Mandibular third molars and anterior crowding in the lower jaw. A longitudinal study from 15 to 21 years

JESSIE POON

Faculty of Dentistry

University of Oslo, Norway

2009

Supervisor: Lisen Espeland

CONTENTS

SUMMARY

Aim:

The aim of the study is to examine whether presence of third molars contribute to changes in anterior dental alignment in the lower jaw in individuals from adolescence to young adulthood, when compared to the development in individuals with congenitally missing third molars.

Material:

The present study was based on 69 individuals selected from the Oslo Craniofacial Growth Archives. The study included patient with longitudinal series of orthopantomograms and plaster models at age 15 years (T1) and at 21 years (T2), and presence of bilateral mandibular third molars (M1) or congenitally missing third molars (M2) at each age stage (table 8). Congenital absence of third molars was determined using panoramic radiographs. Third molars were considered to be congenitally missing when no mineralization of the crown could be seen.

Methods:

Standardized measurements were carried out on the plaster models at time-points T1 and T2 for all the 69 patients. Contact point displacement and intercanine width in the lower jaw were measured applying the computer program Facad (Ilexis AB, Linkøping, Sweden). All the statistical analyses were done in SPSS (SPSS Inc, Chicago, US).

Results:

The results of this study:

- 60 patients with bilateral mandibular third molars from showed no significant changes from 15 to 21 years of age in the lower anterior alignment, or intercanine width.

- 9 patients with bilateral agenesis mandibular third molars show no significant changes in the lower anterior alignment, but a change in intercanine width.

- There were small decreases in intercanine width, with the most significant change occurring in patients with agenesis of both mandibular third molars from 15 to 21 years (p=0,036).

Conclusion:

Our study suggests that changes in alignment of lower incisors are not related to the presence of third mandibular molars.

INTRODUCTION

Late mandibular incisor crowding is a well-recognized clinical problem (Kaplan 1974, Lindqvist and Thilander 1982, Espeland and Aasen 2005, Tüfekçi et al., 2009), and may be due to increased concern of dental appearances in today's society. Anterior dental crowding is perhaps the most frequently occurring malocclusion trait (Rao 2009). It is common to see crowding in the incisor area, particularly in the lower jaw after puberty (Lindqvist 1982).

Many factors may influence development or changes in the anterior alignment during growth. Factors may include: growth (Bishara), erupting third molars (Lindqvist 1982, Richardson 1989), anterior component of force during third molar eruption (Niedzielska 2005), presence or congenitally missing third molars (Sidlauskas and Trakiniene 2006), muscle forces (Björk 47, Sillman 64, and Siatkowski 74), space conditions (Richardson 1983, Quinn 1985), changing facial morphology and growth of anatomical structures (Bondevik 2002), and relapse after orthodontic treatment (Little 83, Sinclair 83, Bondevik 98, Espeland and Aasen 2005) etc.

The relationship between changes in anterior alignment and third molars has been of interest for many years. Third molars may have an impact on dental arch crowding, and impacted third molars, especially in the mandible, are of concern in management of orthodontic patients (Bishara 1999, Pham et al. 2006). However several studies have reported that there is no relationship between erupting third molars and late anterior crowding, while others state that there is a definite association.

The aim of this study was to identify factors associated with changes in alignment of the lower anterior dental arch in young Norwegian adults.

AIM

The aim of this study is to examine if there is any correlation between the presence of bilateral lower third molars and changes in lower incisor alignment by using a longitudinal study design. The objectives are:

- To examine changes in lower arch from 15 to 21 years.
- To examine if these changes are affected by whether patients have bilateral mandibular third molars or congenitally missing third molar.

MATERIAL AND METHODS

Samples

The sample consisted of 69 patients who were selected from the archives at the Department of Orthodontics, University of Oslo. These archives originally established as a project of longitudinal growth including individuals born 1958-1972. They were all living in Nittedal, a community of about 16 000 inhabitants near Oslo. The archive includes plaster models, lateral cephalograms, panoramic radiographs, and facial photographs, collected every third year from the age of 6 until 21 years. Accordingly, between 9 and 12 years of age The University of Oslo Growth Archives represents a normal population, and after 12 years of age the material is selected as most individuals have acceptable occlusal conditions. Individuals who received orthodontic treatments were excluded, and in most cases, not further examined.

