

Oral health-related quality of life in pediatric patients under general anesthesia a prospective study

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Abstract

Our goal was to evaluate how dental treatments under general anesthesia (GA) affect the quality of life by a prospective pair-matched design. Pediatric patients, who had received dental treatments under GA, were enrolled and were asked to complete the Early Childhood Oral Health Impact Scale (ECOHIS) before the treatment and 1 month after the treatment. To shield the observed impacts, a pair-matched control group was performed. Patients in the control group were also required to complete the ECOHIS at these different points in time. In both groups, the items of troubled sleep and oral/dental pain scored highest, whereas avoiding smiling or laughing and avoiding talking scored lowest before the treatment. The total mean score in the 2 groups was 13.1 and 13.7, respectively, and there was no significant statistical difference ($P > 0.05$). However, the total mean score was 1.9 in the experimental group after the treatment and smaller compared with the control group (1.9 vs. 4.7, $P < 0.001$). The majority of the items in both groups had an apparent effect size and the total mean effect in the experimental group was greater than that in the control group (85.5% vs. 65.7%, $P < 0.001$). Therefore, dental treatment under GA could provide better quality of life restoration compared with treatment over multiple visits.

Abbreviations: GA = General anesthesia, QoL = Quality of life, ECOHIS = The Early Childhood Oral Health Impact Scale, OHRQoL = Oral health-related quality of life.

Keywords: dental treatment, general anesthesia, oral health-related quality of life, pediatric dentistry

1. Introduction

Early child caries is a common health problem in pediatric patients, having an apparent negative effect on child development. Dental decay has a high incidence on children in China and progress in decay prevention, diagnosis, and treatment is not reflected in children's and adolescents' oral health.^[1] Dental decay has been proven to decrease quality of life by causing pain and engendering-specific eating behaviors and particular ways of speech or smile.^[2] Therefore, appropriate and reliable treatments are required.

Dental treatments under general anesthesia (GA) have gained much attention and inform the choices of dentists and parents nowadays.^[3–7] Under GA, all required treatments are performed in a single session in hospital, providing efficient services in a safe environment. Moreover, GA ensures that the child received effective pain control.^[8] It has been reported that, compared to

conventional treatments, dental treatments under GA are of greater durability and quality.^[3–7] However, all anesthetic agents are associated with some risk and hazard to the patients' overall health with some reports of morbidity and mortality.^[2,8] Pediatric dentists must limit dental treatments using GA to cases where routine office practices are not applicable.

Furthermore, psychological preparation before treatment is crucial. It is highly helpful to permit patients to allay their distress, building constructive interactions. Game playing, simple explanations, and distraction are some of the methods used to reduce the patients' fear. The parental presence is another possible way to help the children to cope with their emotional trauma. It has been well documented that personality changes are highly related with age.^[3] Patients, aged 1 to 5 years, represent the prevalent age group for dental GA.

Several authors have described definite improvements in oral health-related quality of life (OHRQoL). However, most of these studies did not take the observed effect into consideration, as there were no appropriate control groups.^[9,10] Therefore, in this study, we aimed to evaluate how dental treatments under GA affect the quality of life (QoL) by a prospective pair-matched design.

2. Methods

The Zhengzhou University institutional research committee approved our study and all participants signed an informed consent agreement (Number: ZZ2008765).

From January 2009 to December 2014, pediatric patients who had received dental treatments under GA were enrolled. They were asked to complete the Early Childhood Oral Health Impact Scale (ECOHIS) before the treatment and 1 month after the treatment.

Editor: Chun-Yao Yang.

The authors report no conflicts of interest.

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Medicine (2017) 96:2(e5596)

Received: 16 June 2016 / Received in final form: 9 November 2016 / Accepted: 16 November 2016

<http://dx.doi.org/10.1097/MD.0000000000005596>

To shield from the observed impact of age and sex, a pair-matched control group was performed. In this group, patients were enrolled who should have received dental treatments under GA, but did not receive the treatment. Their nutritional status was good. One pediatric patient in the experimental group was matched with 1 control case by age (± 0.5 year) and sex. Similarly, patients in the control group were also required to complete the ECOHIS before the treatment. In the control group, parents refused the dental treatments under GA because of dental fear or other factors. Therefore, dental disease in those patients was treated over multiple visits. One month after the last visit, the patients were asked to complete the ECOHIS for a second time.

