

Retrospective Study of Intensive Dental Treatment under General Anesthesia in Children at Matsumoto Dental University Hospital

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Summary

We investigated the actual child-rearing environment, considering factors such as hygiene training, among 177 children (102 boys, 75 girls) ranging from 1 year and 9 months to 7 years and 2 months in age who underwent intensive dental treatment under general anesthesia in the Department of Pediatric Dentistry, Matsumoto Dental University Hospital between January 1990 and December 2000. The following results were obtained.

- 1) The annual number of patients slightly increased between 1992 and 1994. Thereafter, the annual number of patients decreased slightly each year.
- 2) The mean age at treatment was 3 years and 7 months (44.5 ± 12.9 months).
- 3) Concerning the regional distribution, more than 50% of the children came from Nagano Prefecture areas other than Shiojiri City, where our university is located.
- 4) With respect to feeding methods during infancy, most children were breast fed or mixed breast and bottle fed. Furthermore, any feeding irregularity was noted.
- 5) The mean interval from birth until the start of weaning was 7.5 ± 4.1 months. The mean interval until completion of weaning was 16.0 ± 6.3 months.
- 6) 95.5% of the children habitually brushed their teeth. The frequency of tooth brushing was "once a day" or "sometimes" in 69.5% of the children.
- 7) Overall, 46.9% of the children had received fluoride application.

Introduction

Recently, full prevention service for oral diseases and improved access to dental treatment have decreased the number of untreated teeth and have increased the number of treated teeth in young children, especially in the area of deciduous tooth caries, thus improving the status of treatment^{1,2)}.

However, in many children, including those who do not seek dental treatment despite caries involving several teeth, those with psychosomatic disorder, and those in whom frequent dental examinations are difficult due to the parents' social, economic, and regional issues, oral diseases remain untreated³⁻⁵⁾. Furthermore, symptoms are less marked in many cases⁶⁻⁹⁾. In some patients, no treatment was performed at the stage appropriate for caries treatment, increasing severity and causing severe multi-tooth caries.

In the Department of Pediatric Dentistry in our university, we have administered general anesthesia to children with multi-tooth caries or severe caries in whom oral health was inhibited for various reasons, and provided accurate high quality medical service¹⁰⁾.

In this study, to clarify factors related to multi-tooth caries or severe caries, we investigated child-rearing environments among children who underwent intensive dental treatment under general anesthesia between 1990 and 2000.

Materials and Methods

This survey included 177 children (102 boys, 75 girls) ranging from 1 year and 9 months to 7 years and 2 months in age who underwent intensive dental treatment under general anesthesia in the Department of Pediatric Dentistry, Matsumoto Dental University Hospital (Chushin area, Nagano Prefecture) between January 1990 and December 2000 (Table 1).

Table 1 : Subjects

	Number of patients	Age (month, mean \pm S. D.)
Boys	102	43.2 \pm 12.6
Girls	75	45.6 \pm 12.0
Total	177	44.5 \pm 12.9

In these children, we investigated the regional distribution, annual changes in the number of patients, annual changes in mean age, and factors related to caries, such as feeding methods, timing when weaning was started, timing when weaning was completed, consumption of between-meal snacks, habitual tooth brushing, and Fluoride application, based on a review of dental records in the Department of Pediatric Dentistry and Department of Dental Anesthesia, protocols for medical practice, and questionnaire sheets.

Values were compared using the chi square test.

Results

1. Patients

1) Annual changes in the number of patients

In 1992, there were 14 patients. Then, the number increased slightly to a peak (25) in 1994, but thereafter serially decreased to 7 in 2000 (Fig.1).

2) Annual changes in mean age

In 1991, the mean age was 38.6 ± 6.8 months, and slightly increased each year. In 1999, the value peaked at 53.6 ± 13.9 months (Fig.2). The longitudinal mean age at treatment was 3 years and 7 months (44.5 ± 12.9 months).

3) Regional distribution

With respect to the regional distribution of our patients, 54 children (30.5%) came to our hospital from Shiojiri City, where our university is located, and an adjacent city, Matsumoto City. One hun-

