

Factors determining the need for general anesthesia to deliver dental treatment for adults with intellectual and developmental disabilities

ABSTRACT

Aim: To investigate factors determining the need for general anesthesia (GA) to deliver dental treatment for adult people with intellectual and developmental disabilities (IDD).

Methods: This study involved a retrospective review of medical records of adult patients with IDD who received dental treatment under GA at Tabuk Specialist Dental Center, Saudi Arabia, between 2018 and 2020. Demographic characteristics and dental-related details, level of cooperation, and methods of delivering dental treatment were collected.

Results: A total of 86 adult patients with IDD were included. The mean age of the study participants was 34.8 years (standard deviation [SD] 6.5), and the majority were males ($n = 47$, 54.7%). Eighteen patients had aphasia (20.9%), 16 had epilepsy (18.6%), and 10 had cerebral palsy (11.6%). Most dental treatments delivered were complex dental treatments ($n = 39$, 45.3%) followed by dental extraction ($n = 25$, 29.1%), and non-surgical periodontal therapy ($n = 22$, 25.5%). Females had higher odds of undergoing GA compared to males (Odds ratio (OR) = 6.79, 95% Confidence intervals (CI): 1.62–28.41). Furthermore, patients who had aphasia had higher odds of undergoing GA compared to patients who had no medical conditions (OR = 14.03, 95% CI: 1.05–186.7).

Conclusion: Being female or having aphasia are independent factors related to the need for GA to deliver dental treatment for Saudi adults with IDD.

Key words: General anesthesia, intellectual disability, local anesthesia, special care dentistry

Introduction

Special care dentistry (SCD) is concerned with delivering better oral health for people who need unique consideration and extra attention because of their difficulties or disabilities.^[1] A systematic review showed that adults with intellectual and

developmental disabilities (IDD) have poor oral health status and high dental needs, and hence, poor quality of life.^[1] Furthermore, when treatment does occur, adults with special needs are more likely to have multiple dental extractions than

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conservative dental treatment with dental fillings.^[2] Although conscious sedation helps to provide dental treatment for many adults who live with IDD,^[3] the need for general anesthesia (GA) to deliver dental care cannot be eliminated.^[4] GA is one of the behavioral management techniques that can be used to deliver dental care for adults who live with severe dental anxiety, IDD, dementia, physical limitations, behavioral disorders, and chronic systemic conditions.^[5] Unfortunately, these medical conditions increase the risk of poor oral health and dental needs, as they are associated with polypharmacy, poor dietary behavior, ineffective oral hygiene practices, and behavioral challenges. In SCD, particularly in the case of adults with IDD, a major challenge for outpatient care is to provide adequate care for those who may not cooperate at an expected level of compliance, which in many cases is due to lack of understanding, as well as a high level of anxiety.^[2] To date, little is known about other factors that determine the need for GA to deliver dental treatment for adults living with IDD. Furthermore, the factors that impact the need for GA to deliver dental treatment for Saudi adults living with IDD have not yet been studied. Hence, this study aimed to investigate factors that determine the need for GA to deliver dental treatment for adults with IDD in Saudi Arabia.

Materials and Methods

Ethical approval

Full ethical approval from the Ministry of Health (Tabuk, Saudi Arabia) was granted on 04/01/2021 (reference: 14420964875).

Study design

This study involved a retrospective review of medical records of adult patients with IDD who received dental treatment under GA at Tabuk Specialist Dental Center (Tabuk, Saudi Arabia) between 2018 and 2020. The dental protocol in this hospital includes trying to treat adult patients with IDD under local anesthesia (LA) with behavioral management techniques such as tell-show and do. However, if dental treatment under LA with tell-show and do was not possible, the patient would receive dental treatment under GA.

Inclusion and exclusion criteria

Patients (> 18 years of age) who had IDD with medical diseases were included. Eligible patients should have received dental treatment with LA or GA. Patients younger than 18 years old and who had not received dental treatment under GA or LA were excluded.

Procedures

The direct care team (Abdullah Aloufi and Fawz Alatawi) identified eligible patients (adult patients with IDD who had received dental treatment with LA or GA (2018–2020).

Subsequently, medical records were used to check demographic characteristics such as age, gender, type of medical diseases, types of paralysis (i.e. quadriplegia, paraplegia, hemiplegia, or none), and types of medication (i.e. sugar-based medications, non-sugar-based medications, or none). Dental-related details such as teeth brushing (i.e. yes or no), types of dental treatment delivered (i.e. non-surgical periodontal therapy [NSPT], dental extraction, or complex dental treatment including dental extraction, restorative dental treatment and NSPT), and methods of delivering dental treatment (i.e. LA only or LA combined with GA) were recorded. Patients' level of cooperation (i.e. definitely negative, negative, positive, or definitely positive) was recorded. Data extracted from medical records were anonymized using a pseudo-ID (numbers from 1 to 86).

