Turk J Anaesth Reanim 2015; 43: 332-6 DOI: 10.5152/TJAR.2015.82542

Original Article

Retrospective Evaluation of Dental Treatment under General Anaesthesia

Ahmet Selim Özkan, Mehmet Ali Erdoğan, Mukadder Şanlı, Osman Kaçmaz, Mahmut Durmuş, Cemil Çolak
Department of Anaesthesiology and Reanimation, İnönü University Faculty of Medicine, Malatya, Turkey

Abstract

Objective: Most dental procedures can be performed with local anaesthesia, however noncompliant paediatric patients, patients with mental retardation or psychiatric disorders, severe anxiety, severe craniofacial anomalies and orofacial trauma may need general anaesthesia. In these patients accompanying central nervous system diseases and airway problems increase the risk of complications. Anaesthesia records of 467 cases of dental surgery performed under general anaesthesia between 2011-2014 is reported with information from the recent literature.

Methods: In the study, 467 cases of dental procedures performed under general anaesthesia were taken from the İnönü University of Medicine, Dentistry Disabled Treatment Centre, after approval of the İnönü University Faculty of Medicine Ethics Committee. Demographic data, ASA classification, Mallampati (MP) score, duration of surgery, type of intubation and difficulties, comorbid diseases, premedication application, endocarditis prophylaxis, recovery time, analgesia and reasons for general anaesthesia were recorded as mean±standard deviation (SD) or as a number.

Results: The mean age of the patients was 16.78±12 years and the female/male ratio was 277/190 (59.3%/40.7%). Of the 467 patients, 219 (46.9%) were classified as ASA I, 234 (50.1%) as ASA II and 14 (3%) as ASA III. Furthermore, 182 (38.9%) patients with mental retardation, 33 (7.1%) with cerebral palsy and 28 (6%) with autism were identified. The mean operative time was 114.53±35.4 min, and the average recovery time 40.4±6 was min. Of the endotracheal intubations 277 (59.3%) were oral, 82 (17.6%) were nasal, and 108 (23.1%) were nasal with the help of fibreoptics. Difficult intubation was observed in 20 (4.3%) patients. The MP score was 1 in 397 (85%) patients, 2 in 50 (10.7%) patients, 3 in 18 (3.9%) patients and 4 in 2 (0.4%) patients. General anaesthesia was applied because of cooperation difficulties in 213 (45.6%), mental retardation in 182 (38.9%), autism in 28 (5.9%), schizophrenia in 7 (1.7%) and jaw surgery in 37 (7.9%) patients. Local infiltration was used for analgesia in 141 (30.2%), morphine in 12 (2.6%), tramadol in 3 (0.6%) and paracetamol in 311 (66.6%) patients. Endocarditis prophylaxis was employed in 36 (7.7%) cases.

Conclusion: General anaesthesia in dental procedures is becoming increasingly common. Anaesthetic management is important due to the frequency of genetic syndromes and mental retardation. In the anaesthetic management of these patients, strategies for the patient should be identified, the process should be implemented in the operating room and preparations should be made with risk analyses.

Keywords: Dental procedure, general anaesthesia, airway

Introduction

Anaesthesia applications during dental interventions are parallel with the history of modern anaesthesia (1). Although most of the dental interventions such as dental filling and extraction can be performed under local anaesthesia, general anaesthesia is often required because of mismatch and mental retardation, particularly in child patients, and difficulty in cooperation, immense anxiety, advanced craniofacial anomalies and orofacial traumas in psychiatric patients (2). General anaesthesia is preferred because multiple and prolonged treatments can be performed in the same session and because it is cost- and time-efficient. General anaesthesia application by same-day admission is becoming frequent for dental examinations and interventions.

