

Cephalometric Appraisal of Orthodontic Management of Class II Malocclusions

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The cases herewith presented are for the most part typical Class II malocclusions, but a few present special features to which attention will be called in the description of the case. The age range extends from the late mixed denture to early maturity.

The method of treatment employed in all of these cases followed that described in the writings of Drs. Angle,¹ Brodie,³ and Wright.⁴ Briefly, this consists of tipping the maxillary teeth distally to a Class I relation with the lowers by means of second order bends and elastics. The mandibular arch is maintained as a unit of stationary anchorage.

Case E.I., Female—Class II Division I

Age at beginning of treatment, 11 years, 3 months.

Fig. 19 shows models of case before and after treatment.

Fig. 20 represents tracings of x-rays of case before and after treatment. Elapsed time between the two tracings is 3 years, 5 months.

Fig. 21 is a composite tracing of the case before and after treatment.

It reveals:

1. Angle BSN and Bolton plane have remained constant, but the cranial outline has definitely increased.
2. Orbitale and nasion have moved forward.
3. Pterygomaxillary fissure and the floor of the nose have remained constant.
4. Gonion has gone backward 4 mm. and downward 3 mm.
5. Gnathion has gone forward 3 mm. and downward 10 mm.
6. Upper 6 has moved forward 1 mm. and downward 2 mm., its axis has shifted 3.5°.
7. Lower 6 has gone definitely forward, bodily, a distance of 3 mm.
8. Upper 1 has been tipped distally only 5 mm. and has gone down 3.5 mm. Its angle of inclination has been changed 11.5°.
9. Lower 1 has gone forward 5.5 mm. and downward 10.5 mm. The angle of inclination has changed only 3°.
10. The occlusal plane has been tipped 2°.
11. The mandible has increased 3 mm. in height at gonion and 10 mm. at gnathion, while its length has increased 10 mm.

This case is considered clinically successful.

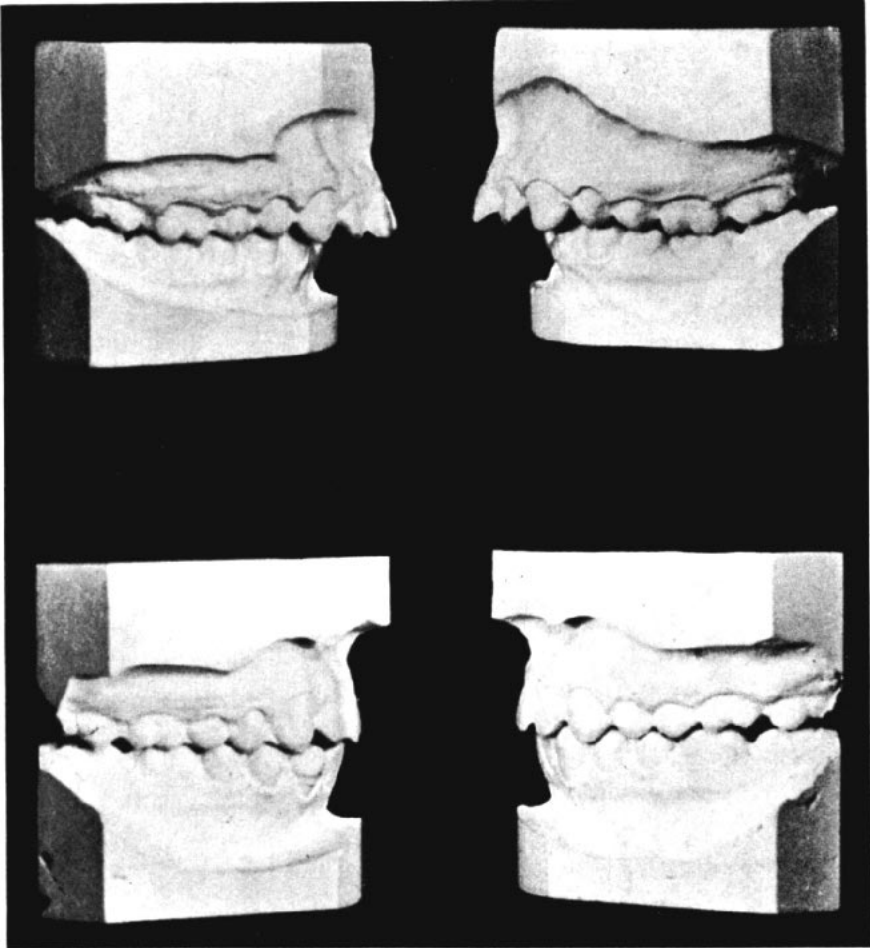


Fig. 19

Case E.I., female, aged 11 years, 3 months. Models before and after treatment.

Case C.D., Female—Class II Division 1

Age at beginning of treatment, 10 years, 1 month.

Treatment was begun in a mixed dentition.

Fig. 22 shows models before and after treatment.

Fig. 23 represents tracings of x-rays of case before treatment and after removal of retention. Elapsed time between the two tracings is 5 years, 6 months.

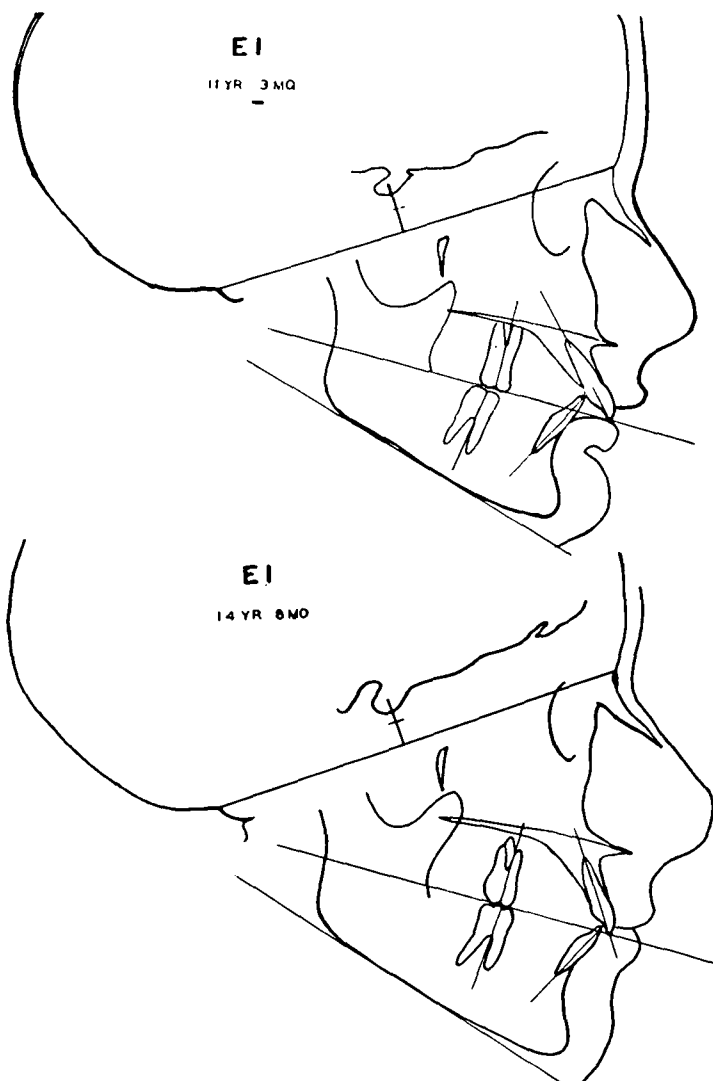


Fig. 20
Case E.I., female. Cephalometric tracings at beginning and end of treatment.

Fig. 24 is a composite tracing of the two previous tracings. It reveals:

1. The angle BSN has changed 2° and there has been marked antero-posterior cranial growth.
2. Orbitale has moved downward and forward.

3. The nasal floor has moved downward and changed its angle to Bolton plane 1° .
4. The occlusal plane has been tipped 7.5° .
5. Gonion has moved backward 9 mm. and remained at the same level.
6. Gnathion has moved downward 8 mm.

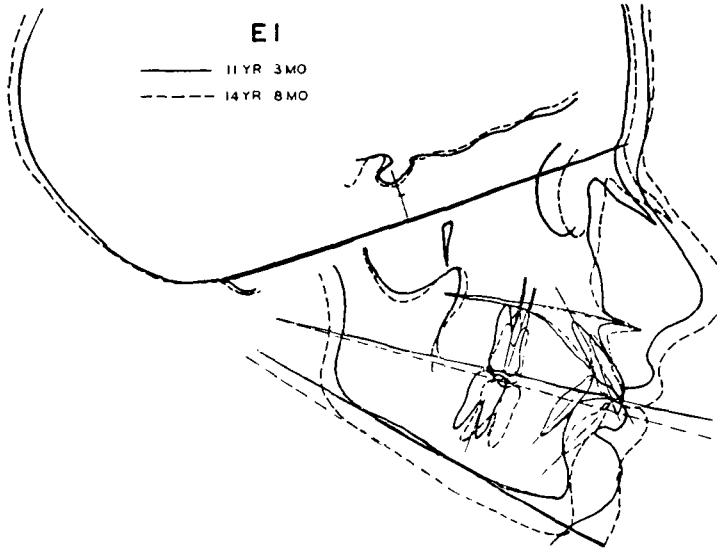


Fig. 21

Case E.I., female. A composite tracing of cephalometric tracing in Fig. 20.

7. Upper 6 shows a backward movement of 1 mm., a change in axial inclination of only 1° and a downward movement of 2.5 mm.
8. Lower 6 has moved forward 3 mm. almost bodily.
9. Upper 1 has moved downward 7 mm., backward 4 mm., and changed its axial inclination 12° .
10. Lower 1 has moved downward 6 mm., forward 10 mm., and changed its axial inclination 20° .
11. The mandible has increased 6 mm. in length, and 6 mm. in height at gnathion and in the molar region.

This case is considered clinically successful.

Case D.E., Male—Class II Division II

Age at beginning of treatment, 10 years, 8 months.

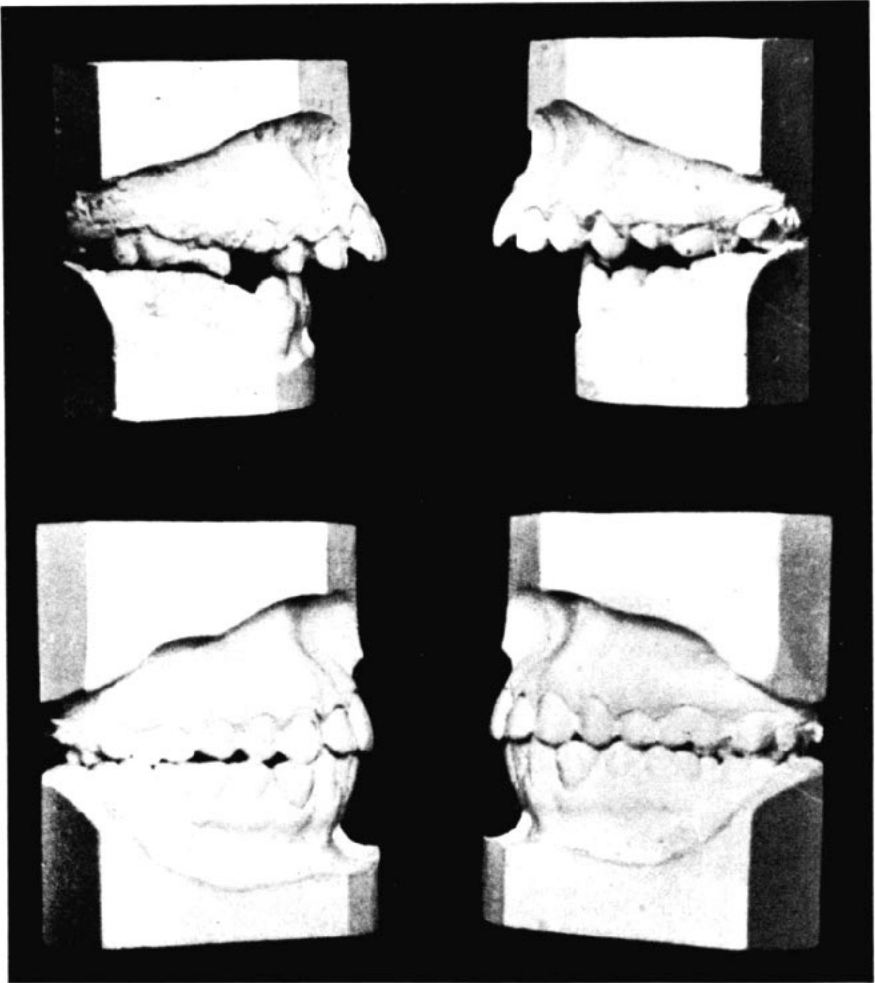


Fig. 22

Case C.D., female, aged 10 years, 1 month. Models before and after treatment.

