



## **MASTEROPPGAVE**

# Reliability of reproducing intercuspal position by hand articulation on dental casts without using an occlusal index

**Guro Møller  
Kristina Garfjell Kantola**

**Veileder:  
Heidi Kerosuo  
Anette Haseid**

**UNIVERSITETET I TROMSØ**  
**Det helsevitenskapelige fakultet**  
Institutt for klinisk odontologi

Juni 2013

**Contents:**

**Abstract .....3**

**Background.....4**

**Objective .....5**

**Material and Methods.....6**

**Results .....8**

**Discussion .....12**

**Conclusion .....14**

**References.....15**

## **Abstract**

The aim of this study was to examine the accuracy of reproducing maximal intercusp position (IP) on dental casts without using a wax-index as compared with the IP determined by the wax index on the same models.

The material consisted of dental casts, which were taken from 15-year old adolescents as part of oral examinations during the "Fit Futures – part of The Tromsø Study". All dental casts having wax bites were included in this study (N=80). Two examiners assessed Angle's classification and overjet on all dental casts twice, first fitting the dental casts together by hand articulation without using the wax index and second time using the wax index. Differences between the first and second assessment were measured and the agreement was analyzed using Cohen's kappa.

In 49 % of the models, there was no difference in overjet measurements with or without using an occlusal index, while 21 % of the casts showed a difference of more than 0.5 mm, out of which 2 casts differed more than 1 mm. Agreement on Angle's classification was 93 % on the right side and 91 % on the left between the two measurements. In molar millimeter measurements 16- 20% of the cases showed more than 0.5 mm difference between the assessments. An agreement on treatment need between the first and second measurement, based on overjet values, was found in 84% of the cases.

The results suggest that in the majority of dental casts with permanent dentition and no extreme malocclusions, the maximal intercusp position may be reproduced acceptably by hand articulation without a wax index. However, this method may not be reliable enough for research purposes or for planning of orthodontic treatment in some individual patients with severe occlusal deviations.

## Background

Categorization of a malocclusion according to its typical characteristics is helpful for describing and documenting a patient's occlusion. Malocclusion can be approached in two ways: as a qualitative assessment or from a quantitative point of view<sup>1</sup>. Among the most commonly used qualitative classifications of malocclusions is Angle's classification<sup>2</sup>. The Angle's classification is based on the sagittal relationship of the buccal segments and provides a uniform tool for defining the occlusion. According to Angle's classification, in the ideal occlusion the mesial cusp of the maxillary first molar occludes in the buccal groove of the mandibular first molar, and if the rest of the teeth in the arch are aligned, ideal occlusion will result<sup>3</sup>. The occlusal relationship of the incisors is usually described with overjet in the horizontal plane, and with overbite in the vertical plane, which are expressed in millimeters. Overjet and overbite have also been used as diagnostic standards e.g. in the Index of Orthodontic Treatment Need (IOTN) and in the British Standards Institution (BSI). The latter one regards overjet as the main diagnostic parameter.

In orthodontic treatment planning, it is important to be able to transfer a patient's occlusion into dental casts in centric occlusion, which is defined as the position with maximum contact points between maxillary and mandibular teeth<sup>4</sup>. To transfer this position correctly on dental casts, different technics and recording materials have been introduced. In order to be of clinical and diagnostic use, the occlusal index is required to be taken as a see-through bite, revealing the contact points. Closing pressure and sufficient duration are required to make suitable interocclusal recordings in different selected impression materials. Hard, quick setting materials such as baseplate wax requires greater closing force of a shorter duration and increased initial closing pressure than softer, slow-setting material such as silicones<sup>5</sup>.

The recording material has been considered to matter in reproducing the interocclusal position<sup>6</sup>. Wax has gained wide acceptance for interocclusal recording in orthodontics. However, studies have shown that exact intraoral reproduction of the original was difficult to accomplish with wax recording even under highly controlled experimental conditions<sup>7</sup>. Wax softens at 55 degrees, where the heat transfers very quickly throughout the material and is stabilized during cooling time from work temperature via the mouth temperature until the final cooling temperature. Due to a combination of changes in temperature and material properties, potential distortion can occur in each step<sup>8</sup>. If the wax-indexes have been cooled in cold water, greater horizontal and vertical changes have been showed compared to air cooled wax<sup>9</sup>. Studies also show that some wax materials have a flow rate as low as 37,5°C, which make them susceptible to mechanical distortion upon removal from the mouth<sup>10</sup>. Any dimensional changes the index may undergo after impression

are due to the mechanical properties of the material <sup>5,11</sup>. Compared to other recording materials, such as polyvinylsiloxan and Zink Oxide Eugenol, wax shows significant more dimensional change, and less accuracy and surface hardness <sup>12</sup>.

