

## POSTOPERATIVE PAIN IN CHILDREN AGED FROM 3 TO 5 YEARS FOLLOWING FULL MOUTH DENTAL REHABILITATION UNDER GENERAL ANESTHESIA A CROSS SECTIONAL STUDY

Marwa Mostafa El-Garsh<sup>\*</sup>, Soad Abdelmoniem<sup>\*\*</sup> and Nada Wassef<sup>\*\*</sup>

### ABSTRACT

**The aim of the study:** To monitor the postoperative complications in Children aged from three to five years following full mouth dental rehabilitation under general anesthesia.

**Subjects and Methods:** This study included children attended the general anesthesia operating room at the Unit of Pediatric Dentistry and those with Special Needs, Faculty of Dentistry, Cairo University. Their total number was (67) with age range from three to five years old. Data were collected postoperatively by contacting caregivers by phone at four postoperative times: first, third, seventh, and thirtieth days by using Post-Operative Complaints Questionnaire.

**Results:** The most common complaints reported were: inability to eat normally (100%), sleepiness (55.2%), cough (34.3%) and fever (21.1%), followed by drowsiness (20.9%), psychological changes (17.9%). The least reported complaints at day one were nausea (13.4%). These complaints showed a statistically significant decrease at the third, seventh and 30th day. Sleepiness and psychological changes were absent at 30th day. Drowsiness and nausea disappeared starting from the seventh day.

**Conclusion:** Post-operative morbidity was common. The severity is high in the first day and then showed a gradual decrease at the third, seventh day till the thirtieth day.

**KEYWORDS:** Keywords: Children, dental rehabilitation, general anesthesia, postoperative complaints

\* Msc, Department of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Cairo University.

\*\* Associate Professor, Department of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Cairo University

## INTRODUCTION

Children with special health care needs, extremely anxious or uncooperative children and children having disabilities, or medical conditions require general anesthesia (GA) to perform dental procedures safely. <sup>(2)</sup> It provides safe, efficient, and effective dental care, eliminates anxiety, reduces movement and reaction to dental treatment, helps in the treatment of the mentally, physically, or medically compromised patient and eliminates the patient's pain response. <sup>(12)</sup>

Despite the fact that GA is an accepted behavior management technique, it has some morbidity risks. The severity and frequency of general health complaints after general anesthesia can be assessed using post-operative complaints questionnaire. It is a pre-formulated questionnaire that is used 24 hours after GA. Data is collected through telephone calls to the patient's parents or guardian. <sup>(1-6-11)</sup>

Various pain measurement scales are used to help assess pain intensity, and monitor the response to treatment decisions. <sup>(13)</sup> In case of young children, parents are an important source of information for pain assessment, based on specific behaviors that children exhibit. <sup>(10)</sup>

Therefore, the aim of this study was to monitor the post-operative pain and medical condition in children aged from three to five years following full mouth dental rehabilitation under general anesthesia by using the post-operative complaints questionnaire.

## SUBJECTS AND METHODS

This cross sectional study, was initiated after obtaining Ethical Committee approval from Research Ethics Committee (REC), Faculty of Dentistry, Cairo University. The ethical approval number was 1-3-19. Sample size was calculated based on the results of a study conducted by *Costa*

*et al., 2011.* <sup>(4)</sup> The type 1 error was set at 0.05 and power was set at 0.8. The calculated sample size was 67 participants. The calculated sample size was approved by the Medical Biostatistics Unit, Faculty of Dentistry, Cairo University. The study was conducted in 3 months from 1/12/2020 to 1/3/2020

### Subjects

This study was conducted to monitor the postoperative pain in children following full mouth dental rehabilitation under general anesthesia. It included children attended the general anesthesia operating room at the Unit of Pediatric Dentistry and those with Special Needs, Faculty of Dentistry, Cairo University.

### Inclusion Criteria

- Egyptian children undergoing full mouth dental rehabilitation under general anesthesia.
- Egyptian children aged from three to five years old.
- Physically and mentally apparently healthy children.
- Children whose parents can be contacted easily and accepted to sign the informed consent.

### Methods

Informed consent was signed by parents of the children who participated in the study. Patient history was collected including: Patient name, age, gender, address and telephone number. Postoperative data was collected by contacting caregivers by phone at four postoperative times: first, third, seventh, and thirtieth days after general anesthesia using the post-operative complaints questionnaire. This questionnaire is used to assess the patient medical conditions including: pain, bleeding from dental origin, sore throat, fever, or vomiting. Severity of the complaints was evaluated using verbal

descriptive severity scale (none/mild/moderate/severe). Inability to eat, sleepiness, drowsiness, cough, nausea or psychological changes were evaluated using binary scale (Yes, No).