Fig. 25 shows models of case before and after treatment.

Fig. 26 represents tracings of x-rays before treatment and after removal of retention. Elapsed time between the two is 5 years, 4 months.

Fig. 27 represents a composite tracing of the previous two. It reveals:

1. The angle BSN has remained the same, the Bolton plane has moved

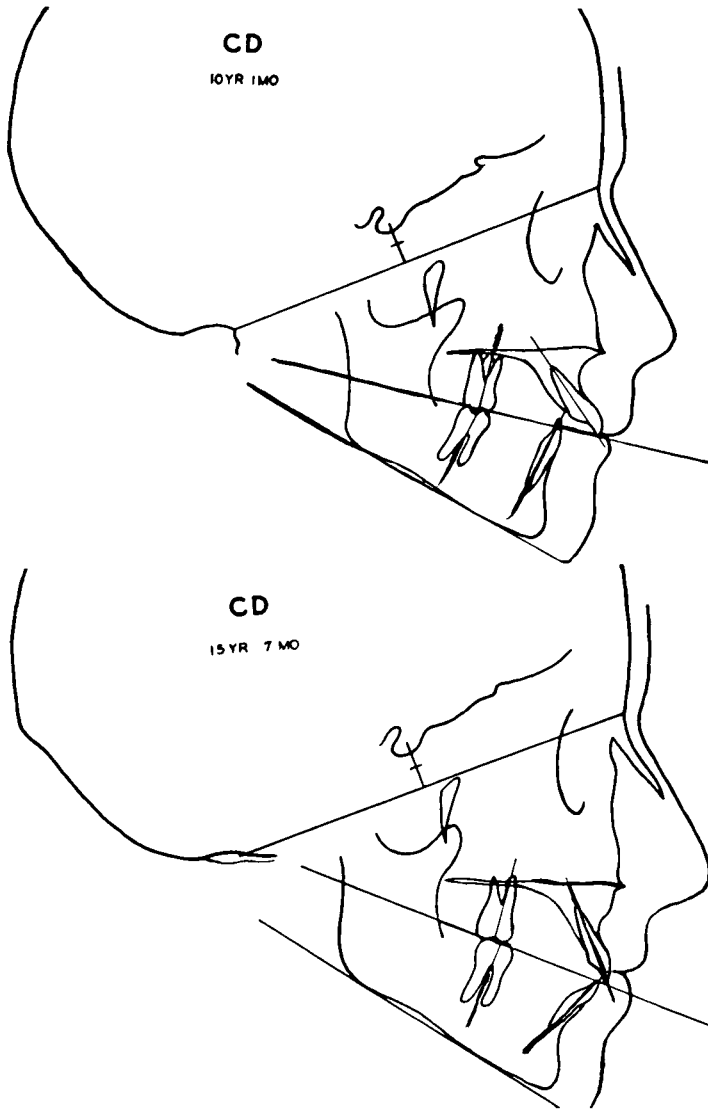


Fig. 23

Case C.D., female. Cephalometric tracings at beginning and end of treatment.

- downward, and there has been marked anteroposterior cranial growth.
2. Orbitale has moved downward and forward about 4 mm.
3. The nasal floor has moved down about 6 mm. while the angle of Bolton

plane to nasal floor has opened 4° .

4. Gonion has gone backward 5 mm. and downward 5 mm.
5. Gnathion has moved downward 8 mm. and forward only 1.5 mm.
6. Upper 6 has moved downward about 10 mm., forward about 2 mm., and changed its axial inclination 1.5° .
7. Lower 6 has moved downward about 10 mm. and forward about 5 mm. in a nearly upright position.

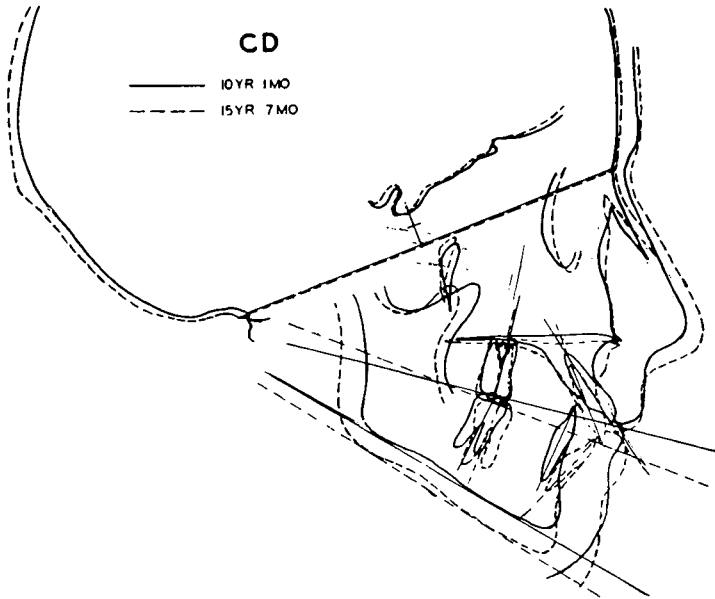


Fig. 24

Case C.D., female. A composite tracing of cephalometric tracing in Fig. 23.

8. Upper 1 has moved downward 5.5 mm. but has been tipped distally only .5 mm. It has changed its axial inclination 6° .
9. Lower 1 has moved downward 13 mm., forward 5 mm., and changed its axial inclination 9° .
10. There has been an extensive drop in the entire plane of occlusion, although the angle to Bolton plane has changed only 1.5° .
11. The mandible has increased about 10 mm. both in length and height. This is considered a clinically successful case.

Case C.V., Male—Class II Division II

Age at beginning of treatment, 12 years, 11 months.

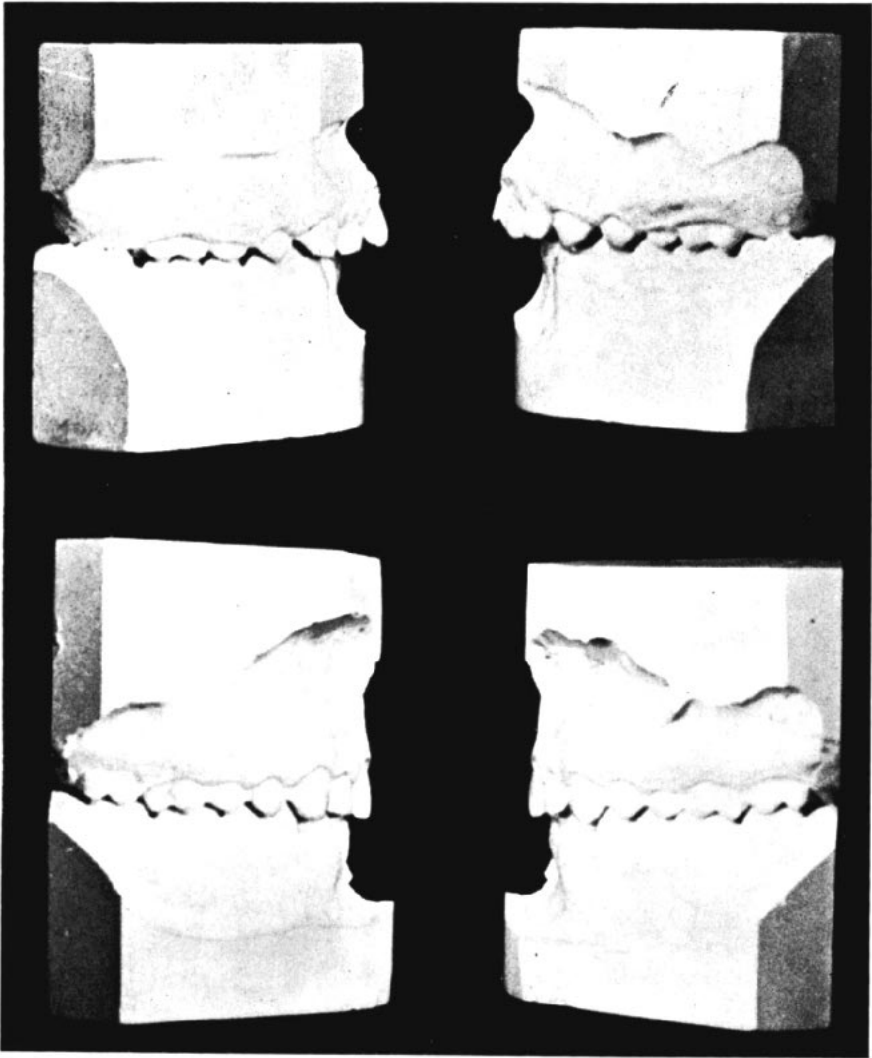


Fig. 25
Case D.E., male, aged 10 years, 8 months. Models before and after treatment.

Fig. 28 shows models before and after treatment.

Fig. 29 represents tracings of x-rays before treatment and after removal of retention. Elapsed time between the two is 4 years, 7 months.

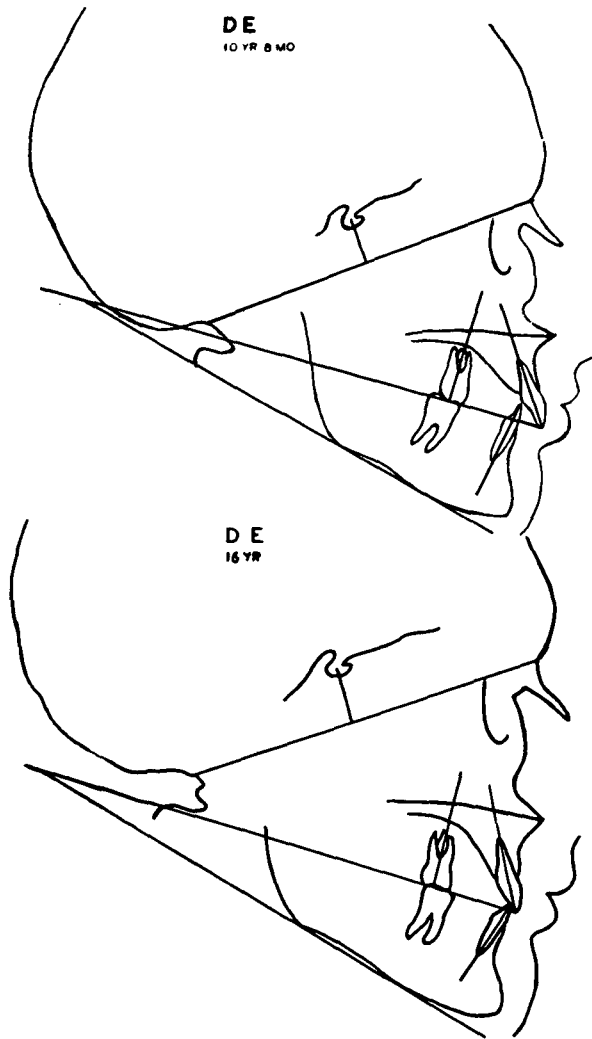


Fig. 26
Case D.E., male. Cephalometric tracings at beginning and end of treatment.

