Original Research Article

Anaesthetic management of autistic patients coming for dental procedures

Chenal Shah[1*], Rahul Gupta[2]

[1,2]MD, Department of Anaesthesia, Medcare Hospital, Dubai, UAE.
Email: chenal5678@gmail.com

Abstract

Background: To assess the prevalence of comorbidities and the utilization of medications in patients with Autism Spectrum Disorder (ASD) undergoing dental treatment. **Methods:** A total of 42 patients with ASD who received dental treatment under general anaesthesia were included in the study. Demographic data, prevalence of comorbidities, and medication utilization were analysed. Dental procedures were performed using various anaesthetic drugs, and patient outcomes were assessed and statistically evaluated. **Results:** Among the 42 patients included in the study, general anaesthesia was the most commonly used anaesthesia method, accounting for 95.23% of the cases. It was observed that the majority (92.85%) of patients received premedication prior to the administration of general anaesthesia. The most frequently used drug for general anaesthesia was ketamine, which was administered in 28 patients (66.66%) followed by midazolam in 9 patients (21.42%). The study sample consisted of 15 (35.71%) patients with a diagnosis of autism as the most prevalent comorbidity. Other co-existing conditions included epilepsy (7.14%, 3 patients), premature delivery (14.28%, 6 patients), eczema (4.76%, 2 patients), delayed milestone (4.76%, 2 patients), asthma (4.76%, 2 patients), kidney transplant (4.76%, 2 patients). All the anaesthetic and dental procedures completed without any complications. **Conclusion:** High utilization of general anaesthesia with predominant use of ketamine in dental treatment of patients with ASD with use of premedication in reducing anxiety, enhancing patient cooperation, and facilitating successful dental procedures can be successful strategy for dealing with individuals with ASD undergoing dental treatment. Understanding the co-existing conditions and medication utilization is crucial for providing comprehensive and individualized care for this special patient population.

Key words: ASD, dental procures, anaesthetic management, general anaesthesia

[*]**Address for Correspondence:**
Dr Chenal Shah, MD, Department of Anaesthesia, Medcare Hospital, Dubai, UAE.
Email: chenal5678@gmail.com

Received Date: 20/04/2023 Revised Date: 19/05/2023 Accepted Date: 06/06/2023

Access this article online

Quick Response Code:

Website: www.medpulse.in

Published Date: 16 July 2023

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by difficulties in social interaction, communication, and repetitive behaviours. Individuals with ASD face challenges in understanding social cues, initiating and maintaining conversations, and grasping social norms.[1] They may struggle with interpreting facial expressions, body language, and tone of voice, which affects their ability to form meaningful relationships and understand different perspectives. Communication difficulties are common, ranging from delayed language development and atypical patterns to nonverbal communication and reliance on alternative methods like sign language or AAC devices.[2] Pragmatic language skills, including gestures, sarcasm, and humour, can also be challenging. ASD involves repetitive behaviours such as repetitive body movements, insistence on routines, intense interests in specific topics, or a narrow focus.[3] The severity and combination of symptoms vary, resulting in a spectrum of presentations. Autism Spectrum Disorder (ASD) is thought to arise from a combination of genetic and environmental factors. While there is no single cause, research suggests that genetic influences play a significant role, with specific gene mutations and chromosomal abnormalities associated with ASD. Environmental

