Clinical and Experimental Health Sciences

Analysis of Selection Criteria of Dental Patients for General Anaesthesia and Conscious Sedation

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ABSTRACT

Objective: The term general anaesthesia refers to a state of unconsciousness under control using pharmacological or non pharmacological agents in which patient reflexes are compeletely or partially lost. Concious sedation is a drug-induced state in which the conscious patient is rendered free of fear, anxiety, and apprehension while remaining comfortably relaxed. Both of these methods are used for various reasons in dental clinics for many years and their use in dentistry practice is increasing. Aim of this study is to quantify the number and demographic data of patients that received a dental general anaesthesia (DGA) or conscious sedation (CS) following referral from a general dental practice. Study also aimed to determine the reasons of referral and dental treatment modalities performed during the sessions.
Methods: This study includes patient records who had undergone dental general anaesthesia and conscious sedation in Medipol University Dental Hospital General Anaesthesia Clinic. Data were collected from records of the University Dental Hospital. The collected information included gender, age, type of DGA/ CS, reason for DGA, treatment modalities as tooth extraction, restorative, endodontics, periodontics and pedodontics.
Results: 896 patients were referred for DGA/CS during the two-year period. The mean age was 15.5 years and 27.3% were underaged children. The most common reason for DGA was dental anxiety (46.5%). 79.4% of patientd received DGA, while only 20.6% received CS. The highest mean in treatments is for decidious pulp capping (4.57) followed by decidious pulp amputation (3.57).

Conclusion: Majority of the patients receiving DGA/CS are formed by dental anxiety patients. Also, the rate of underaged children were very high (27.3%).

Keywords: Dentistry, General Anaesthesia, Conscious Sedation, Pediatric Dentistry, Dental Anxiety

1. INTRODUCTION

When behaviour management techniques are inadequate for patients with special needs, general anaesthesia and conscious sedation may take a role for these patients' dental treatments. Patients with dental anxiety, intellectual disability, dementia, physical limitations, behavioural disorders and chronic systemic conditions can be included into the group called 'patients with special needs' (1). Although treatment of pediatric patients may be held out without using any pharmacological agents, incorporation with some patients may require sedation and general anaesthesia (2,3).

The term general anaesthesia refers to a state of unconsciousness under control using pharmacological agents. Patient reflexes are compeletely or partially lost including airway control, response to physical or verbal contact is lost (4). In a study conducted by Nunn et al, it is described that 340 patients with varying ages had undergone general anaesthesia for their dental treatments between 1983 to 1993. Also, review made in the same study pointed out patient quantities in previous researches between 80 and 4000 in variable time periods (5). In 1984, Bennet defined the conscious sedation term as 'drug-induced state in which the conscious patient is rendered free of fear, anxiety, and apprehension while remaining comfortably relaxed' and explained this method is not a method of pain control (6). Pharmacological agents provide the depression of consciousness level, but complete loss is prevented and patient's airway control ability maintains. Patient's response to physical stimulation and verbal contact continues (7,8). In a study conducted by Varpio and Wellfelt included 146 children with dental phobia; while 48 % of children were treated with conventional techniques after been trained by 'tell-show-do' method, 25 % were treated with conscious sedation and 27 % with general anaesthesia (9). Differentiation of conscious sedation applied in dental clinics must be seperated from those made by general anaesthetists made in surgical environments where every kind of patient

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monitoring agents are available. During sedation in dental clinics, patient communication must be maintained (10).

Regarding the benefits and risks of general anesthesia and conscious sedation; complex criteria are included for case and method selection. These criteria included patient anamnesis and evaluation by a dentomaxillofacial radiologist, evaluation of the dental operator, availability of the treatment plan during the selected method and lastly evaluation of the patient by the general anesthesician and planning the protocol.

For obtaining maximum treatment plan goals, patients were all administered for specialist dental operators, tried to comfort and convince for local anesthesia treatments. It is demonstrated that comprehensive discussion of the anesthesia techniques and the specialist reasoning may alter patients' attitude towards anesthesia selection (11).

