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IMPACT DE L'ÉTAT DE SANTÉ GÉNÉRALE SUR LA PRISE DE DÉCISION POUR LES SOINS SOUS ANESTHÉSIE GÉNÉRALE EN ODONTOLOGIE PÉDIATRIQUE

THÈSE POUR LE DIPLÔME D'ÉTAT DE
DOCTEUR EN CHIRURGIE DENTAIRE

Présentée et soutenue publiquement par

ROUSSEAU Thomas

Le 20/04/2023 devant le jury ci-dessous

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Département de Prothèses

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Docteur de l'Université de Grenoble, habilitée à diriger les recherches
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Table des matières

Retrospective study of the impact of medical status on the choice of dental procedures under general anesthesia

Thomas Rousseau[1], Alice Beaupère[1], Roselyne Clouet[2], Camille Boeffard[2], Alexis Gaudin[3], Tony Prud'homme[2]

[1]Nantes Université, CHU Nantes, F-44000 Nantes, France
[2]Nantes Université, CHU Nantes, Unité d'Investigation Clinique en Odontologie, UIC 11, F-44000 Nantes, France
[3]Nantes Université, Oniris, CHU Nantes, INSERM, Regenerative Medicine and Skeleton, RMeS, UMR 1229, F-44000 Nantes, France

Corresponding Author

Tony Prud'homme
1 place Alexis Ricordeau, 44042 Nantes Cedex 1, France
tony.prudhomme@univ-nantes.fr

Retrospective study of the impact of medical status on the choice of dental procedures under general anesthesia

Abstract

Purpose: The purpose of this study was to assess the type of dental procedures performed on children under General Anesthesia (GA) and to determine if the pattern differs between healthy children and those with special healthcare needs.
Methods: In this retrospective study, data were reviewed from the dental records of pediatric patients who underwent dental treatment under GA from 2015 to 2020 at Nantes University Hospital. Patients with mental or physical disabilities were categorized as Disabled (D), while healthy children were assigned to the Healthy group (H). Records from patients with Systemic Diseases were also analyzed with (D+SD) or without (SD) Disabilities. The number and type of dental treatments were compared between each group.
Results: A total of 655 patients were treated under GA. Patients in groups H and SD were significantly younger than those in the disabled group. Primary teeth were more frequently treated in groups H and SD than in groups D and SD+D, while the opposite was true for permanent teeth. There were more extractions of temporary teeth than restorative treatments performed in children with disabilities.
Conclusion: The findings of this study suggest that the health conditions of young patients, such as a disability, impact their dental procedures when undergoing GA.

Keywords: Deep sedation, Pediatric dentistry, Disabled children, Dental Care for Children.

Introduction

Dental treatment of pediatric patients can be difficult due to their high levels of anxiety, which may lead to limited cooperation with clinicians. Many situations can be addressed using non-pharmaceutical behavioral techniques, but some young patients may not respond well due to a lack of psychological or emotional maturity, or because of mental, physical, or medical disabilities (Koberova Ivancakova et al. 2019; Vargas Román et al. 2003; Grindefjord et al. 2018; Albadri et al. 2006). In such cases, they may not be able to tolerate treatment under local anesthesia alone or in combination with inhalation sedation (nitrous oxide/oxygen sedation) (Mallineni and Yiu 2016). General anesthesia allows access to comprehensive oral rehabilitation in a single session including full mouth prophylaxis treatment, pulp therapy, tooth extraction and dental restoration.

Oral health is often described as a source of health inequalities in people with disabilities. Studies have shown that oral health in these individuals is reported to be worse than healthy children (Hennequin et al. 2008; Desai et al. 2001; Lewis 2009) due to difficulties in maintaining oral hygiene and coping skills in dental offices (Casamassimo et al. 2004). General anesthesia may also be required for children with systemic disorders due to risks or contraindications related to their conditions. Moreover, systemic diseases and their associated medications are known to sometimes aggravate dental illnesses (Peretz et al. 2012).

Some studies have suggested that during general anesthesia, the balance between conservative dental treatments and extractions is affected by the child's medical status (Sevekar et al. 2021). More data is required to improve our understanding and management of patients. Therefore, the purpose of this retrospective study was to assess the differences in treatments performed under general anesthesia at Nantes University Hospital between children with special healthcare needs, those who have disability or systemic diseases, and their healthy peers.

