1990년대 초와 2000년대 초의 유치 치근 흡수의 연령 비교

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국문초록

유치의 치근 흡수의 시기에 대한 정보는 소아치과 또는 교정과에서 진단 및 치료 계획의 수립에 중요한 역할을 제공하며, 치아의 발육 상태는 유전, 환경, 인종, 성별, 영양, 사회 경제적 상태 및 시대 변화에 따라 영향을 받는다. 본 연구의 목적은 현대 한국 아동의 유치 치근 흡수의 평균 연령을 측정하고, 1990년대 초와 2000년대 초의 유치 치근 흡수의 평균 연령을 비교하는 것이다. 경북대학교병원 소아치과에 내원한 1990~1992년의 1037명(여아 528명, 남아 509명) 및 2001~2003년의 1065명(여아 394명, 남아 671명)의 파노라마 사진을 대상으로 하여 횡적인 방법으로 조사하였다. 상악 치아 및 하악 전치부의 상의 선예도의 문제로 하악 유견치, 하악 제 1 유구치, 하악 제 2 유구치를 대상으로 하였다. 결과는 다음과 같다.

1. 유치 치근의 흡수는 2000년대 초 아동이 1990년대 초 아동에 비해 더 이른 시기에 흡수되는 경향을 보였으며 Res c 단계에서 평균 연령의 차이는 0.4년이었다.
2. Res c 단계에서 1990년대 초와 2000년대 초의 평균 연령의 차이는 여아에서 하악 유견치, 하악 제 1 유구치, 하악 제 2 유구치의 순으로 증가하였으며, 남아에서 하악 제 2 유구치, 하악 제 1 유구치, 하악 유견치의 순으로 증가하였다. 즉 평균 차이는 여아에서 나이 증가에 따라 증가하였으며, 남아에서는 나이 증가에 따라 감소하였다.
3. 1990년대 초와 2000년대 초 모두에서 여아가 남아에 비해 평균 0.3년 더 이른 시기에 흡수되는 경향을 보였다.
4. 하악 유견치의 치근 흡수의 시작은 하악 제 1 유구치 보다 늦었지만, 하악 유견치의 치근 흡수의 완료는 하악 제 1 유구치 보다 빨랐으며, 하악 유견치에서 치근 흡수에 소요된 총 기간은 가장 짧았다.
5. 치근 흡수의 속도는 흡수 말기가 초기에 비해 빠른 경향을 나타냈다.

정확한 유치 치근의 흡수 시기에 대해 알기 위해서는 정기적이면서 종적인 연구가 필요하리라 생각한다.

주요어 : 치근 흡수, 유치, 시대 변화

Ⅰ. Introduction

Differences in the development among children of the same chronological age have led to the concept of physiologic age as a means to define progress toward completeness of development or maturity in the individual child. Physiologic age are measures for describing the status of an individual child, whereas chronological convey only a rough approximation of this status because of the range in development observed for any given age. Developmental indicators refer to bone development, dental development, secondary sex characteristics, stature and weight. As developmental indicators, the number of teeth present in the mouth, time of emergence of teeth, the stage of formation and maturation of teeth, and the stage of resorption of deciduous teeth estimate dental development.

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There are many studies about dental development: Moorrees[1] and Anderson[2] studied the relationship between the chronological age and formation stage of the permanent teeth. Kronfeld[3], Obersztyn[4] and Soskolne *et al*[5] conducted a histological study on the root resorption of deciduous teeth. Haralabakis *et al*[6], Prove *et al*[7] and Zadik *et al*[8] conducted a radiographic study on the root resorption of deciduous teeth. Becker *et al*[9] and Knott *et al*[10,11] studied the relationship between the chronological age and root resorption of deciduous teeth. Engstrom *et al*[12] researched the relationship between skeletal maturity and dental maturity. Finally, Nanda[13], Hurme[14] and Al-Jasser[15] studied the differences of emergence and the velocity of root resorption of deciduous teeth among the human races.