Statistical analysis

Frequency and percentage were used to report categorical variables and mean and SD were used to report continuous variables. To assess the bivariate relationships between the type of anesthesia and the dependent variables of interest, Chi-square test was used for categorical variables and *t*-test was used for continuous variables. A logistic regression model was conducted to assess the factors associated with the undergoing GA. The logistic regression model was adjusted for all the study variables including age, gender, medical history, type of medication, and level of cooperation. Alpha (α) < 0.05 was used as the level of significance in which any *P* value < 0.05 was considered significant. STATA version 16 (StataCorp, College Station, TX, USA) was used to perform the statistical analyses.

Results

Sample characteristics

The mean age of the study patients was 34.8 years (SD 6.5). The majority of the study patients were males ($n = 47$, 54.7%). In terms of the medical history of the study patients, 18 had aphasia (20.9%), 16 had epilepsy (18.6%), and 10 had cerebral palsy (11.6%). The majority of the sample ($n = 40$, 46.5%) did not use any medications; some used sugar-based medications ($n = 32$, 37.2%) and a few ($n = 14$, 16.3%) used non-sugar-based medications. An almost equal distribution of patients had positive or negative/definitely negative ($n = 36$, 41.8%) levels of cooperation. Apart from gender (P value = 0.006), there was no statistical significant difference between patients who underwent LA and those who underwent GA across the study variables [Table 1].

Dental-related variables

Most dental treatments delivered were complex dental treatments ($n = 39$, 45.3%) followed by dental

extraction ($n = 25, 29.1\%$) and NSPT ($n = 22, 25.5\%$). The majority of patients brushed their teeth ($n = 67, 77.9\%$). Statistical analyses showed significant differences in the type of dental treatment delivered (P value = 0.001) and in the teeth brushing behavior (P value = 0.021) between patients who received dental treatment under LA compared to patients who received dental treatment under GA [Table 2].

Logistic regression model

Table 3 exhibits the association between the study variables and type of anesthesia (LA vs. GA) using a fully adjusted logistic regression model. Females had higher odds for undergoing GA compared to males (OR = 6.79, 95% CI: 1.62–28.41). Furthermore, patients who had aphasia had higher odds of undergoing GA compared to patients who have no medical conditions (OR = 14.03, 95% CI: 1.05–186.7). Other study variables did not show any significant associations with the undergoing GA.

Discussion

This single-center service evaluation aimed to investigate factors that determine the need for GA to deliver dental treatment for adults with IDD. The study findings showed that females with IDD had received dental treatment under GA more often than males with IDD. This finding is consistent with the findings of other studies. For example, a cross-sectional study in Finland reported that 37 female patients received dental treatment under GA (56.1%) compared to 29 male patients (43.9%).^[6] Another retrospective study in Turkey reported that 277 female patients received dental treatment under GA (59.3%) compared to 190 male patients (40.7%).^[7]

Several studies explained why female patients required dental treatment under GA more than male patients. For example, Taskinen *et al.*^[6] reported that dental anxiety toward receiving dental care under LA was more common among female patients than male patients; hence, they required dental treatment under GA. A cross-sectional study of 700 patients with IDD in Italy reported that female patients were more anxious than male patients toward dentistry ($P < 0.001$).^[8] Dental anxiety is one of the main barriers that is known to reduce the accessibility of adult special care patients toward receiving dental treatment under LA.^[9] Therefore, special care patients with severe dental anxiety indeed require treatment under advanced behavioral management techniques such as under GA.^[10] Additionally, empathy toward female patients is more predominant compared to male patients. Females are also known for having more emotional intensity than males.^[11] Thus, it is possible that dental care providers felt more emotional toward adult female patients

Table 1: Demographics and general characteristics of the study participants (n=86)

Variable	Type of Anesthesia		Total sample	P
	LA n=63 (%)	GA n=23 (%)		
Age, mean (SD)	35.9 (10.1)	31.6 (6.3)	34.8 (9.4)	0.06
Gender, n (%)				
Male	40 (63.5)	7 (30.4)	47 (54.7)	0.006
Female	23 (36.5)	16 (69.6)	39 (45.3)	
Medical history, n (%)				
Aphasia	11 (17.5)	7 (30.4)	18 (20.9)	0.17
Epilepsy	9 (14.3)	1 (4.3)	16 (18.6)	
Epilepsy+ Aphasia	8 (12.7)	2 (8.7)	10 (11.6)	
Cerebral palsy	9 (14.3)	1 (4.3)	10 (11.6)	
Mental illness	10 (15.9)	1 (4.3)	11 (12.8)	
Renal failure	6 (9.5)	7 (30.4)	7 (8.1)	
ADHD*	3 (4.8)	3 (13.0)	6 (7)	
None	7 (11.1)	1 (4.3)	8 (9.3)	
Medication, n (%)				
Sugar-based	24 (38.1)	8 (34.8)	32 (37.2)	0.39
Non-sugar-based	12 (19)	2 (8.7)	14 (16.3)	
No medication	27 (42.9)	13 (56.5)	40 (46.5)	
Cooperation, n (%)				
Definitely positive	10 (15.9)	3 (13)	13 (15.1)	0.69
Positive	29 (46)	8 (34.8)	37 (43)	
Negative	15 (23.8)	8 (34.8)	23 (26.7)	
Definitely negative	9 (14.3)	4 (17.4)	13 (15.1)	
Type of plegia, n (%)				
Paraplegia	12 (19)	3 (13)	15 (17.4)	0.38
Quadriplegia	8 (12.7)	6 (26.1)	14 (16.3)	
Hemiplegia	1 (1.6)	1 (4.3)	2 (2.3)	
None	42 (66.7)	13 (56.5)	55 (64)	