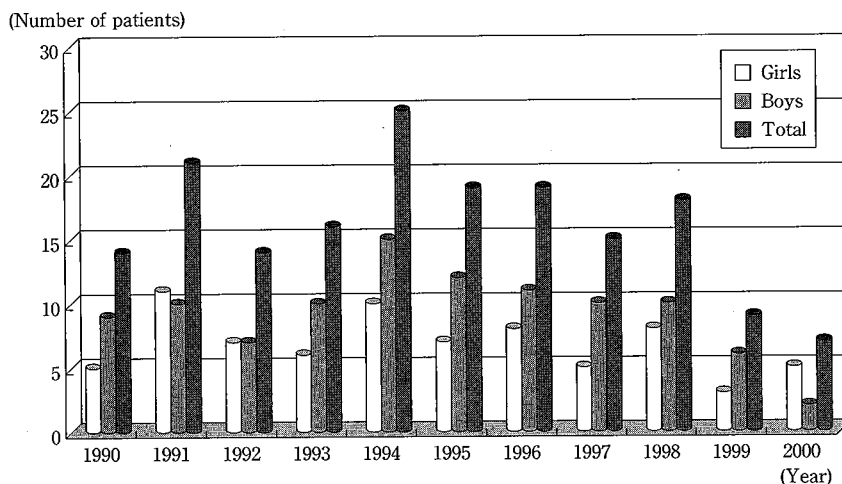


Fig.1 : Annual changes in the number of patients

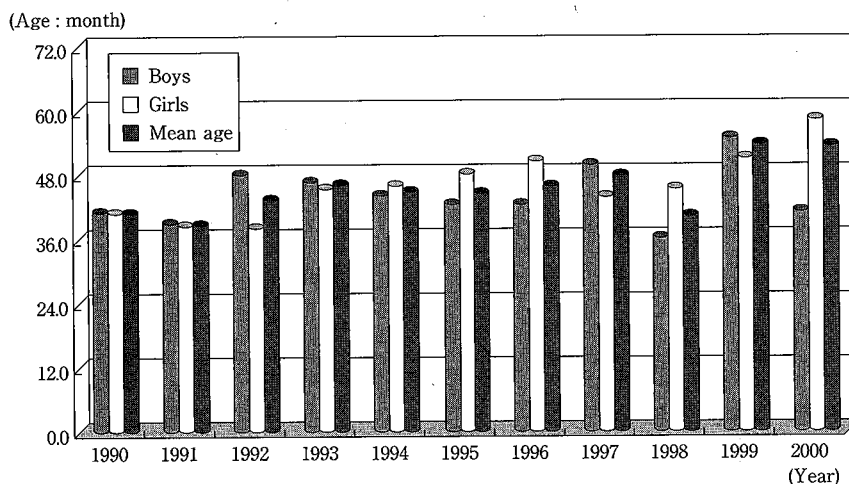


Fig.2 : Annual changes in mean age

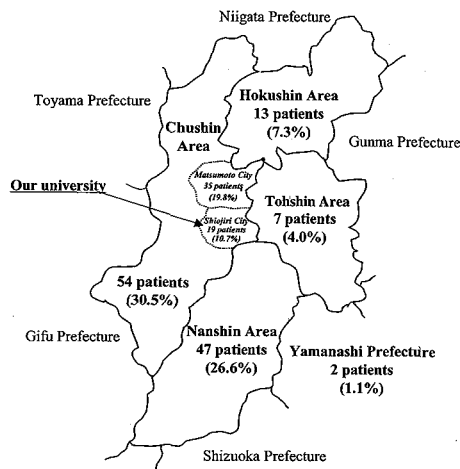


Fig.3 : Regional distribution of patients

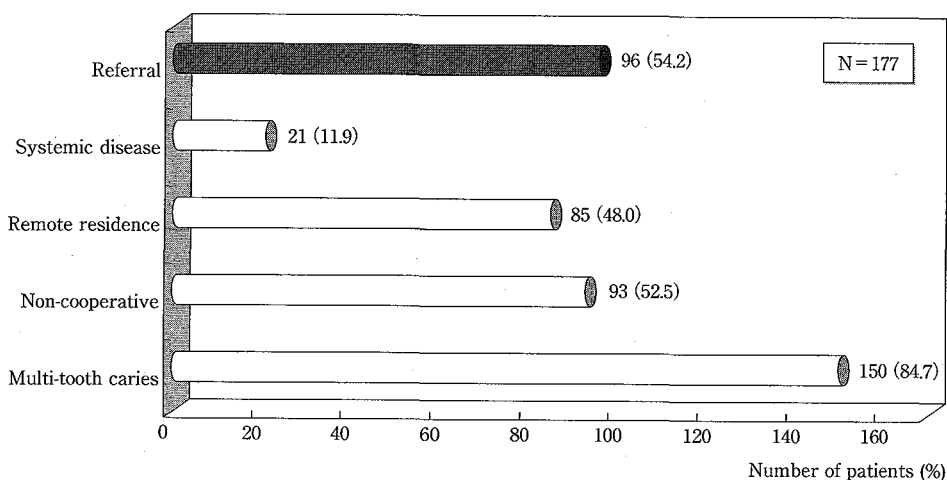


Fig.4 : Reasons for indication (overlapping responses)

dred and twenty-one children (68.4%) came from Chushin area, excluding Shiojiri City and Matsumoto City, Nanshin area, Tohshin area, and Hokushin area in Nagano Prefecture. Two children (1.1%) came from another prefecture (Yamanashi Prefecture) (Fig.3).

4) Reasons for indication

Most children who underwent intensive treatment under general anesthesia did not cooperate with dental treatment despite severe extensive caries involving several teeth. Reasons included systemic diseases, such as heart disease, chromosomal abnormalities, and endocrine disorder, in 21 children (11.9%) and remote areas where 2 hours or more was required for hospital visits in 85 children (48.0%). With respect to the presence or absence of referral, 96 children (54.2%) were referred from other medical institutions. All children for whom intensive treatment under general anesthesia was indicated due to remote residence were referred from other hospitals (Fig.4).

2. Environmental factors

1) Feeding

With respect to feeding methods during infancy, 72 children (40.7%) were breast fed, 70 children (39.5%) received a combination of breast and bottle feeding, and 24 children (13.6%) received bottle feeding (Fig.5-1). Furthermore, there were significant differences between children who were breast fed and those who were bottle fed as well as between those receiving mixed feeding and those who were bottle fed only ($p < 0.01$).

Concerning the regularity of feeding, 102 children (57.6%) received irregular feeding, showing the highest percentage. Fifty-two children (29.4%) received regular feeding. There was a significant difference ($p < 0.01$) (Fig.5-2).

The mean interval from birth until the start of weaning was 7.5 ± 4.1 months (Fig.5-3). Furthermore, the mean interval from birth until completion of weaning was 16.0 ± 6.3 months. In 145 children (81.9%), 12 months or more were required until the completion of weaning (Fig.5-4).

2) Consumption of between-meal snacks

Concerning the regularity of consuming between-meal snacks, 75 children (42.4%) ate between-meal snacks regularly. Ninety-five children (53.7%) ate between-meal snacks irregularly. The percentage of children with irregular snack consumption was higher. However, there was no significant difference (Fig.6).