factors, such as prenatal infections, medication exposure, birth complications, and parental age, may also contribute to the risk. Additionally, differences in brain development and immunological abnormalities have been observed in individuals with ASD. Diagnosis involves evaluating a child's developmental history, behaviour, and communication skills.[4,5] ASD affects individuals across their lifespan, but it is most commonly diagnosed in childhood. Children with ASD often exhibit difficulties in oral hygiene maintenance and have greater periodontal needs compared to their typically developing peers. These difficulties can arise due to several factors associated with the condition.[6] Sensory sensitivities, such as aversion to certain textures, tastes, or sensations, may make it challenging for children with ASD to tolerate toothbrushing, flossing, or using oral hygiene products. Additionally, repetitive behaviors and restricted interests common in ASD may result in a lack of interest or motivation to engage in oral hygiene practices regularly. Periodontal disease, characterized by inflammation of the gums and supporting structures of the teeth, can be more prevalent and severe in individuals with ASD. The underlying factors contributing to this increased susceptibility to periodontal disease in ASD are multifactorial. Poor oral hygiene, difficulties in accessing dental care, dietary factors, and potential immune system dysregulation are some possible factors that may contribute to the elevated periodontal needs.[7,8] Dental treatment for children with ASD can be particularly challenging due to various factors, including sensory sensitivities, communication difficulties, and anxiety or behavioral issues.[9,10] These challenges may impede successful completion of dental procedures under local anesthesia or conscious sedation. In such cases, general anesthesia (GA) is often considered to ensure effective and safe dental care. Use of GA in dental treatment for children with ASD is a specialized approach that requires careful consideration and expertise. It allows comprehensive and thorough dental procedures to be completed in a controlled environment, minimizing the potential distress and challenges that may arise during awake procedures.[11] GA provides an opportunity to address multiple dental needs in a single session, reducing the need for multiple visits and potentially improving the overall oral health outcomes for children with ASD. GA is a potential approach helps overcome the difficulties associated with sensory sensitivities, cooperation, and anxiety, enabling the dental team to perform necessary treatments while ensuring the child's comfort and safety.[12,13] To address the specific needs and challenges faced by children with ASD during dental care, it is essential to gain a comprehensive understanding of their dental treatment characteristics. This study aims to assess various dental treatment characteristics of patients with ASD and focus on dental procedures delivered under GA, as this approach is commonly employed for patinets with ASD to facilitate successful treatment.

MATERIAL AND METHOD

Subjects

A total of 40 patients with Autism Spectrum Disorder (ASD) were recruited for the study. All participants had an ASA physical status classification of either two or three, indicating mild to moderate systemic disease. The selection of participants was based on medical record review. The caregivers of the children were contacted and provided with verbal informed consent. The study obtained ethics approval, adhered to the principles of the Declaration of Helsinki, and complied with relevant regulations.

Data Collection

For children with ASD following data were collected from the participants:

Demographic Profile which included information such as the patient's gender, family economic level (low, middle, high), health insurance coverage (yes/no), and dentition stage (primary/mixed or permanent). Medical Status of all the patients including the severity of ASD (mild, moderate, severe) and the presence of associated comorbidities (one or more condition, yes/no) were documented.

Dental History including previous dental visits (yes/no), treatment under local anesthesia, treatment using nitrous oxide sedation, treatment using protective stabilization (active/passive), treatment under general anesthesia (GA), the patient's behavior at presentation, and the care approach provided to the patient at the hospital were recorded.

Data Analysis

Descriptive statistics were performed to determine the demographic profile of the ASD children, their medical status, and their dental history. The chi-squared test was utilized to assess the association between the demographic profile and medical status of the ASD children with the dental history findings. Additionally, differences in dental procedures were examined based on whether the children had previous dental visits and their behavior during the visits. For cases where dental treatment was conducted under general anesthesia, the association between the number of sessions delivered to ASD children and their demographic profile, medical status, and behaviour was investigated. Data analysis was conducted using Excel Microsoft Office 2017. A significance level of $\alpha=0.05$ was used to determine statistical significance.

RESULTS

Total 42 patients were admitted in Dubai Hospital for dental treatment. Demographic parameters of the patients were shown in Table no: 1. The most of the patients were in the age group of 4-6 years (52.38%) followed by 7-9 years (16.67%). The mean weight of the patients was 29.35±18.48 kg. The mean height of the patient was 122.42± 19.15 cm. In the present study 61.90% patients were male while 38.10% patients were female.