Climate, race, nutrition and prenatal and postnatal care of the children can influence physical and physiological growth. Dental development is also influenced by hereditary characteristics, environmental factors, race, sex, endocrine reaction, nutrition, socioeconomic condition, secular factor, climatic factors, and certain local factors. Secular changes in growth and maturation have been well documented in various world populations, with an increase of changes especially noticeable in the developed countries.

Previous studies of growth and development documented secular changes in physical maturation[16-22]. Miller *et al*[23], Hoffding *et al*[24], Virtanen *et al*[25], Helm[26] and Eskeli[27] examined the secular trend in the emergence time of permanent teeth.

Many studies of the eruption of permanent teeth have been conducted, but few studies have been carried out on the root resorption of deciduous teeth. Tooth resorption is a process that is spread over the early years of life and may provide a valuable means of categorizing somatic maturation in children. The rate of root resorption of deciduous teeth is changed by secular factors. The aims of the present study were to determine the mean age of the root resorption stage of deciduous teeth in contemporary Korean children and to compare the mean age of the root resorption stage of deciduous teeth between early 1990s and early 2000s.

Ⅱ. Subject and method

1) Subject

This study utilized a cross-sectional design. The study population was made up of Korean children attending the pediatric dentistry ward of Kyungpook National University Hospital. One thousand thirty seven children's panoramic radiograph (girls: 528 persons, boys: 509 persons) in 1990~1992 and one thousand sixty five children's panoramic radiograph (girls: 394 persons, boys: 671 persons) in 2001~2003 were examined. All the selected children in this sample satisfied the following criteria: Ages between 4 years and 12 years showing normal development and no systemic disease affecting the resorption of any deciduous tooth. Age and sex distribution are shown in Table 1, 2.

All selected teeth show normal development. Certain deciduous teeth were excluded from the study when they evidenced pulp treatment, pulp necrosis, extensive untreated caries, extensive fillings, and abnormal root resorption by ectopic eruption of the permanent successor or when the perma-

Table 1. Distribution of subject by age and sex in 1990~1992

Age	Girl	Boy	Total
4	10	4	14
5	31	17	48
6	53	52	105
7	106	75	181
8	123	124	247
9	83	82	165
10	74	94	168
11	34	47	81
12	14	14	28
Total	528	509	1037

Table 2. Distribution of subject by age and sex in 2001~2003

Age	Girl	Boy	Total
4	22	16	38
5	20	68	88
6	36	74	110
7	105	160	265
8	85	134	219
9	58	104	162
10	50	70	120
11	10	30	40
12	8	15	23
Total	394	671	1065

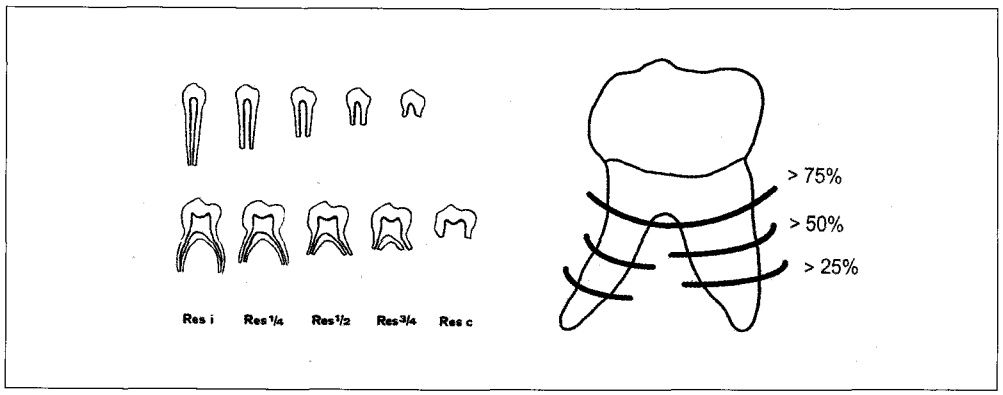

Fig. 1. Stage of root resorption of the deciduous mandibular teeth.