Criteria for inclusion in the sample used in the present study:

1) Individuals with longitudinal series of orthopantomograms and plaster models from 15 until 21 years. Two age stages were analyzed: 15 (T1) and 21 (T2) years.

2) A: Presence of both lower third molars on the orthopantomogram taken at each of the 2 stages (M1).

2) B: Congenitally missing mandibular third molars on the orthopantomogram taken at each of the 2 stages (M2).

A previously selected sample of 92 individuals was available from an earlier research project that used the same archives. 13 individuals who did not fulfill the present selection criteria were excluded from the study. The final sample was reduced to 69 patients, 60 with presence of bilateral lower third molars (M1) and 9 with bilateral congenitally missing third mandibular molars (M2).

Methods

A total of 138 plaster models from 69 individuals at T1 and T2 were first scanned, and then transferred to Facad, a software program used for cephalometric analysis (Facad, Ilexix AB, Linkøping, Sweden).

Millimetre scale (ABFO nr.2), an internationally recognized measuring scale available from Section for Forensic odontology, UiO, was placed next to the plaster models while scanning.

The plaster models were marked with patient's identification number and age (15 and 21 years) before scanning. Both upper and lower jaw appears on the photo taken at these two stages.

We used the same method as Camilla Rao, Department of Orthodontics in her project for measurement of irregularity and intercanine width (Rao 2009).

Computer generated measurements

The software Facad was used for the measurements obtained from the photos. The photographs were calibrated before measurements were recorded in Facad. All the measurements were done in the same order each time, as precribed in the programme Facad. Contact point displacement for the incisors, inter-canine width in mandibular arch was measured.

Measurement method

1. Contact point displacement

Recordings were made on plaster models. Mandibular anterior alignment was measured according to Camilla Rao's definition of landmarks for contact point displacement. Contact point displacement was measured for all lower incisors.

Break of contact is defined as the labio-lingual distance between two neighboring incisors` inciso-approximal corners, measured between the most lingually positioned corners along the occlusal plane (Rao 2009) (Figure 1).

Labeling of the landmarks (Rao 2009):

32ml = inciso-approximal corner, mesiolingually on 32

31dl = inciso-approcimal corner, distolingually on 31

31ml = inciso-approcimal corner, mesiolingually on 31

41ml = inciso-approcimal corner, mesiolingually on 41

41dl = inciso-approcimal corner, distolingually on 41

42ml = inciso-approcimal corner, mesiolingually on 42

Figure 1- Definition of landmarks for measuring of contact-point displacement of maxillary incisors (Rao 2009)

2. Intercanine width

The intercanine width was measured as the distance between the cusps of the permanent canines. In cases of abration the estimated midpoint of the abraded area was used as reference point (Figure 2).

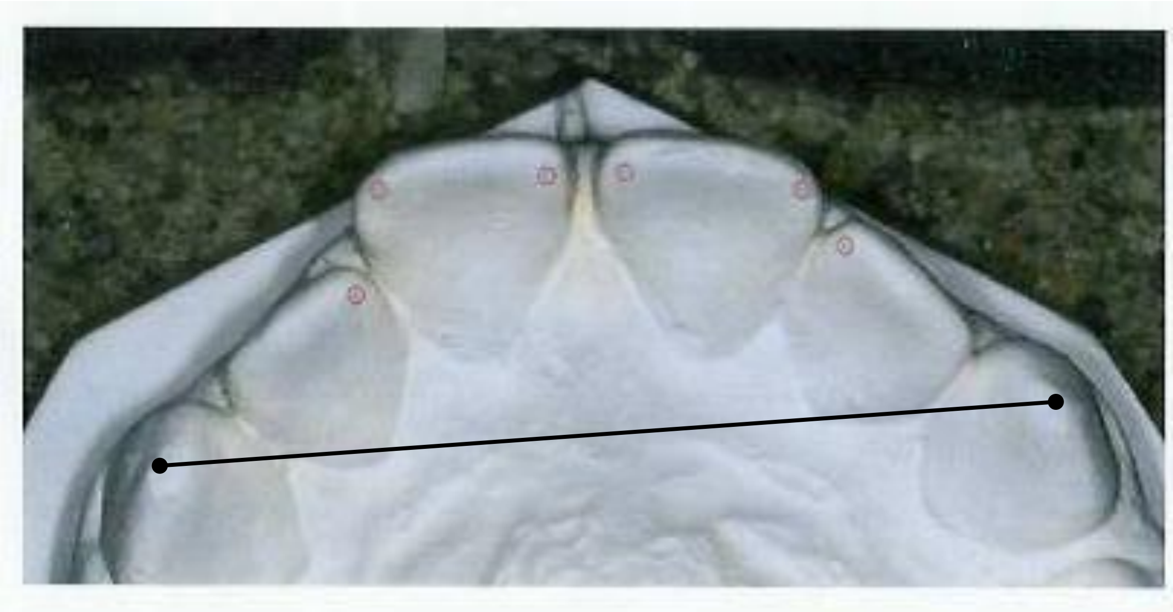
Labelling of the landmarks:

33i= cusp of permanent canine 33

43i= cusp of permanent canine 43

All measurements were made twice one week apart by the same examiner. In cases when there were difference between duplicate recordings of more than 0, 5 mm, a third measurement was taken and the average of the two closest recordings was used.

Figure 2- shows the landmark for measurement of intercanine width



Statistical analysis

All statistical computations were performed with SPSS version 12.0. A two sample t-test is a statistical method that can determine whether one group of numerical scores is statistically higher or lower than another group of scores, where both samples have a normal distribution and equal variances. When carrying out a two sample t-test, it is usually assumed that the variances for the two populations are equal. The null hypothesis for the two sample t-test is that the $\bar{y}_1$ is equal to $\bar{y}_2$, where $\bar{y}_1$ and $\bar{y}_2$ are the sample means. The null hypothesis is tested against one out of three possible alternative hypotheses, depending on how you define the question. The three possible hypotheses are: $\bar{y}_1 \neq \bar{y}_2$, $\bar{y}_1 > \bar{y}_2$ and $\bar{y}_1 < \bar{y}_2$.

According to Douglas C. Montgomery (2005), the t-test is defined as

$$t_0 = \frac{\bar{y}_1 - \bar{y}_2}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where n_1 and n_2 are the sample sizes, S_p is an estimate of the common variance $\sigma_1^2 = \sigma_2^2 = \sigma^2$ (which is an assumption for the t-test) computed from

$$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

and S_1^2 and S_2^2 are the two individual sample variances.

For all my tests, I will be looking at a two-tailed t-test with 95% confidence interval. Due to the relative small difference in the variance between M1 and M2, I have chosen to use the two sample t-test, assuming equal variance as my test-method. The results from a t-test assuming unequal variance gives approximately the same results. (Refeance Montgomery, Douglas C. 2005)

The following significance test were used:

- Analyzing the difference between M1 and M2
- Analyzing the differences between T1 and T2.

RESULTS AND DISCUSSION

In this chapter the results of the statistical analysis will be presented and seen in relation to previous studies.

Error of the method

The reproducibility of the measurements was assessed by statistically analyzing the difference between double measurements taken one week apart. In cases when there were difference between duplicate recordings of more than 0, 5 mm, a third measurement was taken and the average of the two closest recordings was used.

Results

The table shown below summarizes the statistical findings in this study:

Table 1 Mean change between 15 and 21 years of age, standard deviation (SD) (mm), and p value.

	Bilateral congenitally missing mandibular third molars (n=9)		Bilateral mandibular third molars (n=60)		
	Mean	SD	Mean	SD	P value
Canine-canine T1-T2	-0,58	0,39	-0,03	0,74	**0,036**
32m-31d T1-T2	-0,06	0,22	-0,05	0,33	0,950
31m-41m T1-T2	0,03	0,26	0,02	0,36	0,893

41d-42m T1-T2	-0,02	0,20	0,01	0,30	0,733

Intercanine width change (T1-T2):

Mean intercanine width was significantly more reduced in the M2 group than in the M1 group (p=0.036). As can be seen from the table above, the mean value of this change in width was -0,58 mm in the M2 group, and only -0,03 mm in the M1 group.

Changes from T1 to T2 in the other three distances measured did not differ significantly between the groups.

In addition, we analysed group M1 and M2 at T1 and T2 to examine if there were significant values that support our findings in Table1. These Tables are presented in the Appendix (page 27 and 28).