* Attention deficit hyperactivity disorder

Table 2: Dental-related details of the study participants (n=86)

Variable	Type of Anesthesia		Total sample	P
	LA n=63 (%)	GA n=23 (%)		
Type of dental treatment (n)				
Complex dental treatment	16 (25.4)	23 (100)	39 (45.3)	0.001
Dental extraction	25 (39.6)	0 (0)	25 (29.1)	
NSPT*	22 (34.9)	0 (0)	22 (25.5)	
Teeth brushing				
Yes	53 (84.1)	14 (60.9)	67 (77.9)	0.021
No	10 (15.9)	9 (39.1)	19 (22.1)	

* NSPT: Non-surgical periodontal therapy

with IDD and referred them to receive their dental needs under GA more than adult male patients with IDD. Lastly, it has been reported that female patients with IDD had a higher prevalence of dental caries when compared to male patients with IDD.^[12] Therefore, female patients might need complex dental treatment that requires GA instead if LA was considered alone.

Table 3: Logistic regression model showing the associated factors with having GA among the study participants (n=86)

Variable	Fully Adjusted Model		P
	OR	(95% CI)	
Age, mean (SD)	0.97	(0.90-1.04)	0.45
Gender, n (%)			
Male	(Reference)		
Female	6.79	(1.62-28.41)	0.009
Medical history, n (%)			
None	(Reference)		
Epilepsy	8.63	(0.67-111.1)	0.098
Renal failure	3.18	(0.11-84.3)	0.489
Aphasia	14.03	(1.05-186.7)	0.045
Epilepsy + Aphasia	3.86	(0.18-80.5)	0.383
Cerebral palsy	1.55	(0.06-38.27)	0.788
ADHD*	18.74	(0.88-398.0)	0.06
Mental illness	1.27	(0.05-31.7)	0.833
Medication, n (%)			
Non-sugar-based	(Reference)		
Sugar-based	1.35	(0.15-11.6)	0.783
No medication	2.02	(0.25-16.3)	0.506
Cooperation, n (%)			
Definitely positive	(Reference)		
Positive	0.59	(0.08-4.12)	0.598
Negative	1.75	(0.24-12.5)	0.577
Definitely negative	0.98	(0.10-3.14)	0.986

* Attention deficit hyperactivity disorder

This study also found that adult patients with IDD who had aphasia more commonly received dental treatment under GA, when compared to adult patients with IDD and who had other medical diseases. Poor communication is one of the major barriers that reduce the accessibility of special care patients to dental care.^[13] A scoping literature review indicated that patients with IDD have complex communication needs that increase their dental anxiety level,^[4] hence, increasing their needs for GA. For example, a crossover randomized-controlled trial showed that using a sensory-adapted dental environment was effective at reducing dental anxiety of patients with IDD when compared to a routine dental setting.^[14] Moreover, a national cross-sectional survey of adult patients with IDD found that adult patients with difficulty speaking reported using pharmacological supports (i.e. GA or conscious sedation) rather than non-pharmacological supports to receive dental care (OR = 3.0, 95% CI = 1.8–4.8).^[15] Therefore, poor communication of dental care providers with adult patients with IDD and aphasia is a possible reason for having dental treatment under GA. This will help to establish a thorough dental examination and accordingly a definitive treatment plan. Additionally, Ortiz and Marinelli found that 48% of post-stroke aphasic patients had dysphagia.^[16] Therefore, it could be argued that the participants in this

study received dental treatment under GA to increase the safety margin of delivering more complex treatment and preventing the risk of aspiration.

Study limitations

This was a single-center study; hence, this limits the generalizability of the results to Saudi people who live with IDD. Additionally, due to this study being retrospective in nature, other potential variables could be missed. For example, assessing the prevalence of dysphagia among patients included in this study could give in-depth details about why patients with aphasia would receive dental treatment under GA. Indeed, this also applies to some patients with Cerebral Palsy. It was not possible to assess the type of dental treatment as a potential confounding factor in determining the need for GA, as there were insufficient numbers to run binary logistic regression analyses. Future studies involving multiple centers in Saudi Arabia are needed to address factors that determine the need for GA and to overcome the limitations of this study.

Conclusion

Aphasia, epilepsy, and cerebral palsy were common medical diseases among adult patients with IDD. Most dental treatments delivered were complex dental treatments followed by dental extraction, and NSPT. Most of the participants received dental treatment under LA. Being female or having aphasia are independent factors related to the need for GA to deliver dental treatment for adults with IDD.

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Conflicts of interest

There are no conflicts of interest.

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