The purpose of this study is to evaluate a group of dental patients that has undergone dental general anaesthesia (DGA) or conscious sedation (CS) in aspect of clinical necessities such as younger age, mental retardation, surgical necessities, gagging reflex or patient choice due to dental anxiety.

2. METHODS

2.1. Study Design

This study is held out in Medipol University, School of Dentistry. Data for the study cohort was collected retrospectively via general anesthesia electronic records. Total of 896 patients were analysed (425 female, 471 male) who received either conscious sedation or general anesthesia for their dental treatments. Patients were evaluated by age groups as child (age under 12) or adult (above age 12). Gender, reason of anesthesia and type of anesthesia are evaluated in age groups. Number and ratio of the operated treatments were also determined.

Because this study was a retrospective research based on data collection and informed consents of all patients were taken (which declares that patient information can be used for scientific research); no ethical regulation was required.

2.2. Statistical analysis

During evaluation of the cohort data, IBM SPSS Statistics 22 (IBM SPSS, Turkey) program was used for the statistical analysis. Correlation of data for normal distribution was determined by ShapiroWilks test. Mann Whitney U test was used for mean, standard deviation and frequency anlyses. Chi – square test, Fisher Freeman Halton test and Continuity (Yates) Correction was used for determination of the comparison of qualitative data. Statistical significance was determined as $p<0.05$.

3. RESULTS

This study demographics included 896 patients (425 female, 471 male) treated under general anaesthesia or conscious sedation. Mean age and standard deviation of the study group was 15,54±16,63 and female / male percentage was 47,4 % to 52,6 %. 67% of the study group were child patients (under age 12). Table 1 demonstrates the reasons for application to anaesthesia clinic and the technics used for the operation. It can be concluded that the most common cause for DGA/ CS selection in this study group is dental anxiety (46,5%), followed by underaged children (27,3%).

Table 1. *Reasons for application to anaesthesia clinic and selected anesthesia types for the operations.*

		n	%
Reasons for anaesthesia	Underaged child	245	27,3
	Patient with special needs	127	14,1
	Mental retardation	57	6,4
	Cerebral palsy	10	1,1
	Autism	27	3
	Down syndrome	24	2,7
	Visual/ hearing impaired	9	1
	Gagging reflex	28	3,1
	Surgical necessity	79	8,8
	Anxiety	417	46,5
Anesthesia type	**General anaesthesia**	711	79,4
	Sedation	185	20,6

No statistical significance is found among genders for anaesthesia reason, anaesthesia type and distribution of children with special needs ($p>0.05$) (Table 2).

Table 2. *Distribution of anesthesia reason and type in children aged ≤12 among genders.*

≤12 years		**Gender**		**p**
		Female (n=264)	**Male (n=336)**	
		n (%)	**n (%)**	
Reasons for anaesthesia	**Underaged child**	118 (%44,7)	127 (%37,8)	0,307
	Patient with special needs	32 (%12,1)	52 (%15,5)	
	Surgical necessities	3 (%1,1)	6 (%1,8)	
	Anxiety	111 (%42)	151 (%44,9)	
Anaesthesia type	**General anaesthesia**	259 (%98,1)	330 (%98,2)	0,922
	Sedation	5 (%1,9)	6 (%1,8)	
Patient with special needs	**None**	232 (%87,9)	285 (%84,8)	0,553
	Mental retardation	13 (%4,9)	16 (%4,8)	
	Cerebral palsy	3 (%1,1)	5 (%1,5)	
	Autism	5 (%1,9)	14 (%4,2)	
	Down Sydrome	9 (%3,4)	10 (%3)	
	Visual/hearing impaired	2 (%0,8)	6 (%1,8)	

Chi-square test p<0.01

Statistically significant differences were found in patients over 12 years old. In terms of reasons for general anaesthesia; anxiety was more frequent in females (p<0.01), while gagging reflex and surgical operation neccessities were more frequent in male patients (p<0.01). General properties of patients above 12 years old can be seen in Table 3. Chi-square test results reveal that female patients have statistically significant anxiety rates than man (p<0.01). Applied anesthesia type does not have significance in relation to gender.