Discussion

This study included 69 individuals with plaster models and panoramic radiographs at age 15 and 21 years. All individuals were selected from the Oslo Craniofacial Growth Archive. In 60 (87 %) individuals bilateral lower third molars (M1), were present compared to 9 (13 %) who had congenitally missing mandibular third molars (M2).

Sinclair and Little studied a group of individuals from 13 to 20 years who had not undergone orthodontic treatment and they observed a decrease in arch length and intercanine width, and that lower incisor irregularity increased during young adulthood (Sinclair and Little 1983). In another study, Årtun also demonstrated an increase of incisor irregularity and reduction of intercanine width and arch length long-term following orthodontic treatment and retention. The degree of relapse was associated with narrow pretreatment intercanine width and incisor irregularity (Årtun et al. 1996).

The influence of third molars on the alignment of the anterior dentition is controversial (Kaplan 1974, Lindqvist 1982, Tüfekçi et al. 2009). In a study Richardson found that anterior crowding is present more often in patients with third molars than in subjects with these teeth absent (Richardson 1989). This is supported with the findings in Lindqvist's (1982) study. She claimed that in cases with severe crowding removal of the third molars could be recommended (Lindqvist 1982). Sidlauskas and Trakiniene also confirm these theories in their study where they found greater tendency for crowding of the mandibular anterior teeth expressed in groups with third molars present than in groups with these teeth missing (Sidlauskas and Trakiniene 2006).

To the contrary Ades reported in her study no differences in dental arch length and irrespective crowding of presence or absence of third molars in orthodontic patients 10 years post-retention. Therefore, it was concluded that removal of third molars to alleviate anterior crowding may not be justified (Ades 1990). Bishara also concludet in his study that third molars do not play a signicicant role in mandibular anterior crowding (Bishara 1999)

Congenitally missing third molars is frequently observed, and although the frequency ranges widely, varying from 0 % among an unspecified sample of skulls from Tasmania to 49 % in an unspecified sample of Hungarian skulls. Other radiographic studies of Caucasian populations observe prevalences between 7% and 26% (Banks 1934, Hellman 1936). In our study we found 9 individuals with congenitally missing third molars, compared to 60 individuals with presence of both mandibular third molars. The sample in group M2 may be considered small as it represents only 13 % of the whole study sample. However, if we did not exclude individuals with presence of congenitally missing third molar, which did not fulfil out criteria for inclusion, the rate would be higher.

In the present study we found no significant differences in anterior alignment and irrespective of presence mandibular third molars or congenitally missing third molars. However, the findings indicate that there is a significantly higher risk for intercanine width change from T1-T2 among patients in group M2 compared to group M1.

Earlier studies have shown a small but significant reduction in the lower intercanine width (Sillman 1964, Knott 1972, Blake and Bibby 1998). These findings are supported by Sinclair and Little (1983) who found significant change (mean 0,75mm reduction) in the intercanine distance especially in women, between 13 to 20 years of age. Bishara et al. did also observe a reduction of 0, 4 and 0, 6 mm in the lower intercanine width, but only after 25 years (Bishara et al. 1996).

We cannot exlude the possibility that some of the results that were non-significant in our statistical analysis would have been significant if a more advanced statistical ananysis had been performed.

Table 2- Overview of some studies that have examined changes in anterior alignment

STUDY	NO PATIENTS	AGE	TREATMENT	INDEX	REMARKS (CONCLUSION))
Ade 1990	97				This finding suggests that the recommendation for mandibular third molar removal with the objective of alleviating or