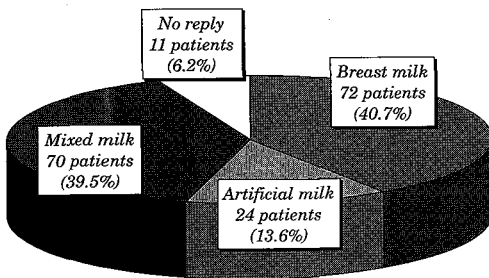


Fig.5-1 : Feeding methods

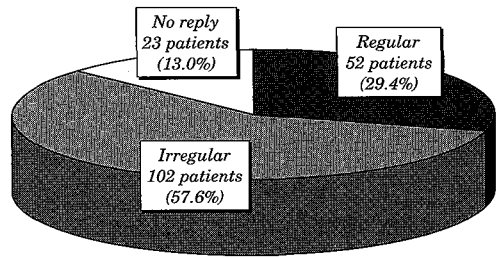


Fig.5-2 : Regularity of feeding

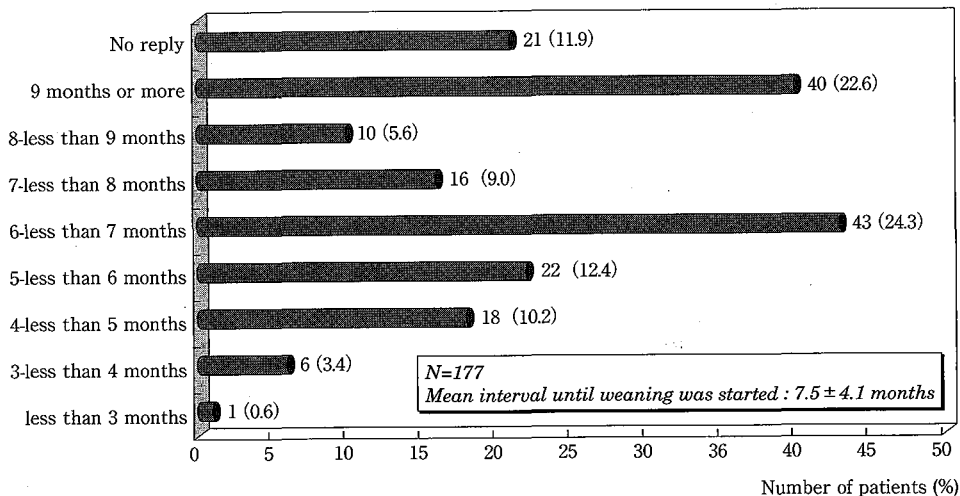


Fig.5-3 : Interval until weaning was started

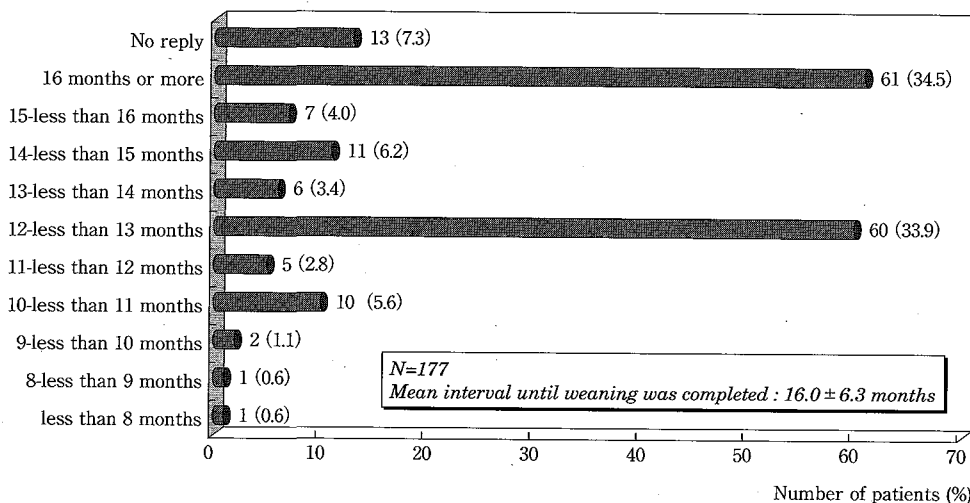


Fig.5-4 : Interval until weaning was completed

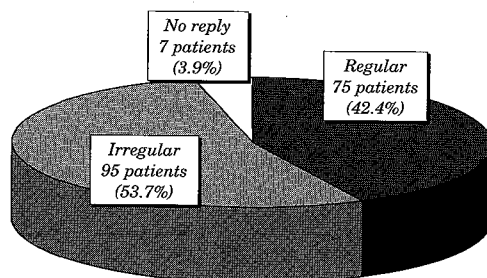


Fig.6 : Regularity of consuming between-meal snacks

Table 2 : Annual changes in the kind of between-meal snacks

(overlapping responses) unit : person (%)

Kind \ Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Subtotal	Total
Caramel	5 (1.6)	1 (0.3)	2 (0.6)	1 (0.3)	1 (0.3)	0 (0.0)	2 (0.6)	0 (0.0)	3 (0.9)	0 (0.0)	0 (0.0)	15 (4.7)	317 (100.0)
Gum	8 (2.5)	7 (2.2)	2 (0.6)	3 (0.9)	2 (0.6)	2 (0.6)	4 (1.3)	3 (0.9)	2 (0.6)	0 (0.0)	0 (0.0)	33 (10.4)	
Chocolate	5 (1.6)	1 (0.3)	2 (0.6)	5 (1.6)	2 (0.6)	3 (0.9)	5 (1.6)	3 (0.9)	5 (1.6)	2 (0.6)	5 (1.6)	38 (12.0)	
Biscuit	4 (1.3)	6 (1.9)	4 (1.3)	6 (1.9)	9 (2.8)	8 (2.5)	7 (2.2)	6 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	50 (15.7)	
Lactic acid beverage	6 (1.9)	9 (2.8)	6 (1.9)	6 (1.9)	10 (3.1)	9 (2.8)	12 (3.8)	7 (2.2)	5 (1.6)	2 (0.6)	1 (0.3)	73 (23.0)	
Snack	2 (0.6)	1 (0.3)	0 (0.0)	1 (0.3)	2 (0.6)	0 (0.0)	2 (0.6)	5 (1.6)	2 (0.6)	6 (1.9)	3 (0.9)	31 (9.8)	
Others	4 (1.3)	5 (1.6)	4 (1.3)	6 (1.9)	9 (2.8)	2 (0.6)	10 (3.1)	6 (1.9)	16 (5.0)	9 (2.8)	6 (1.9)	77 (24.3)	