- **Dental Pain:** The parents were asked to describe the severity of pain on a scale from (1 to 5), where 1 is the least and 5 is the greatest pain severity. The severity of pain was then recorded either as: None (if parents gave score 1). Mild (if parents gave score 2). Moderate (if parents gave score 3). Severe (if parents gave score 4 or 5).<sup>(3)</sup>
- **Sore throat:** The scores were recorded as follows: None: if there was no throat pain. Mild: if there was mild pain with swallowing, infrequent complaint of pain in mouth or throat or mild discomfort. Moderate: if there was moderate pain with swallowing, occasional complaint of pain in mouth or throat or moderate discomfort. Severe: if swallowing was very painful, frequent complaint of pain in mouth or throat or severe discomfort.<sup>(14)</sup>
- **Fever:** The scores were recorded as follows: None: no fever or looking flushed. Mild: felt warm to the touch, no flushing. Moderate: felt very warm to the touch or temperature  $> 38^{\circ}\text{C}$ , slightly flushed. Severe: felt hot to the touch or temperature  $> 38.9^{\circ}\text{C}$ , very flushed.<sup>(14)</sup>
- **Vomiting:** The scores were recorded as follows: None: no vomiting. Mild: 1-2 episodes, small amount of emesis. Moderate: 3-5 episodes, vomiting persist. Severe:  $> 7$  episodes, vomiting persist.<sup>(8)</sup>

- **Bleeding:** The scores were recorded as follows: None: if there was no blood. Mild: if there was slight amount of blood in saliva. Moderate: if there was plenty amount of blood in saliva and need pressure by cotton to stop bleeding. Severe: if the child wakes up from sleeping and there was a copious amount of blood on the pillow.

The majority of patients were induced by inhalation agent sevoflurane for 3 to 4 minutes then the intravenous anesthetic agent propofol, patients were then maintained using isoflurane.

Microsoft Excel 2013 was used for generation of representative charts. Statistical analysis was performed using a commercially available software program (SPSS 19), Chicago, IL, USA. Qualitative values were presented as number and percentages. Chi square test was used to compare categorical data. The significance in difference by time in quantitative values was tested using Friedman and Wilcoxon signed Rank tests. The level of significance was set at  $P \leq 0.05$ .

## RESULTS

The children's age range was from three to five years with the mean  $4.16 \pm 0.72$  years. The numbers of males and females were 34 (50.7%), 33 (49.3%), respectively. The most common complaint reported was: inability to eat normally (100%). The least reported complaint was nausea (13.4%). Sleepiness and psychological changes were absent at 30<sup>th</sup> day. Drowsiness and nausea disappeared starting from the seventh day. The frequency of morbidity at the four times intervals was illustrated in Table (1).

TABLE (1): The frequency of morbidity with pediatric dentistry GA procedure at 1st, 3rd, 7th and 30th day post-operatively.

		Complaint at first day N=67 n(%)	Complaint at third day N=67 n(%)	Complaint at seventh day N=67 n(%)	Complaint at 30 <sup>th</sup> day N=67 n(%)	P value
<b>Inability to eat</b>		67 (100%)	62 (92.5%)	47 (70.1%)	22 (32.8%)	0.00*
<b>Sleepiness</b>		37 (55.2%)	21 (31.3%)	9(13.4%)	0(0%)	0.00*
<b>Dental pain</b>	Mild	6 (9.0%)	18 (26.9%)	42 (62.7%)	32 (47.8%)	0.00*
	Moderate	38(56.7%)	42 (62.7%)	12 (17.9%)	0(0%)	
	Severe	23 (34.3%)	6 (9.0%)	3 (4.5%)	0 (0%)	
<b>Dental bleeding</b>	Mild	18 (26.9%)	15 (22.4%)	4 (6.0%)	0 (0%)	0.00*
	Moderate	23 (34.3%)	5 (7.5%)	0 (0%)	0 (0%)	
	Severe	4 (6%)	0 (0%)	0 (0%)	0 (0%)	
<b>Drowsiness</b>		14 (20.9%)	1(1.5%)	0 (0%)	0 (0%)	0.00*
<b>Sore throat</b>	Mild	10 (14.9%)	19 (28.4%)	5 (7.5%)	3(4.5%)	0.00*
	Moderate	19 (28.4%)	6 (9%)	0 (0%)	0 (0%)	
	Severe	3 (4.5%)	0 (0%)	0 (0%)	0 (0%)	
<b>Vomiting</b>	Mild	15 (22.4%)	12 (17.9%)	0 (0%)	4 (6%)	0.00*
	Moderate	7 (10.4%)	3 (4.5%)	1 (1.5%)	0 (0%)	
	Severe	4 (6%)	0 (0%)	0 (0%)	0 (0%)	
<b>Psychological changes</b>		12 (17.9%)	7 (10.4%)	3 (4.5%)	0 (0%)	0.001*
<b>Fever</b>	Mild	15 (22.4%)	31(46.3%)	7 (10.4%)	5 (7.5%)	0.00*
	Moderate	26 (38.8%)	0 (0)%	1 (1.5%)	5 (7.5%)	
	Severe	1 (1.5%)	0 (0)%	0 (0)%	0 (0)%	
<b>Cough</b>		23 (34.3%)	19 (28.4%)	12 (17.9%)	3 (4.5%)	0.00*
<b>Nausea</b>		9 (13.4%)	3 (4.5%)	0 (0%)	0 (0%)	0.00*