					preventing long-term mandibular incisor irregularity may not be justified.
Aasen, Espeland 2005	56		Stripping 0,5-5mm (gj.snitt 1.9)	Little`s index	Lomg term changes in lower incisor, 3 years after debonding
Keene 1964	195	17-25			Agnesi of thirs molars give more frequently space in both arches and less frequently crowding. Following also smaller mesiodistal crown diameter of the lower right first molar.
Margrethe Richardsson 1983	10, 4male and 6 female.		Ex. 3rd molar unilateral		Ex. Of a lower second molar can reduce the possibility or severity of late lower arch crowding.
Margrethe Richardsson 1986	48		Ex. 1.premolars		A greater increase in molar space occurs in mandibular first premolar extraction compared with non-extraction cases.
Ross g. Kaplan 1971	75				The presence of third molars does not appear to produce a greater degree of lower anterior crowding and rotational relapse after the cessation of retention than that which occurs in patients with third molar agnesis.
Berit Lindqvist	52 (23 boys, 29 girls)	13-19 (gj.snitt 15 ½)	Ex. third molars Ex. Second molars		Extraction can be recommended in severe crowding.
Robert M. Little 1988	31		Ex. of 4 premolar	Little`s	Relapse after orthodontic treatment
Robert M. Little 2002	26	6-23			Without lifetime retention, the strategy of arch development will yield unacceptable results. (The degree of relapse are significant and alarming)

CONCLUSIONS

Our study suggests that mandibular third molar is not a contributing factor to crowding in mandibular alignment. A greater reduction in intercanine width occurred when mandibular third molars were missing when compared to cases where third molars were present.

REFERENCES

1. Aasen T., Espeland L. An approach to maintain orthodontic alignment of lower incisors without the use of retainers. European Journal of Orthodontics 27: 209-214, 2005

2. Ades AG., Joondeph DR., Little RM., Chapko MK. A long-term study of the relationship of third molars to changes in the mandibular dental arch. American Journal of Orthodontics and Dentofacial Orthopedics. 97: 323-335, 1990

3. Banks HV. Incidence of third molar development. Angle Orthodontist. 4: 223–233, 1934

4. Bishara SE. Third molars: a dilemma! Or is it? American Journal of Orthodontics and Dentofacial Orthopedics. Stomatologija. 115: 628–633, 1999

5. Bishara SE., Jakobsen JR. Arch width changes from 6 weeks to 45 years of age. American Journal of Orthodontics and Dentofacial Orthopedics. 111: 401-409, 1997

6. Bishara SE., Peterson LC. Changes in facial dimensions and relationships between the ages of 5 and 25 years. American Journal of Orthodontics and Dentofacial Orthopedics. 85: 238-52, 1984

7. Bishara SE., Treder JE. , Damon P. and Olsen M. Changes in the dental arches dentition between 25 and 45 years of age. Angle Orthodontist. 66: 417–422, 1996

8. Björk, A. The face in profile: An anthropological x-ray investigation on Swedish children and conscripts. American Journal of Orthodontics. 34: 691-699, 1948

9. Blake M., Bibby K. Retention and stability: A review of the literature. American Journal of Orthodontics and Dentofacial Orthopedics. 114: 299-306, 1998

10. Bolton A. Disharmony in tooth size and its relation to the analysis and treatment of malocclusion. Angle Orthodontist. 28: 113-130, 1958

11. Bondevik O. Changes in occlusion between 23-34 years. Angle Orthodontist. 68: 75-80, 1998

12. Burleigh T., Surbeck BT., Årtun J. Associations between initial, posttreatment, and postretention alignment of maxillary anterior teeth. American Journal of Orthodontics and Dentofacial Orthopedics. 113: 186-195, 1998

13. Crosby DR., Alexander CG. The occurrence of tooth size discrepancies among different malocclusion groups. American Journal of Orthodontics and Dentofacial Orthopedics. 95: 457-461, 1989

14. Dahlberg G. Statistical method for medical and biological students. London: George Allen and Unwin Ltd. 122-132, 1940

15. De La Cruz A., Sampson P., Little RM., Årtun J., Shapiro PA. Long-term changes in arch form after orthodontic treatment. American Journal of Orthodontics and Dentofacial Orthopedics. 107: 518-530, 1995

16. Hellman M. Our third molar teeth, their eruption, presence and absence. Dental Cosmos. 78:750-62, 1936

17. Kaplan RG. Mandibular third molars and postretention crowding. American Journal of Orthodontics and Dentofacial Orthopedics. 66: 411-430, 1974

18. Knott VB. Longitudinal study of dental arch widths at four stages of dentition. Angle Orthodontist. 42: 387–394, 1972

19. Lindqvist B., Thilander B. Extraction of third molars in cases of anticipated crowding in the lower jaw. American Journal of Orthodontics and Dentofacial Orthopedics. 81: 130-139, 1982

