Parental Satisfaction with Ambulatory Anesthesia during Dental Treatment for Disabled Individuals and Their Preference for Same in Future

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Abstract

The purpose of this study was to survey parental satisfaction with ambulatory anesthesia during dental treatment in disabled patients. Factors associated with parental preference for general anesthesia during future dental treatment in such patients were also investigated. A questionnaire was mailed to the parents of 181 disabled individuals who underwent dental treatment under ambulatory anesthesia at Tokyo Dental College Suidobashi Hospital between 2012 and 2016. A total of 71 responses were received (39.2%). The mean patient age was 18 years, and disabilities included autism spectrum disorder, intellectual disability, cerebral palsy, and epilepsy. The items surveyed included dental treatment details, number of times patients received general anesthesia, type of anesthetic used, anesthesia induction method, durations of treatment and anesthesia, and the presence or absence of intraoperative or postoperative complications. Questionnaire items queried problems related to dental care, anesthesia history, preoperative anxiety, length of fasting period, induction of general anesthesia, nursing and hospital room environment, postoperative anxiety, overall evaluation, and whether the parent would prefer general anesthesia during future dental treatment. The patients were divided into 2 groups: those whose parents preferred general anesthesia during future dental treatment and those whose parents did not. The results revealed that, where disabled individuals had previously received general anesthesia during dental treatment, the parents were more likely to prefer general anesthesia during future dental treatment.

Key words: Disabled — Satisfaction — Ambulatory anesthesia — Dental treatment

Introduction

The benefits of administering general anesthesia during dental treatment for disabled individuals include increased safety in cases where the patient is fearful and/or non-cooperative and increased postoperative quality of life. In addition, general anesthesia is
often selected for disabled patients undergoing dental treatment due to the duration of treatment and number of visits required. Because of the nature of dental care, disabled patients typically undergo dental treatment multiple times during their lifetime. Although children without disabilities are usually able to undergo dental treatment without general anesthesia, those with special needs may need to undergo general anesthesia multiple times due to behavioral difficulties, regardless of any training they might have undergone.

The aim of this study, therefore was to survey parental satisfaction with ambulatory anesthesia during dental treatment in disabled patients. Factors associated with parental preference for general anesthesia during future dental treatment in such patients were also investigated.

**Materials and Methods**

The protocol of this study was approved by the Independent Ethics Committee of Tokyo Dental College (Approval number: 691). The subjects comprised disabled patients undergoing ambulatory anesthesia during dental treatment at this hospital between 2012 and 2016. Questionnaires and details regarding the study were mailed to the parents of these disabled patients. Parents who consented to participate in the study then completed and returned the questionnaires by post. The items surveyed included the following: patient age; sex; diagnosed disorder or disability; details of dental treatment; number of times patient underwent general anesthesia; type of anesthetic used; anesthesia induction method; operative duration; anesthesia duration; and presence or absence of intraoperative or postoperative complications. The questionnaire items also included the following: whether the patient visited the department of dentistry again after dental treatment; the number of times they underwent dental treatment under general anesthesia; whether they had problems related to dental care; whether the parents experienced preoperative anxiety; whether the parents understood the preoperative explanations; whether the patient adhered to the fasting period; whether anesthesia induction went smoothly; whether the hospital room and nursing care were pleasant; the presence or absence of postoperative anxiety; the overall evaluation of the most recent dental treatment; and whether the parents would prefer general anesthesia during future dental treatment. Multiple selections were possible regarding details of preoperative and postoperative anxiety. Preoperative anxiety was assessed based on the following questionnaire items: anxious about subsequent complications or accidents from general anesthesia; anxious about the impact of the anesthetic on the body; fasting prior to anesthesia; and anxious about preoperative tests. Postoperative anxiety was assessed by using the following questionnaire items: anxious that the patient would feel ill after returning home; anxious about some inconvenience on the way home; and anxious that the patient would feel ill on the way home.

The patients were divided into 2 groups: those whose parents preferred general anesthesia during future dental treatment and those whose parents did not. Each item surveyed was compared between the 2 groups. An unpaired *t*-test was used to examine intergroup differences in operative duration, anesthesia duration, the number of teeth treated, and patient age. The *χ*² test was used to examine questionnaire items and whether patients underwent surgical or endodontic procedures. For all univariate comparisons, a *p*-value of <0.05 was considered statistically significant. Univariate items with a *p*-value of <0.05 were then used as independent variables in the multivariate analysis. Logistic regression analysis was performed on the items selected as independent variables, and the dependent variable was whether the parents preferred general anesthesia during future dental treatment or not. All statistical analyses were performed using SPSS version 24 (IBM Corp., Armonk, NY, USA).
Results

The questionnaires were mailed to the parents of 181 disabled patients. The response rate to the questionnaire was 71/181 (39.2%). The 71 patients comprised 43 male patients (60.6%) and 28 female patients (39.4%); the mean patient age was 18 years (≤10 years = 24 patients, 11–20 years = 20 patients, 21–30 years = 18 patients, 31–40 years = 5 patients, and 41–50 years = 4 patients). Forty-one patients (57.7%) had an autism spectrum disorder; 21 patients (29.6%) had an intellectual disability, including chromosomal abnormalities; 15 patients (21.1%) had epilepsy; and 6 patients (8.5%) had cerebral palsy with an intellectual disability.