Material and methods

This retrospective monocentric study was conducted at Nantes University Hospital, France, based on an analysis of past medical records (dental and general) available in the hospital database. The research protocol was approved by the Department of Clinical Research and Innovation of the hospital.

Information was manually reviewed through the different software programs used in the hospital. By cross-checking them, we identified 655 patients under 17-years-old who received dental treatment under General Anesthesia (GA) between 2015 and 2020. Birthdate, medical situation and dental care under GA were required for each patient to be included in this study.

All patients were either referred by dentist offices or were already followed in the hospital. GA was planned after the failure of behavioral techniques and/or conscious sedation. Waiting time between planning and GA ranged from 6 months to 1 year. Temporary dental care could be performed depending on children's cooperation. Anesthetic preoperative assessment was received by all patients and a pediatric anesthesiologist assessed if their general condition was suitable for GA. Information was given to parents prior to obtaining their written consent. Dental treatment was performed by three different dentists over the 5 years. Patients were asked to attend a follow-up control from 3 to 6 months' post-treatment.

Patients were divided into four groups according to medical status. The first group consisted of Healthy children (H); the second group involved children with Systemic Diseases (SD); the third group concerned our patients suffering from at least one mental or physical Disability (D); while the last one involved children suffering from both Disability and Systemic Disease (D+SD). The data regarding patient age, general health, and type of treatment were analyzed. Dental care was classified into restorative procedures, endodontic treatment and avulsion for both permanent or temporary teeth.

All data were manually retrieved by the same investigator by cross-checking the database. Quantitative data were assessed by descriptive analysis using mean and standard deviation. Qualitative data were expressed by number and frequency. The mean age of every group was evaluated using an ANOVA test, followed by a post-hoc Tukey test. The Student's t-test was used to check variations in the mean number of each type of dental treatment. The ratio between dental extractions and conservative treatment was also calculated and compared using a Fisher test. Validity conditions were confirmed for every test. Statistics were performed using Python (3.11.2 version, USA) and Jamovi (2.3.16 version, Netherlands). Figures were created using Canva (1.62.0 version, Australia) and Jamovi (2.3.16 version, Netherlands).

Results

Descriptive analysis

After screening the database, a total of 655 patients were eligible for study inclusion. As shown in **Figure 1**, 461 were assigned to group H (70,4%); 77 to group SD (11,8%); 82 to group D (12,5%); and the remaining 35 of them to the group D+SD (5,3%).

The mean age was calculated for each group. For group H, the average age was 5,66 years, while it was 6,22 in the SD group. Patients in group D were on average 8,57 years old, when they were 8,89 years old in the D+SD group.

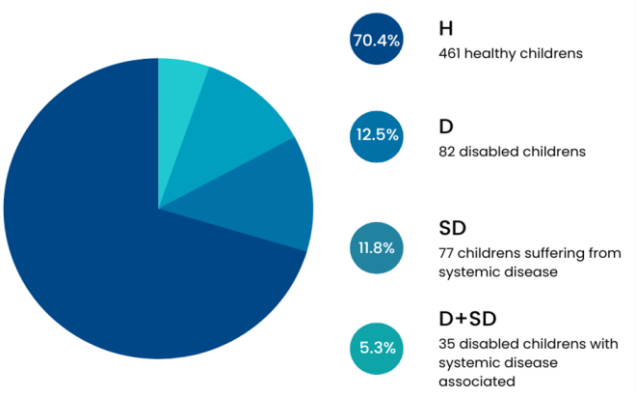

Figure 1 Distribution of patients according to their medical status

Overall, a total of 5962 teeth were treated, with 5153 (86,4%) of them being Temporary Teeth (TT), and 810 (13,6%) Permanent Teeth (PT). The distribution of patients between the 4 groups is shown in **Figure 2**. Group H shows 3946 (90,3%) TT on 4372 teeth treated; while in group SD 615 (87,1%) of the 706 teeth attended were temporary. In group D, these numbers were 413 (66,3%) on 623 teeth treated; and 179 (68,3%) on 262 in group D+SD.