Significance level  $p \leq 0.05$ , \*significant

Relationship between first day post-operative complaints and gender

Moderate bleeding was present in 48.5% of the females in comparison to 20.6% in males, this difference was the only complaint that was statistically significant ( $p=0.01$ ).

## DISCUSSION

Children were selected from the age of 3 to make sure that the all deciduous teeth have been erupted, to the age of 5 to exclude pain that may result from eruption of the first permanent molar and pain and discomfort that might appear with treatment of permanent teeth. Children also should be physically and mentally normal, to exclude any distress or anxiety that may result from their health status. They were selected to be Egyptian for better communication with them. Because of the children inability to express how they feel and inability to understand medical terms, parents were asked to monitor their children and answer the questionnaire.

All patients reported complaints in the first day post-operatively but greater than other studies by This difference might be as a result of using the questionnaire in the present study 24 hours after discharge, which is consider as a longer duration, that gave opportunity for the symptoms to occur and to be reported, compared with the other studies that used the questionnaire in the same day of GA *Enever et al., 2000, and Farsi et al., 2009.* <sup>(5-6)</sup> The number and severity of complaints of the present study showed significant decrease after 72 hours. This was consistent with several previous studies by *Atan et al., 2004, Farsi et al., 2009, and Almaz et al., 2019.* <sup>(3-6-1)</sup>

Inability to eat a normal meal was the major complaint reported, similar to a study by *Farsi et al., 2009* <sup>(6)</sup> being in 100% of children on the first day after GA. This might be due to the children complaining of dental pain, bleeding, sore throat, fever, and nausea/vomiting in the first day, which may affect their ability to eat, by the 7<sup>th</sup> day, all complaints were reduced which enabled the children to eat normally.

Sleepiness was reported in 55.2% of the patients, being less than percentage recorded by *Atan et al., 2004 and Faris et al., 2009* <sup>(3-6)</sup> as it was reported one hour after the GA , and more than *Almaz et al.,*

*2019* <sup>(1)</sup> which was recorded one day after the GA as in the present study. Longer anesthesia duration was significantly related to more sleepiness, nausea and psychological changes but less bleeding complaints.<sup>(6)</sup> Nausea was found to be the least reported complaint at day one similar to study by *Farsi et al., 2009 and Almaz et al., 2019.* <sup>(6-1)</sup> It was disappeared starting from the 7<sup>th</sup> day.

Vomiting was found to be mild in (22%) of the patients on the first day close to *Farsi et al., 2009* <sup>(6)</sup> and more than results by *Almaz et al., 2019* <sup>(1)</sup> , then it disappeared at the seventh day. Disappearance of nausea and vomiting after the seventh day might be due to the elimination of drugs and anesthetic agents from the body. <sup>(1)</sup> The severity of dental pain reported was limited to the moderate category at the first day (56.7 %) then it increased by the third day (62.7%) then decreased on the seventh day (12%) and finally disappeared at the 30<sup>th</sup> day. It was found more among female patients. This might be due to the physiological differences between males and females. Another possible reason is that females are known to report symptoms more often than males. <sup>(3)</sup>

The majority of cases reported the bleeding to be of moderate severity, in contrast to the results of *Farsi et al., 2009 and Almaz et al., 2019* <sup>(6-1)</sup> who reported bleeding to be of mild severity. In the present study bleeding was found more among female patients and totally disappeared at the 30<sup>th</sup> day.

Some children complained of a sore throat in the first day. The majority of cases reported the sore throat to be of moderate severity. This may be due to the traumatic intubation by multiple attempt trials and throat pack used by the anesthesiologist. The majority of the cases reported a moderate severity of fever while they were of a mild severity in the study by *Farsi et al., 2009 and Almaz et al., 2019* <sup>(6-1)</sup>. This could be explained by the longer duration of children pre-operative fasting and their inability to eat post-operatively. Those two reasons

might lead to post-operative children dehydration and fever. <sup>(6)</sup>

Psychological changes were reported during the first day in the form of bad sleep, nightmare and cry and were found to be absent at the 30<sup>th</sup> day, similar to studies by *Farsi et al., 2009 and Almaz et al., 2019*. <sup>(6-1)</sup> Closer to the results of this study, a study by *Foesel and Reisch, 2001* <sup>(7)</sup> found that the children having sevoflurane anesthesia developed behavioral problems postoperatively. It was reported that (25.7%) of children received sevoflurane and (16.1%) of children received halothane developed these problems which were in form of crying during sleep, night terrors and sleeping in parent's bed. <sup>(7)</sup> In contrast, a study by *Keany et al., 2004* <sup>(7)</sup> reported that the developed behavioral change was only immediate postoperative distress and was not carried over into the longer post-hospital period.