Fifty-six patients (78.9%) underwent inhaled anesthesia induction with sevoflurane, while 15 patients (21.1%) underwent intravenous induction with propofol. Anesthesia was maintained with intravenous propofol and remifentanil in 39 patients (54.9%) and with sevoflurane in 32 patients (45.1%).

The mean operative duration was 118 ± 66 min, and the mean anesthesia duration was 177 ± 69 min. Intraoperative complications occurred in 4 patients (5.6%) and comprised laryngospasm and decreased percutaneous arterial oxygen saturation [SpO₂], but there were no severe complications. Postoperative complications comprised shivering, nausea, and sore throat, and occurred in 1 patient each (a total of 3 patients, 4.2%). The mean number of teeth treated per dental treatment session under general anesthesia was 7.4 (range, 1–16). Surgical procedures, including dental extraction, were performed in 42 patients (59.2%), and endodontic procedures in 19 patients (26.8%).

Fifty-one patients (71.8%) continued to visit the dentist after undergoing dental treatment under general anesthesia. Although the parents of 47 patients (66.2%) answered that their children did not continue to have problems related to dental care, the parents of 24 patients (33.8%) responded that they did. These problems comprised dental caries, periodontal disease, dentures, and which dentist would treat him/her. This was the first dental treatment under general anesthesia for 51 patients (71.8%), the second for 11 patients (15.5%), and the third or more for 9 patients (12.7%). The parents of 54 patients (76.1%) responded that the patient experienced preoperative anxiety, whereas the parents of 17 patients (23.9%) responded that the patient did not. Preoperative anxiety details comprised the following: anxious about subsequent complications or accidents from general anesthesia, which was selected by the parents of 36 patients (50.7%); followed by anxious about the impact of the anesthetic on the body (parents of 24 patients, 33.8%); fasting prior to anesthesia (parents of 7 patients, 9.9%); anxious about preoperative tests (parents of 6 patients, 8.5%); and other anxieties (parents of 7 patients, 9.9%). The parents of 70 patients (98.6%) understood the preoperative explanations regarding general anesthesia and the dental procedure, but the parent of 1 patient (1.4%) did not. The parents of 44 patients (62.0%) felt that the length of the fasting period was appropriate, whereas the parents of 27 patients (38.0%) felt that it was too long. The parents of 42 patients (59.2%) responded that the induction of general anesthesia went smoothly, whereas the parents of 29 patients (40.8%) responded that it did not; the reasons comprised difficulty entering the room and difficulty attaching the mask. No parent responded that it was difficult to secure vascular access. The parents of 58 patients (81.7%) replied that the postoperative nursing care and hospital room environment were good. Those who replied that it was not good added that the hospital room was uncomfortable, and that the nursing care was not pleasant. The parents of 41 patients (57.7%) replied that there was no postoperative anxiety, whereas the parents of 29 patients (40.8%) reported postoperative anxiety. The details of postoperative anxiety comprised the following: anxious that the patient would feel ill after returning home (parents of 19 patients, 65.5%); anxious about some inconvenience on the way home (parents of 13 patients, 44.8%); anxious that the
Table 1  Intergroup comparisons according whether or not would undergo future dental treatments under general anesthesia

