Cephalometric Appraisal of Dentoskeletal Pattern in Mentally Retarded Children

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For years research workers the world over have been studying a common malady of civilized people, namely, malocclusion in normal children. Very few studies have been carried out on mentally retarded children who, being handicapped, require more attention because of their inability to maintain proper oral hygiene.

In spite of increasing interest in the psychological field as related to orthodontics, the passage of time has failed to produce investigations which are of practical value. Need for information about normal children has been widely realized throughout the world compared with that on mentally retarded children. Therefore, to extend the services of orthodontics to the mentally retarded children, it is necessary to determine the types of skeletal and dental patterns in such children and compare them with normal children of the same age and socioeconomic group.

Among the studies carried out related to incidence of malocclusion in these cases, the criterion of classification has been the conventional Angle's rather than the more reliable cephalometric skeletal pattern. Hence, in the present study skeletal pattern has been used for the classification of malocclusion and type of dentofacial complex it presents by cephalometric appraisal.

Mental defects involve conditions where there is incomplete and arrested development of mind before the age of 18 years. It may arise as an inherent entity, which may be caused by an infliction or trauma. Mental subnormality is a severe entity of the mind which leaves the patient incapable of leading an independent life and unable to safeguard himself against serious exploitation.

These unfortunate individuals are handicapped by their inability to social adaptation and require a guarded training regime. The degree of mental defectiveness depends on the person's Intelligence Quotient.

A common characteristic of mentally retarded children is poor muscular coordination. The advent of speech is often accompanied by defective articulation, which may be due to developmental anomalies like high saddle-shaped palate, and also anomalies of teeth, lips and jaws. Irregular dentition, decayed teeth, and enamel hypoplasia may contribute further.

In 1862 J. Langdon Downs,[1] in his pioneering survey of 200 random cases of idiocy, observed that in 58% of these cases there was an inordinately and excessively arched palate. However, in 17% the palate was flat, or with keel or ridge.

A detailed study of oral and dental anomalies associated with mongolism was presented by Jones[2] in 1890. He concluded that it was usual for the lower jaw to be slightly more prominent than the upper with open bite. He further observed the congenital absence of maxillary lateral incisors, lower incisors, and third molars.

In 1908 Kingsley[3] thought that a disturbance of trophic influence of the trigeminal nerve in particular might account for jaw deformities, but there is little evidence of the direct influence of the nervous system on facial bones.

It was found by Brousseau and Brainard in 1928 that in mongolism there is general retardation of growth, hence abnormally small body height.[4]

Benda, correlating the size of the tongue in relation to the oral cavity in mongoloid patients, observed that dental deformities were due to smallness of the oral cavity and not the size of the tongue.[5]

However, Gosman and Vindard[6] considered from their study of 22 cases that, although the mandible was shorter than normal, there was a relative mandibular prognathism. They further confirmed mesio-occlusion, open bite, and posterior crossbite as characteristic features and that the tongue caused relative expansion of arches in both forward and lateral directions.

Synder, analyzing dental problems of 113 retarded children in 1960, found malocclusion to be present in 67% with a large percentage of Class III.[7] It was 11% as compared with 0.5% by Newman, 0.7% by Hill, and 0.5% by Korkhaus.

More recently, in a study by Smith,[8] greater prevalence of habits and functional disorders in these children were thought to be the cause for orthodontic imbalance.

Material and Methods

There were two groups of children, male and female, selected at random between ages 12 and 15 years, from the same socioeconomic group. The first group consisted of 20 mentally retarded children from the Children Aid Society, Bombay, India, the second group of 20 children from the Municipal School of Bombay. No past history of the mentally retarded was available. The I.Q. range was between 10 and 50. The children of the second group were normal. The selection of both groups was irrespective of their facial pattern and dental occlusion.

A lateral cephalogram and study models were prepared for each child. Black and white frontal, right and left profile photographs were also taken.