20. Little RM. Stability and relapse: Early treatment of arch length deficiency. American Journal of Orthodontics and Dentofacial Orthopedics. 121: 578-81, 2002

21. Little RM. The irregularity index: A quantitative score of mandibular anterior alignment. American Journal of Orthodontics. 68: 554-563, 1975

22. Montgomery, Douglas C. Design and Analysis of Experiments. Hoboken, NJ: John Wiley & Sons, Inc. 6 edition, 2005

23. Nanda RS. Agenesis of the third molar in man. American Journal of Orthodontics. 40: 698-706, 1954

24. Niedzielska I. Third molar influence on dental arch crowding. European Journal of Orthodontics. 27: 518–523, 2005

25. Norderval K., Wisth PJ., Böe OE. Mandibular anterior crowding in relation to tooth size and craniofacial morphology. Scandinavian Journal of Dental Research. 83: 267-273, 1975

26. Pham L., Fang W. Change in inclination and eruption of mandibular third molars: a longitudinal radiographic study among 12 to 21-year-olds. Thesis, Master of Dentistry, University of Oslo 2006

27. Quinn GW. Extraction of four second molars. Angle Orthodontist. 55: 58-69, 1985

28. Rao C. Factors influencing the stability of maxillary incisors after orthodontic treatment. Thesis, University of Oslo 2009

29. Richardson ME. Lower arch crowding in the third decade. European Journal of Orthodontics. 20: 597-607, 1998

30. Richardson ME. The effect of lower second molar extraction on late lower arch crowding. Angle Orthodontist. 53: 25-28, 1983

31. Richardson ME. The effect of mandibular first premolar extraction on third molar space. Angle Orthodontist. 59: 291-294, 1989

32. Richardson ME. The role of the third molar in the cause of late lower arch crowding: a review. American Journal Orthodontics and Dentofacial Orthodpedics. 95: 79-83, 1989

33. Schütz-Fransson U., Bjerklin K., Kurol J. Long-term development in the mandible and incisor crowding with and without an orthodontic stabilizing appliance. Journal of Orofacial Orthopedics 59: 63-72, 1998

34. Siatkowski RE. Incisor uprighting: Mechanism for late secondary crowding in the anterior segments of the dental arches. American Journal of Orthodontics. 66: 398-410, 1974

35. Sidlauskas A, Trakiniene G. Effect of the lower third molars on the lower dental arch crowding. Stomatologija. 8: 80-84, 2006

36. Sillman JH. Dimensional changes of the dental arches: Longitudinal study from birth to 25 years. American Journal of Orthodontics. 50: 824-842, 1964

37. Sinclair PM., Little RM. Maturation of untreated normal occlusions. American Journal of Orthodontics and Dentofacial Orthopedics. 83: 114-123, 1983

38. Tüfekçi E.¸ Kallunki J., Huggare J. Opinions of American and Swedish Orthodontists about the Role of Erupting Third Molars as a Cause of Dental Crowding. Angle Orthodontist. 79: 1139-1142, 2009

39. Årtun J., Garol JD., Little RM. Long-term stability of mandibular incisors following successful treatment of Class II, Division 1, malocclusions. Angle Orthodontist. 66: 229-238, 1996

Appendix

Table 3- Show all individuals at T1 and T2

	Age 15 (T1)	Age 21 (T2)	Differenc e (T2-T1)	Differenc e %	Increase d %	Neutral %	Decreased %	Increase d	Neutral	Decreased
Canine-canine	26,29	26,18	-0,10	-0,4 %	33 %	6 %	61 %	23	4	42
32m-31d	1,76	1,71	-0,05	-2,8 %	38 %	16 %	46 %	26	11	32
31m-41m	1,70	1,72	0,02	1,1 %	43 %	12 %	45 %	30	8	31
41d-42m	1,76	1,77	0,01	0,5 %	43 %	14 %	42 %	30	10	29

Table 4- Shows individuals with congenitally missing third molars at T1 and T2

	Age 15 (T1)	Age 21 (T2)	Differenc e (T2-T1)	Differenc e %	Increase d %	Neutral %	Decreased %	Increase d	Neutral	Decreased
Canine-canine	25,93	25,36	-0,58	-2,2 %	0 %	0 %	100 %	-	-	9
32m-31d	1,33	1,28	-0,06	-4,2 %	44 %	22 %	33 %	4	2	3
31m-41m	1,21	1,24	0,03	2,8 %	56 %	0 %	44 %	5	-	4
41d-42m	1,29	1,27	-0,02	-1,7 %	33 %	22 %	44 %	3	2	4