Most of complaints showed marked decrease or even disappeared at the seventh day that might be because of the end of the antibiotic and analgesics course at the fifth day, prescribed by most dentists. At 30<sup>th</sup> day mild sore throat (4.5%), vomiting (6%) and mild to moderate fever (7.5%) were reported. This might be due to some children catching cold as it was a winter time.

Among the limitation of this study that the cases were followed up by phone and not scheduled in a hospital, so the study lost the importance of accurate examination and direct communication between the child and dentist. Also following up the cases for long period of time, lost some patients especially at 30<sup>th</sup> day this made it necessary to register another patient to keep the required number (67).

## CONCLUSION

- Inability to eat was the most common complaint reported.
- The severity of post-operative complaints showed a gradual decrease from the first to the thirtieth day

## RECOMMENDATION

- For better results, further studies involving greater number of children are recommended.
- Further studies with same questionnaires and other questionnaires are recommended to be done in different governorates not only Cairo for better representation of the whole nation.
- Further studies involving older patients and patients with special needs are recommended.

## REFERENCES

1. Almaz, M., Sonmez, I., Oba, A. & Alp, S. (2019): Postoperative morbidity in pediatric patients following dental treatment under general anesthesia. *European Oral Research*, 53(3): 113-118.
2. American Academy of Pediatric Dentistry (AAPD) (2009): Guideline on use of anesthesia personnel in the administration of office-based deep sedation/general anesthesia to the pediatric dental patient. Adopted 2001, Revised, 2009. *The Reference Manual of Pediatric Dentistry*, (312) 337-2169.
3. Atan, S., Ashely, P., Gilthorpe, M., Scheer, B., Mason, C. & Roberts, G. (2004): Morbidity following dental treatment of children under intubation general anesthesia in a day-stay unit. *International Journal of Pediatric Dentistry*, 14 (1):9-16.
4. Costa, L., Harrison, R., Aleksejuniene, J., Nouri, M. & Gartner, A. (2011): Factors Related to Postoperative Discomfort in Young Children Following Dental Rehabilitation Under General Anesthesia. *Pediatric Dentistry*, 33:321-326.
5. Enever, G., Nunn, J. & Sheehan, J. (2000): A comparison of postoperative morbidity following outpatient dental care under general anesthesia in pediatric patients with and without disabilities. *International Journal of Pediatric Dentistry*, 10:120-125.
6. Farsi, N., Ba'akdah, R., Boker, A. & Almushayt, A. (2009): Postoperative complications of pediatric dental general anesthesia procedure provided in Jeddah hospitals, Saudi Arabia. *Biomedical Central Oral Health*, 9:1-9.
7. Foesel, T. & Reisch, H. (2001): Postoperative behavioral changes in children: a comparison between halothane and sevoflurane. *Pediatric Anesthesia*, 11: 719-723.

8. Halpin, A. & Huckcbay, L. (2019): Benefits of Nausea Vomiting Scales in Practice- A Research Study. *Journal of Emergency Medicine and Critical Care*, 3.11: 01-11.
9. Keaney A., Diviney, D., Harte, S. & Lyons, B. (2004): Postoperative behavioral changes following anesthesia with sevoflurane. *Pediatric Anesthesia*, 14(10):866-870.
10. Marques, B., Cardoso, J. & Silva, M. (2019): Postoperative Pain Assessment Methods for Infants and Young Children: A Review. *Journal of Clinical Research in Pain and Anesthesia*, 1(1):1-11.
11. Patel, R. & Hannalah R. (1988): Anesthetic complication following Pediatric Ambulatory Surgery: A 3- years study. *Anesthesiology*, 69:1009-1012.
12. Silverman, J., Reggiardo, P. & Litch, S. (2012): An Essential Health Benefit: General Anesthesia for Treatment of Early Childhood Caries. *AAPD Pediatric Oral Health Research & Policy Center*, 1-20.
13. Sirintawat, N., Sawang, K., Chaiyasamut, T. & Wongsirichat, N. (2017): Pain measurement in oral and maxillofacial surgery. *Journal of Dental Anesthesia and Pain Medicine*, 17(4):253-263.
14. Taylor, J., Weber, W., Martin, E., Rachelle, L., McCarty, R. & Englund, J. (2010): Development of a Symptom Score for Clinical Studies to Identify Children with a Documented Viral Upper Respiratory Tract Infection. *Pediatric Research*, 68(3): 252–257.