“The Tromsø Study” was first established in 1974 as a response to the high mortality rate related to heart and cardiac diseases in North Norway. As the study evolved, a broader health perspective was incorporated. The “Fit Futures” is a sub-study of the “Tromsø study” and aims to explore health and lifestyle, including oral health, among adolescents in Northern Norway, as is conducted as co-operation study between the University of Tromsø, the Norwegian Institute of Public Health and the University Hospital of North Norway. In “Fit Futures 2 – part of the Tromsø Study “, all 15-year old adolescents in Tromsø were examined also with respect to their oral health. Among other things, alginate impressions were taken and dental casts were prepared for every subject. However, bite registrations with occlusal indices were missing from the majority of the dental casts. Since all subjects had fully developed permanent dentitions, a question was raised whether it was possible to determine the maximal intercuspal position on the casts without bite indices, by fitting the upper and lower casts together manually guided by the cuspidation, in a way that would be reliable enough to enable further use of the models.

## **Objective**

The objective of this master thesis was to examine the accuracy of reproducing the maximal intercuspal position (IP) on dental casts without a wax-index as compared with the occlusion determined by the wax index on the same models.

Hypothesis:

- The maximal intercuspal position can be reliably derived on dental casts irrespective of the availability of a wax index.

# Material and Methods

## Material

The material consisted of dental casts of 15-year old adolescents, which were taken as a part of oral examinations during the "Fit Futures 2". Out of 1100 invited subjects, the dental casts were obtained from 1038 examined participants. All dental casts incorporating wax indices were included in this study, 94 dental casts in total.

### Preparation of the dental casts and wax indexes

The dental casts were not ready to use and the following procedures were prepared before the measurements: Excessive plaster was removed by grinding the models. Visual plaster air bubbles were removed using a scalpel. The dental casts were then washed gently in lukewarm, mild soap water with a dish brush, and subsequently rinsed in clear water and air-dried. Those wax-indexes which had buccal wax overflow which interfered with the assessment were gently reheated in lukewarm water and then cut with a scissor into proper shape in order to disclose the buccal surfaces of the dental casts.

After the preparation of the casts it was noticed that 14 wax-indexes were obviously incorrectly taken. These indexes were decided to be excluded, leaving a total of 80 models for the study.

## Methods

### Study protocol

The dental casts were numbered, and the date of assessment and the name of examiner were recorded. A Beerendonk dental vernier was used for all measurements. Two examiners evaluated and measured independently all dental casts twice. In the first assessment, the upper and lower dental casts were fit together manually in the anticipated maximal intercuspal position without using the wax index. A vertical, continuous line was drawn with the pencil from the upper jaw second molar to the antagonist in the lower jaw to mark the intercuspal position. In the second assessment, the pencil markings were kept unaltered, and the upper and lower jaw dental casts were fit together guided by the wax bite. Differences between the 1<sup>st</sup> and 2<sup>nd</sup> measurement were measured and recorded. The second assessment served as a reference presenting the "true" intercuspal position. All pencil markings were erased before the operator switch.

Following measurements were done on each dental cast:

### *Overjet*

Overjet was measured in millimeters along the occlusal plane from the incisal edge of the most prominent maxillary incisor to the labial surface of the corresponding mandibular incisor first without and second time with the occlusal index. If the overjet decreased (=mandibular shifted anteriorly) from the 1<sup>st</sup> to 2<sup>nd</sup> measurement, the difference in millimeter was recorded as negative. If the mandible shifted posteriorly the difference between measurements was recorded as positive.

For assessing orthodontic treatment need overjet was divided into two categories according to the Index of Orthodontic Treatment Need (IOTN)<sup>13</sup>. Overjet values from 0 to 3.5mm (IOTN grade 1) indicated no treatment need, and overjet above +3.5mm or reverse overjet (IOTN grades 2-5) indicated treatment need (slight, moderate or severe).