Fig. 30 represents a composite tracing of the previous two. It reveals:

1. Bolton plane has moved down, and there has been an anteroposterior cranial growth.
2. Orbitale has moved forward, but remained at the same level.
3. The nasal floor has moved down about 3 mm., but has changed its

angle to Bolton only 1° .

4. Gonion has moved downward 8 mm. and backward 1 mm.
5. Gnathion has moved downward 7 mm. and forward 4 mm.
6. Upper 6 has moved almost directly downward 3.5 mm. and maintained the same axial inclination.

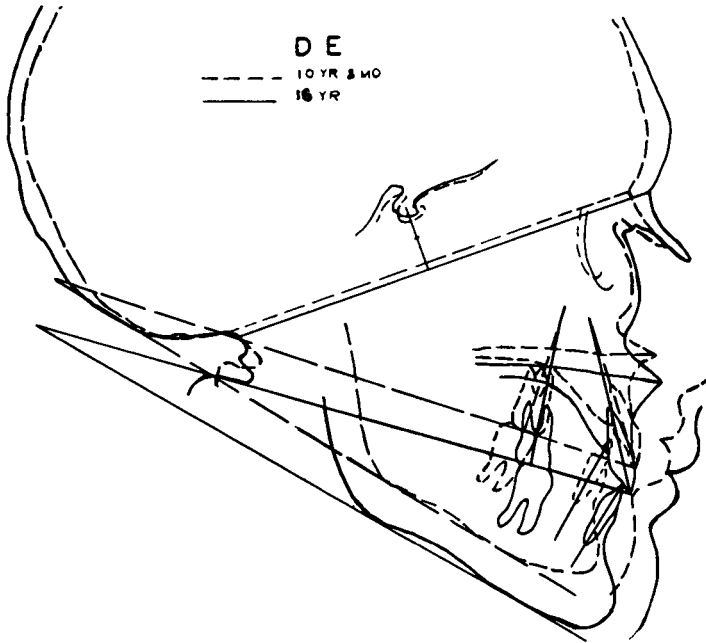


Fig. 27

Case D.E., male. A composite tracing of cephalometric tracing in Fig. 26.

7. Lower 6 has moved downward 5 mm. and forward 4 mm., also maintaining the same axial inclination.
 8. Upper 1 has moved almost directly downward 4 mm., has not tipped distally but has moved forward 1 mm., while the root has straightened its axial inclination 6° .
 9. Lower 1 has moved down 8 mm., has moved forward 5 mm., and has changed its axial inclination only 2.5° .
 10. The angle between Bolton plane and plane of occlusion has been increased 3° .
 11. There has been an increase in the mandible of 7 mm. in length, and 8 mm. in height both at gonion and gnathion.
- This is considered a clinically successful case.

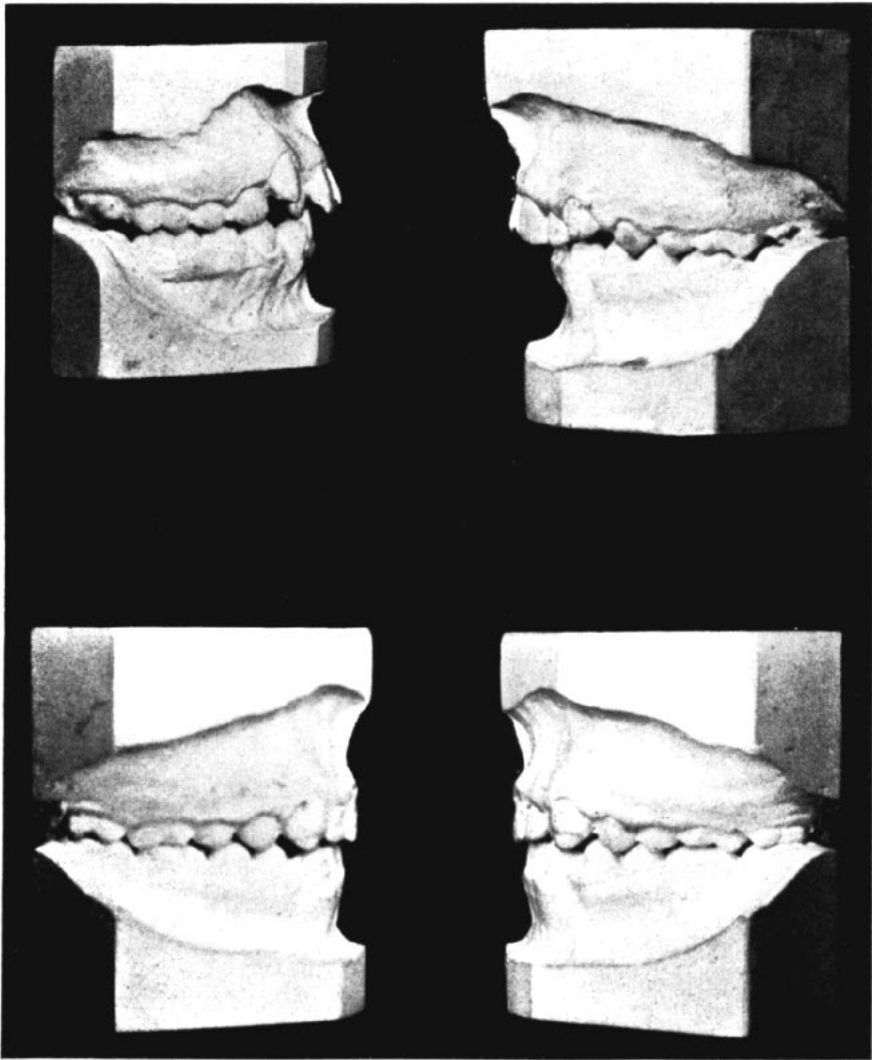


Fig. 28

Case C.V., male, aged 12 years, 11 months. Models before and after treatment.

Case D.Q., Female—Class II Division I

Age at beginning of treatment, 11 years, 6 months.

This case was complicated by an open bite and tongue habit.

Fig. 31 shows models of case before and after treatment.

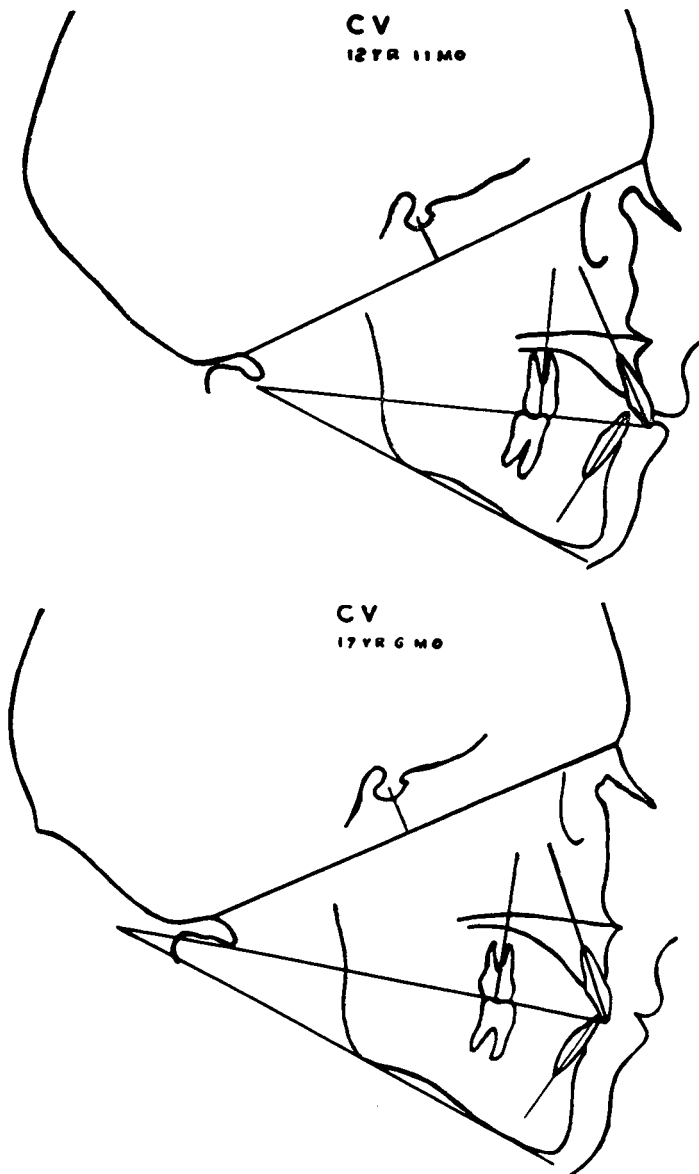


Fig. 29
Case C.V., male. Cephalometric tracings at beginning and end of treatment.

Fig. 32 represents tracings of x-rays of case before treatment and after removal of retention. Elapsed time between first and last tracings is 4 years, 1 month.

Fig. 33 is a composite tracing of the previous two. It reveals:

1. The angle BSN has changed 5° . Bolton plane has gone downward and there has been an increase in anteroposterior cranial growth.

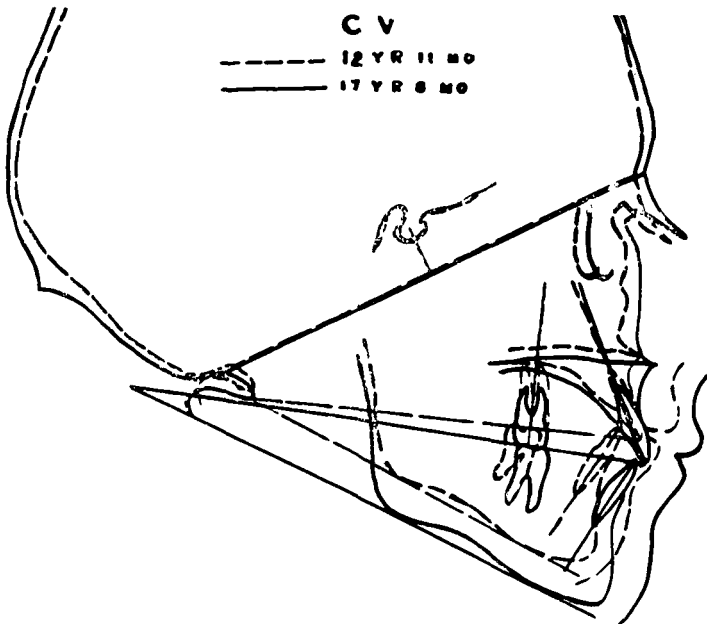


Fig. 30
Case C.V., male. A composite tracing of cephalometric tracing in Fig. 29.

2. Nasion and orbitale have moved forward but orbitale has remained at the same level.
3. The nasal floor has moved downward but has changed its angle to Bolton plane only $.75^{\circ}$.
4. Gonion has gone downward 4.5 mm. and backward only 1 mm.
5. Gnathion has moved downward 5 mm. and forward 3 mm.
6. Upper 6 has moved downward 2 mm., forward 1 mm., and changed its axial inclination 1.5° .
7. Lower 6 has moved downward 4 mm., forward 3 mm., and has changed its axial inclination 12° .



Fig. 31

Case D.Q., female, aged 11 years, 6 months. Models before and after treatment.

8. Upper 1 has moved downward 3 mm., forward 2 mm., and changed its axial inclination 5° .
9. Lower 1 has moved downward 6 mm., forward 9 mm., and its axial inclination has been changed 12° .
10. Both gnathion and gonion have moved downward about 5 mm., so that the lower border of the mandible has not changed its angle to Bolton plane.



Fig. 32
Case D.Q., female. Cephalometric tracings at beginning and end of treatment.

11. There has been an increase of 3 mm. in the length of the mandible. This case is considered clinically successful.

Case D.I., Female—Class II Division 1

Age at beginning of treatment, 12 years, 8 months.

Fig. 34 shows models before and after treatment.

Fig. 35 represents tracings of x-rays of case before treatment, and after

removal of retention. Elapsed time between the two tracings is 4 years, 9 months.