Possible central nervous system diseases and accompanying airway problems increase the risk of observing complications during and after anaesthesia in patients who are treated as out patient cases (3). Because the risk of difficult ventilation and difficult intubation can be high in these patients due to scletal and muscle anomalies in the head-neck anatomy, necessary precautions must be taken. Nasal endotracheal intubation is commonly preferred because of the surgical application is in the oral cavity. Establishing vascular access may be difficult in general anaesthesia applications because of contractures, spine deformations, airway problems and coordination problems (2). Because of these reasons, the anaesthesia method that will be

Address for Correspondence: Dr. Ahmet Selim Özkan, Turgut Özal Tıp Merkezi, Malatya, Türkiye
E-mail: asozkan61@yahoo.com

Received : 19.01.2015
Accepted : 09.03.2015
Available Online Date : 21.08.2015

performed in patients who will undergo dental intervention becomes crucial.

In this retrospective study, the anaesthesia records of 467 cases who underwent dental surgery under general anaesthesia between 2011 and 2014 are reported in light of the recent literature.

Methods

After having received approval from İnönü University Medical Faculty Ethics Committee (Ethics committee protocol code: 2014/192-03,12,2014), 467 cases, aged from 2 to 101 years, that underwent dental intervention under general anaesthesia in İnönü University Disabled Dental Care Centre were included in the study. Demographic data (age, sex, weight and height), American Society of Anesthesiologists (ASA) classification, Mallampati (MMS) score, intervention duration, intervention history, mode and difficulty of intubation, comorbid diseases, premedication application, mode of induction, type of performed intervention, endocarditis prophylaxis, recovery period, analgesia application, reason for performing general anaesthesia and general anaesthesia agent that was used were recorded.

Statistical analysis

The Statistical Package for the Social Sciences (SPSS Inc., Chicago IL, USA) 13.0 packaged software was used in the statistical analysis of the data. Values of numbers, percentages, means, and standard deviations were used in defining the data. The data recorded were obtained with complete inventory sampling.

Results

The mean age of 467 cases that underwent dental intervention was 16.78±12 years, the female/male ratio was 277/190 (59.3%/40.7%), the mean body weight was 41.51±23 kg, the mean height was 135.52±32 cm and the mean body mass index was 21.09±5.6 kg/m^2. Of the 467 patients, 219 (46.9%) were classified as ASA I, 234 (50.1%) as ASA II and 14 (3%) as ASA III. Mental retardation was observed in 182 of the cases (38.9%), cerebral palsy in 33 (7.1%) and autism in 28 (6%). The mean intervention duration was measured as 114.53±35.4 min, and the mean recovery period as 40.4±6 min. In total, 277 (59.3%) of the endotracheal intubations were performed orally, 82 (17.6%) via the classical nasal method and 108 (23.1%) via the fiberoptic nasal method. Intubation difficulty was observed in 20 (4.3%) of the cases. The MMS score was detected as 1 in 397 (85%) patients, as 2 in 50 (10.7%) patients, as 3 in 18 (3.9%) patients and as 4 in 2 patients. In total, 239 of the cases (51.2%) underwent tooth extraction, 191 (40.9%) underwent filling and tooth extraction and 37 (7.9%) underwent maxillofacial surgery. The reasons for performing general anaesthesia were as follows: cooperation difficulty in 213 (45.6%) cases, mental retardation in 182 (38.9%), autism in 28 (5.9%), schizophrenia in 7 (1.7%) and maxillofacial surgery in 37 (7.9%). Anaesthesia induction was established by intravenous agents in 436 cases (93.4%), propofol was administered in 307 (65.7%) cases and thiopental was administered in 160 (34.3%) cases. An inhalation agent (sevoflurane) was administered in 31 (6.6%) cases. Local infiltration anaesthesia was performed in 141 of the cases (30.2%) with the purpose of analgesia, and morphine was administered to 12 of them (2.6%), paracetamol to 311 of them (66.6%) and tramadol to 3 of them (0.6%). Endocarditis prophylaxis was performed in 36 (7.7%) cases. The general features of the cases are shown in Table 1, features regarding intervention are shown in Table 2, comorbidities of patients are shown in Table 3 and reasons for anaesthesia are shown in Table 4.