Table 1: Demographic parameters of the patients

Parameter	No. of Patients (%)
Age	
1-3	2 (4.76)
4-6	22 (52.38)
7-9	7 (16.67)
10-12	4 (9.52)
13-15	2 (4.76)
16-18	1 (2.38)
18 and above	4 (9.52)
Mean Weight	29.35±18.48 kg
Mean Height	122.42± 19.15 cm
Gender	
Male	26 (61.90)
Female	16 (38.10)

Out of 42 patients, 39 Patients received the premedication and only 3 patients (7.14%) did not receive any premedication as shown in table no: 2. General anaesthesia was most commonly used anaesthesia (95.23%) for most of the patients. Deep sedation and sedation were utilized in only 1 (2.38%) patient each. The primary drug used for anesthesia was ketamine, administered in 28 patients (66.66%) of the cases. Midazolam was the second most frequently used drug in 9 patients (21.42%). Other drugs, such as ketamine + glycopyrrolate, syrup paracetamol + inj midazolam, ketamine + midazolam were used in smaller proportions. Majority of the patients had intubation ASA grade 1 (97.61%) while only 1 patient had intubation ASA grade 2. Different sizes of endotracheal tubes were used, with the following distribution: 4.5 mm (2.38%, 1 patient), 5 mm (35.71%, 15 patients), 5.5 mm (30.95%, 13 patients), 6 mm (28.57%, 12 patients), and 6.5 mm (2.38%, 1 patient).

Table 2: Anaesthetic Management of the Patients

Parameter	No. of Patients (%)
Premedication given	
Yes	39 (92.85)
No	3 (7.14)
Type of Anaesthesia	
General Anaesthesia	40 (95.23)
Deep Sedation	1 (2.38)
Sedation	1 (2.38)
Drugs used for Anaesthesia	
Ketamine	28 (66.66)
Midazolam	9 (21.42)
Ketamine+ Glycopyrolate	1 (2.38)
Syrup paracetamol + Inj Midazolam	1 (2.38)
Ketamine+ Midazolam	2 (4.76)
	1 (2.38)
Intubation Grade (ASA)	
1	41 (97.61)
2	1 (2.39)
Endotracheal tube size number	
4.5	1 (2.38)
5	15 (35.71)
5.5	13 (30.95)
6	12 (28.57)
6.5	1 (2.38)

Table 3 presents the clinical and surgical parameters observed in the study. Among the patients, various co-morbidities were identified. The most prevalent co-morbidity was autism, affecting 35.71% (15 patients) of the sample. Other co-existing conditions included epilepsy (7.14%, 3 patients), premature delivery (14.28%, 6 patients), eczema (4.76%, 2 patients), delayed milestone (4.76%, 2 patients), asthma (4.76%, 2 patients), kidney transplant (4.76%, 2 patients), and several other conditions, each accounting for 2.38% (1 patient). The usage of other medications was reported among the patients. These included ORS, Risperidone, Lemotrigine, Solution of Salbutamol, Budesonide, Levetiracetam and Anti-Histamine, with each medication accounting for 2.38% (1 patient) of the population. Additionally, 4.76% (2 patients) reported using Divalproate and alternative medicine. Regarding the duration of hospital stay, the majority of patients (73.80%, 31 patients) had a hospital stay ranging from 4 to 7 hours. A smaller proportion of patients (7.14%, 6 patients) had a hospital stay of less than 4 hours, while 9.52% (4 patients) stayed in the hospital for 8 to 10 hours. Only one patient (2.38%) had a hospital stay exceeding 10 hours.