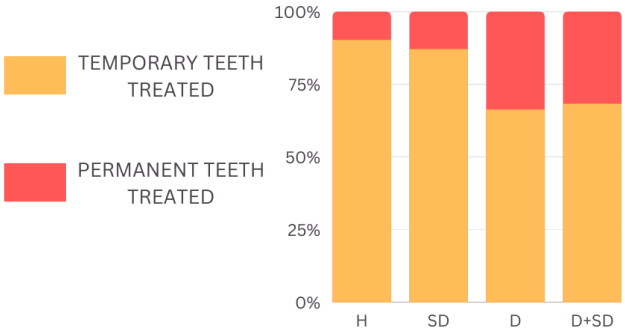

Figure 2 Temporary and permanent teeth treated

		RESTORATIVE TREATMENT	ENDODONTIC TREATMENT	EXTRACTION	PEDIATRIC CROWN	TOTAL OF TREATMENTS	TEETH TREATED
TEMPORARY TEETH	H	2087	563	1859	0	**4509**	**3946**
	SD	339	89	276	0	**704**	**615**
	D	181	45	232	0	**458**	**413**
	SD+D	84	18	95	0	**197**	**179**
	TOTAL	**2691**	**715**	**2462**	**0**	**5868**	**515**
PERMANENT TEETH	H	308	5	108	13	**431**	**426**
	SD	57	4	31	3	**95**	**91**
	D	157	3	50	3	**213**	**210**
	SD+D	60	0	23	0	**83**	**83**
	TOTAL	**582**	**12**	**212**	**16**	**822**	**810**

Table 1 Type and number of dental cares performed on temporary and permanent teeth

Table 1 illustrates the distribution of dental cares (Restorative, Endodontic, or Extraction) performed on temporary or permanent teeth. It is important to acknowledge that for every endodontic treatment, a restorative care is then needed on the same tooth. It means that the sum of all treatment is not equal to the number of teeth treated overall.

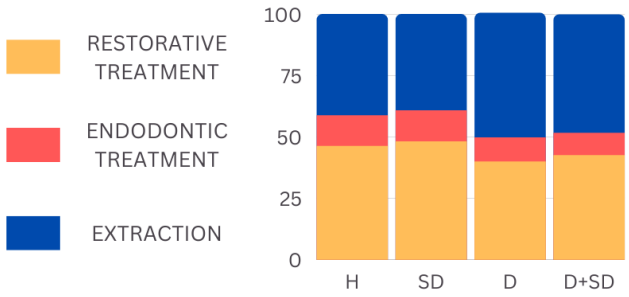

Figure 3 Dental treatment performed on temporary teeth

Endodontic treatment ratio was similar in each group (ranging from 9,1% of all treatments in D+SD group to 12,6% in SD group) (**Figure 3**). Patient with disabilities with or without systemic disease had more teeth extracted than restored **(**50,7% extraction VS 39 ,5% restorative treatment and 48,2 VS 42,7%, respectively).
Opposite results were observed from patients in group H and SD (respectively 48,2% restorative treatment VS 39,2% extraction; and 46,3% VS 41,2%). Regarding permanent teeth, restorative care was above other treatments in all groups (**Figure 4)**.

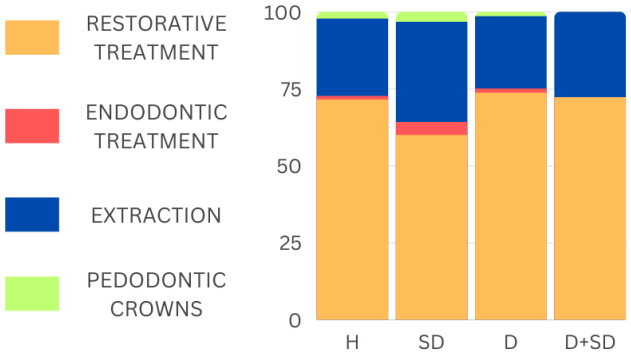

Figure 4 Dental treatment performed on permanent teeth

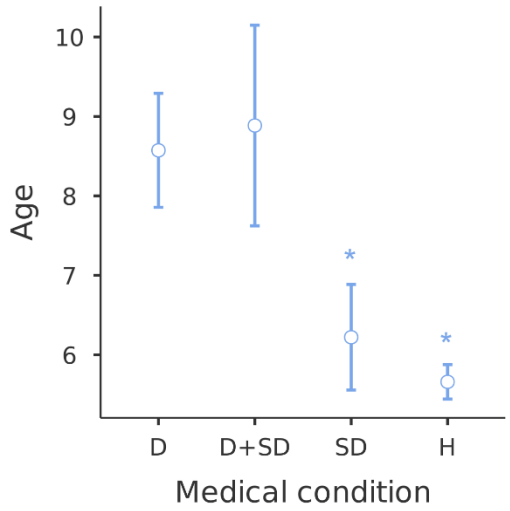

Figure 5 Age distribution, results are expressed in mean +/- Standard deviation
* significantly different from D and D+SD (p<0,001)

Comparative analysis

Healthy children and those suffering from systemic disease were significantly older than their disabled peers (**Figure 5**).