Fig. 36 is a composite tracing of the two previous ones. It reveals:

1. The angle BSN has remained constant but the Bolton plane has moved downward.
2. Orbitale has remained at the same level but has gone decidedly forward. There has been a slight increase in cranial outline.

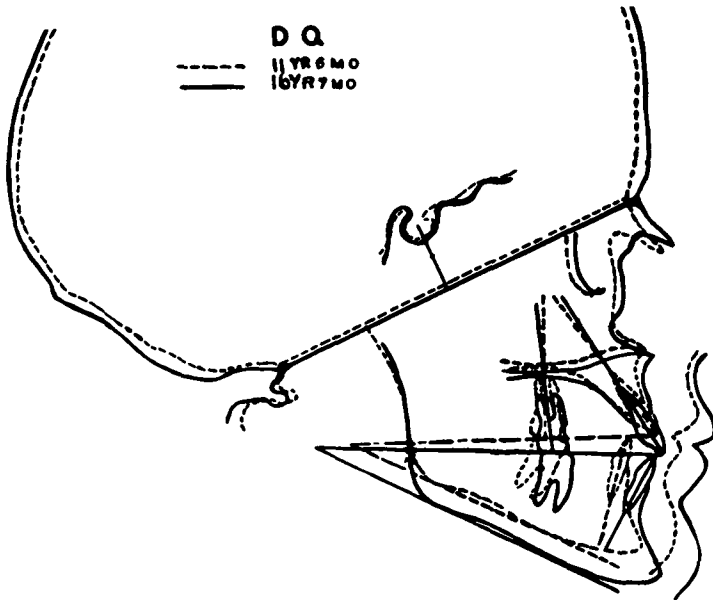


Fig. 33

Case D.Q., female. A composite tracing of cephalometric tracing in Fig. 32.

3. The pterygomaxillary fissure has gone backward 2.5 mm.
4. The nasal floor has gone downward 2 mm. but has changed its angle to Bolton plane only $.75^\circ$.
5. The angle between Bolton plane and plane of occlusion has been increased 3.75° .
6. Gonion has moved backward 2.75 mm. and downward 6 mm.
7. Gnathion has moved downward 2.5 mm. and forward only 1.5 mm.
8. Upper 6 has remained in the same position anteroposteriorly, has moved downward 2 mm., and has changed its axial inclination 3.5° .

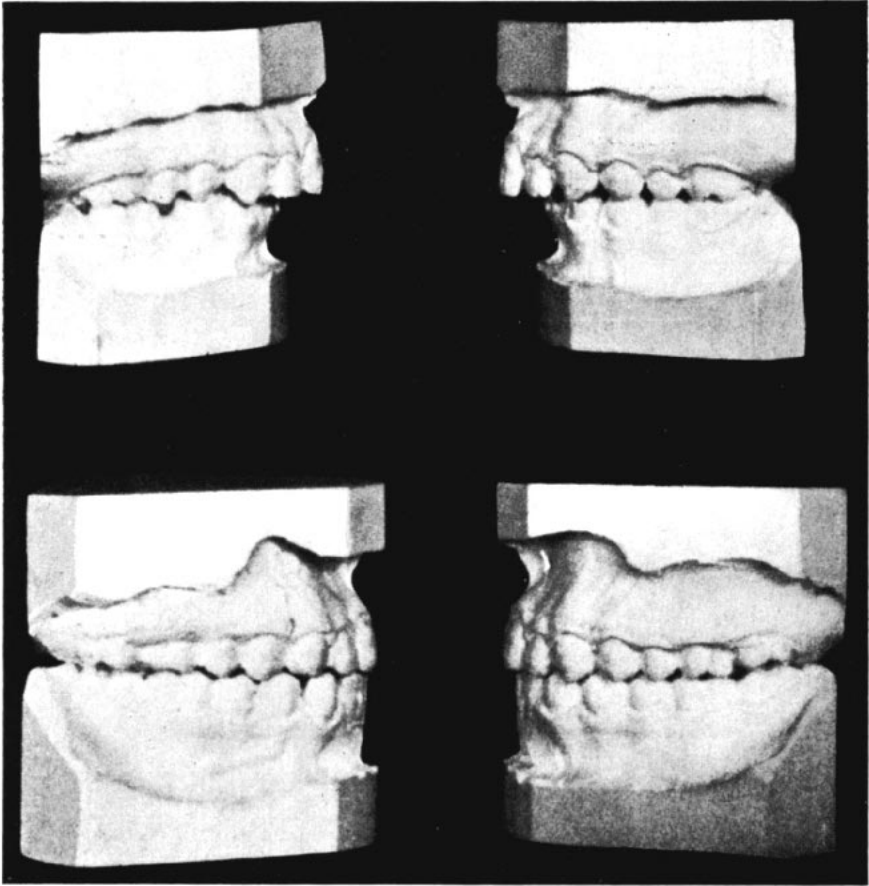


Fig. 34

Case D.I., female, aged 12 years, 8 months. Models before and after treatment.

9. Lower 6 has moved forward 4 mm., downward 1.5 mm., and has tipped very slightly.
10. Upper 1 has moved forward 1 mm., downward 3 mm., and has changed its axial inclination 3.5° .
11. Lower 1 has moved forward 8.5 mm., downward 4 mm., and has changed its axial inclination only 3° .
12. The mandible has increased in height 2.5 mm. at gnathion and 6 mm. in the molar region.

This case is considered clinically successful.

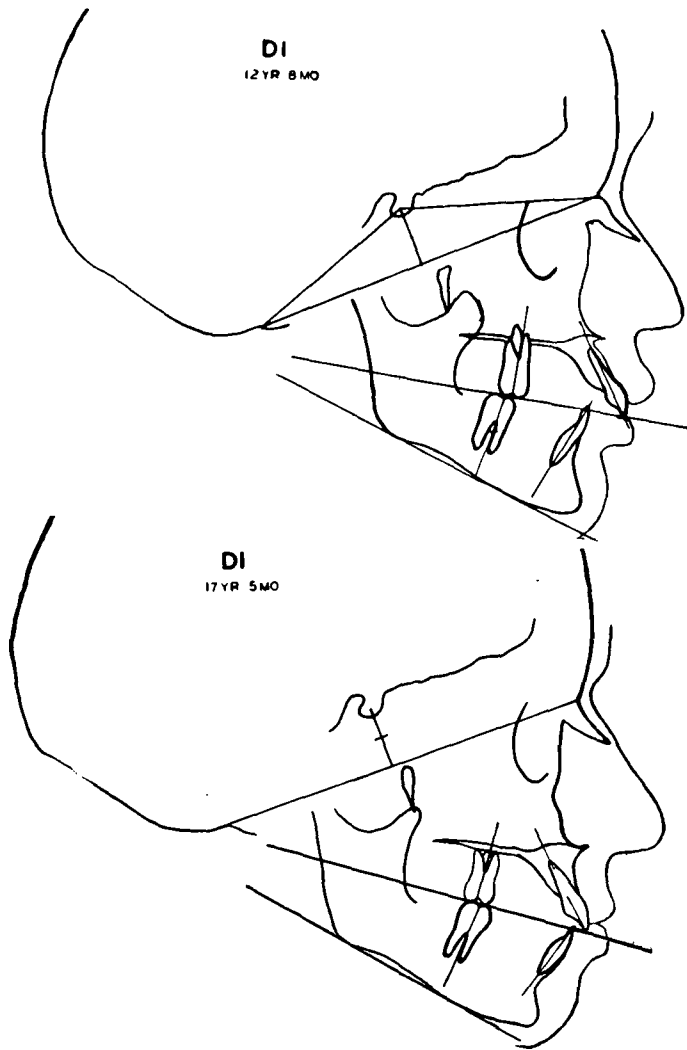


Fig. 35

Case D.I., female. Cephalometric tracings at beginning and end of treatment.

Case D.S., Male—Class II Division I

Age at beginning of treatment, 13 years, 3 months.

Fig. 37 represents the models before and after treatment.

Fig. 38 represents cephalometric tracings of the case before treatment and shortly after being retained.

Fig. 39 is a composite of the two previous tracings. It reveals the following:

1. The upper central has been tipped distally 5 mm. and down 6 mm., with a change in axial inclination of 6° .
2. The upper molar has tipped distally 2 mm. and down 4 mm., with a change in axial inclination of 3° .
3. The lower central has tipped downward 8 mm. and forward 8 mm., with a change in axial inclination of $23\frac{1}{2}^\circ$.

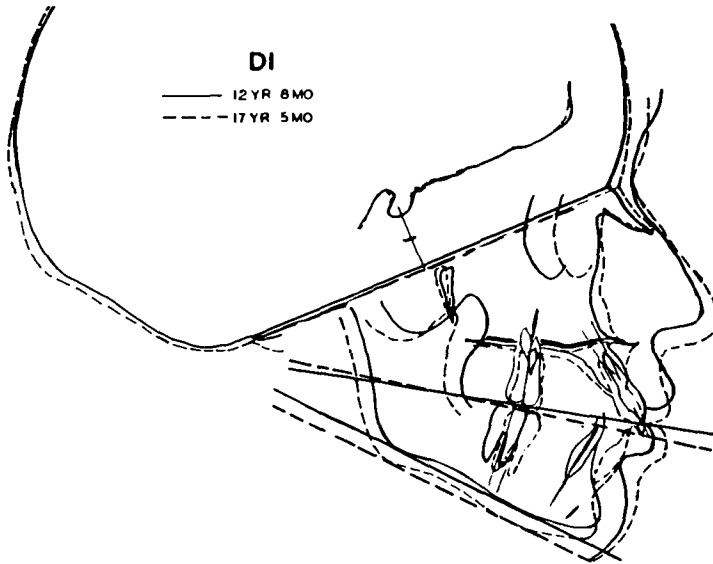


Fig. 36

Case D.I., female. A composite tracing of cephalometric tracing in Fig. 35.

4. The lower molar has moved bodily forward 3 mm. and downward 5 mm.
5. The angle between Bolton plane and occlusion has opened $3\frac{1}{2}^\circ$.
6. The angle between Bolton and the lower border of the mandible has opened only $1\frac{1}{2}^\circ$.
7. The length of the mandible has increased 9 mm.
8. The angle between Bolton and the floor of the nose has changed 1° .

Fig. 40 represents cephalometric tracings shortly after the case was retained and 10 months after retention.

Fig. 41 is a composite of the two previous tracings and reveals the following:

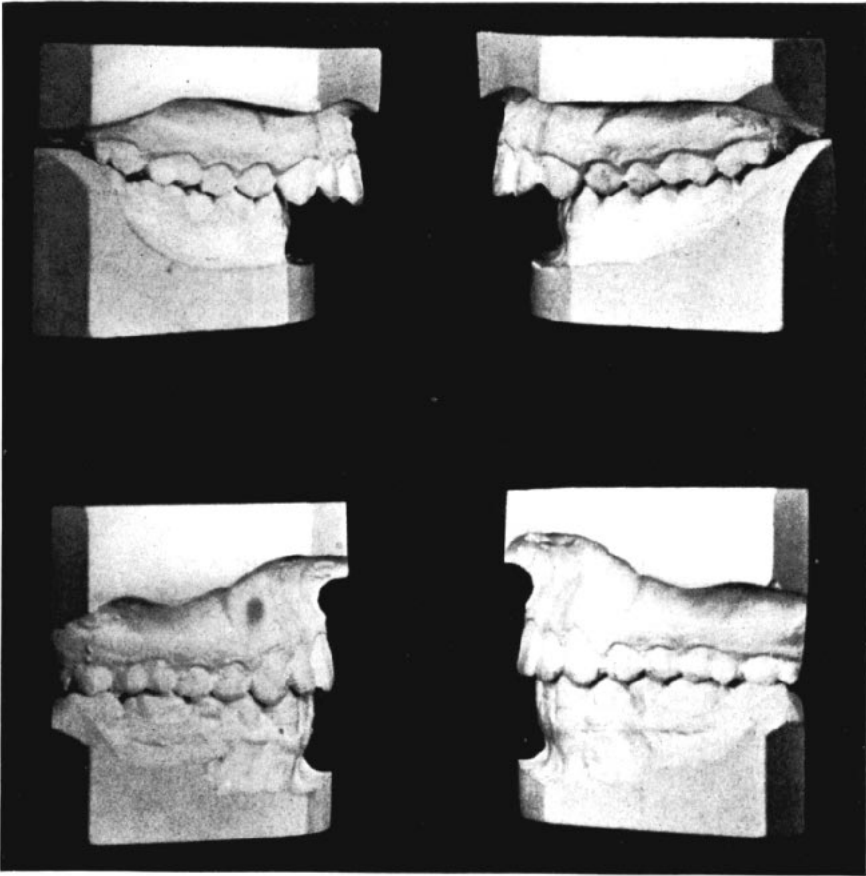


Fig. 37

Case D.S., male, aged 13 years, 3 months. Models before and after treatment.