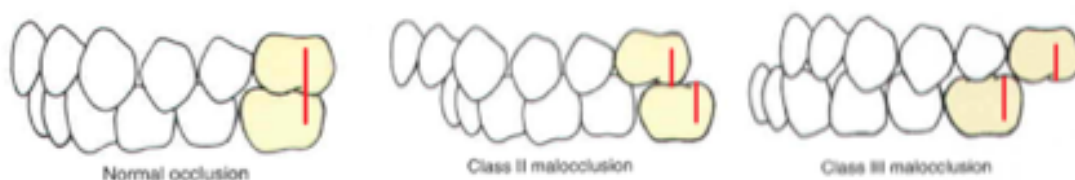
### *Sagittal molar relationship*

Angle classification was determined separately for the left and right side on the first molars, first without and second with the occlusal index<sup>3</sup>.

Angle class I: If the mesiobuccal cusp of the maxillary first molar occluded in the buccal groove of the mandibular first molar within the range of +/- 2mm mesially and distally from the optimal point of occlusion in the buccal groove.

Angle class II: If the buccal groove of the mandibular first molar occluded more than 2 mm distally in relation to the mesiobuccal cusp of the maxillary first molar.

Angle class III: If the buccal groove of the mandibular first molar was more than 2 mm mesially in relation to the mesiobuccal cusp of the maxillary first molar when the teeth were in occlusion.



I

Figure 1: Illustration of Angle's classes I, II and III. A vertical reference line is shown in red. The eventual deviation between the red lines in the second assessment was measured<sup>14</sup>.

During the first measurement without an index, a vertical reference line was drawn on the molar region. If the reference lines were not coinciding in the 2<sup>nd</sup> measurement using the index, the discrepancy between the reference lines was measured in millimeters. With mandibular anterior

shift the difference was recorded negative, while a posterior shift of the mandible was considered positive in counting the differences (Figure 1).

The differences (mm) between measurements without and with the index were further categorized as follows:

Category 1: No difference = Perfect agreement

Category 2: Differences up to +/-0.5mm = Good agreement

Category 3: Differences bigger than +/- 0.5mm up to +/- 1mm = Moderate agreement.

Category 4: Differences bigger than +/- 1.0 mm = Not acceptable difference

The form for recording the results of the measurements of every dental cast is attached (appendix I).

### **Statistics:**

The measurements were transferred from the paper scoreboard into Microsoft Excel spreadsheets, and thereafter imported into IBM SPSS Statistics for Windows 19.0.0. The agreements between measurements without and with an index were analyzed using kappa co-efficient<sup>15</sup>.

### **Reliability of the measurements**

Prior to the evaluation of the 94 casts, the student examiners were calibrated by the supervisor (AH) using additional 20 dental casts to ensure a uniform assessment of the models. After the calibration, the two operators executed the measurement procedure separately with all models. The results of the measurements were then compared between the two operators, and the non-coinciding results were re-measured and eventually discussed with the supervisor until a consensus was reached. Hence, the inter-examiner agreement was 100%.

## **Results**

### *Overjet*

In almost half (49%) of the dental casts, there was no difference in overjet measurements assessed without or with the occlusal index (Table 1). Thirty percent of the cases showed good agreement between the two measurements, while the rest 21 % of the casts showed a difference of more than 0.5 mm, out of which 2 casts differed more than 1 mm, being categorized unacceptable.



In 67 out of 80 dental casts (84%) there was an agreement in treatment need between measurements without and with the wax index according to overjet categories of the IOTN DHC component. Eighty-nine percent of the cases that were allocated into no treatment category in the first measurement without an index stayed in the same category when measured with an index (Table 2). Six cases (11%) changed from no treatment to treatment category in the second measurement, and 6 (26%) of the cases that was measured without an index into treatment need category changed into no treatment category when measured with an index. Two models showed reverse overjet that according to IOTN standards entitled treatment need in both measurements. The kappa value between measurements without and with the occlusal index was 0,64 indicating substantial agreement (P=0.001) <sup>15</sup>.

### *Sagittal molar relationship (=Angle's classification)*

In the right side (Table 3), for 74 out of 80 models (93 %) there was an agreement upon the Angle's Class between the assessments done without and with the wax bite. Four of 61 models (8%) first classified into Angle cl I shifted to either Class II or Class III with an index (Table 3). All molars classified into Class II without an index, remained in the same class upon measurement with an index. One model, originally measured as Class III without index, changed into Class I with the index. The kappa value was 0.817 indicating almost perfect agreement (P= 0.000).