	TEMPORARY TEETH				PERMANENT TEETH		
Groups compared	**Teeth treated**	**Restorative care**	**Pulp therapy**	**Extraction**	**Teeth treated**	**Restorative care**	**Extraction**
H and D	H > D *p*=0.000001	H > D *p*=0.000001	H > D *p*=0.0002	H > D *p*=0.0017	H < D *p*=0.000001	H < D *p*=0.000001	H < D *p*=0.0001
H and D+SD	H > D+SD *p*=0.000007	H > D+SD *p*=0.0001	H > D+SD *p*=0.0087	H > D+SD *p*=0.0204	H < D+SD *p*=0.00002	H < D+SD *p*=0.0001	H < D+SD *p*=0.0024
SD and D	SD > D *p*=0.001	SD > D *p*=0.00002	SD > D *p*=0.009		SD < D *p*=0.0006	SD < D *p*=0.0004	
SD and D+SD	SD > D+SD *p*=0.0045	SD > D+SD *p*=0.0055			SD < D+SD *p*=0.0153	SD < D+SD *p*=0.0098	

Table 2 Difference in numbers of treatment performed under general anesthesia and their p-value

Our results show that disabled children with or without systemic diseases present a significantly higher number of temporary teeth treated compared to patients from group H or SD (**Table 2**). Focusing on those temporary teeth, our study revealed significantly more restorative treatment and pulp therapy in group H or SD compared to their disabled counterparts. Healthy children also exhibit significantly more temporary teeth extracted than disabled children (D and D+SD).

Most of those trends reverse when considering permanent teeth, which were significantly more impacted when children were disabled. Restorative treatment and extractions were significantly lower in healthy children than in disabled ones (D and D+SD). The low number of endodontic treatments and pedodontic crowns carried out on permanent teeth did not make it possible to identify a significant trend in this study

Overall, during an intervention under general anesthesia, significantly more teeth (permanent and temporary) were treated in healthy children compared to disabled ones with (p=0.0024) or without (p=0.00002) systemic diseases. Similarly, more teeth were treated in group SD than in group D (p=0.0077) and D+SD (p=0.04). When it came to evaluating the proportion of extraction in comparison to restorative care on temporary teeth, this study highlights a significantly higher ratio of dental avulsion in disabled children than in group H and SD (p=0.0005).

Discussion

The use of general anesthesia for dental care can be essential for providing safety and efficacy to certain groups of patients. Individuals with mental or physical disabilities, and very young children with low cooperation skills are known to be a major part of this group (Wong et al. 1997; Giovannitti 1995; Lee et al. 2009). In this study conducted at the Nantes University Hospital, we aimed to determine whether the medical condition of pediatric patients undergoing general anesthesia was a factor in the type of dental care they received. We analyzed dental records from 655 young patients.

Our results indicate an increased number of temporary teeth treated in children without disabilities, whether we focus on restorative and pulp therapy, extraction, or all treatments on primary dentition. These results are consistent with other findings showing that treatment of primary dentition was more frequently performed in healthy children compared to medically compromised ones (Koberova Ivancakova et al. 2019). This might be explained by a difference in age distribution. In this study, disabled patients were significantly older than healthy children, in agreement with findings by Haubek et al. (2006). In healthy and systemic disease groups, the major issue for dental office treatment was the lack of cooperation and reluctance due to the patients' young age. As they age, these patients are more likely to understand and tolerate dental treatment under local anesthesia. This could explain the age discrepancy between them.

However, in the case of temporary dentition, the proportion of extractions to restorative care in our patients was significantly higher when they suffered from a handicap. An underlying medical condition may influence the choice of treatment by the pediatric dentist, leading them towards more invasive procedures for disabled children ; as discussed by Harrison and Roberts (1998). According to them, the dentist may prefer to opt for tooth extraction over restorative care in those groups because of the risk of harmfulness is higher in disabled children in case of restoration failure. Moreover, several studies report that oral health in children with disabilities is poorer than in healthy patients, and this situation worsens with age (Hennequin et al. 2008; Desai et al. 2001; Lewis 2009; Lee et al. 2009). As a result, the number of poor prognosis teeth is increased in our medically compromised patients, subsequently increasing radical treatments.