Furthermore, regarding the kind of refreshments, caramels and lactic acid beverages were more frequently ingested before 1996. After 1997, snacks were more frequently ingested (Table 2).

3) Habitual tooth brushing

With respect to the presence or absence of tooth brushing, 169 children (95.5%) made a habit of tooth brushing, while 8 children (4.5%) did not brush their teeth. There was a significant difference ($p < 0.01$). The frequency of tooth brushing was once a day in 64 children (36.2%). For fifty-nine children (33.3%), the response was “sometimes”, 43 children (24.3%) “twice a day”, and 3 children (1.7%) “3 times a day” (Fig.7).

4) Fluoride application

Overall, 83 children (46.9%) had a history of fluoride application.

Annual changes were investigated. In 1996, 63.2% of the children had a history of fluoride application, showing the highest rate of fluoride application (Fig.8-1).

3. Annual changes in the incidence of tooth caries

The incidence of tooth caries in our patients who underwent intensive dental treatment during

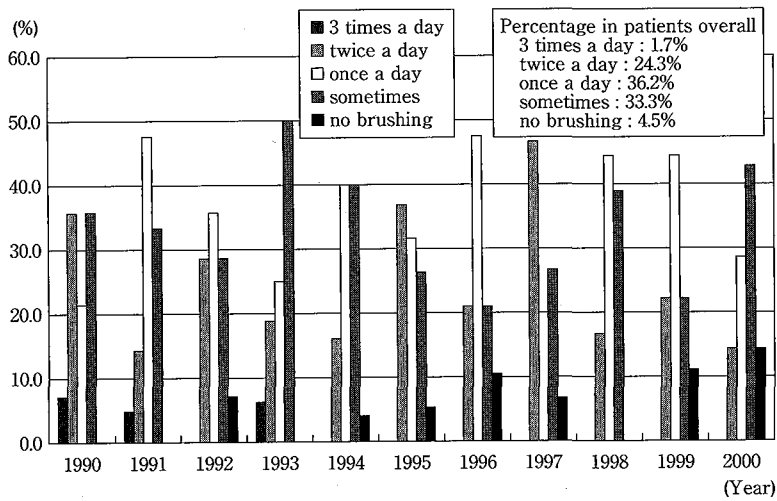


Fig.7 : Tooth brushing

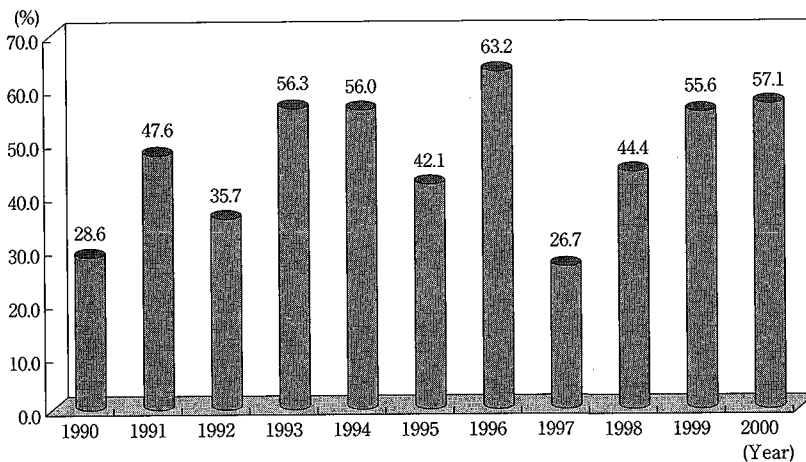


Fig.8-1 : Fluoride application (annual changes)

Table 3 : Incidence of tooth caries

Year	Current number of teeth	Number of carious teeth	Rate of carious teeth (%)	Mean number of carious teeth per child (mean \pm S. D.)
1990 (N=14)	275	215	78.2	15.4 \pm 3.4
1991 (N=21)	416	352	84.6	16.8 \pm 2.9
1992 (N=14)	278	217	78.1	15.5 \pm 3.0
1993 (N=16)	319	235	73.7	14.7 \pm 3.1
1994 (N=25)	498	419	84.1	16.8 \pm 3.0
1995 (N=19)	368	299	81.3	15.7 \pm 3.1
1996 (N=19)	380	321	84.5	16.9 \pm 2.8
1997 (N=15)	302	210	69.5	14.0 \pm 2.3
1998 (N=18)	351	251	71.5	13.9 \pm 2.8
1999 (N=9)	182	125	68.7	13.9 \pm 3.2
2000 (N=7)	140	97	69.3	13.9 \pm 1.1
Total (N=177)	3509	2741	78.1	15.5 \pm 3.5

the last 11 years is shown in Table 3. Overall, the incidence of tooth caries was 78.1%. The mean number of carious teeth per child was 15.5 ± 3.5 teeth.