In the left side, for 73 out of 80 models (91 %) there was an agreement upon the Angle's Class between the assessments done without and with the wax bite (Table 4). Three (5%) of 60 models classified into Angle cl I without index shifted to either class II or class III with an index. Two models (14%) first classified in Class II, changed into Class I upon measurement with the index (Table 4). Two (33%) models originally measured to a Class III changed into Class I with the index. The kappa value of 0.777 indicated substantial agreement (P=0.000).

### *Differences in the sagittal molar relationship measured in millimeters*

In the right side, no difference was recorded between assessments without and with using the occlusal index in 39% of the cases (Table 5). A deviation up to +/-0,5mm was found in 39 %, while 20 cases showed a difference of more than 0.5 mm up to +/-1.0 mm. 2% of the models showed a difference between the two assessments that was +/-1mm or more. One model contrasted with a difference of -6,0 mm, compared to maximum +/-2mm deviation among the rest of the models.

On the left side, in 28 cases (35%) there were no differences between 1<sup>st</sup> and 2<sup>nd</sup> millimeter measurements in molars (Table 6). A deviation up to +/-0.5mm was found in 38 (48%) cases, while 13 (16%) cases showed a difference of more than 0.5 mm up to +/-1.0 mm. Only 1 pair of casts belonged to the non-acceptable category 4 difference (more than 1.0 mm) between the two measurements, by showing a deviation of -6.0 mm.

Table 1. Differences between overjet values (in mm) measured on dental casts without and with an occlusal index.

Difference between two measurements		Frequency	Percent
<b>Category:</b>	Equal to perfect (no difference)	39	49
	Good agreement (difference up to +/-0,5mm)	24	30
	Moderate agreement (difference more than 0.5 up to +/-0,5mm)	15	19
	Not acceptable difference (more than 1.0 mm)	2	2
	Total	80	100

Table 2. Agreement in orthodontic treatment need because of overjet between the measurements without and with an occlusal index. No treatment need (NTN) equals IOTN DHC grade 1, treatment need (TNO and TNrO) equals IOTN grades 2 – 5, from “little” to “definite” need for treatment”.

		With index			Total
		NTN	TNO	TNrO	
Without index	No treatment need (NTN)	49	6	0	55
	%	89%	11%	0%	69%
	Treatment need with overjet above 3,5 mm (TNO)	6	16	1	23
	%	26%	70%	4%	29%
	Treatment need with reverse overjet (TNrO)	0	0	2	2
	%	0%	0%	100%	2%
Total	Count	55	22	3	80
	%	69%	27%	4%	100%

Table 3. Agreement on Angle's classification on the right side between the two assessments done first without and thereafter by using an occlusal index.

		With index			Total
		CI I	CI II	CI III	
Without index	Angle's class I	56	2	3	61
	%	92%	3%	5%	76%
	Angle's class II	0	16	0	16
	%	0%	100%	0%	20%
	Angle's class III	1	0	2	3
	%	33%	0%	67%	4%
Total	Count	57	18	5	80
	%	71%	22%	6%	100%

Table 4. Agreement on Angle's classification on the left side between the two assessments done first without and thereafter by using an occlusal index.

		With index			Total
		CI I	CI II	CI III	
Without index	Angle's class I	57	2	1	60
	%	95%	3%	2%	75%
	Angle's class II	2	12	0	14
	%	14%	86%	0%	17%
	Angle's class III	2	0	4	6
	%	33%	0%	67%	8%
Total	Count	61	14	5	80
	%	76%	18%	6%	100%

Table 5: Differences (in millimeters) in the sagittal occlusal relationship on the right side measured on the first molars both without and with an occlusal index.

Difference between two measurements		Frequency	Percent
<b>Category:</b>	Equal to perfect (no difference)	31	39
	Good agreement (difference up to +/-0,5mm)	31	39
	Moderate agreement (difference more than 0.5 up to +/-0,5mm)	16	20
	Not acceptable difference (more than 1.0 mm)	2	2
	Total	80	100

Table 6: Differences (in millimeters) in the sagittal occlusal relationship on the left side measured on the first molars both without and with an occlusal index.