Discussion

General anaesthesia in dental interventions is performed as out patient applications with modern anaesthesia methods (4). General anaesthesia is commonly preferred in patients that cannot undergo dental treatment via local anaesthesia due to mental or psychological reasons because it allows multiple treatments in a single session, and it can be safely performed in prolonged interventions (5).

The method of anaesthesia in patients who will undergo dental treatment is decided based on the condition of the patient and the features of the treatment (2). Propofol and thiopental are commonly administered in intravenous (IV) induction, whereas anaesthesia induction is performed by inhalation anaesthetics such as sevoflurane in patients where vascular

Table 1. General features of patients (Mean±SD), n (%)

Age (year)	16.78±12.7
Sex, n (%)	
Male	277 (59.3)
Female	190 (40.7)
Weight (kg)	41.51±23.8
Height (cm)	135.52±32.9
BMI (kg m$^{2-1}$)	21.09±5.6
ASA, n (%)	
ASA I	219 (46.9)
ASA II	234 (50.1)
ASA III	14 (3)
Mallampati score	
MMS 1	397 (85)
MMS 2	50 (10.7)
MMS 3	18 (3.9)
MMS 4	2 (0.4)
Total of 467 patients	

SD: standard deviation; n: number of patients; MMS: Mallampati score; BMI: body mass index; ASA: American Society of Anaesthesia

Table 2. Features of intervention (Mean±SD), n (%)	
Duration of intervention (min)	114.53±35.4
Recovery period (min)	40.47±6.0
Intubation difficulty, n (%)	20 (4.3)
Intubation, n (%)	
Oral	277 (59.3)
Classical nasal	82 (17.6)
Fiberoptic nasal	108 (23.1)
Premedication, n (%)	172 (36.8)
Oral	126 (26.9)
Intravenous	46 (9.8)
Induction, n (%)	
Inhalation	31 (6.6)
Intravenous	436 (93.4)
Endocarditis prophylaxis, n (%)	36 (7.7)
Anaesthetics medicine, n (%)	
Thiopental	160 (34.3)
Propofol	307 (65.7)
Surgery type, n (%)	
Tooth extraction	239 (51.2)
Filling+tooth extraction	191 (40.9)
Maxillofacial surgery	37 (7.9)
Analgesia, n (%)	
Paracetamol	311 (66.6)
Morphine	12 (2.6)
Tramadol	3 (0.6)
Infiltration anaesthesia	141 (30.2)
Operation story, n (%)	
None	267 (57.2)
Once	158 (33.8)
Multiple	42 (9)
SD: mean±standard deviation; n: number of patients	

Table 3. Comorbidities of patients, n (%)	
MR	114 (24.4)
CP	33 (7.1)
Epilepsy	18 (3.9)
Autism	28 (6)
Down syndrome	11 (2.4)
Schizophrenia	7 (15)
Morbid obesity	1 (0.2)
MR+Epilepsy	57 (12.2)
MR+CP	3 (0.6)
Epilepsy+CP	24 (5.1)
MR+Epilepsy+CP	8 (1.7)
No additional diseases	163 (34.9)
MR: Mental retardation; CP: Cerebral Palsy; n: number of patients	

Table 4. Reason for anaesthesia n (%)	
Cooperation difficulty	213 (45.6)
Mental retardation	182 (38.9)
Autism	28 (5.9)
Schizophrenia	7 (1.7)
Maxillofacial surgery	37 (7.9)
n: number of patients	

access cannot be established (6). Çağıran et al. (5) performed induction via sevoflurane in each of the 330 mentally retarded patients whose mean age was 18.13±16 years, whereas in this study, mask induction via sevoflurane was performed in 31 (6.6%) patients whose mean age was 16.78±12 years. Although the mean age was similar, the fact that IV induction was so high [436 (93.4%)] was because 159 of the patients (34%) do not have comorbidities and easily established vascular access. It is reported that sedation is established by administering sevoflurane during establishing vascular access and performing inhalation anaesthesia or administering intramuscular (IM) ketamine (7).