The ECOHIS consists of 13 items, where each item is scored on a scale from 0 to 4, as follows: very often (score 4), often (score 3), occasionally (score 2), hardly ever (score 1), never (score 0). The total score varies from 0 to 52.

All data were assessed using a pair nonparametric test based on our design and all statistical analyses were performed using SPSS 13.0 (SPSS Inc, Chicago, IL). A P value < 0.05 was considered significant. The effect size was calculated by dividing the mean of the change score by the standard deviation of the pretreatment score.^[11] An effect of < 0.2 indicated a small change, 0.2 to 0.7 a moderate change, and > 0.7 a large change.

3. Results

A total of 68 pediatric patients in good general condition had received dental treatments under GA. Sixty-two (28 boys and 34 girls) patients or caregivers agreed to take part in our research. They had no previous dental treatment history. Dental caries was found in at least 8 teeth (mean: 10.2) in every child at first diagnosis. The mean age was 5.4 (range: 3.3–6.0) years. In the control group, there were also 62 patients (28 boys and 34 girls), the mean age was 5.6 years (range: 3.6–6.3), and the mean amount of teeth affected by caries was 10.6. No difference was noted between the 2 groups regarding age, sex, and the severity of the disease.

Before the treatment, the items of troubled sleep and oral/dental pain scored highest, and the items of avoiding smiling or laughing and avoiding talking scored lowest in both groups. The total mean score after the treatment was significantly smaller compared to the pretreatment score in the experimental group

(1.9 vs. 13.1, $P < 0.001$). Similar trends were also noted in the control group. Furthermore, the total mean score before the treatment in the 2 groups was 13.1 and 13.7, respectively, and there was no significant statistical difference between the scores ($P > 0.05$). However, the total mean score was 1.9 in the experimental group after the treatment and it was lower than that in the control group (1.9 vs. 4.7, $P < 0.001$) (cf., Table 1).

In the experimental group, almost all items showed a large effect size, whereas, in the control group, half of the items had a large effect size. The smallest effect size concerned the item “irritable or frustrated.” However, in the control group, a surprising negative effect size was noted for the item concerning family members requiring time off work. The total mean effect in the experimental group was greater than that of the control group (85.5% vs. 65.7%, $P < 0.001$) (c.f., Table 1).

4. Discussion

The Early Childhood Oral Health Impact Scale was first developed by Pahel et al^[12] and the authors had provided reliable evidence for the internal consistency and constructed validity of the ECOHIS when testing preschool children. It has become a preferred method for assessing OHRQoL in pediatric patients.^[13,14]

The observed total ECOHI score in this study was approximately 13.5 for both groups, consistent with previous reports.^[15,16] The findings suggested that the OHRQoL could be affected by dental diseases. Jankauskiene et al^[3] reported a score of nearly 22. Possible explanations might be attributed to inadequate oral health services or a high prevalence of dental diseases in these countries. Dental diseases frequently disturbed sleep and caused oral pain in this study, consistent with results presented by Pakdaman et al^[6] and dental caries was common in preschool children, characterized by hypnalgia.

After dental treatments under GA, almost all the items reported a lower score, consistent with results reported by several authors.^[3–7] It suggested treatment of severe dental caries under GA had an immediate effect on the OHRQoL in children. Interestingly, no effect on the items of avoiding smiling or laughing and avoiding talking by dental diseases was noted, conflicting with some previous studies.^[16,17] Possible explan-

Table 1
Comparison of quality of life between the 2 groups.