Difference between two measurements		Frequency	Percent
<b>Category:</b>	Equal to perfect (no difference)	28	35
	Good agreement (difference up to +/-0,5mm)	38	48
	Moderate agreement (difference more than 0.5 up to +/-0,5mm)	13	16
	Not acceptable difference (more than 1.0 mm)	1	1
	Total	80	100

## Discussion

The scope of this study was to explore if the intercuspal position (IP) could be reproduced and with what accuracy on dental casts, without the guidance of a wax-index. The use of occlusal indexes has been generally advocated in order to achieve a comparable, reliable and quality assured system for transferring occlusal characteristics from the clinical situation to dental casts<sup>13</sup>. However, some studies have suggested that if there are sufficient occlusal contact points to assess intercuspal position, hand articulation of casts could be a more reliable guide to obtain and reproduce IP than the use of a bite registration paste such as polyether<sup>8</sup>. Elastomeric materials such as polyether have showed low number of error and have the great stability compared to other pastes as well as wax-material<sup>16-18</sup>. Corresponding studies on reliability of wax bites versus hand articulation were not found.

Our study material contained dental casts taken of 15 years old adolescents, all with at least 24 permanent teeth erupted and with no notable spaces in the dental arches. The casts presented a wide dental variety. Some models belonged to adolescents who had already received orthodontic treatment and now presented with a retainer, others had some remaining primary teeth. The majority of the models presented sufficient amount of contact points for finding the intercuspal position, which is also reflected in the results of our study.

Overjet is included in most treatment need indices and is considered an important diagnostic criterion in the evaluation of orthodontic treatment need<sup>13</sup>. However, overjet assessment on the models is sensitive to inaccuracies regarding the correct intercuspal position. Our overjet results showed that only 21 % of the models exceeded the deviation of +/- 0.5 mm. However, 0.5 mm can be considered a negligible difference in practice. An error up to one millimeter in the overjet

assessment may not have clinical relevance for orthodontic treatment planning, but may sometimes affect orthodontic treatment need assessment in borderline cases. The interesting part is that only 2 models showed a discrepancy exceeding +/- 1mm indicating that in almost all models the hand articulated intercuspals corresponded to the intercuspals position guided by the wax bite with at least moderate accuracy. The two models which showed more than one millimeter discrepancy between overjet assessments, showed discrepancies throughout all measurements performed in this study.

In order to test the effect of discrepancy in the intercuspals position on treatment need, the IOTN grading for overjet was applied. According to IOTN overjets exceeding 3.5 mm are graded into either slight, borderline or severe treatment need categories, depending on the extent of overjet and on lip competence. Since soft tissue analysis was not included in our material, we anticipated the worst case using 3,5mm as a cut off value.

Angle's classification was found to be the most reliable of the measurements. The agreement between the measurements was from substantial to almost perfect indicating that Angle's classification is not as sensitive to small IP changes as e.g. the overjet. With reference to the molar measurements, we experienced no correlation in left and right side deviations. While one side tended to move out of normal Angles class I, the contralateral side could move into Angle class I. Hence, both right and left side were evaluated independently, which makes generalization of trends difficult especially due to the contradicting results.

In 16-20 % of the models both left and right side showed moderate (more than 0.5 up to 1.0mm) deviation in millimeters. Our measurements suggest that these discrepancies are of little clinical significance in general, but may affect borderline cases such as Angle superclass I. Treatment need evaluation should not solely depend on a dental cast, but rather supplement chairside examination and evaluation.

During the study, 14 dental casts were excluded from our material. These casts either contained inadequate indexes e.g. the indexes hardly contained any teeth markings or see through points at all or suffered from plaster failures such as excessive plaster on the occlusal surfaces covering the teeth bucco-incisally so that the intercuspals position could not be reestablished.

The dental Alminax (2,7mm thick) and Tenaxwax (143x75mm, sheet size) baseplate were used for wax bites in this study. These materials have in earlier studies been considered as the least accurate material available due to their resistance to closure, poor detail, low dimensional stability, and

distortion on removal<sup>6,8</sup>. Based upon these studies the question should be raised why wax is so commonly used as a bite registration material. Literature gives no clear answer and we can only assume the high availability and high cost efficiency in a daily clinical practice may influence the choice of material.

In order to eliminate distortion of the wax index while adjusting it, the index must be modified and reconfirmed when the patient is in the clinical chair. It seems that this was not done in this study material and consequently we had to reheat and adjust the indexes prior to use in our study. Another source of error was the vertical bite registration. The vertical overbite could not be determined on most casts with wax-indices, due to incomplete bite through. This may suggest that the dental casts were not fully intercuspal positioned with the wax as a reference. Originally, canine classification and overbite were planned to be included in this study, but due to bite elevation as a consequence of incomplete see-through of most indexes, registration of the overbite was not considered enough reliable. Also, the indexes in our study were stored unprotected in plastic bags together with the dental casts, tightly packed and it's possible that they have been subject to mechanical distortion during this storage period.