Because of the frequency of genetic syndromes and mental retardation in this patient group that underwent general anaesthesia due to dental treatment, problems can occur regarding airway management. Craniofacial anomalies related to genetic syndromes, large structures in the oral cavity and pharynx, adiposity, respiratory system diseases and limitation and instability of neck motion can cause difficult airway (8). In a study involving 330 mentally retarded patients, intubation difficulty was observed in 6 (1.8%) patients, and 1 patient could not be intubated and was woken up (6). In another study, 174 patients were investigated and intubation difficulty was observed in 17 (9.7%) cases, and it was reported that 3 (1.7%) patients could not be intubated (9). Similarly, in this study, intubation difficulty was observed in 20 (4.3%) patients, and all patients were intubated.

MMS being 3 or 4 must suggest that the patient carries risk of difficult intubation (10). In a study, intubation difficulty was observed in 6 (1.8%) patients, although MMS 3 and MMS 4 were not observed. In this study, MMS was 3 in 18 (3.9%) patients and 4 in 2 (0.4%) patients, and difficult intubation was observed in these patients. Although difficult intubation can be anticipated in the preoperative evaluation, unexpected difficult intubation can also be encountered.

Nasal mask and laryngeal mask can be safely used in short and small dental interventions under general anaesthesia. However, a wet tampon must be placed to the oropharynx in this method, and it must be removed after the completion of the surgery. Flynn et al. (11) noted that LMA-flexible™ is

advantageous in oral cavity surgeries because of its flexible features and that it might be preferred. Nasal endotracheal intubation is more commonly preferred than oral endotracheal intubation in oral cavity surgeries such as dental treatment. Nasal intubation can be performed directly with the help of laryngoscopy by the classical method of using Magill forceps as well as the fiberoptic method. If there is also an expectation of haemorrhage in medium-long term and big interventions, endotracheal intubation with nasally cuffed tubes is preferred (2). Zhao et al. (12) compared laryngeal mask and nasal tracheal intubation in patients who underwent dental intervention and emphasized that LMA is performed in a shorter time, but there were no differences regarding airway complications. In another study, nasal intubation is preferred in 59.2% of patients, and oral intubation is preferred in 38.5% of patients (9). In this study, 277 of the patients (59.3%) received oral intubation, 108 (23.1%) received nasal intubation with the fiberoptic method and 82 (17.6%) received endotracheal intubation with the classical nasal method.

Patients with cooperation difficulty are premedicated depending on their general condition. Pre-school children that appear calm prior to anaesthesia application are observed to be more scared of the intervention, and premedication is recommended (13). In premedication, midazolam is commonly preferred, which is a short-acting benzodiazepine, and it is reported that orally administering a dose of 0.5 mg kg^{-1} midazolam does not prolong the duration of stay in the hospital (13). Premedication was performed in 172 (36.8%) patients in this study, and a significant portion of this [126 patients (26.9%)] is established by oral midazolam. Absence of premedication was because of insufficient follow-up opportunities, frequency of genetic syndromes and difficult airway related to mental retardation.

General anaesthesia in dental interventions is performed in large dental treatments, in major craniofacial anomalies that require treatment, in major orofacial traumas and broken jaws, in patients that cannot cooperate because of having physical or mental problems or because of being minor and in patients who are scheduled to undergo multiple treatments in one session (14). Chen et al. (15) observed autism in 31% and mental retardation in 19% of the cases that received dental treatment under general anaesthesia. Çağıran et al. (5), in their study that included 330 mentally retarded cases, reported epilepsy in 35 (10.6%) patients and Down syndrome in 20 (6.1%) patients. In this study, it was observed that general anaesthesia was performed because of large surgical operations such as the presence of mental problems in 217 (46.5%) cases, presence of cooperation difficulty in 213 (45.6%) cases and maxillofacial surgery in 37 (7.9%) cases. The reasons for the ratios of mental problems such as autism (5.9%), mental retardation (38.9%), epilepsy (22.9%) and Down syndrome (2.4%) being different from those of other studies maybe because of the status of our hospital as a district hospital and patients from neighbouring cities coming to our hospital, which varies the population.