Between 1990 and 1996, the incidence of tooth caries ranged from 73.7% to 84.6%. The mean number of carious teeth per child ranged from 14.7 ± 3.1 to 16.9 ± 2.8 . Between 1997 and 2000, the incidence of tooth caries was 71.5% or less. The mean number of carious teeth per child was 14.0 ± 2.3 or less. These values were slightly decreased.

Discussion

Intensive dental treatment under general anesthesia in the Department of Pediatric Dentistry at our university hospital is performed to establish a tertiary medical system and support health-oriented parents and children. We introduced this system to resolve the issue of untreated oral diseases in children.

Recently, many studies have reported intensive dental treatment under general anesthesia in handicapped children (or adults)¹¹⁻¹³⁾. However, in our university hospital, the Department of Dentistry for the Handicapped has been separately established. Therefore, most children were healthy children with regional issues or limitations in the child's cooperation or were referred from other regional medical institutions.

1. Annual changes

Between 1994 and 2000, the number of children who underwent intensive dental treatment under general anesthesia decreased. Especially in 1999 and 2000, values decreased to about two-thirds to three-fourths of the peak in 1994. These results may not have been solely because the annual number of infants decreased, but may have been associated with full prevention service in regional medical practice, especially the establishment of the Regional Health Law¹⁴⁾ in 1997 and full infant physical examinations and health guidance in cities, towns, and villages.

2. Age

The mean age at treatment was 3 years and 7 months (44.5 ± 12.9 months). Children 4 years old

or younger comprised the greater part¹⁰). In our department, routine dental treatment is basically performed using management methods for children. However, among children with high caries sensitivity and multi-surface/multi-tooth caries, children requiring emergency treatment, children who did not cooperate with dental treatment, children with whom rapport could not be established, and children who were referred from remote districts and other medical institutions, compulsive treatment was avoided if possible and general anesthesia was employed to protect the mental state and achieve accurate treatment in many children for the two reasons described above. This may have resulted in a younger mean age.

3. Reasons for indication and regional distribution

In 84.7% of the children, intensive dental treatment under general anesthesia was indicated for multi-tooth caries, which was the most common reason during the last 11 years. This finding was similar to that reported by Miyazawa et al.³) and Fukuta et al.⁴) Furthermore, the number of children referred from other medical institutions was slightly larger than that in a previous study³), suggesting that our university plays a role as a tertiary medical institution.

Subsequently, the regional distribution of children was investigated. Children from cities other than Shiojiri City, where our university is located, and an adjacent city, Matsumoto City, comprised 69.5%.

Concerning location, our university has a regional feature that Shiojiri City and Matsumoto City are surrounded by a farm mountain village area. In this farm mountain village area, opportunities for hospital visits are limited, and a relatively long time is required for hospital visits. Therefore, bringing children to the outpatient clinic for treatment is difficult for parents, and oral diseases remain untreated in many children. Among children for whom intensive dental treatment was indicated due to remote residence, intensive dental treatment under general anesthesia was performed in some children based on the parent's request, although the child cooperated with dental treatment. In our department, this procedure is selected based on general condition, emergency, and comprehensive evaluation. To contribute to regional medical practice, minimize untreated oral diseases, and eliminate "quality differences" related to regional issues (including remote residence), our procedure may be useful.

4. Environmental factors

(1) Feeding

Breast milk is a nutrient essential for psychosomatic growth in children. In the field of child nutritional science, autonomous nutrition, in which the required volume is given at any time based on the infant's demand, is recommended¹⁵), since there are individual differences in breast milk volume, and the interval and frequency of feeding vary among infants. Furthermore, from the standpoint of the development of masticatory function, it is not good if the start and completion of weaning are early. However, the kind of milk during infancy, regularity of feeding intervals, timing when weaning is started, and timing when weaning is completed are involved in the pathogenesis of deciduous tooth caries¹⁶⁻²⁵). In particular, with respect to feeding methods, the incidence of tooth caries is high in the breast milk group¹⁶⁻²³). In this survey, children who received breast feeding comprised the highest percentage, 40.7%, followed by children who received mixed feeding (39.5%).

With respect to the regularity of feeding intervals, the proportion of children who received irregular feeding was slightly higher than that of children who received regular feeding. Furthermore, the

mean interval from birth until weaning was started was 7.5 months. The mean interval from birth until weaning was completed was 16.0 months. These values were delayed by approximately 3 to 4.5 months compared to mean ages at the start and completion of weaning in Japanese children^{26,27}.

As a main factor, it was thought that the regional health guidance and child care environment were related.

These findings suggest that multiple factors are involved in the pathogenesis of tooth caries. As previously reported²⁰⁻²⁵, it is suggested that irregular feeding and delayed weaning cause multi-tooth caries.

(2) Between-meal snacks

Concerning the kind of between-meal snacks, Matsukubo et al.²⁸ reported that foods with high oral retention, such as gum and caramels containing sucrose, glucose, or fructose, induced a relatively high incidence of caries, while snacks containing salt induced a relatively low incidence of caries. In our survey, before 1996, caramels, gum, and lactic acid beverages were more frequently ingested. After 1997, snacks were more frequently ingested between meals. However, we could not accurately evaluate the association between the kind of between-meal snacks and factors for caries, considering that caries involved several teeth in most children.

A previous study reported the relation between snack intervals and factors for caries. In children who ate between-meal snacks at irregular intervals, the incidence of caries was slightly higher. In our survey, 53.7% of the children ate between-meal snacks at irregular intervals. As previously reported, irregular snack consumption may be a factor involved in multi-tooth caries²⁹⁻³³.