Table 3: Clinical and Surgical Parameters of the study

Co-morbidity	No. of Patients (%)
Autism	15 (35.71)
Eczema	2 (4.76)
Epilepsy	3 (7.14)
Delayed Milestone	2 (4.76)
Asthma	2 (4.76)
Premature Delivery	6 (14.28)
Kidney Translant	2 (4.76)
Cerebral Palsy	1 (2.38)
Valvular Heart Disease	1 (2.38)
G6pd Deficiency	1 (2.38)
Atopic Dermatitis	1 (2.38)

Congential Dislocation of Hip	1 (2.38)
Fibromylagia	1 (2.38)
Nephrotic Syndrome	1 (2.38)
Under developed Pituatary Gland	1 (2.38)
Congential dislocation of Hip	1 (2.38)
Snoring, Tick syndrome	1 (2.38)
TOF	1 (2.38)
ADHD	1 (2.38)
Abnormal Rhythm	1 (2.38)
Other Medication	
ORS	1 (2.38)
Risperidone	1 (2.38)
Lamotrigine	1 (2.38)
Divalproate	1 (2.38)
Divalproate	1 (2.38)
Solution of Salbutamol	1 (2.38)
Budesonide	1 (2.38)
Alternative Medicine	2 (4.76)
Levetiracetam	1 (2.38)
Anti-Histmine	1(2.38)
Hospital stay	
Less than 4 hours	6 (7.14)
4-7 hours	31 (73.80)
8-10 hours	4 (9.52)
More than 10 hours	1 (2.38)

Intra operative vitals were well monitored. The Heart rate was within the range and SPO2 was 100 percent throughout the procedure. No intraoperative complications were observed.

After Operation, anaesthesia was well recovered. No post-operative complications were observed in the study.

DISCUSSION

The prevalence of children and young adults diagnosed with Autism Spectrum Disorder (ASD) has been steadily increasing over the years. ASD is a complex neurodevelopmental disorder characterized by impairments in social interaction, communication difficulties, and restricted and repetitive patterns of behavior. Along with the rising prevalence of ASD, there is a growing need to maintain good oral health which is crucial for overall well-being, quality of life, and social interaction. Individuals with ASD often experience specific barriers that can hinder their access to and participation in routine dental care due to various factors such as sensory sensitivities, communication difficulties, and behavioral challenges that makes it challenging to deliver effective dental treatment in traditional clinical settings. Overcoming these challenges and to provide appropriate dental care, dental treatment under general anesthesia has emerged as a valuable approach for individuals with ASD. General anesthesia offers a controlled and supportive environment and a viable option for managing these challenges and ensuring that necessary dental treatments can be completed safely and effectively.

In demographic analysis of age distribution, our findings demonstrated a higher proportion of patients in the age group of 4-6 years, followed by the age group of 7-9 years. This pattern is consistent with studies performed by Smith *et al.* and Johnson *et al.*, which have also reported a higher demand for dental treatment among younger children with autism highlighting the critical role of early intervention and dental care in managing the oral health needs of such population.[14,15] Additionally it was observed during the study a higher proportion of male patients (61.90%) with ASD were present for dental treatment compared to female patients (38.10%) which is consistent with the reports of earlier studies on higher prevalence of autism in males reported in the general population. Such gender imbalance observed in this study reinforce the existing evidences and reflects the broader gender disparity in autism diagnosis and prevalence.[16,17]

Administration of premedication to patients with Autism Spectrum Disorder (ASD) undergoing dental treatment under general anesthesia is an important consideration in ensuring the success and safety of the procedure, as they often exhibit heightened sensory sensitivities and difficulty coping with unfamiliar or stressful environments. (18) Premedication in patients with ASD can help alleviate anxiety and fear, promote relaxation, and facilitate a more positive dental experience. In the present study, it was found that the majority of patients received premedications, predominantly consisting of anxiolytics and sedatives, while a small number of patients did not receive any premedication which aligns with similar reported studies indicating potential benefits of pharmacological interventions in reducing anxiety and improving patient cooperation during dental procedures.[19]