The anaesthesia method in dental interventions is accepted as same-day interventions. Because there is a strong relationship between the duration of intervention and discharge, it is reported that the duration of this kind of same-day interventions is limited to 90 min (13). In studies, the mean surgery time was observed as between 15 and 164 min (7, 9, 16-18) and postoperative recovery period as 45 min (7) and 70 min (16). In this study, the duration of intervention was on average 114.53±35.4 min, and this duration was due to cases of maxillofacial surgery that took approximately 300 min. The mean recovery period was 40.7±6.02 min, and this value is compatible with other studies (7, 16).

The ratios of temporary bacteraemia frequency after dental interventions differ greatly compared with other interventions and vary between 10% and 100% (19). In dental interventions where the gum or periapical region of the teeth is manipulated and in perforations of mouth mucosa and in patients with prosthetic valves and with congenital heart diseases who underwent intervention, antibiotics prophylaxis regarding infective endocarditis is recommended (20). The main goal in prophylaxis is oral streptococci, and oral or IV 2 g for adults, oral or IV 50 mg kg^{-1} for children amoxicillin and ampicillin is administered 30–60 min prior to the intervention (20). In this study, endocarditis prophylaxis was performed in 36 (7.7%) patients within the recommended time frame.

The method of analgesia differs depending on the features and magnitude of dental treatment. In small and short interventions, infiltration anaesthesia with 2% lidocaine and 1/80,000 adrenalin solution is sufficient, whereas additional analgesics must be administered in larger and longer interventions (21). In this study, analgesia is established by infiltration anaesthesia depending on the features of the surgery in 141 (30.2%) cases and by paracetamol in 311 (66.6%) cases.

Conclusion

General anaesthesia applications during dental treatments are becoming more common. In this patient group, the method of anaesthesia is important because of the frequency of genetic syndromes and mental retardation. Strategies must be determined, processes must be performed in the operating room and risk analysis must be performed in the anaesthesia management of these patients.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of İnönü University Faculty of Medicine (Ethics committee protocol code: 2014 / 192-03,12,2014).