Table 3. Tooth resorption stages and their coded symbols

Stage	Coded symbol
Initial root resorption	Res i
Root one quarter resorbed	Res $\frac{1}{4}$
Root one-half resorbed	Res $\frac{1}{2}$
Root three-quarters resorbed	Res $\frac{3}{4}$
Root resorption completed	Res c

nent successor was missing. Due to the problems of imaging in the maxillary region and the mandibular incisor region, the mandibular deciduous canine and the mandibular deciduous molars were chosen for examination.

2) Method

The method used was panoramic radiograph converted to digital imaging by scanning. The resorption stage was recorded without knowing any specific group.

The five stages of root resorption of deciduous teeth were determined using the method introduced by Moorres et al[28], Haselden[29] and Fass[30] (Fig. 1, Table 3). In these cases the division that was closer to the stage of development was used. Bilaterally symmetrical teeth in the same arch were pooled because of the similarity of age from the right and left sides. Multi-rooted teeth were recorded only on the least resorbed root.

3) Statistical analysis

The data was transferred into a computer for statistical analysis using the statistical program SAS Ver 8.01. For early 1990s and early 2000s, the mean age and standard deviation of each stage of root resorption of deciduous teeth were calculated for boys and girls. The t-test was used to assess the statistical significance of the difference in the mean age of each stage of root resorption of deciduous teeth between early 1990s and early 2000s at the 5% confidence interval. The P-value was also calculated.

Ⅲ. Results

Table 4~6 show the mean age of each stage of root resorption of each deciduous teeth and the statistical significance of the difference in the mean age of root resorption of each deciduous tooth between early 1990s and early 2000s.

There is a tendency for the teeth to resorb earlier in the contemporary children than in children of the past. At the Res c stage, the difference of the mean age between early 1990s and early 2000s was 0.4 year.

At the Res c stage, the order of the difference of the mean age from smaller to larger for the girls was: the mandibular deciduous canine, the mandibular first deciduous molar, and the mandibular second deciduous molar. On the other hand, for the boys, the order was as follows: the mandibular second deciduous molar, the mandibular first deciduous molar, and the mandibular deciduous canine.

There is a tendency for the teeth to resorb earlier in girls in both the early 1990s and early 2000s groups, with the exception being the Res c stage in the early 1990s. The difference of the mean age between girls and boys was 0.3 year, but a test of sig-

Table 4. Mean age of root resorption of mandibular deciduous canine

		Early 1990s		Early 2000s		P-value
		N	Mean±SD	N	Mean±SD	
Res i	Boy	77	7.50±0.88	146	7.39±0.93	0.3856
	Girl	65	7.30±0.77	57	7.01±0.71	0.0299*
	Total	142	7.41±0.83	203	7.28±0.89	0.1773
Res ¼	Boy	98	8.03±0.89	158	7.75±0.85	0.0110*
	Girl	116	7.87±0.89	94	7.66±0.84	0.0933
	Total	214	7.94±0.89	252	7.71±0.85	0.0052*
Res ½	Boy	52	9.03±0.87	61	8.81±0.89	0.1968
	Girl	34	8.56±0.82	30	8.22±0.81	0.1021
	Total	86	8.84±0.88	91	8.62±0.91	0.0944
Res ¾	Boy	28	9.80±0.83	40	9.48±0.91	0.1346
	Girl	31	8.93±0.83	17	8.35±0.81	0.0250*
	Total	59	9.34±0.94	57	9.14±1.02	0.2645
Res c	Boy	28	10.19±0.99	38	9.52±0.96	0.0070*
	Girl	17	9.06±0.54	20	8.55±0.57	0.0089*
	Total	45	9.77±1.01	58	9.19±0.96	0.0037*