| Item                        | Category | Yes group | No group | p Value |
|-----------------------------|----------|-----------|----------|---------|
| Number of cases             |          | 56        | 15       |         |
| Age (y)                     |          | 17.9 ± 10.6 | 17.7 ± 12.9 | 0.47   |
| Sex                         | Male     | 33        | 10       | 0.59    |
|                             | Female   | 23        | 5        |         |
| Type of disabled (Duplicate +) |          |           |          |         |
| Intellectual disability     | Yes      | 18        | 3        | 0.53    |
|                             | No       | 38        | 12       |         |
| Autism spectrum disorder    | Yes      | 31        | 10       | 0.62    |
|                             | No       | 25        | 5        |         |
| Epilepsy                    | Yes      | 13        | 2        | 0.50    |
|                             | No       | 43        | 13       |         |
| Chromosomal abnormalities   | Yes      | 11        | 0        | 0.10    |
|                             | No       | 45        | 15       |         |
| Cerebral palsy              | Yes      | 4         | 2        | 0.60    |
|                             | No       | 52        | 13       |         |
| Anesthesia induction method | Intravenous | 14       | 1        | 0.17    |
|                             | Inhaled  | 42        | 14       |         |
| Anesthesia agent            | Propofol | 31        | 8        | 0.89    |
|                             | Sevoflurane | 25       | 7        |         |
| Duration of operation (min) | 118.3 ± 69.6 | 117.5 ± 55.0 | 0.49   |
| Duration of anethesia (min) | 178.3 ± 72.3 | 170.3 ± 58.3 | 0.34   |
| Intraoperative complication | Yes      | 4         | 0        | 0.57    |
|                             | No       | 52        | 15       |         |
| Postoperative complication  | Yes      | 2         | 1        | 0.51    |
|                             | No       | 54        | 14       |         |
| Number of treated teeth     |          | 7.2 ± 4.1 | 8.0 ± 3.8 | 0.26   |
| Surgical procedure          | Yes      | 34        | 8        | 0.83    |
|                             | No       | 22        | 7        |         |
| Endodontic procedure        | Yes      | 15        | 4        | 0.75    |
|                             | No       | 41        | 11       |         |
| Questionnaires              |          |           |          |         |
| Problems related to dental care | Yes   | 17        | 7        | 0.24    |
|                             | No       | 39        | 8        |         |
| Anesthesia history          | Yes      | 19        | 1        | 0.03*   |
|                             | No       | 37        | 14       |         |
| Preoperative anxiety        | Yes      | 42        | 12       | 0.69    |
|                             | No       | 14        | 3        |         |
| Preoperative explanation understanding | Yes | 56        | 14       | 0.21    |
|                             | No       | 0         | 1        |         |
| Length of the fasting period | Appropriate | 37       | 7        | 0.28    |
|                             | Long    | 19        | 8        |         |
| Induction of general anethesia | Smooth | 37       | 5        | 0.05*   |
|                             | Difficult | 19      | 10       |         |
| Nursing and hospital room environment | Good | 45       | 13       | 0.72    |
|                             | Not good | 11       | 2        |         |
| Postoperative anxiety       | Yes      | 19        | 10       | 0.05*   |
|                             | No       | 37        | 5        |         |
| The overall evaluation      | Good     | 54        | 12       | 0.06    |
|                             | Not good | 2         | 3        |         |

*p < 0.05 = significant correlation
patient would feel ill on the way home (parents of 2 patients, 6.9%); and other (parents of 4 patients, 13.8%). Overall, dental treatment under general anesthesia was rated “good” by the parents of 66 patients (93.0%) and not good by the parents of 5 patients (7.0%). Those who responded that the overall treatment was not good included the parent of 1 patient who was not satisfied with general anesthesia. There was no parent who was not satisfied with the dental treatment. The parents of 56 patients (78.9%) answered yes to whether they would want their child to undergo general anesthesia for future dental treatment, whereas the parents of 15 patients (21.1%) answered no.

Table 1 shows the results of intergroup comparisons according to whether the parents would prefer general anesthesia for future dental treatment or not. Significant differences (p<0.05) were observed in anesthesia history, induction of general anesthesia, and postoperative anxiety. Logistic regression analysis was performed using preference for general anesthesia during future dental treatment (the “yes” and “no” groups) as the dependent variable. The results revealed a significant correlation with having undergone prior dental treatment under general anesthesia. The adjusted odds ratios for previous dental treatments under general anesthesia was 8.703 (95% confidence interval [CI]: 1.010–75.004) (Table 2).

Table 2  Factors analyzed for future dental treatments under general anesthesia

|                               | Odds ratio | 95%CI      | p value |
|-------------------------------|------------|------------|---------|
| Induction of general anesthesia| 2.956      | 0.814–10.742| 0.100   |
| Anesthesia history            | 8.703      | 1.010–75.004| 0.049*  |
| Postoperative anxiety         | 2.693      | 0.745–9.738 | 0.131   |

*p<0.05 = significant correlation

Discussion

Patients with disabilities frequently need to undergo multiple rounds of dental treatment under general anesthesia due to medical problems and/or problems related to behavioral management. An earlier survey conducted at this hospital revealed that 9.8% of disabled patients underwent dental treatment under general anesthesia multiple times during the survey period of 5 years and 9 months\(^\text{12}\). Another study also reported that 48% of disabled patients aged 18 and above underwent dental treatment under general anesthesia\(^\text{15}\).