Table 5- Shows individuals with present of both third mandibular molars at T1 and T2

	Age 15 (T1)	Age 21 (T2)	Differenc e (T2-T1)	Differenc e %	Increase d %	Neutral %	Decreased %	Increase d	Neutral	Decreased
Canine-canine	26,34	26,31	-0,03	-0,1 %	38 %	7 %	55 %	23	4	33
32m-31d	1,83	1,78	-0,05	-2,6 %	37 %	15 %	48 %	22	9	29
31m-41m	1,78	1,79	0,02	0,9 %	42 %	13 %	45 %	25	8	27
41d-42m	1,83	1,84	0,01	0,7 %	45 %	13 %	42 %	27	8	25

Tabel 6- Show group M1 at T1 and T2

	T1		T2		
	Mean	SD	Mean	SD	P value
Canine-canine	26,34	1,94	26,31	2,14	0,744
32m-31d	1,83	0,68	1,78	0,64	0,266
31m-41m	1,78	0,67	1,79	0,70	0,718
41d-42m	1,83	0,66	1,84	0,69	0,732

Table 7- Show group M2 at T1 and T2

	T1		T2		
	Mean	SD	Mean	SD	P value
Canine-canine	25,93	1,51	25,36	1,50	**0,002**
32m-31d	1,33	0,22	1,28	0,22	0,479
31m-41m	1,21	0,18	1,24	0,26	0,715
41d-42m	1,29	0,38	1,27	0,27	0,753

The canine-canine distance was significantly reduced from T1 to T2 in the M2 group (p= 0,002), but not in the M1 group. Otherwise no significant changes from T1 to T2 were seen.

Table 8- Raw data

Id	Yes/No	33-43 T1	33-43 T2	32-31 T1	32-31 T2	31-41 T1	31-41 T2	41-42 T1	41-42 T2
500	0	26,3	25,00	1,10	1,10	1,40	1,80	0,90	0,90
501	0	22,5	22,20	1,20	1,30	1,20	1,00	1,20	1,40
502	0	25,1	24,10	1,60	1,70	0,90	1,10	2,10	1,80
503	0	25,6	25,40	1,00	1,10	1,00	1,10	1,30	1,00
504	0	26,3	25,50	1,50	1,10	1,30	1,00	1,00	1,10
505	0	26,1	25,90	1,60	1,20	1,40	1,10	1,20	1,20
506	0	27,8	27,10	1,30	1,10	1,10	1,40	0,90	1,20
507	0	27,2	26,90	1,20	1,40	1,40	1,30	1,60	1,50
508	0	26,5	26,10	1,50	1,50	1,20	1,40	1,40	1,30
511	1	26,9	27,00	2,10	2,70	2,20	2,30	1,90	2,20
512	1	26,2	26,00	2,80	2,40	2,80	2,20	3,00	2,20
513	1	28,1	27,40	2,90	2,40	2,40	2,40	2,60	2,60
514	1	23,4	24,00	1,70	1,30	1,80	1,70	2,00	2,00
515	1	29,5	29,80	3,40	3,10	2,80	2,80	2,90	2,70
516	1	22,7	23,20	1,50	1,60	1,50	1,00	1,50	1,60
517	1	28,1	28,50	2,40	2,10	3,20	3,10	2,20	2,30
518	1	28,1	28,00	2,60	2,70	2,70	2,50	2,70	2,50
519	1	26,6	26,30	2,60	2,20	2,50	2,40	2,60	2,80
520	1	28,3	28,10	2,70	2,40	2,60	2,70	2,60	2,80
521	1	26,8	26,40	1,30	1,40	1,40	1,20	1,40	1,40
522	1	26,1	25,50	2,90	2,30	2,90	2,30	2,70	2,30
523	1	28,0	28,00	2,60	2,60	2,70	3,30	2,60	3,00
524	1	27,8	27,60	1,70	1,10	1,70	1,40	1,90	2,10
525	1	29,2	29,40	2,70	2,60	2,70	2,60	3,20	3,10
526	1	26,1	25,70	2,60	2,20	2,40	2,10	2,60	2,10
527	1	25,0	24,70	3,20	2,80	2,80	2,60	2,50	3,00
528	1	28,3	30,00	2,40	2,30	2,40	2,90	2,60	2,80
529	1	28,1	29,90	2,50	2,50	2,40	2,80	2,50	2,50
530	1	27,5	26,50	2,90	3,20	2,00	2,00	3,00	3,30
531	1	27,7	28,30	2,50	2,60	2,50	2,30	2,40	2,50
532	1	28,2	26,90	1,90	1,90	2,00	1,90	2,10	2,30
533	1	26,7	27,70	2,80	2,30	2,90	3,30	2,80	2,40
534	1	30,1	29,00	2,10	2,20	2,80	2,30	2,50	2,40
535	1	24,6	24,60	1,50	1,20	1,30	1,10	1,70	1,30
536	1	30,5	31,20	1,40	2,00	1,40	1,40	1,50	1,90
537	1	23,1	23,00	1,50	0,80	1,30	1,00	1,50	1,40
538	1	22,9	23,60	1,10	1,10	0,90	1,10	1,20	1,10
539	1	23,0	22,30	1,10	0,80	1,20	1,90	1,00	0,90
540	1	27,1	27,20	0,70	0,80	1,00	1,10	0,80	0,70