N : Number of subject, Mean : Mean age, SD : Standard deviation
P-values are computed by t-test

Table 5. Mean age of root resorption of mandibular deciduous first molar

		Early 1990s		Early 2000s		P-value
		N	Mean±SD	N	Mean±SD	
Res i	Boy	78	7.38±0.81	103	6.89±0.87	0.0001*
	Girl	70	7.22±0.87	32	6.91±0.85	0.0910
	Total	148	7.31±0.84	135	6.89±0.86	0.0001*
Res ¼	Boy	87	8.17±0.85	172	7.79±0.81	0.0004*
	Girl	133	7.89±0.84	104	7.54±0.78	0.0010*
	Total	220	8.00±0.85	276	7.69±0.81	0.0001*
Res ½	Boy	55	8.97±0.86	102	8.14±0.86	0.0001*
	Girl	52	8.38±0.69	61	8.06±0.67	0.0139*
	Total	107	8.69±0.84	163	8.11±0.79	0.0001*
Res ¾	Boy	40	9.54±0.86	49	9.35±0.78	0.2951
	Girl	22	8.92±0.67	23	8.68±0.74	0.2603
	Total	62	9.32±0.84	72	9.14±0.83	0.2179
Res c	Boy	34	9.93±0.97	26	9.65±0.91	0.2677
	Girl	22	9.94±0.98	24	9.32±0.95	0.0346*
	Total	56	9.93±0.97	50	9.49±0.94	0.0193*

N : Number of subject, Mean : Mean age, SD : Standard deviation
P-values are computed by t-test

nificance for the differences was not calculated.

The arrangement of teeth in order of the age of commencement of root resorption of the deciduous teeth from fast to slow is as follows: The mandibular first deciduous molar, the mandibular deciduous canine, and the mandibular second deciduous molar in the boys and girls of the early 1990s and 2000s. The arrangement of teeth in order of the age of completion of root resorption of the deciduous teeth from fast to slow is as follows: The mandibular first deciduous molar, the mandibular deciduous canine, and the mandibular second deciduous molar in the boys of the early 1990s. The mandibular deciduous canine, the mandibular first deciduous molar, and the

Table 6. Mean age of root resorption of mandibular deciduous second molar

		Early 1990s		Early 2000s		P-value
		N	Mean±SD	N	Mean±SD	
Res i	Boy	116	8.02±0.88	201	7.69±0.93	0.0025*
	Girl	153	7.81±0.96	114	7.59±0.99	0.0691
	Total	269	7.90±0.93	315	7.66±0.95	0.0019*
Res ¼	Boy	73	9.11±0.98	152	8.31±0.92	0.0001*
	Girl	84	8.67±0.97	104	8.24±0.92	0.0022*
	Total	157	8.87±1.00	256	8.28±0.92	0.0001*
Res ½	Boy	53	9.95±0.95	63	9.40±0.96	0.0027*
	Girl	37	9.51±0.79	32	9.34±0.89	0.4133
	Total	90	9.77±0.91	95	9.38±0.93	0.0050*
Res ¾	Boy	20	10.18±0.92	23	9.76±0.67	0.0898
	Girl	18	?9.96±0.91	17	9.40±0.99	0.0929
	Total	38	10.07±0.91	40	9.61±0.83	0.0199*
Res c	Boy	32	10.29±0.94	14	10.17±0.72	0.6836
	Girl	31	10.47±0.91	13	9.60±0.41	0.0001*
	Total	63	10.38±0.93	27	9.89±0.65	0.0063*

N : Number of subject, Mean : Mean age, SD : Standard deviation
P-values are computed by t-test

mandibular second deciduous molar in the girls of the early 1990s and the boys and girls of the early 2000s. Therefore, the commencement of root resorption of the mandibular deciduous canine was slower, but its completion is faster than that of the mandibular first deciduous molar. The total elapsed time of root resorption from commencement to completion was shortest for the mandibular deciduous canine.