Table 3. *Distribution of anesthesia reason and type in children aged >12 among genders*

>12 age		Gender		p
		Female (n=161)	Male (n=135)	
		n (%)	n (%)	
Reasons for anesthesia	Underaged Child	2 (%1,2)	0 (%0)	0,001**
	Patient with special needs	22 (%13,7)	24 (%17,8)	
	Gagging reflex	6 (%3,7)	22 (%16,3)	
	Surgical necessities	32 (%19,9)	37 (%27,4)	
	Anxiety	99 (%61,5)	52 (%38,5)	
Anaesthesia type	General anaesthesia	65 (%40,4)	57 (%42,2)	0,747
	Sedation	96 (%59,6)	78 (%57,8)	
Patient with special needs	None	141 (%87,6)	113 (%83,7)	0,219
	Mental retardation	14 (%8,7)	11 (%8,1)	
	Cerebral palsy	2 (%1,2)	0 (%0)	
	Autism	2 (%1,2)	6 (%4,4)	
	Down Syndrome	1 (%0,6)	4 (%3)	
	Hearing/ Visual Impaired	1 (%0,6)	1 (%0,7)	

*Chi-square Test **p<0.01*

Table 4 and 5 demonstrates the gender distribution of dental operations. No statistically significant difference was observed among genders in patients below 12 years with regard to dental treatments (p>0.05); on the other hand females had higher rate for permanent teeth extractions (p<0.01), subgingival curretage and periodontal flap surgeries (p<0.05).

Table 4. *List of dental operations and their relationship between genders in patients aged below 12 years old*

≤12 years	Gender		1p
	Female (n=264)	Male (n=336)	
	Mean±SD	Mean±SD	
Endodontic treatment	4,99±3,00	5,28±3,23	0,364
Decidous tooth extraction	2,09±2,42	2,19±2,39	0,362
Permanent tooth extraction	0,11±0,50	0,15±0,56	0,254
Restorative treatment	5,56±3,61	5,89±3,65	0,299
	n (%)	n (%)	2p
Surgery	4 (%1,5)	12 (%3,6)	0,195
Detartrage	8 (%3)	14 (%4,2)	0,606
Curretage	1 (%0,4)	0 (%0)	0,440
Flap surgery	1 (%0,4)	1 (%0,3)	1,000

1: Mann Whitney U Test
2: Continuity (Yates)Correction and Fisher's Exact Test

Table 5. *List of dental operations and their relationship between genders in patients aged above 12 years old.*

>12 years	Gender		1p
	Female (n=161)	Male (n=135)	
	Mean±SD	Mean±SD	
Endodontic treatment	0,34±0,94	0,58±1,41	0,128
Decidous tooth extraction	0,03±0,26	0,11±0,76	0,526
Permanent tooth extraction	1,75±3,36	1,16±2,62	0,033*
Implant surgery	0,45±1,37	0,87±2,49	0,184
Restorative treatment	1,14±2,63	1,43±2,74	0,123
	n (%)	n (%)	2p
Surgery	36 (%22,4)	40 (%29,6)	0,196
Lefort surgery	7 (%4,3)	6 (%4,4)	1,000
Detartrage	45 (%28)	34 (%25,2)	0,686
Curretage	11 (%6,8)	0 (%0)	0,005**
Flap surgery	8 (%5)	1 (%0,7)	0,043*
Prosthetic treatment	11 (%6,8)	10 (%7,4)	1,000

1: Mann Whitney U Test
2: Continuity (Yates) Correction and Fisher's Exact Test
**p<0.05 **p<0.01*

Table 6 demonstrates the distribution of dental treatments and their relationships between age groups. Restorative treatment modalities showed significant differences between age groups. While pulp capping operations of decidous teeth and fissure restorations in patients below 12 years age were more frequent than patients above 12 years old (p<0.01); permanent tooth pulp cappings and amalgam restorations were more common in patients above 12 years old (p<0.01).

No statistically significant differences were found in terms of tooth extractions between age groups (p>0.01).

