore of the child. Parent's understanding of fasting is low, which justifies the systematic control of the reality of preoperative fasting [32].

Conclusion

The rationale of preoperative fasting is to reduce the risk of vomiting and bronchial inhalation of contents gastric at the time of anesthetic induction. The application of the rules of fasting by the parents must be strict and simple; they must be informed during the pre-anesthetic consultation in an oral way and handed over a written document on the recommendations of the pre-operative fast. Using a methodology on optimizing preoperative youngster rules, the number of children who stayed at younger than 6 hours decreased.

This study carries the advantages of a large sample size comparable to literature and a prospective validation. To our knowledge, this is the first prospective study studying the preoperative fasting in children in Algeria. There were some limitations to the present study. Our study is monocentric, performed by a single anesthesiologist.

For future research, we want to carry out a multicentric study extended to all pediatric surgery departments of Algeria, on the understanding of parents the reasons for the preoperative fasting and generalize our methodology to all Algerian institutions.

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