For the each tooth in the early 1990s and 2000s groups, the speed of root resorption was faster in the later stage than in the earlier stage.

The total elapsed time from commencement to completion of root resorption was shorter in the 2000s group than in the 1990s group, except for the mandibular first deciduous molar and the mandibular second deciduous molar in boys. The greatest difference was found in the mandibular deciduous canine in boys.

Ⅳ. Discussion

It is essential to have adequate knowledge of the timing and pattern of the eruption of permanent teeth for diagnosis and treatment planning. Dental age is estimated by clinically, histologically and radiographically. Clinical methods to assess dental age are based on the number of teeth present in the mouth and emergence of teeth in the mouth. Histological and radiographic methods are based on the stage of formation and maturation of teeth and of resorption of deciduous teeth. Tooth emergence is a short period determined by the time elapsed and can be altered by local factors and the histological method is difficult by clinical access. For these reasons, the radiographical method was mainly used. Various researchers have made statements about the dental development. Moorrees[1] and Anderson[2] in particular have stressed the relationship between the chronological age and formation stage of permanent teeth, while Haralabakis *et al*[6], Becker *et al*[9] and Knott *et al*[10,11] presented the relationship between the chronological age and root resorption of the deciduous teeth. Tooth resorption is a process, which is spread over the early years of life and may provide a valuable means of categorizing somatic maturation in children. Several researchers have extrapolated ages by using of dental development[31-35]. The schedule of root resorption of deciduous teeth influences their exfoliation and the retardation of these processes often leads to faulty permanent tooth positioning and to the development of dental malocclusion. The root resorption of deciduous teeth can be used to determine the developmental age of children between 5 and 13 years old[13].

Hereditary and environmental factors, systemic disease, nutrition, and some local factors influence the rate of root resorption as well as the timing of exfoliation of deciduous teeth. Several authors have reported that the root resorption of deciduous teeth is accelerated by the pressure from erupting permanent teeth, masticatory load, and inflammatory processes such as decay, pulp necrosis and pulpotomy[3,4,6-9,29,36-39].

The criteria for the inclusion of patients into this study in the light of the previous research required a clear medical history, no history of dental trauma, and an overall normal oral appearance. Deciduous teeth were excluded when they evidenced pulp treatment, pulp necrosis, extensive untreated caries, extensive fillings, abnormal root resorption, or when the permanent successor was missing.

The present cross-sectional study was conducted using panoramic radiograph and the age of selected children, which ranged from 4 years to 12 years. Due to the problems of imaging in the maxillary region and the mandibular incisor region, the mandibular deciduous canine and the mandibular deciduous molars were chosen for examination. Bilaterally symmetrical teeth in the same arch were pooled because bilaterally symmetrical teeth attain each stage at a similar age[2,9,40]. Estimating of the mean age of exfoliation time was difficult by cross-sectional study, so exfoliation was excluded.

Secular trends in dental development were studied by various researchers[23-27]. Many studies of the eruption of permanent teeth have been conducted, but few studies have been carried out on the root resorption of deciduous tooth. There was change of dental development over time.

In this study, there is a tendency for the teeth to resorb earlier in the early 2000s group than in the early 1990s group. The significance varied with each stage. The decrease of mean age between the 1990s groups and 2000s groups in boys and girls made no difference. The wide intervals between each stage may influence this result.

Several researchers noted the changing trend of dental development and they linked this trend with a general advancement in physical development[23-25]. Developmental tempo is measured, for example, by bone or pubertal stage. The simplest and most accurate pubertal stage measure is menarche in girls. The age at menarche had been getting younger during the past century, and this trend still going on in Korea[41,42]. The extent of this reduction in age for menarche was 6.6 months for every 10 years[41].

At the Res c stage, the mean age was lower in early 2000s group than in the early 1990s group and the difference of the mean age between the 1990s and 2000s groups was found to be an average of 0.4 year.