1. The upper incisors have moved forward $\frac{1}{2}$ mm. with no change in axial inclination.
2. The lower incisor has straightened up $3\frac{1}{2}^{\circ}$.
3. The molars have gone downward 2 mm. with a change in axial inclination of 1° .
4. There is a closure in the angle between the Bolton and occlusal planes of $2\frac{1}{2}^{\circ}$.
5. The angle between Bolton plane and the lower border of the mandible remains the same.
6. The entire mandible has shifted slightly forward.

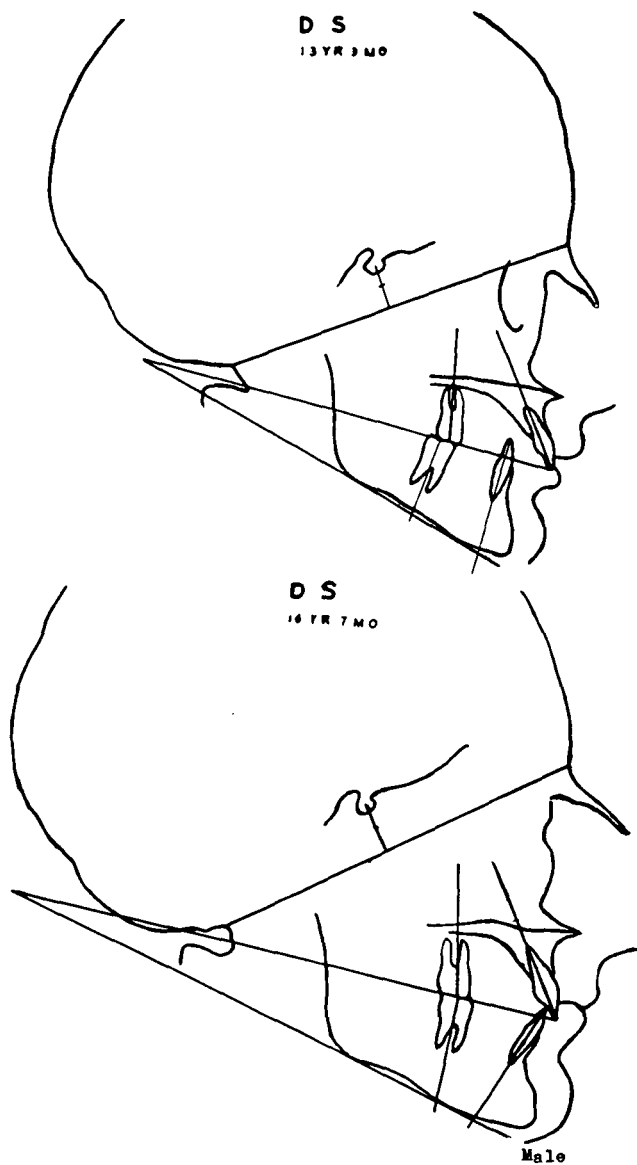


Fig. 38

Case D.S., male. Cephalometric tracings of case before treatment and shortly after being retained.

7. The angle between Bolton and the floor of the nose remains the same.

Fig. 42 is a composite of the three previous tracings analyzed by the use of straight lines, and representing the relationship of the lower border of the mandible, occlusion, and the axial inclination of the teeth to the Bolton plane.

This case is considered clinically successful.

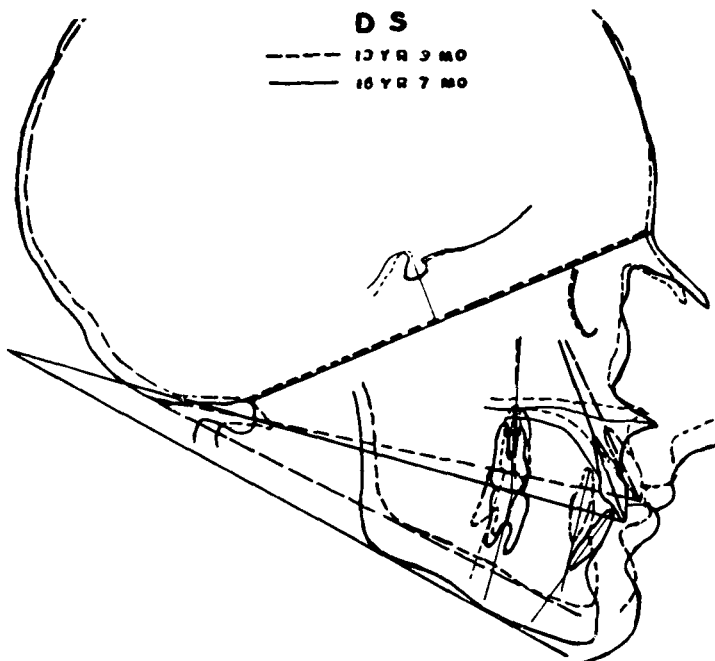


Fig. 39

Case D.S., male. A composite tracing of cephalometric tracing in Fig. 38.

Case D.F., Male—Class II Division I

Age at beginning of treatment, 12 years, 9 months.

Fig. 43 represents the models before and after treatment.

Fig. 44 represents the cephalometric tracings of the case before treatment and after all retention was removed. Elapsed time, 5 years, 1 month.

Fig. 45 is a composite of the two previous tracings and reveals the following:

1. The upper central has tipped distally $1\frac{1}{2}$ mm. and downward $6\frac{3}{4}$



Fig. 40
Case D.S., male. Cephalometric tracings shortly after the case was retained, and 10 months after retention.

- mm., with a change in axial inclination of $11\frac{1}{2}^{\circ}$.
2. The upper molar has gone downward $7\frac{1}{2}$ mm. and forward $\frac{1}{4}$ mm.
 3. The lower incisor has moved 6 mm. anteriorly and 11 mm. downward, with a change in axial inclination of $\frac{3}{4}^{\circ}$.
 4. The lower molar has moved 7 mm. anteriorly and 7 mm. downward.
 5. The lower border of the mandible has increased 5 mm. in length.
 6. The angle between Bolton and occlusal planes increased $3\frac{1}{2}^{\circ}$.

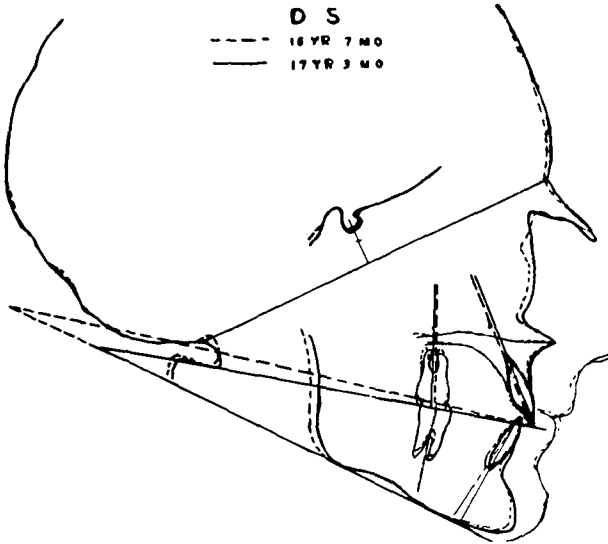


Fig. 41

Case D.S., male. A composite tracing of cephalometric tracing in Fig. 40.

7. The angle between Bolton plane and the lower border of the mandible increased 1° .
 8. The angle between Bolton plane and the floor of the nose increased $\frac{1}{2}^{\circ}$.
- This case is considered clinically successful.

Case D.T., Female—Class II Division I

Age at beginning of treatment, 13 years, 8 months.

Fig. 46 represents the models before and after treatment.

Fig. 47 represents the cephalometric tracings of the case before treatment and at the end of retention. Elapsed time, 3 years, 7 months.

Fig. 48 is a composite of the two previous tracings and reveals the following:

D S

----- 13 YR 3 MO
- - - - - 16 YR 7 MO
————— 17 YR 3 MO

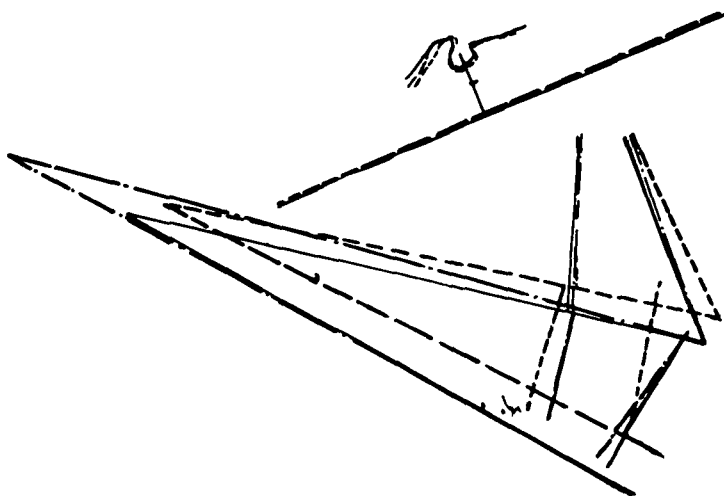


Fig. 42

Case D.S., male. A composite of the three previous tracings analyzed by the use of straight lines, and representing the relationship of the lower border of the mandible, occlusion, and the axial inclination of the teeth to the Bolton plane.

1. The upper central has tipped anteriorly 1 mm., with a change in axial inclination of 6° .
2. The upper molar has moved forward $\frac{1}{2}$ mm. and downward $\frac{1}{2}^{\circ}$.
3. The lower incisor has moved almost bodily 5 mm. forward and 5 mm. downward, with only $\frac{1}{2}^{\circ}$ change in axial inclination.
4. The lower molar has moved downward $\frac{1}{2}$ mm. and forward 4 mm., with a change in axial inclination of 8° .
5. The angle between Bolton and occlusal planes closed $\frac{1}{2}^{\circ}$.
6. The angle between Bolton plane and lower border of the mandible has increased $\frac{1}{2}^{\circ}$.