In permanent dentition, this study highlights that children with disabilities have a higher number of permanent teeth treated under GA, whether restorative care or extractions, which is compatible with Koberova Ivancakova et al. (2019) findings.

The comparison of means for the total number of teeth treated, both primary and permanent, also shows that the Healthy and SD groups had the highest number of teeth treated under general anesthesia. Those results are in line with a study from Loyola-Rodriguez et al. (2009) where patient with special medical needs had fewer teeth treated than healthy patients. Findings by Camilleri et al. (2004) have also concluded that healthy children needed more dental procedures than Medically Compromised/Developmentally Disabled children under GA.

Our study was a single center retrospective study. Multi-centric studies are recommended to better understand those variations in dental care based on health status. On large populations, it would be possible to investigate possible differences between specific health conditions, for example between different disability types. This would also avoid an impact linked to the operators. Yet, with 5 years limited duration and a total of 655 medical records included, this survey still manages to give a trend for care habits at a local level. The follow-up of these patients would also be particularly interesting to observe.

Conclusions

General anesthesia is a useful tool to enable access to dental treatment for both young children or disabled one. In this study, our disabled patients were older than those in other groups, resulting in a smaller number of treatments performed on their temporary teeth, but a greater number on their permanent teeth. However, we also found a trend towards more radical treatments in disabled children. Therefore, it seems necessary to develop prevention methods to better raise awareness and care for this population.

Declarations

Author contributions

Conceptualization: TP, AG; Methodology: TP, AG, AB; Formal analysis and investigation: AB, TR; Writing - original draft preparation: TR, CB; Writing - review and editing: TP, AG, AB, RC; Supervision: TP, AG, RC.

Compliance with Ethical Standards

As our study was retrospective, the Clinical Research Department of Nantes University Hospital authorized it without the need for additional ethical advice. Likewise, no contact with the patients has been foreseen, nor any information to their destination.

Conflict of interests

No funding was received for conducting this study. The authors have no relevant financial or non-financial interests to disclose.

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ROUSSEAU (Thomas) - Impact de l'état de santé générale sur la prise de décision pour les soins sous anesthésie générale en odontologie pédiatrique. 5fig. 2 tabl. 18 ref. (Thèse: Chir dent ; Nantes ; 2023)

RÉSUMÉ :
Objectif : L'objectif de cette étude était d'évaluer le type de procédures dentaires réalisées sur des enfants sous Anesthésie Générale (AG) et de déterminer s'il y avait un impact de l'état de santé général sur leur prise en charge.
Méthodes : Dans cette étude rétrospective, les données ont été examinées à partir des dossiers dentaires de patients pédiatriques ayant subi un traitement dentaire sous AG de 2015 à 2020 à l'Hôpital Universitaire de Nantes. Les patients présentant des troubles mentaux ou physiques ont été catégorisés en tant que groupe Handicapé (D), tandis que les enfants en bonne santé ont été assignés au groupe Santé (H). Les dossiers des patients atteints de maladies systémiques ont également été analysés avec (H+SD) ou sans (SD) Handicaps. Le nombre et le type de traitements dentaires ont été comparés entre chaque groupe.
Résultats : Au total, 655 patients ont été traités sous AG. Les patients des groupes H et MS étaient significativement plus jeunes que ceux du groupe Handicapé. Les dents temporaires ont été plus fréquemment traitées dans les groupes H et SD que dans les groupes D et D+SD, tandis que l'inverse était vrai pour les dents permanentes. Il y a eu plus d'extraction de dents temporaires que de traitements restaurateurs chez les enfants handicapés.
Conclusion : Les résultats de cette étude suggèrent que les conditions de santé des jeunes patients, telles qu'un handicap, ont un impact sur leurs procédures dentaires lorsqu'ils subissent une AG.

RUBRIQUE DE CLASSEMENT :
Pédodontie - Anesthésie

MOTS-CLÉ MESH:
Etude rétrospective / retrospective analysis
Enfants handicapé / disabled children
Anesthésie générale / general anaesthesia, deep sedation
Odontologie pédiatrique / Pediatric dentristry

JURY :
Président : Professeur GAUDIN Alexis
Assesseur : Docteur CLOUET Roselyne
Assesseur : Professeure CHAUX Anne-gaëlle
Directeur de thèse : Docteur PRUD'HOMME Tony