Registration of the occlusion with a bite-index is generally practiced in orthodontics and therefore it was regarded as a golden standard when reproducing the intercuspal position on dental casts in this study. However, the above discussed potential hazards in the registration and handling process can have decreased the validity of the wax-indices and question their role as real gold standard. Even if the clearly unusable models and/or wax bites were excluded from this study, the overall quality of the wax bites in our material was rather modest; suggesting that the wax-bite guided intercuspal position may not necessarily be more reliable than the intercuspal position articulated by hand. This should be kept in mind when interpreting the results.

## **Conclusion**

The results suggest that in an occlusion with acceptable number of contact points and no extreme malocclusions, maximal intercuspal position can be reproduced by hand articulation with acceptable accuracy as an alternative for a bite index. The assessment of overjet may be more sensitive to differences in IP position as compared to Angles classification. In cases with severe occlusal deviations, guidance of an index is preferred and hand articulation is considerably more difficult if no clear indication of the bite is present.

## References

1. Mitchell L. An Introduction to Orthodontics. 3rd edition ed. United States NYC: Oxford University Press Inc.,; 2007.
2. Angle EH. Classification of malocclusion. *The Dental Cosmos* 1899;41:248-64, 350-7.
3. Ackerman JL, Proffit WR. The characteristics of malocclusion: A modern approach to classification and diagnosis *Am J Orthod* 1969;56:443-54.
4. Marklund M, Franklin KA, Persson M. Orthodontic side-effects of mandibular advancement devices during treatment of snoring and sleep apnoea. *Eur J Orthod* 2001;23:135-44.
5. Millstein PL, Clark RE, Myerson RL. Differential accuracy of silicone-body interocclusal records and associated weight loss due to volatiles. *The Journal of Prosthetic Dentistry* 1975;33:649-54.
6. Müller J, Götz O, Hörz W, Kraft E, University of Munich. An experimental study on the influence of the derived casts on the accuracy of different recording materials. Part 1: Plaster, impression compound, and wax. *The Journal of Prosthetic Dentistry* 1990;63:263-9.
7. Millstein PL, Kronman JH, Clark RE. Determination of the accuracy of wax interocclusal registrations. Part II. *The Journal of Prosthetic Dentistry* 1971;29:40-5.
8. Walls AWG, Wassell RW, Steele JG. A comparison of two methods for locating the intercusp position (ICP) whilst mounting casts on an articulator. *J Oral Rehabil* 1991;18:43-8.
9. Millstein PL, Kronman JH, Clark RE. Determination of the accuracy of wax interocclusal registrations. *The Journal of Prosthetic Dentistry* 1971;25:189-96.
10. Skurnik H. Resin registration for interocclusal records. *The Journal of Prosthetic Dentistry* 1977;37:164-72.
11. Horowitz S, Hixon EH. The nature of orthodontic diagnosis. St Louis: The C. V. Mosby Company; 1966.
12. Anup G, Ahila SC, VasanthaKumar M. Evaluation of dimensional stability, accuracy and surface hardness of interocclusal recording materials at various time intervals: an in vitro study. *Journal of Prosthodontic Society* 2011;11:26-31.
13. Shaw WC, Richmond S, O'Brien KD. The use of occlusal indices: A European perspective. *Am J Orthod Dentofacial Orthop* 1995;107:1-10.
14. Mosby. Mosby's Dental Dictionary: Elsevier Incorporates,; 2008.
15. Landis JR, Koch GG. The measurement of observer agreement for categorical data. 1977.
16. Faitore L, Malone WF, Sandrick JL, Mazur B, Hart T. Clinical evaluation of the accuracy of interocclusal recording materials. *J Prosthet Dent* 1984;51:152-7.
17. Lassila V. Comparison of five interocclusal recording materials. *J Prosthet Dent* 1986;55:215-8.
18. Lassila V, McCabe JF. Properties of interocclusal registration materials. *J Prosthet Dent* 1985;53:100-4.

APPENDIX 1

	Without wax index		With wax index	
	Left side	Right side	Left side	Right side
Angle classification permanent molar				
Angle classification permanent canine				
Horisontal overbite				
Vertical overbite			-	-
Saggital discrepancies - anterior shift + posterior shift				