Essentially, between-meal snacks in children play a role in assisting to provide necessary calories and nutrients. However, currently, foods are abundant, and a sufficient volume of nutrition can be obtained from staple foods. Therefore, current between-meal snacks are not supplemental nutrition, but are purchased in accordance with the child's taste among commercially available foods or recognized as means of discipline¹⁹. However, irregular consumption of between-meal snacks without establishing quality, quantity, timing, and frequency markedly influences nutritional issues in children²⁹. Many previous studies suggested that irregular consumption of between-meal snacks causes multi-tooth caries. Therefore, in children in whom dietary standard is supplemented from staple foods, between-meal snacks are nutritionally unnecessary. It has been reported that supplemental consumption of between-meal snacks for children who do not eat a sufficient volume of staple food is unfavorable³⁴.

Based on these results, between-meal snacks should be given to children to promote pleasure in eating and to promote the child's mental life. For this purpose, parents must be aware of the content of diets and snacks, and it is important to give between-meal snacks regularly, if necessary. We are responsible for health guidance, and should select issue-related factors to provide accurate guidance for parents.

(3) Habitual tooth brushing

Taura et al.³⁵ reported that the incidence of tooth caries in children who started tooth brushing earlier was significantly lower than that in children who started later. However, several studies conflicted with their finding. Saito et al.¹⁹ reported that in younger children with a habit of tooth brushing, the number of carious teeth was larger than that in children without a habit of tooth brushing. Akisawa et al.³⁶ and Okuno et al.³² indicated that tooth brushing did not prevent deciduous tooth caries. Kanoh et al.²⁵ reported that there was no relationship between the frequency of brushing and the incidence of caries. Takahashi et al.³⁷ described that there was no significant difference in the

incidence of tooth caries between the group with habitual tooth brushing and the group without habitual tooth brushing.

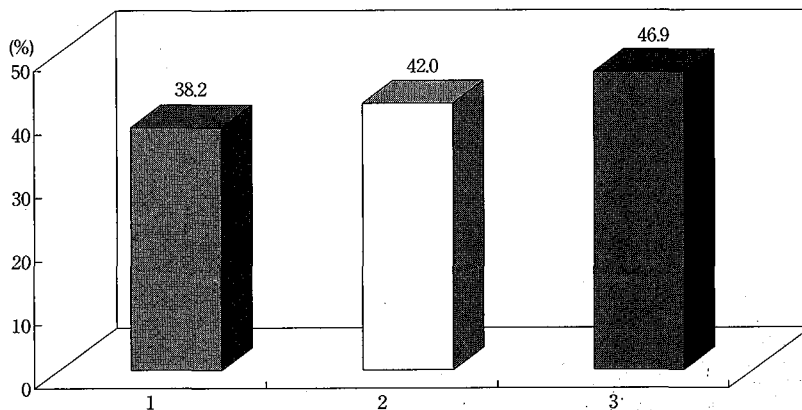
In this survey, approximately 96% of the children's parents reported that their child performed habitual tooth brushing. However, the frequency of tooth brushing was "sometimes" or "once a day" in 69.5% of the children, suggesting insufficient tooth brushing. In most children investigated in this survey, the following background is assumed : tooth brushing was started immediately after the parents were surprised at multiple caries detected on a dental checkup. At that time point, the child may have showed high caries sensitivity. In addition, they may have employed brushing methods in which sufficient brushing effects could not be obtained.

Therefore, tooth caries may be etiologically associated with various factors. If age-matched correct brushing methods had been acquired prior to the development of multi-tooth caries, as observed in this survey, and regular habitual brushing with a final brushing by the parents had been performed, severe caries involving several teeth might have been inhibited to some degree. In the future, regional dental health activities should be conducted in a more extensive range to develop oral hygiene guidance.

(4) Fluoride application

The proportion of children with a history of fluoride application in this survey was slightly higher than the rate of fluoride application¹⁾ among children in Japan (Fig.8-2). However, in this survey, multi-tooth caries was detected, although the proportion of children with a history of fluoride application has increased year by year. Relief related to fluoride application may have reduced subsequent care. Furthermore, Nakamura et al.³⁸⁾ reported increased interest in dental health consciousness, as the number of parents selecting a dentifrice containing fluoride has recently increased. However, they indicated that there was no improvement in knowledge about dental diseases.

Therefore, the results of this survey suggest that a lack of the parent's knowledge about oral hygiene promotes multi-tooth caries. Accurate oral hygiene guidance in regional medical practice may inhibit factors contributing to tooth caries to some degree.



- 1 : Mean national rate of fluoride application in 1993 (age : 1 to 15 years)
 2 : Mean national rate of fluoride application in 1999 (age : 1 to 15 years)
 3 : Mean rate of fluoride application in patients investigated in this survey

Fig.8-2 : Fluoride application (comparison)

Conclusion

We investigated child-rearing environmental factors among 177 children (102 boys, 75 girls) who underwent intensive dental treatment under general anesthesia in the Department of Pediatric Dentistry, Matsumoto Dental University Hospital between January 1990 and December 2000. The following results were obtained.

1. The annual number of patients increased between 1992 and 1994. Thereafter, the annual number of patients slightly decreased each year. In 2000, 7 patients were treated.
2. The mean age at treatment was 3 years and 7 months (44.5 ± 12.9 months). Furthermore, the mean age/year slightly increased each year after 1991 (40.9 ± 12.0 months). In 1999, the value reached a maximum at 53.6 ± 13.9 months.
3. With respect to the regional distribution of children, more than 50% of the children came from Nagano Prefecture areas other than Shiojiri City, where our university is located.
4. With respect to feeding methods during infancy, breast feeding and mixed feeding comprised the greater portion. Furthermore, irregularity in feeding was observed.
5. The mean interval from birth until the start of weaning was 7.5 ± 4.1 months. The mean interval from birth until completion of weaning was 16.0 ± 6.3 months.
6. Concerning habitual tooth brushing, 95.5% of the children were reported to perform habitual tooth brushing. The frequency of tooth brushing was "once a day" or "sometimes" in 69.5% of the children.
7. Overall, 46.9% of the children had a history of fluoride application.