Informed Consent: Written informed consent was obtained from patients and parents who participated in this case.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - A.S.Ö.; Design - A.S.Ö., M.A.E.; Supervision - M.D.; Funding - A.S.Ö., O.K.; Materials - M.Ş., O.K.; Data Collection and/or Processing - A.S.Ö., M.A.E., Analysis and/or Interpretation - M.D., C.Ç.; Literature Review - A.S.Ö., M.Ş.; Writer - A.S.Ö.; Critical Review - M.D., C.Ç., M.A.E.; Other - C.Ç.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. Landes DP. The provision of general anaesthesia in dental practice, an end which had to come? Br Dent J 2002; 192: 129-31. [CrossRef]
2. Karacalar S, Aykaç B. Dental girişimlerde genel anestezi uygulamaları. Marmara Med Jour 2010; 23: 400-7.
3. Enever GR, Nunn JH, Sheehan JK. A comprasion of postoperative morbidity following outpatient dental care under general anaesthesia in paediatric patinets with and without disabilities. Int J Paeditr Dent 2000; 10: 120-5. [CrossRef]
4. Nunn JH, Davidson G, Gordon PH, Storrs J. A retrospective review of a service to provide comprehensive dental care under general anesthesia. Spec Care Dentist 1995; 15: 97-101. [CrossRef]
5. Çağıran EY, Efeoğlu C, Balcıoğlu T, Koca H. Mental retarde hastalarda dental tedavi:Retrospektif inceleme. Turkiye Klinikleri J Med Sci 2011; 31: 830-6. [CrossRef]
6. McKay RE, Sonner J, McKay WR. Inhaled anesthetics In:Stoelting RK, Miller RD, eds. Basics of Anesthesia, 5th ed. Philadelphia: Churchill Livingstone, Elsevier 2007: 77-156.
7. Şahin M. Genel anestezi altında diş çekimi yapılan mental retarde hastalarda deneyimlerimiz. J Dent Fac Ataturk Univ 2011; 21: 10-4.
8. Michalek P, Hodgkingson P, Donaldson W. Fiberoptic intubation through an I-gel supraglottic airway in two patients with predicted difficult airway and intellectual disability. Anesth Analg 2008; 106: 1501-4. [CrossRef]
9. Küçükyavuz Z, Açar E. Diş hekimliği fakültesinde genel anestezi ile operasyon uygulanan hasta grubunun özellikleri. Turkiye Klinikleri J Dental Sci 2002; 81: 13-9.
10. Uzun Ş, Erdoğan N, Çelebi N, Çeliker V. Sifilizli olguda zor entübasyon. Türk Anest Rean Der Dergisi 2007; 35: 64-7.
11. Flynn P, Ahmed FB, Mitchell V, Patel A, Clarke S. A randomised comprasion of the single use LMA Fleksible with the reusable LMA Fleksible in paediatric dental day-case patients. Anaesthesia 2007; 62: 1281-4. [CrossRef]
12. Zhaoa N, Deng F, Yu C. Anesthesia for paediatric day-case surgery: A study comparing the classic laryngeal mask airway with nasal tracheal intubation. The J Craniofacial Surg 2014; 25: 245-8. [CrossRef]
13. White PF, Eng MR. Ambulatory (Outpatinet) Anesthesia. In:Miller RD, Ericson LI, Fleisher LA, Wiener-Kronish JP, Young WL, eds. Miller's Anesthesia, 7th edition. New York: Churchill Livingstone, Elsevier 2010: 2419-60. [CrossRef]
14. Wilson S. Pharmacologic behavior management for paediatric dental treatment. Paediatr Clin Noth Am 2000; 29: 30-6.
15. Chen YC, Chen YW, Tsai TP, Shih WY. Oral health status of children with special health care needs receiving dental treatment under general anesthesia at the dental clinic of Taipei Veterans General Hospital in Taiwan. J Chinese Med Association 2014; 77: 198-202. [CrossRef]
16. Kilmartin E, Grunwald Z, Kaplan FS, Nussbaum BL. General anesthesia for dental procedures in patients with fibrodysplasia ossificans progressiva: A review of 42 cases in 30 patients. Anesth Analg 2014; 118: 298-301. [CrossRef]
17. Silay E, Candirli C, Taskesen F, Coskuner I, Ceyhanli KT, Yildiz H. Could concious sedation with midazolam for dental procedures be an alternative to general anesthesia? Nigerian J Clinic Pract 2013; 16: 211-5. [CrossRef]
18. Forsyth AR, Seminario AL, Scott J, Berg J, Ivanova I, Lee H. General anesthesia time for dental cases. Pediatr Dent 2012; 34: 129-35.
19. Lockhart PB. The risk for endocarditis in dental practice. Periodontology 2000; 23: 127-35. [CrossRef]
20. Habib G, Hoen B, Tornos P, Thuny F, Prendergast P, Vilacosta I, ve ark. Enfektif endokardit tanı, önleme ve tedavi kılavuzu (2009 güncellemesi). Türk Kardiyol Dern Arş 2009; (Suppl 8): 89-133.
21. Roberts GJ, Hosey MT. Pharmacological management of pain and anxiety. In: Welbury RR, Duggal MS, Hosey MT, eds. Paediatric Dentistry, 3th ed. Philadelphia: Oxford University Press Inc, 2005: 65-88.