In the present study, although the parents of 98.6% of the patients responded that the preoperative explanation of dental treatment under general anesthesia was easy to understand, the parents of 76.1% of the patients responded that they experienced preoperative anxiety. There are many aspects to anesthesia that can induce anxiety in parents, such as subsequent complications or accidents related to general anesthesia, impact of the anesthetic on the body, and fasting prior to anesthesia. Completely eliminating vague anxiety is difficult, even when sufficient time is given to provide a thorough explanation and obtain informed consent. No statistically significant difference was observed, however, between the presence of preoperative anxiety and parental preference regarding general anesthesia during future dental treatment. It appears, therefore that parental preoperative anxiety regarding anesthesia was relieved after the patient had once already safely undergone treatment under general anesthesia.

In previous reports on parental satisfaction with dental treatment under general anesthe-
sia in children\textsuperscript{15,16,17} and disabled individuals\textsuperscript{6,8}, the satisfaction of parents of non-disabled children was 82.8\% in one study\textsuperscript{5} and 100\% in another\textsuperscript{17}, while that of caregivers and parents of disabled individuals was 84.6\% in one study\textsuperscript{6} and 94.7\% in another\textsuperscript{6}. The results of the present study were similar to those of these earlier studies, with the parents of 93.0\% of patients reporting that dental treatment went well overall. Moreover, one earlier study found no relationship between parental satisfaction and the patient’s type of disability, age, or sex\textsuperscript{8}. The relationship between these factors and overall satisfaction with dental treatment were not addressed in the present study. No relationship was observed, however, between parental preference for general anesthesia during future dental treatment and the patient’s type of disability, age, or sex.

Even though 93.0\% of the parents answered that they were satisfied with the overall treatment, 12 (21.2\%) did not prefer future dental treatment under general anesthesia. Besides a preference to avoid general anesthesia, vague anxiety as well as preoperative examinations may have deterred these parents from choosing to let their disabled children undergo future dental treatment under general anesthesia.

Intraoperative awakening, postoperative pain, and postoperative nausea and vomiting have all been identified as factors influencing patient satisfaction with general anesthesia\textsuperscript{9,11}. Dental procedures are not very invasive, however, and it is generally accepted that postoperative complications are uncommon\textsuperscript{10}. The results of the present survey corroborate this observation: intraoperative and postoperative complications occurred in only 4 (5.6\%) and 3 (4.2\%) patients, respectively. Moreover, neither type of complication was severe, nor was it related to whether the parents preferred general anesthesia during future dental treatment.

Induction of anesthesia by inhalation is selected when an intravenous line cannot be secured while the patient is conscious. The present results showed that a large majority of disabled patients (78.9\%) underwent anesthesia by this route. The parents of 40.8\% of all the patients responded that induction of general anesthesia did not go smoothly, however, for reasons such as difficulty in entering the room and difficulty in attaching the inhalation mask. None of the parents responded that it was difficult to secure vascular access. Moreover, a significant difference was observed in whether induction went smoothly between the “yes” and “no” groups. The moment of induction can leave a particularly strong impression on parents, so special care must be taken during this step. Consequently, it may be necessary to provide a demonstration of anesthesia induction using a photo card or face mask.

Postoperative anxiety can comprise many factors, such as treatment outcomes and changes in physical conditions during the procedure or after returning home. Therefore, it is important to provide a detailed explanation to the parents of what is involved in dental treatment and the level of care that will be required after the patient returns home. Patient satisfaction regarding personal care was reported to have increased significantly by implementing a single postoperative home visit by the anesthesiologist versus no visit by the anesthesiologist\textsuperscript{13}. This indicates that home visits represent an important aspect of postoperative care, and one that should be considered in attempting to improve outcomes in cases where they are not usually given.

Where disabled individuals had previously undergone dental treatment under general anesthesia, the parents were more likely to express a preference for it to be performed again during future dental treatment. Among parents whose disabled children were undergoing dental treatment for the first time, however, 27.5\% said they would prefer it was not given during future dental treatment. This result may be attributable to the same reasons that parents would not prefer general anesthesia in the future, i.e., to avoid general anesthesia or vague anxiety, despite satisfactory overall treatment. It is, therefore, important
to take special care in discussing dental treatment and the effects of general anesthesia with parents when the disabled individual is about to have this experience for the first time.

This study has some limitations, including differences in the postoperative follow-up periods. Furthermore, previous studies on parental satisfaction with dental treatment under general anesthesia included over-the-phone surveys and regular face-to-face interviews during follow-up visits, in addition to postal questionnaires. This means that a direct comparison cannot be made between the results of the present study, in which only posted surveys were utilized, and those of these earlier reports. This holds true, even for patients who underwent dental treatment more than 5 years ago. Requesting parents to return the questionnaires by post may have contributed to the low response rate. It should be noted, however, that a low response rate of only 48.0% was also observed in an earlier study in which both face-to-face interviews and postal surveys were used.

**Conclusion**

Where disabled individuals have previously undergone dental treatment under general anesthesia, parents are more likely to express a preference for general anesthesia during future dental treatment.

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