The abstract of this study was presented at the 39 th meeting and general meeting of the Japanese Society of Pediatric Dentistry (May 17, 2001, Osaka).

References

- 1) Dental Health Section, Health Strategy Bureau, Ministry of Health and Welfare (2000) Abstract of survey on the actual state of dental diseases in 1999—Survey in November 1999—. *Journal of Health and Welfare Statistics* **47** : 42–9. (in Japanese)
- 2) Kamijo H (2000) : Tendency of dental health in Japanese based on the results of survey on the actual state of dental diseases in 1999. *Dental Outlook* **96** : 249–54. (in Japanese)
- 3) Miyazawa H, Namba H, Seiki K, Karasawa S, Kaneko H, Imanishi T, Takeuchi T, Hayashi N and Hirose I (1990) Dental treatment for children under general anesthesia. *Jpn J Ped Dent* **28** : 1117–24. (in Japanese, English abstract)
- 4) Fukuta O, Braham RL and Kurosu K (1994) A Survey of dental treatment under the general anesthesia in same day cases of the pediatric dentistry at the University of California, San Francisco. *Jpn J Ped Dent* **32** : 903–10. (in Japanese, English abstract)
- 5) Ishikura Y, Morinushi T, Ogura T, Toyoshima S, Yokoyama K, Sugiyama K, Irifune M and Joh S (1999) Statistical examinations performed on handicapped visiting the out-patient clinic of pediatric dentistry in Attached Dental Hospital of Kagoshima University –Part 2 Cases in intensive dental treatment under general anesthesia—. *Jpn J Ped Dent* **37** : 128–36. (in Japanese, English abstract)
- 6) Sato M and Sasa R (1995) Oral hygiene for children and dental caries. *Jpn J Ped* **36** : 965–9. (in

- Japanese)
- 7) Kimura M, Igarashi S, Uchimura N, Daito M and Miyazawa H (1997) *The Textbook for Dental Hygienist*, 1 st ed, 112–3, Quintessence, Tokyo, Japan. (in Japanese)
 - 8) Ogihara K and Miyazawa H (1998) *Standards of Pediatric Dentistry*, 1 st ed, 103–18, Dental Forum, Tokyo, Japan. (in Japanese)
 - 9) Akasaka M, Daito M, Maeda T and Miyazawa H (1999) *Manual of Laboratory and Clinical Practice for Pediatric Dentistry*, 1 st ed, 223–9, Ishiyaku Publishers, Tokyo, Japan. (in Japanese)
 - 10) Han J, Murakami Y, Uchiyama M, Sonoda N, Iwahori H, Osuga N, Iwasaki H, Miyazawa H, Taniyama K, Shibutani T and Hirose I (2000) Statistical survey of comprehensive dental treatment for children under general anesthesia during a 10 year period. *Jpn J Ped Dent* **38** : 1034–41. (in Japanese, English abstract)
 - 11) Kohara K, Hatori F, and Sato K (1996) Clinical examination of dental treatment under general anesthesia for handicapped children during the last 6 years in Chiba Prefectural Child Hospital. *J Jpn Soc Dent Handicapp* **17** : 7–12. (in Japanese)
 - 12) Kawano M, Shida T, Son H, Kamada T, Suwa I, Mizuno M, Ito T, Kondo E and Ueda Y (1996) Retrospective study of general anesthetic management for dental treatment of handicapped patients in Osaka Dental University. *J Jpn Dent Soc Anesthesiol* **24** : 325–31. (in Japanese, English abstract)
 - 13) Takagi J, Shibuya A, Taki K, Ogawa A, Kim Y, Shibutani T, Niwa H, Asahi Y, Sakiyama K, Ichibayashi Y, Hashiguchi K, Hasiguchi K, Nagae M, Yoneda T and Matsuura H (1998) Special considerations in dental treatment of the handicapped under general anesthesia (Mainly day-case anesthesia) at Osaka University Dental Hospital. *J Jpn Dent Soc Anesthesiol* **26** : 56–64. (in Japanese, English abstract)
 - 14) Ito M (1997) Discussion by the person who prepared the “Regional Health Law”. *J Pub Health Prac* **61** : 4–8. (in Japanese)
 - 15) Morita T (1995) Childcare and nutrition in relation to growth and development. *Jpn J Ped* **48** : 1578–86. (in Japanese)
 - 16) Suzuki Y, Inoue M, Yoneyama M, Ohno K and Noda T (1976) Relationship between incidence of caries and feeding in young children. *Jpn J Ped Dent* **14** : 308–14. (in Japanese, English abstract)
 - 17) Amamoto S, Ariyoshi Y, Natsuaki M, Uji T, Matsumoto K, Naruse T and Nakata M (1984) A statistical analysis of cariogenic factors from the dental health examination of three year old infants. *Jpn J Ped Dent* **22** : 137–44. (in Japanese, English abstract)
 - 18) Shimohida M, Futatsuki T, Ogata T, Kaneyuki N, Yamasaki K and Nakata M (1991) A study to predict the cariogenicity at 3 years of age with the use of dental health parameters at 18 months of age. *Jpn J Ped Dent* **29** : 707–19. (in Japanese, English abstract)
 - 19) Saito T, Shimamura K, Yatsu M and Fujino N (1994) On the factors of daily habits influencing the progress of dental caries with advancing age of young children. *Jpn J Ped Dent* **32** : 21–7. (in Japanese, English abstract)
 - 20) Osuga N, Mizushima H, Kuneshita T, Miyazawa H, Imanishi T, Hayashi N, Takeuchi T and Hirose I (1994) Environmental survey of dental treatment for intensive care infants under general anesthesia. *Matsumoto Shigaku* **20** : 76–9.
 - 21) Kawauchi K, Nakajima M, Eda S, Osuga N, Lin YF, Miyazawa H and Hasegawa T (1994) The correlation between nursing method and incidence of dental caries. *Matsumoto Shigaku* **20** :