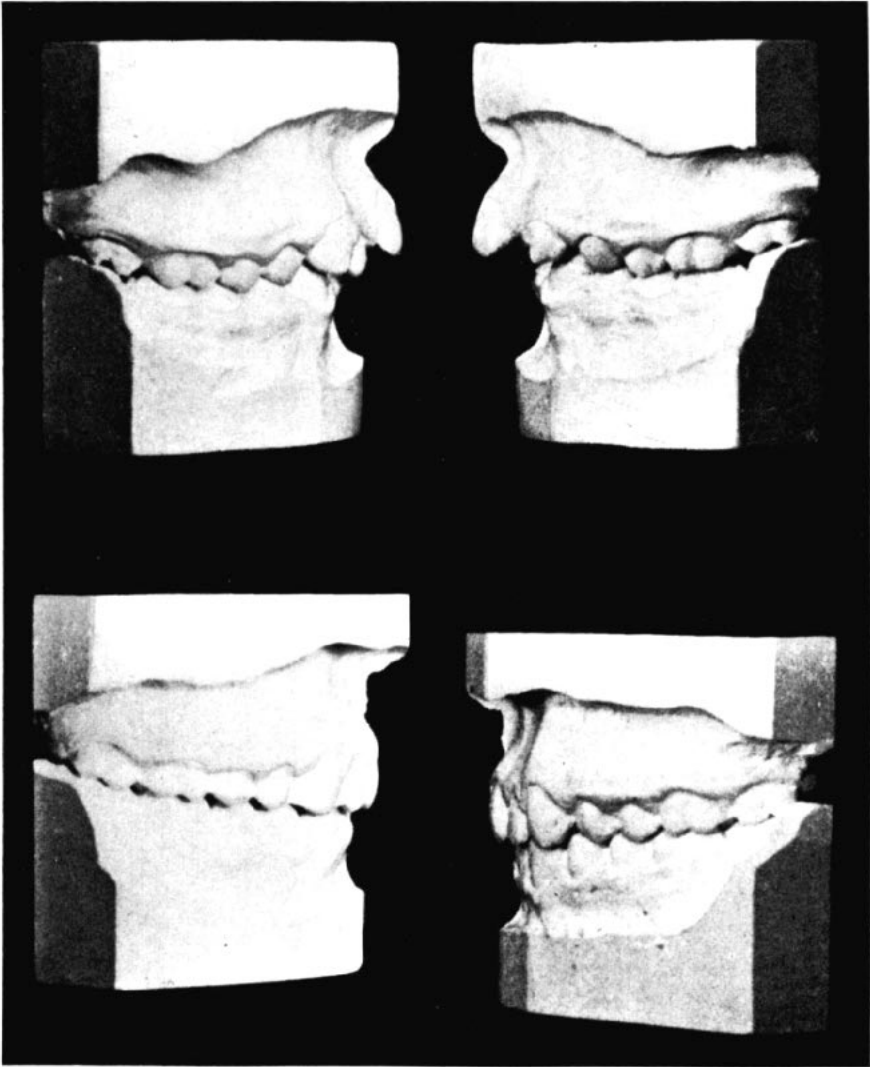


Fig. 43

Case D.F., male, aged 12 years, 9 months. Models before and after treatment.

7. There has been an increase in the length of the mandible of 6 mm. This case is considered clinically successful.

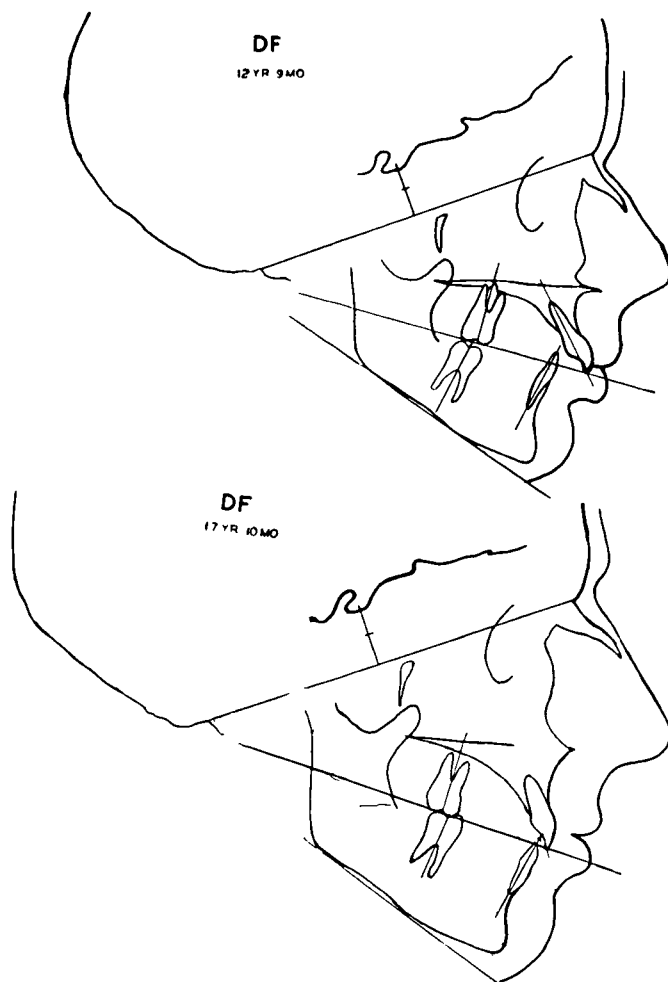


Fig. 44

Case D.F., male. Cephalometric tracings at beginning and end of treatment.

Case C.Y., Female

Age at beginning of treatment, 14 years, 9 months.

This case is a Class II Division I, complicated with mesial drift of both lower buccal segments from the cuspids back.

Treatment of this case differed in that the lower teeth from the first bicuspid forward were used as a means of anchorage to move the lower

posteriors distally. When sufficient space was opened the first bicuspids and the cuspids were moved distally to gain an ideal arch form and the case was thus retained for eight months. At the end of this retention period the case was then treated as a typical Class II Division I malocclusion.

Fig. 49 represents the models at the beginning of treatment, at the end of the first retention period, and at the conclusion of treatment.

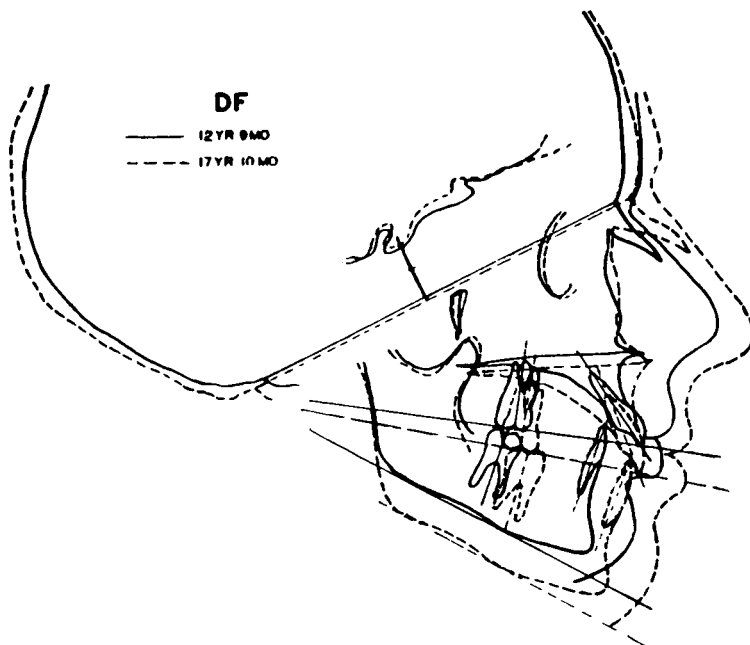


Fig. 45
Case D.F., male. A composite tracing of cephalometric tracing in Fig. 44.

Fig. 50 represents the cephalometric tracings before and after treatment.

Fig. 51 is a composite of the two previous tracings and reveals the following:

1. The upper incisor has tipped distally 3 mm. and downward 3 mm., with a change in axial inclination of 14° .
2. The upper molar has changed axial inclination $4\frac{1}{2}^{\circ}$, with the crown remaining stationary.
3. The lower incisor has tipped forward 9 mm. and downward 6 mm., with a change in axial inclination of 18° .
4. The lower molar has moved bodily forward 2 mm.

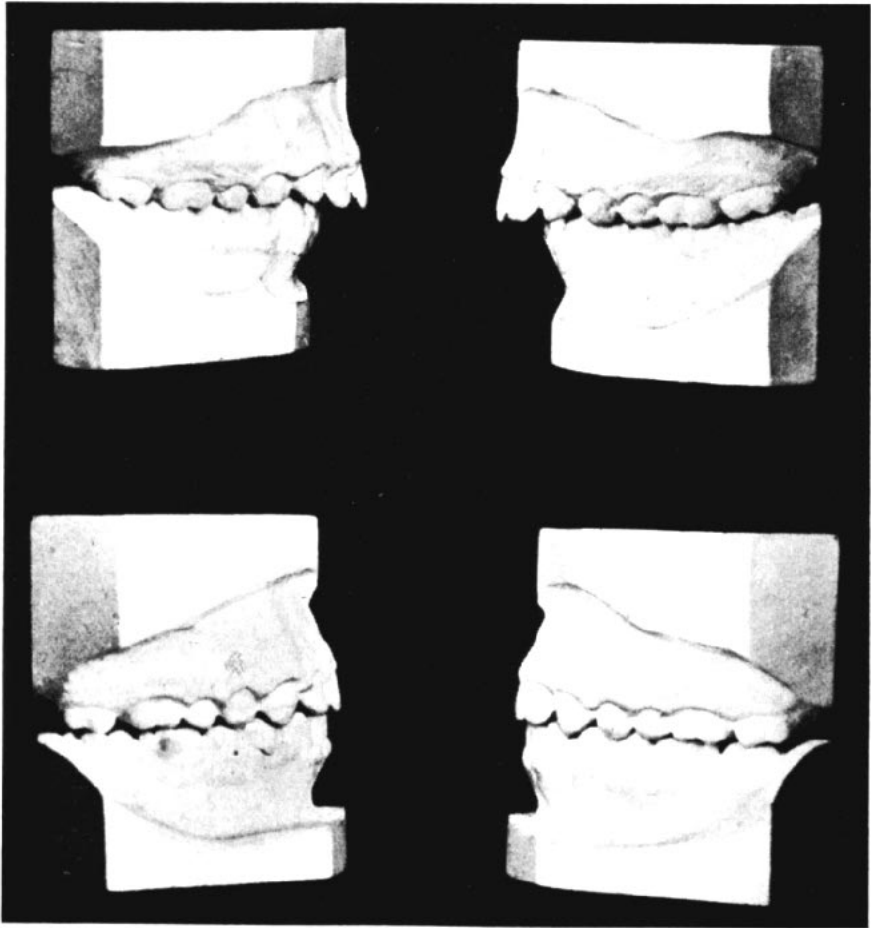


Fig. 46

Case D.T., female, aged 13 years, 8 months. Models before and after treatment.

5. The angle between Bolton and occlusal planes has increased $5\frac{1}{2}^\circ$.
6. The lower border of the mandible has remained the same, with changes primarily in the alveolar processes.

This case is considered clinically successful.

Case D.P., Male—Class II Division II

Age at beginning of treatment, 11 years, 7 months.

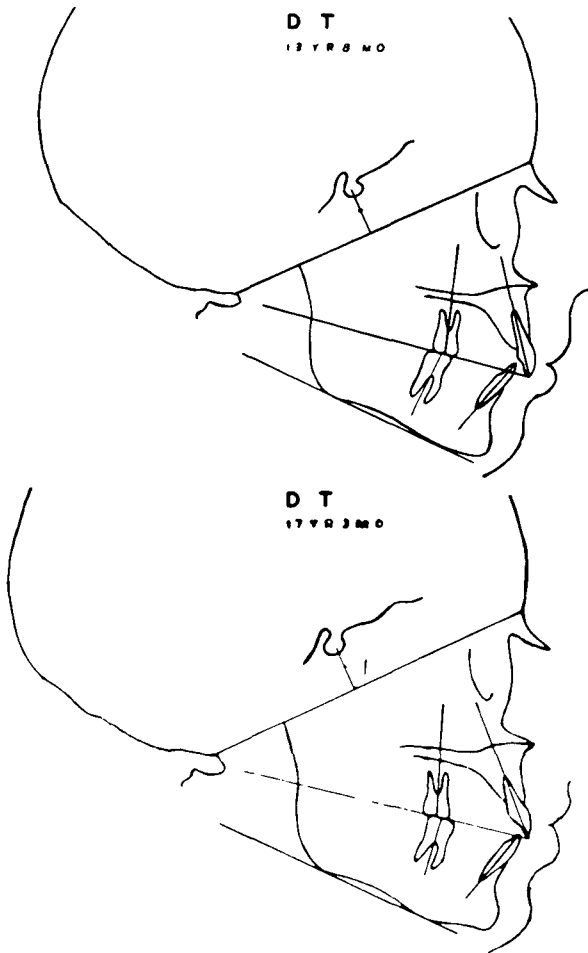


Fig. 47
Case D.T., female. Cephalometric tracings at beginning and end of treatment.