| Scale | Pretreatment | | | Posttreatment | | | Effect Size | | |
|---------------------------------|--------------|-------------|---|---------------|-----------|-----------|--------------|--------------|-----------|
| | E (SD) | C (SD) | P | E (SD) | C (SD) | P | E (SD) | C (SD) | P |
| Child impact section | | | | | | | | | |
| Oral/dental pain | 2.3 | 2.4 | | 0.3 | 0.3 | | 87.0% | 87.5% | |
| Difficulty in drinking | 1.4 | 1.5 | | 0 | 0.2 | | 100% | 86.7% | |
| Difficulty in eating | 1.9 | 1.8 | | 0.3 | 0.4 | | 84.2% | 77.8% | |
| Difficulty in pronouncing words | 0.6 | 0.6 | | 0.6 | 0.6 | | 0 | 0 | |
| Missing pre-school or school | 1.2 | 1.4 | | 0 | 0.6 | | 100% | 57.1% | |
| Trouble sleeping | 2.4 | 2.5 | | 0 | 0.4 | | 100% | 84.0% | |
| Irritable or frustrated | 0.8 | 0.8 | | 0.7 | 0.6 | | 12.5% | 25.0% | |
| Avoided smiling or laughing | 0 | 0 | | 0 | 0 | | | | |
| Avoided talking | 0 | 0 | | 0 | 0 | | | | |
| Family impact section | | | | | | | | | |
| Family member been upset | 1.8 | 1.7 | | 0 | 0.6 | | 100% | 64.7% | |
| Family member felt guilty | 0.5 | 0.3 | | 0 | 0 | | 100% | 100% | |
| Family member got time off work | 0 | 0.6 | | 0 | 1.0 | | | –66.7% | |
| Financial impact on family | 0.2 | 0.1 | | 0 | 0 | | 100% | 100% | |
| | 13.1 (17.2) | 13.7 (18.0) | — | 1.9 (3.2) | 4.7 (5.1) | < 0.001 | 85.5% (1.11) | 65.7% (0.84) | < 0.001 |

C=control group, E=experimental group, SD=standard deviation. $P > 0.05$.

ations might be that only preschool children were included in this study or that, in our opinion, a child's oral health was not important for peer-group acceptance at such a young age.

Associations between some factors and OHRQoL after dental treatments under GA have been evaluated. Jankauskiene et al^[3] showed that there were no sex differences in dental health status and Klaassen et al^[16] also failed to report a positive relationship. The finding could possibly be explained by the fact that preschool children did not start puberty, providing a similar psychological status in boys and girls.

Quality of life after dental treatment under GA has been widely studied,^[3-5,18] but all these studies lacked proper control groups. We were the first to compare quality of life in patients receiving dental treatments under GA versus receiving these treatments over multiple visits.

It was noted that the total mean effect size was 85.5% in the experimental group, which was higher than in previous reports.^[15] A possible explanation might be that the treatment effect increased with the seriousness of the disease. Moreover, the effect size in the experimental group was higher than that in the control group. Furthermore, in most of those items, the degree of recovery was stronger in the experimental groups. These findings indicated that dental treatments under GA could provide better immediate quality of life restoration. Moreover, owing to a single-visit dental treatment under GA, the experimental group had a minor effect on "missing pre-school or school," "Trouble sleeping," "Family member been upset," and "Family member required time off work," thus suggesting further benefits of dental treatment under GA.

The topic of anesthetic-related neurotoxicity in pediatric patients had been debated intensely.^[19] A number of animal studies had shown that abnormal synaptic development and neurodegeneration might be caused by clinical use of general anesthetics during vulnerable brain development periods.^[20,21] However, the data from those animal studies could not be confirmed in recent human studies.^[22] Therefore, it seems safe to perform a single brief anesthetic in pediatrics. In fact, it is not necessary to cancel or postpone truly urgent pediatric surgeries.^[22]

GA is widely used in pediatric dentistry.^[23,24] Wong et al^[25] had reported that the oral health-related quality of life of preschool children, admitted to the emergency department with the consequences of untreated dental caries, was significantly improved following emergency GA. Similarly, in a previous study performed by Eidelman et al,^[23] a total of 248 restorations were evaluated for the GA group, with a 94% success rate for marginal adaptation, 92% success for anatomic form, and 97% had no secondary caries. Furthermore, the authors concluded that, compared with conscious sedation, the outcome of treatments was better under GA in terms of the quality of the restorations.

Some limitations were present in our study. First, the main problem was a lack of randomization and selection bias, and thus more prospective studies are needed. Second, the sample size was small, with only 124 patients included in this study. Finally, we analyzed the study population at a single point in time and could not fully assess the effect of dental treatments under GA on patients' QoL during the entire post-treatment period.

In summary, single-visit dental treatment under GA could provide better QoL restoration compared to multiple-visit treatment.

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