Id	Yes/No	33-43 T1	33-43 T2	32-31 T1	32-31 T2	31-41 T1	31-41 T2	41-42 T1	41-42 T2
541	1	25,5	25,80	0,90	1,10	1,10	1,10	0,90	1,10
542	1	24,4	26,10	1,20	1,20	1,00	1,10	1,30	1,20
543	1	25,4	26,30	1,70	1,50	1,30	1,80	1,30	1,50
544	1	27,1	28,20	1,40	1,10	1,30	1,40	1,50	1,00
545	1	25,8	25,20	1,60	1,10	0,90	0,70	1,20	1,00
546	1	23,6	23,20	0,80	1,00	1,30	1,20	1,30	1,30
547	1	28,9	29,30	1,20	1,80	2,50	2,60	1,90	1,60
548	1	27,1	26,30	1,30	1,20	0,80	1,20	0,80	1,20
549	1	25,5	26,70	1,60	1,40	1,00	0,90	1,30	1,20
550	1	25,1	24,60	1,00	0,80	1,50	1,10	0,70	0,50
551	1	25,8	25,40	0,80	1,30	0,80	1,30	1,20	1,00
552	1	25,8	25,80	1,60	1,60	1,30	1,50	1,50	1,60
553	1	24,4	24,30	1,60	1,40	1,40	1,50	2,40	2,20
554	1	23,6	23,50	1,10	1,20	1,00	1,30	0,90	1,30
555	1	25,3	24,70	1,10	1,00	1,10	1,00	1,10	1,40
556	1	25,1	23,90	1,10	1,20	1,10	1,10	1,00	1,20
557	1	25,3	24,90	1,70	1,70	1,90	1,70	1,30	1,60
558	1	25,9	25,50	1,70	1,70	1,70	2,00	1,60	1,60
559	1	28,7	28,50	1,10	1,20	1,60	1,20	1,70	1,00
560	1	26,5	26,70	1,80	1,90	1,00	1,20	2,00	2,50
561	1	24,2	23,80	1,70	1,50	2,00	1,70	1,40	1,60
562	1	29,8	31,00	2,10	2,00	1,60	1,50	1,60	1,70
563	1	23,6	23,90	1,10	1,20	1,00	1,10	1,20	1,10
564	1	26,0	26,00	1,80	1,80	1,40	1,60	1,20	1,20
565	1	25,3	25,50	1,40	1,50	1,40	1,50	1,60	1,40
566	1	27,6	27,50	2,00	2,90	1,90	3,40	2,00	2,90
567	1	28,1	27,80	2,10	2,30	1,70	2,00	1,90	2,00
568	1	26,5	24,90	1,90	1,70	1,60	1,00	1,90	2,00
569	1	24,3	23,40	1,20	2,00	1,70	1,70	1,60	1,60
570	1	25,5	24,00	1,80	1,70	1,40	1,40	1,90	1,80