Fig. 52 shows models of case before and after treatment.

Fig. 53 represents tracings of x-rays before treatment and after removal of retention. Elapsed time between the two is 3 years, 10 months.

Fig. 54 represents a composite tracing of the previous two. It reveals:

1. The angle BSN has remained the same.
2. Orbitale has moved downward 1 mm. and forward 3 mm.
3. The nasal floor has moved down about 2 mm. while the angle of Bolton

plane to nasal floor has opened 2° .

4. Gonion has gone backward 2 mm. and downward 1 mm.
5. Gnathion has moved downward 4 mm. and forward only 1 mm.
6. Upper 6 has moved downward about 3 mm., forward about $1\frac{1}{2}$ mm., and changed its axial inclination 5° .
7. Lower 6 has moved downward 3 mm. and forward about $3\frac{1}{2}$ mm. in a nearly identical axis.

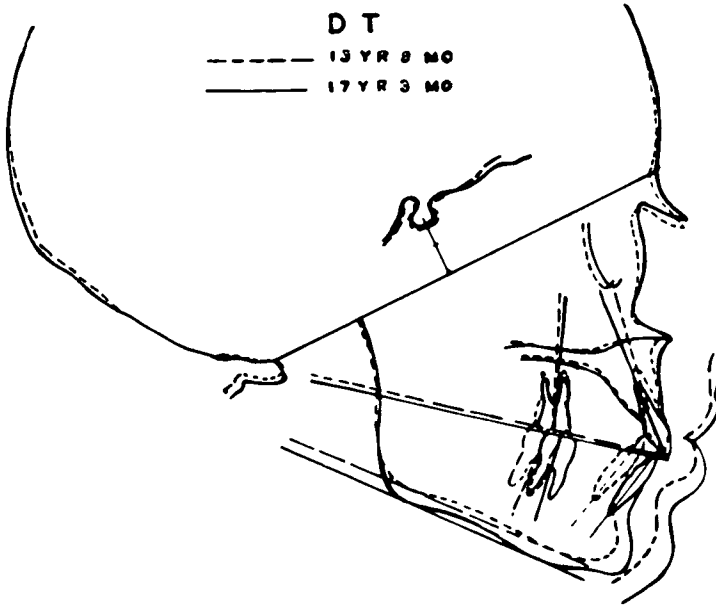


Fig. 48

Case D.T., female. A composite tracing of cephalometric tracing in Fig. 47.

8. Upper 1 has moved downward $2\frac{1}{2}$ mm. but has been tipped distally only 1 mm. It has straightened its axial inclination 13° .
9. Lower 1 has moved downward 5 mm., forward $2\frac{1}{2}$ mm., and changed its axial inclination 14° .
10. The angle between Bolton plane and occlusal plane has increased $\frac{1}{2}^{\circ}$, while the angle between Bolton and lower border of the mandible has increased $\frac{3}{4}^{\circ}$.
11. The mandible has increased about 4 mm. in length and 3 mm. in height. This is considered a clinically successful case.

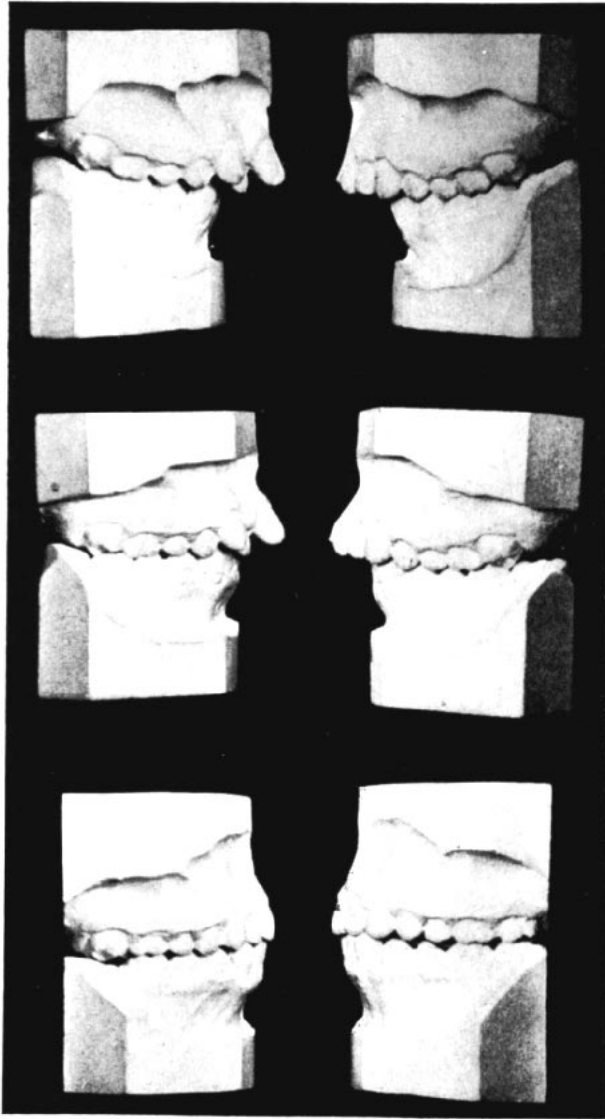


Fig. 49

Case C.Y., female, aged 14 years, 9 months. Models before, during and after treatment.

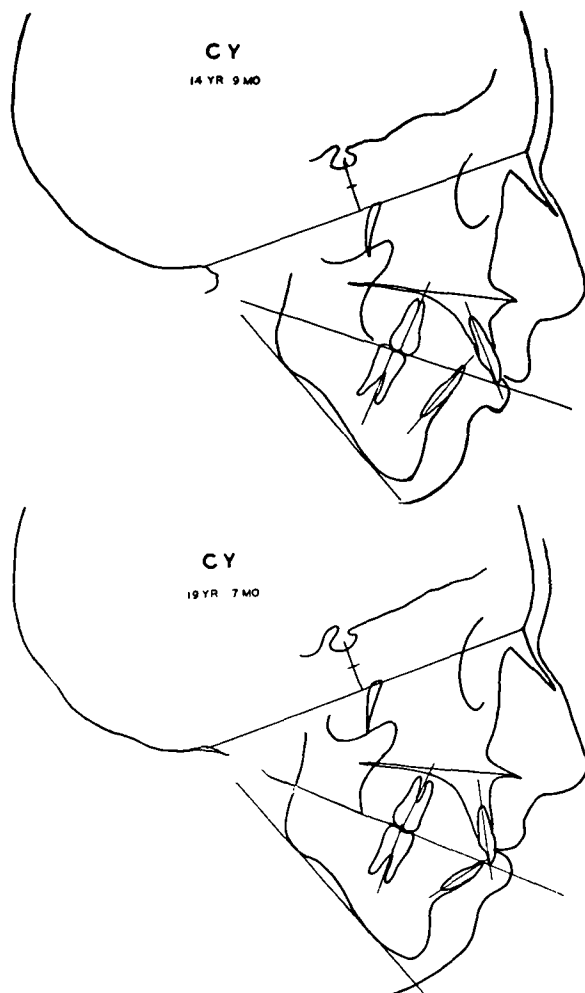


Fig. 50

Case C.Y., female. Cephalometric tracings at beginning and end of treatment.

Case D.O., Female

Age at beginning of treatment, 16 years, 1 month.

A Class II Division I malocclusion complicated by an open bite.

Fig. 55 represents the models before and after treatment.

Fig. 56 represents the cephalometric tracings at the beginning and end of treatment.

Fig. 57 is a composite of the two previous tracings and reveals the following:

1. The upper incisor has moved distally 1 mm. and downward $1\frac{1}{2}$ mm., with a change in axial inclination of 8° .
2. The upper molar has moved downward $\frac{1}{2}$ mm., with a change in axial inclination of 8° .

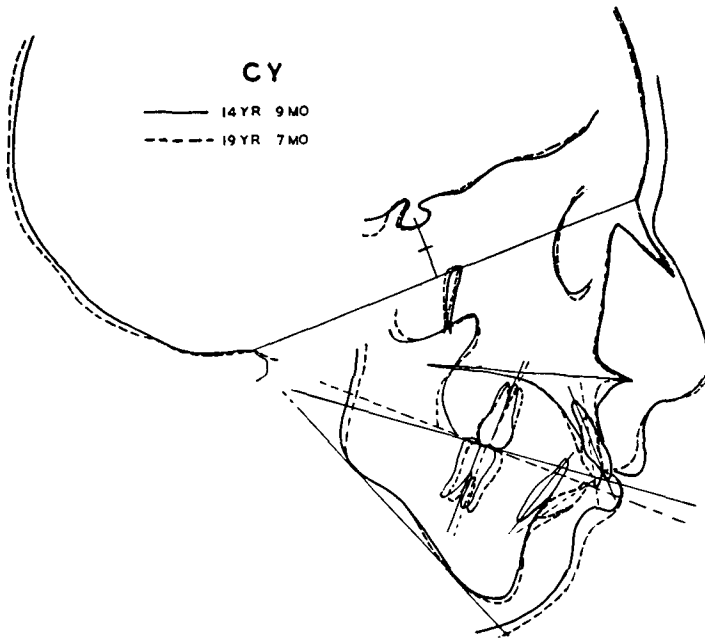


Fig. 51

Case C.Y., female. A composite tracing of cephalometric tracing in Fig. 50.

3. The lower incisor has moved forward $\frac{1}{2}$ mm. and upward $\frac{1}{2}$ mm., with a change in axial inclination of $\frac{1}{2}^\circ$.
4. The angle between Bolton and occlusal planes has opened 1° .
5. The angle between Bolton plane and the lower border of the mandible remains the same.
6. The cranial outline and outline of the mandible have not changed to any appreciable extent.
7. The changes occurred primarily in the alveolar process.

This case is not considered clinically successful.

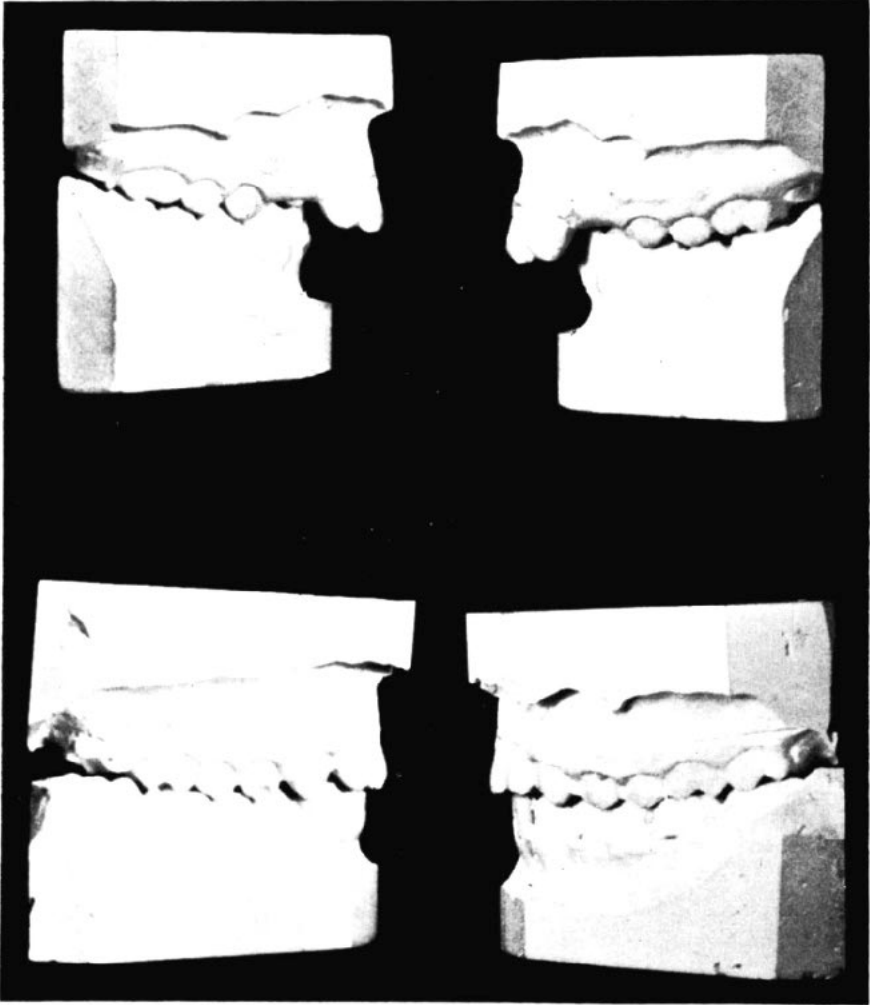


Fig. 52

Case D.P., male, aged 11 years, 7 months. Models before and after treatment.