- 297-301. (in Japanese, English abstract)
- 22) Kanetsaka H (1977) Infant caries-examined according to the nutrition ingestion conditions during infancy-A comparison of non-carious children and severely carious children-. *Jpn J Ped Dent* **15** : 198-204. (in Japanese, English abstract)
 - 23) Nakata T, Chen PJ, Sakai Y, Nabeshima K, Miura K and Nagasaka N (1980) Relationship between feeding life and susceptibility to caries of children at age 2.0-2.5 years. *Jpn J Ped Dent* **18** : 643-50. (in Japanese, English abstract)
 - 24) Nishimura Y, Uchimura N, Nagatani N and Higaki M (1984) Studies on oral health Examination of one and a half year old infants (1) correlation between dietary habits and dental caries incidence up to one and a half year old of age. *Jpn J Ped Dent* **22** : 321-32. (in Japanese, English abstract)
 - 25) Kanou N, Koseki A, Yamada K, Sakurai S, Ohnishi N, Mayanagi H and Kamiyama K (1989) An investigation into the actual condition of outpatients II. Correlation between the daily habits of eating and tooth-brushing and the prevalence of dental caries incidence. *Jpn J Ped Dent* **27** : 467-74. (in Japanese, English abstract)
 - 26) Social Welfare Corporation, Oncho Zaidan Boshi-Aiiku-Kai, Japan Comprehensive Aiiku Institute (1991), 1991/92 Japanese Child Material Yearbook, 168, Chuo Publishers, Tokyo, Japan. (in Japanese)
 - 27) Social Welfare Corporation, Oncho Zaidan Boshi-Aiiku-Kai, Japan Comprehensive Aiiku Institute (1992), 1991/92 Japanese Child Material Yearbook, Volume 3, 225-6, KTC Chuo Publishers, Tokyo, Japan. (in Japanese)
 - 28) Matsukubo T and Takeuchi M (1979) New techniques and knowledge useful for health guidance, edited by Toshio Morioka, Sugar and Caries-Etiology, Dietary Life, and Prevention-, 113-24, Quintessence, Tokyo, Japan. (in Japanese)
 - 29) Nishino M, Shimono T, Suzuki T and Sobue S (1972) : Actual status of between-meal snacks in children and the incidence of tooth caries. *Jpn J Ped Dent* **10** : 104-7. (in Japanese)
 - 30) Taura K and Shimada Y (1983) Relationship between dental caries, tooth brushing, and dietary habits in nursery school children. *J Dent Hlth* **32** : 61-71. (in Japanese, English abstract)
 - 31) Ohhashi K (1986) The quantification of nursery environment to caries prevalence in children. *J Ped Dent* **24** : 704-24. (in Japanese, English abstract)
 - 32) Okuno M, Kani T and Shimizu H (1994) A cohort study on dental caries in infants. *Jpn J Public Hlth* **41** : 625-8. (in Japanese, English abstract)
 - 33) Tanaka Y, Onozawa H and Yasui T (1998) Incidence of dental caries at a dental checkup in children 1 year and 6 months old and life environmental factors. *J Dent Hlth* **48** : 508-9. (in Japanese)
 - 34) Fukada H and Akasaka M (1980) Dental Nutrition Handbook for Children, 1-65, Ishiyaku Publishers, Tokyo, Japan. (in Japanese)
 - 35) Taura K (1981) Relationship between dental caries in deciduous teeth and tooth brushing in nursery school children. *J Dent Hlth* **31** : 2-16. (in Japanese, English abstract)
 - 36) Akizawa Y, Hara N, Fujita Y, Nagai M, Yanagawa H, Minowa M and Hatano S (1986) Effects of the intake of sweets and tooth brushing on tooth decay in infants. *Jpn J Public Hlth* **33** : 625-35. (in Japanese, English abstract)
 - 37) Takahashi N and Shimada Y (1983) Relationship between tooth brushing and the prevalence of dental caries in 1 to 3 years old infants. *J Dent Hlth* **33** : 49-60. (in Japanese, English abstract)

- 38) Nakamura S, Ebina K and Suzuki A (1996) Improvement in less advanced dental knowledge and behaviors—based on the results of a questionnaire survey for dental health in children in Shizuoka Prefecture—. *Dental Outlook* **88**: 243–6. (in Japanese)

抄録：松本歯科大学病院における小児全身麻酔下集中歯科治療の検討

—過去11年間の環境要因の変遷について—

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松本歯科大学病院小児歯科において、1990年1月から2000年12月までの11年間に全身麻酔下集中歯科治療を施術した1歳9か月から7歳2か月の177症例（男児102例，女児75例）について育児環境等の実態調査を行った。その結果，以下の結論を得た。

1. 症例数は1992年から1994年までの3年間に増加傾向を示し，その後は症例数が経年的に減少傾向を示した。
2. 処置時の平均年齢は3歳7か月（ 44.5 ± 12.9 か月）であった。
3. 症例の地域分布は，本学の位置する塩尻市以外の長野県の地区からの患児が半数以上であった。
4. 乳児期の授乳方法は，母乳と混合乳が大半を占めた。また，授乳の不規則性が認められた。
5. 平均離乳開始時期は 7.5 ± 4.1 か月，平均断乳時期は 16.0 ± 6.3 か月であった。
6. 刷掃すると答えた症例は95.5%であり，刷掃回数では，1回/日と時々割合が69.5%を占めた。
7. フッ素塗布経験者は対象症例全体の46.9%であった。