With regard to endodontic treatments, statistical significance was evident between age groups. Decidous tooth pulp amputations and root canal therapies were more frequent in patients aged below 12 years (p<0.01) and permanent tooth root-canal therapies were more common in patients above 12 years old (p<0.01). No statistical significance was found between age groups according to permanent tooth pulp amputations (p>0.01).

Table 6. *Treatment modalities between age groups*

	Age group			P
	≤12 years	>12 years	Total	
	Mean±SD	Mean±SD	*Mean±SD*	
Decidous teeth pulp capping	5,55±3,54	0,13±0,80	*4,84±3,79*	**0,001****
Permanent tooth pulp capping	0,60±1,48	4,55±3,31	*1,12±2,26*	**0,001****
Decidous tooth extraction	0,10±0,71	0,00±0,00	*0,09±0,66*	**0,126**
Permanent tooth extraction	0,01±0,18	0,03±0,23	*0,01±0,18*	**0,126**
Fissure restorations	0,35±0,99	0,04±0,25	*0,31±0,93*	**0,004****
Amalgam restorations	0,04±0,29	0,18±0,58	*0,06±0,35*	**0,001****
Decidous tooth amputation	3,96±2,78	0,00±0,00	3,57±2,89	**0,001****
Permanent tooth amputation	0,03±0,29	0,00±0,00	0,03±0,27	**0,382**
Decidous tooth root-canal therapy	1,17±1,68	0,05±0,29	1,06±1,63	**0,001****
Permanent tooth root-canal therapy	0,45±1,16	1,21±1,51	0,52±1,21	**0,001****
Root extraction	0,05±0,32	0,88±0,97	0,13±0,5	**0,004****

Mann Whitney U Test
***p<0.01*

4. DISCUSSION

The study examined a considerable number of subjects (896) that a major percentage has undergone DGA (79,4%). The percentage ranking of the evaluated patient group is as follows; anxiety (46,5%), underaged child (27,3%), patient with cooperation problems (14,1%), surgical necessity (8,8%) and gagging reflex (3,1%).

Evaluating dental anxiety, it can both occur in children and adults. Varience in percentage of populations may occur due to parent attitudes, population norms, dentist attitude and cooperation for explanation and social status (12-15).

Studies regarding patient demographics reveal that dental anxiety is higher in young females than males (16) and dental anxiety decreases with age (17). In this study, our demographics also revealed higher dental anxiety in females above 12 years age, in comparison to males. Coric et al (18) and Wu and Gao (19) also stated that dental enxiety and fear in children is with coexistence of the parents, family style and increases with child age.

Studies about DGA and CS of children have also been carried out. Tyrer, in his study suggested that the increased need for dental treatments in many sexants led to more referral for DGA in children. He also concluded younger age as a referral need (11). Our study data also includes that 245/ 600 child patients were underaged. Looking at the total number of patients, 27,3% were underaged children in this study. Richards et al (20) determined similar percentage of underaged childred (30,7%) in his study that has evaluated 287 dental patients that has undergone GA in a 9 year period. Saxen et al (21) provided evidence that, due to widespread childhood caries, children having DGA had a peak below age 6.

Evaluating the type of anesthesia, our study group revealed DGA rates (79,4%) higher than CS (20,6%) in all age groups. In regard to childrens' group, these rates are higher for DGA than CS (98,1% to 1.9%). Whittle, in his study revealed that, the number of DGA's diminished 24%, and the number of CS or inhalation anesthetics have increased slightly from 1997/98 to 1999/2000 (22). Regarding the time limitation, in contrast to DGA, CS may be handled better in patients having limited number of treatments to avoid more treatment sessions (23,24).

5. CONCLUSION

The presented data here was collected from a single dental hospital that could manage daily hospitalization. Major maxillofacial surgeries in need of patient hospitalisation were not involved. This study indicates that a major percentage of all patients are formed by dental anxiety patients. As all patients were first evaluated for local anesthesia treatments, female patients older than 12 years tend to have higher and more persistent rate of dental anxiety.

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