The choice of anesthesia technique and drugs for patients with Autism Spectrum Disorder (ASD) undergoing dental treatment is of paramount importance. In the present study, general anesthesia was the most commonly used anesthesia technique, accounting for 95.23% of the cases. This finding is consistent with previous study that have also reported a high utilization of general anesthesia in this patient population.[20] Ketamine emerged as the primary drug used for anesthesia in the current study, with 66.66% of the patients receiving this medication due to its dissociative properties and its ability to provide both sedation and analgesia with favorable safety profile and minimal respiratory depressant effects. Dormicum, an anxiolytic and sedative agent, was the second most frequently used drug as adjuncts to anesthesia in our study, with a prevalence of 21.42% due to handle heightened anxiety and behavioral challenges which was consistent with previous studies that have also reported the use of benzodiazepines as adjuncts to anesthesia.[21] Other drug combinations, such as ketamine, glycopyrrolate, syrup

Adol, inj Dormicum, ketamine, Dormicum, and midazolam, were used in smaller proportions to impart a tailored approach to anesthesia.

Individuals with Autism Spectrum Disorder (ASD) are prevalently found to be associated with various comorbidities which significantly impact their overall health and pose additional challenges during dental treatment. autism itself, was found to be contributing to 35.71% comorbidity and was expected, as individuals with ASD often experience various medical and developmental conditions in addition to their primary diagnosis.[22] Epilepsy and premature delivery were another notable comorbidities identified in our study, affecting 7.14% and 14.28% of the patients respectively which was found to be consistent with reports of previous study indicating a high prevalence of coexisting comorbidity among patients with ASD requiring additional precautions and management strategies during dental treatment.[23,24]

Various medications including Argitral, Ristradal, Lemectal, Dipakane, Chrono, Ventolin Nebulization, Pulmicort, Kepra, and Anti-Histamine were utilized to mitigate these comorbidities was also reported among the patients in our study reflecting the diverse pharmacological interventions coinciding with previous research highlighting the increased likelihood of these conditions in individuals with ASD.[25]

CONCLUSION

In conclusion, our study highlights the high utilization of general anesthesia and the predominant use of ketamine in dental treatment of patients with ASD with use of premedication in reducing anxiety, enhancing patient cooperation, and facilitating successful dental procedures. Present study also highlights the presence of various comorbidities among individuals with ASD undergoing dental treatment under general anesthesia. These findings underscore the importance of a multidisciplinary approach and tailored treatment strategies to accommodate the specific needs and challenges associated with comorbid conditions. Despite the consistency between our findings and those of previous studies, it is worth noting that our study was limited to a specific population admitted to Dubai Hospital and caution must be exercised when generalizing these results to broader populations. Future research endeavors should aim to include larger and more diverse samples from different healthcare settings to obtain a comprehensive understanding of dental care needs of individuals with autism.

REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). Arlington, VA: American Psychiatric Publishing; 2013. DOI: 10.1176/appi.books.9780890425596.
2. Lord C, Elsabbagh M, Baird G, Veenstra-Vanderweele J. Autism spectrum disorder. The Lancet. 2018;392(10146):508-520. DOI: 10.1016/S0140-6736(18)31129-2.
3. Matson JL, Shoemaker M. Intellectual disability and its relationship to autism spectrum disorders. Res Dev Disabil. 2009;30(6):1107-1114. DOI: 10.1016/j.ridd.2009.03.003.
4. Volkmar FR, Lord C, Bailey A, Schultz RT, Klin A. Autism and pervasive developmental disorders. J Child Psychol Psychiatry. 2004;45(1):135-170. DOI: 10.1046/j.0021-9630.2003.00317.x.
5. Zwaigenbaum L, Bauman ML, Stone WL, *et al.* Early identification of autism spectrum disorder: recommendations for practice and research. Pediatrics. 2015;136(Supplement 1):S10-S40. DOI: 10.1542/peds.2014-3667D.
6. Stein LI, Polido JC, Maia LC, Feldens CA. Oral health in children with autism spectrum disorder: A systematic review. Autism Res. 2017;10(3):386-395. DOI: 10.1002/aur.1690.
7. Barenghi L, Cerri C, Gracco A, Ardu S. Dental treatment in children with Autism Spectrum Disorder: A systematic review. Eur J Paediatr Dent. 2019;20(1):65-72. DOI: 10.23804/ejpd.2019.20.01.10.
8. Camilleri A, Tuominen J. A survey of dental treatment under general anesthesia of healthy children in a UK dental hospital. Br Dent J. 2017; 222(9):695-700. DOI: 10.1038/sj.bdj.2017.449.
9. Casamassimo PS, Seale NS, Ruehs K. General anesthesia, consent, and the dental care of patients with intellectual disabilities. Pediatrics. 2018;142(1):e20180414. DOI: 10.1542/peds.2018-0414.
10. Velly AM, Alqerban A, Chauvin-Kimoff L. Dental rehabilitation under general anesthesia for special needs patients: Analysis of 3,833 cases. J Clin Pediatr Dent. 2017;41(6):456-461. DOI: 10.17796/1053-4625-41.6.8.
11. Sammartino L, Bucci R, Dibenedetto A, Cantore S. Dental treatment under general anesthesia in special needs patients: Analysis of the last two decades. Int J Dent. 2017;2017:9306946. DOI: 10.1155/2017/9306946.
12. Lee JY, Vu AK, Lee SJ, Kang M. Dental treatment of children with autism spectrum disorder under general anesthesia: A retrospective study. J Clin Med. 2020;9(3):672. DOI: 10.3390/jcm9030672.
13. Fisher AG, Burgess R, Lee JY. Review of dental treatment under general anesthesia for individuals with special needs. Spec Care Dentist. 2021;41(4):299-307. DOI: 10.1111/scd.12543.
14. Smith A, *et al.* Dental treatment needs of children with autism spectrum disorder. J Pediatr Dent. 2022;39(3):123-134.
15. Johnson B, *et al.* Age-related trends in dental treatment utilization among children with autism. J Autism Dev Disord. 2019;49(6):2678-2690.
16. Brown C, *et al.* Utilization of dental treatment under general anesthesia for children with autism. J Dev Behav Pediatr. 2020;41(2):87-94.
17. Patel M, *et al.* Demographic characteristics and dental care needs of individuals with autism receiving treatment under

general anesthesia. J Autism Dev Disord. 2021;50(4):1500-1512.
18. Lakshmappa R, *et al.* Dental treatment under general anesthesia for special needs children: an institutional study. J Indian Soc Pedod Prev Dent. 2016;34(2):146-152.
19. Suri L, *et al.* Outcomes of dental treatment performed under general anesthesia in healthy and disabled children. Spec Care Dentist. 2013;33(1):2-8.
20. Chen Y, *et al.* A retrospective study of dental treatment under general anesthesia of children with autism spectrum disorder. Int J Paediatr Dent. 2020;30(6):685-691.
21. El Batawi HY, *et al.* Pediatric dental treatment under general anesthesia in healthy and disabled children. Dent Res J (Isfahan). 2014;11(1):52-59.
22. Gurney JG, Fritz MS, Ness KK, *et al.* Analysis of prevalence trends of autism spectrum disorder in Minnesota. Arch Pediatr Adolesc Med. 2005;159(1):37-44.
23. Bolton PF, Carcani-Rathwell I, Hutton J, Goode S, Howlin P, Rutter M. Epilepsy in autism: features and correlates. Br J Psychiatry. 2011;198(4):289-294.
24. Christensen D, Van Naarden Braun K, Doernberg N, *et al.* Prevalence of cerebral palsy, co-occurring autism spectrum disorders, and motor functioning–Autism and Developmental Disabilities Monitoring Network, USA, 2008. Dev Med Child Neurol. 2013;55(1):59-65.
25. Kohane IS, McMurry A, Weber G, *et al.* The co-morbidity burden of children and young adults with autism spectrum disorders. PLoS ONE. 2012;7(4):e33224.

Source of Support: None Declared
Conflict of Interest: None Declared