At the Res c Stage, the mean age came earlier for the early 2000s group than for the early 1990s group. The difference was greater with aging in girls and smaller with aging in boys. In girls, the closer resorption got to the age of puberty, the greater the difference was found in the mean age between the early 2000s group and the early 1990s group. In boys, the age of puberty comes later than for girls. Therefore, resorption in boys was less influenced by puberty.

The teeth in girls developed earlier than in boys[1,2,27,34,35]. Nolla[40] has reported the degree of variability is similar in both sexes. Tooth development in males and females coincides closely during earlier developmental stage. However, during later stage, root formation, in particular, shows a notable divergence between the sexes, with females being advanced as compared to males[33,43,44]. In this study, there is a tendency for the tooth to resorb earlier in the girls than in the boys. The difference of the mean age between girls and boys was 0.3 year.

Eruption and root completion for the mandibular deciduous canine comes later than for the mandibular deciduous first molar. However, eruption of the mandibular canine is more rapid than eruption of the mandibular first premolar[45]. The commencement of root resorption of the mandibular deciduous canine was slower than that of the mandibular first deciduous molar, but its completion is faster than completion of the mandibular first deciduous molar[13,45]. This study got same results.

Usually the dissolution of the root of deciduous tooth allows accommodation of the permanent tooth and this is charactered by the alternating of resorption and repair[7,45]. Deciduous teeth are resorbed by externally or internally. External root resorption is mainly up to half of the root length, but after this

the odontoclasts proliferate in the root canal and internal root resorption is recognized. At this point in time, the velocity of root resorption is quick[45]. Root resorption and root formation are different biological processes, but these two biological processes are intimately related[6]. So the exfoliation of deciduous teeth and eruption of permanent teeth are also intimately related. Exfoliation of deciduous teeth mainly occurred when the root formation of their successors had reached from 2/3 to 3/4 of their entire length[6]. Eruption speed was fast when root formation had reached between 1/2 and 3/4 of the entire root length[46]. Res $\frac{1}{2}$ and Res $\frac{3}{4}$ mainly occurred when the root formation of their successors had reached half of their entire length[6]. So, the speed of root resorption was faster in the later stage than in the earlier stage of root resorption of deciduous tooth.

In this study, the resorption speed was rapidly between Res i and Res $\frac{1}{4}$, and later after Res $\frac{1}{2}$. When Res i was recorded, root resorption was already in progress. So, it is difficult to say that the resorption speed between Res i and Res $\frac{1}{4}$ is rapid.

The mean maximum growth age for the growth accelerating phenomena is getting younger[47]. In Europe, adult height has largely stabilized, but the development tempo has a strong differentiated increase[16,19] in children. Similarly, the total time of root resorption from commencement to completion was diminished in the contemporary children as opposed to children in the past.

There is no doubt that secular trends in height, weight, body mass index and developmental tempo have been occurring over a long period of time and in many cases continue to occur. Several aspects of these trends are of interest; first, the varying nature of the trends in terms of their timing and intensity; second, the physiological processes underlying them; and third, the environmental factors that have been driving them[19]. In USA, England and Japan, it is said that the growth accelerating phenomena has reached its limit[47]. So, it is possible that the precedence of this quickened dental development will slow down in the future.

A number of factors related to the dental development in population, e. g. racial composition, sex, climate, city or countryside and socioeconomic factors. Therefore, in order to know about the exact developmental timing of teeth, periodic and longitudinal studies preferably covering the entire period of growth, is required.

Ⅴ. Summary

The aims of the present study were to determine the mean age of root resorption of deciduous teeth in contemporary Korean children and to compare the mean age of root resorption time of deciduous teeth between early 1990s and early 2000s. The study population was composed of Korean children attending the pediatric dentistry ward of Kyungpook National University Hospital. One thousand thirty seven children's panoramic radiograph (girls: 528, boys: 509) in 1990~1992 and one thousand sixty five children's panoramic radiograph (girls: 394, boys: 671) in 2001~2003 were examined using a panoramic radiograph. The stages of root resorption were recorded and the mean ages were estimated.