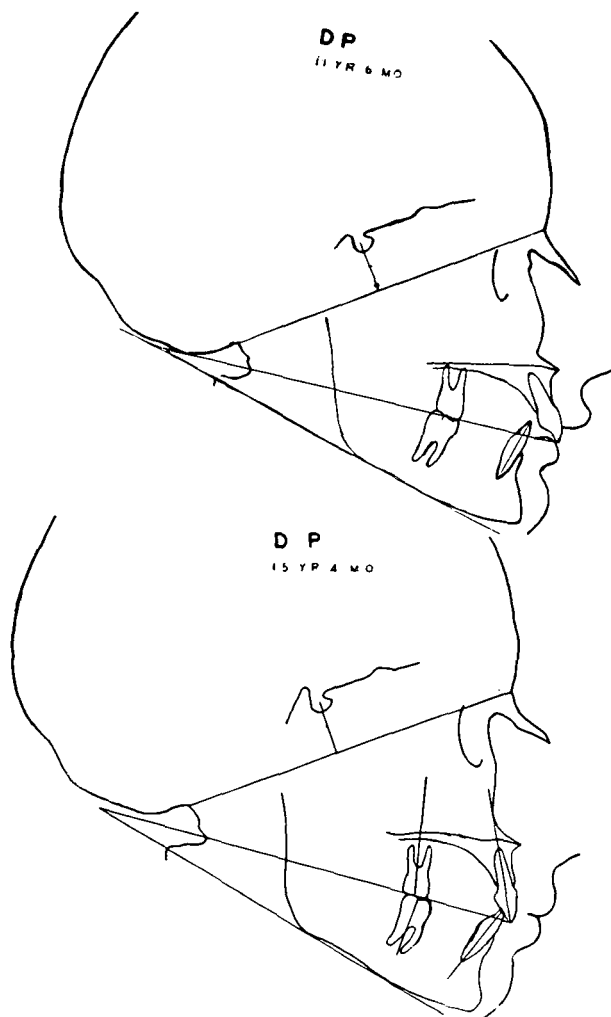


Fig. 53

Case D.P., male. Cephalometric tracings at beginning and end of treatment.

Summary

1. In only one case (D.S.) is any appreciable distal movement of upper molars demonstrable. This is possibly due to the fact that no x-rays were taken at the end of the distal movement. This is now being investigated and will be reported later.

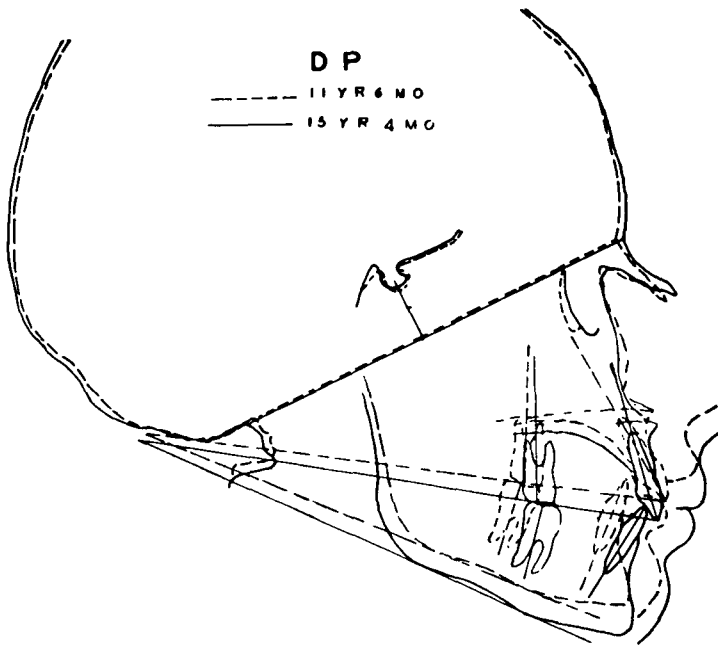


Fig. 54

Case D.P., male. A composite tracing of cephalometric tracing in Fig. 53.

2. In every case the occlusal plane has been tipped, opening the angle between the Bolton and occlusal planes.
3. The lower molars show a decided tendency to come forward with this method of treatment.
4. The changes induced by tooth movement appear to be restricted to the alveolar process.
5. The disturbances of the angulation of individual teeth and of the occlusal plane show a tendency toward recovery, following active treatment. This is particularly true where growth is active.

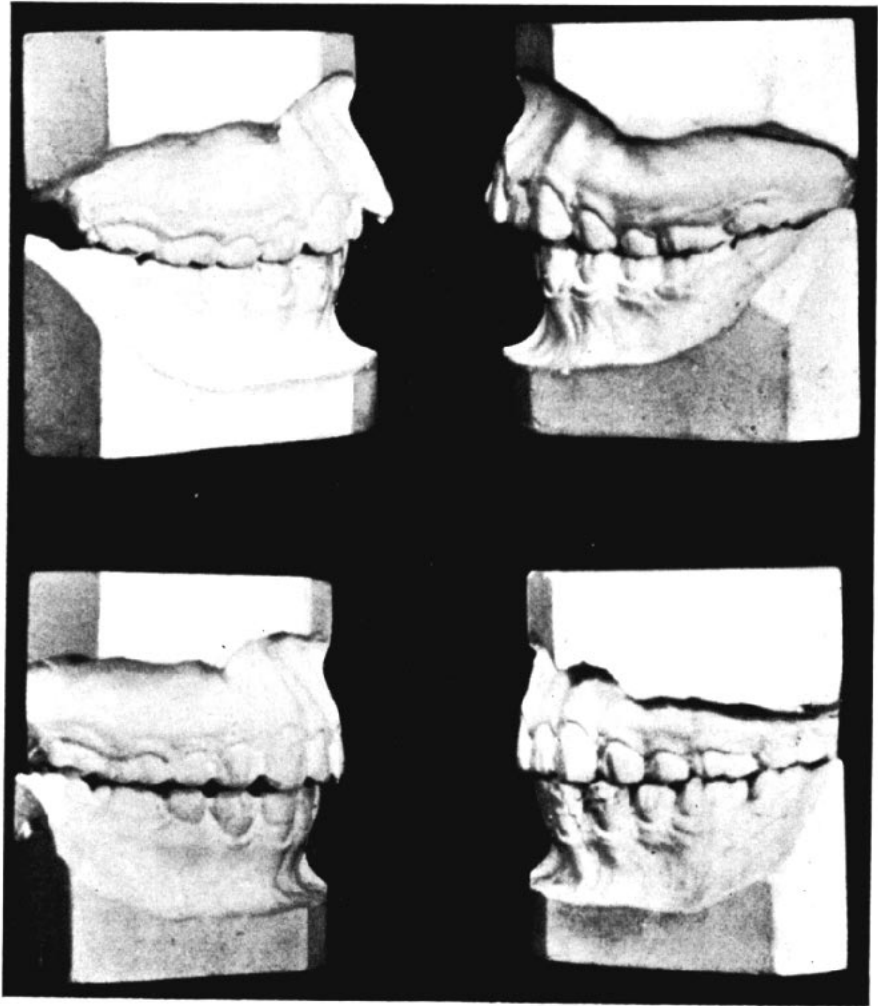


Fig. 55

Case D.O., female, aged 16 years, 1 month. Models before and after treatment.

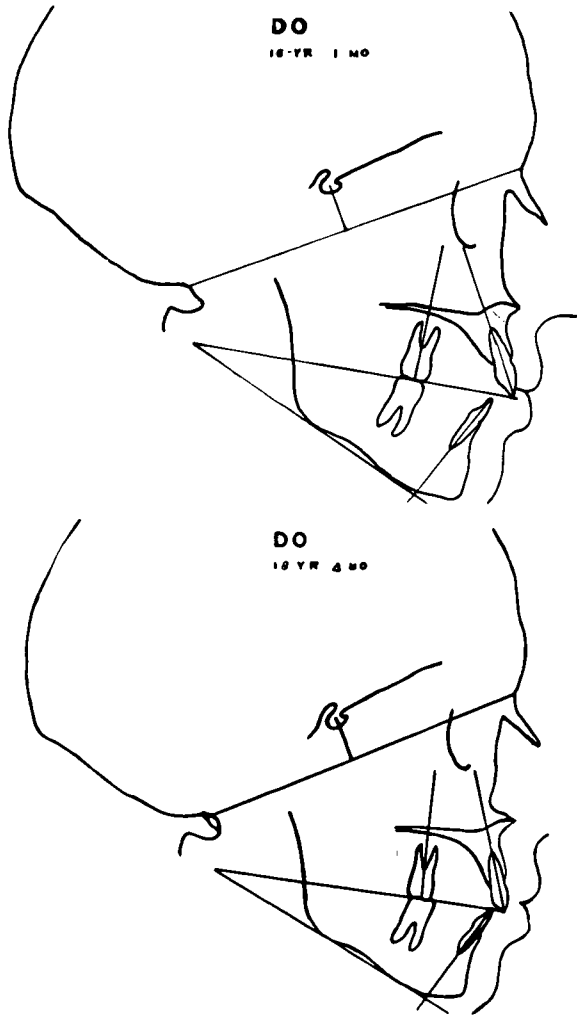


Fig. 56

Case D.O., female. Cephalometric tracings at beginning and end of treatment.

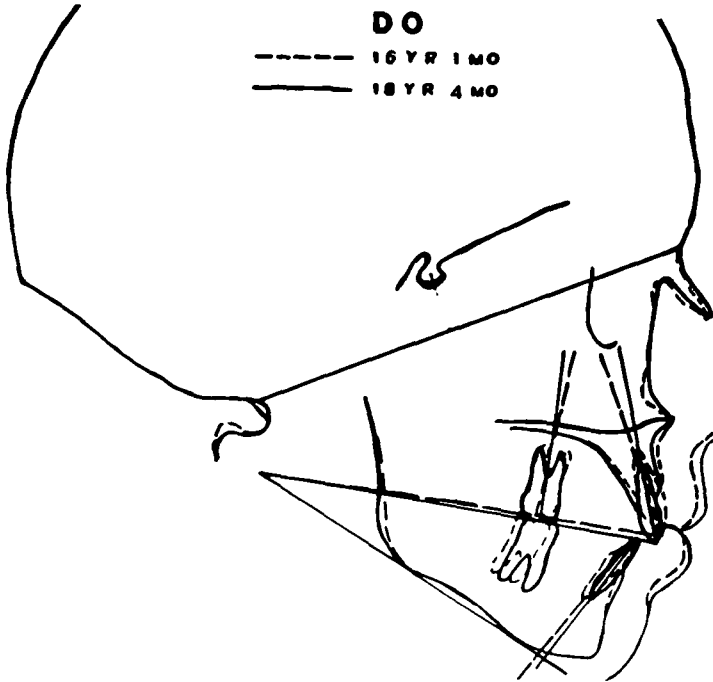


Fig. 57

Case D.O., female. A composite tracing of cephalometric tracing in Fig. 56.

6. Although most of the cases included in this report were considered clinically successful, the best esthetic results were obtained in those where growth was most active. This applies particularly to mandibular growth.