The results were as follows.

1. There is a tendency for the teeth to resorb earlier in the early 2000s group than the in early 1990s group. At the Res c stage, the difference of the mean age was 0.4 years.
2. At the Res c stage, the order of difference of the mean age from smaller to larger for the girls was the mandibular deciduous canine, the mandibular first deciduous molar, and the mandibular second deciduous molar. On the other hand, for the boys, the order was the mandibular second deciduous molar, the mandibular first deciduous molar, and the mandibular deciduous canine. The difference was larger with aging in girls and smaller with aging in boys.
3. There is a tendency for the teeth to resorb earlier in girls in both the early 1990s group and the early 2000s group. The difference of the mean age between girls and boys was 0.3 year.
4. The commencement of root resorption of the mandibular deciduous canine was slower than that of the mandibular first deciduous molar. However, the completion of root resorption of the mandibular deciduous canine is faster than that of the mandibular first deciduous molar. The total elapsed time of root resorption from commencement to completion was shortest in the mandibu-

lar deciduous canine.

5. For each of the teeth in the early 1990s and the early 2000s groups, the speed of root resorption was in the later stage faster than in the earlier stage.

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Abstract

COMPARISON OF THE CHRONOLOGY OF ROOT RESORPTION OF DECIDUOUS TEETH BETWEEN EARLY 1990S AND EARLY 2000S

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It is essential to have adequate knowledge of the timing of root resorption of deciduous teeth for diagnosis and treatment planning in pediatric and orthodontic dentistry. Dental development is also influenced by hereditary characteristics, environmental factors, race, sex, endocrine reaction, nutrition, socioeconomic condition and secular factor. The aims of the present study were to determine the mean age of root resorption of deciduous teeth in contemporary Korean children and to compare the mean age of root resorption time of deciduous teeth between early 1990s and early 2000s. The study population was made up of Korean children attending the pediatric dentistry ward of Kyungpook National University Hospital. One thousand thirty seven children's panoramic radiograph (girls: 528 persons, boys: 509 persons) in 1990~1992 and one thousand sixty five children's panoramic radiograph (girls: 394 persons, boys: 671 persons) in 2001~2003 were examined. This study utilized a cross-sectional design. Due to the problems of imaging in the maxillary region and the mandibular incisor region, the mandibular deciduous canine, the mandibular deciduous first molar and the mandibular deciduous second molar were chosen for examination. The results were as follows.

1. There is a tendency for the teeth to resorb earlier in the early 2000s group than the in early 1990s group. At the Res c stage, the difference of the mean age was 0.4 years.
2. At the Res c stage, the order of difference of the mean age from smaller to larger for the girls was the mandibular deciduous canine, the mandibular first deciduous molar, and the mandibular second deciduous molar. On the other hand, for the boys, the order was the mandibular second deciduous molar, the mandibular first deciduous molar, and the mandibular deciduous canine. The difference was larger with aging in girls and smaller with aging in boys.
3. There is a tendency for the teeth to resorb earlier in girls in both the early 1990s group and the early 2000s group. The difference of the mean age between girls and boys was 0.3 year.
4. The commencement of root resorption of the mandibular deciduous canine was slower than that of the mandibular first deciduous molar. However, the completion of root resorption of the mandibular deciduous canine is faster than that of the mandibular first deciduous molar. The total elapsed time of root resorption from commencement to completion was shortest in the mandibular deciduous canine.
5. For each of the teeth in the early 1990s and the early 2000s groups, the speed of root resorption was in the later stage faster than in the earlier stage.

In order to know about the exact timing of root resorption of deciduous teeth, periodic and longitudinal studies preferably covering the entire period of growth, is required.

Key words : Root resorption, Deciduous teeth, Secular factor