Seven angular and one linear measurements were taken for each child to determine the skeletal and dental patterns using the Bolton plane as the reference (Fig. 1). In addition, point "F" was established at the intersection of a perpendicular line drawn from pogonion to the Bolton plane. A perpendicular drawn from the center of sella turcica to the above perpendicular created "E" at the point where it intersected Pg-F. The linear distance from E to F was measured in millimeters.

Discussion

With the advent of cephalometric roentgenography by Broadbent in 1931, extensive investigations pertaining to growth and development and malocclusion have been undertaken.[9] However, scrutiny of the literature fails to reveal any cephalometric roentgenographic study of growth and development in mentally retarded children. Therefore, this study was undertaken with a view to study the cranio-facio-dental structures of mentally retarded children.

Angle SNA

The mean angle SNA for the mentally retarded children is 82.95° ± 4.07

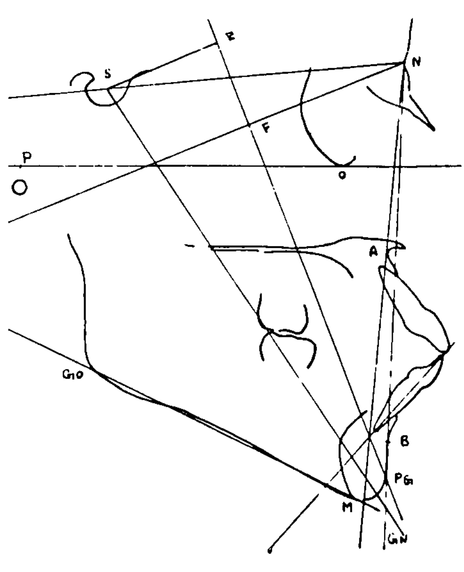

Fig. 1

TABLE I

Means, Standard Deviations and Significant Difference of Mentally Retarded and Normal Children

	Normal		*Retarded*			
	Mean	S.D.	Mean	S.D.	"t" test	
SNA	80.00	4.30	82.95	4.06	2.17	Sig.
SNB	77.65	3.45	79.15	4.19	1.20	N.S.
ANB	2.35	3.05	3.80	3.10	1.45	N.S.
FMA	29.30	6.02	31.15	5.87	0.95	N.S.
IMPA	100.35	4.92	100.85	8.74	0.21	N.S.
FMIA	50.35	8.42	48.10	6.57	0.91	N.S.
Y axis	63.25	5.24	63.60	5.91	0.19	N.S.
S (F - E)	18.93	2.75	17.65	3.40	1.32	N.S.

Value of "t" with 38° of freedom at 5% significant level lies between 2.042 and 2.021

with a range of 77° to 91°. The mean angle for the normal children is 80° ± 4.30 with a range of 72-90°.

The "t" test (Table I) shows that there is a significant difference between the position of maxilla anteriorly in relation to anterior cranial base in mentally retarded and normal subjects. In the mentally retarded, the anterior limit of apical base is placed forward compared with normal subjects. This may either be attributed to poor coordination of muscles, especially the orbicularis oris, or length of maxilla, which has allowed the maxillary dento-alveolar complex, together with the anterior border of the apical base of the maxilla, to move forward.

Angle SNB

The mean angle SNB for the mentally retarded children was 79.15° ± 4.20 with a range of 70-89°. The mean angle SNB for the normal group was 77.65 ± 3.43 with a range of 71-85°. The "t" test indicates that the difference observed between the SNB readings of the two groups is not statistically significant. This shows that the mandibular base in the normal group is more posteriorly placed than in mentally retarded children. In the age group involved in this study, the last growth spurt may occur which might result in the variation of point B in relation to the cranial base.

Angle ANB

The mean angle ANB is 3.80° ± 3.11 with a range of —2° to 10° for mentally retarded children. The mean for the normal children is 2.35° ± 3.05 with a range of —2° to 8°.

The "t" test, which is not significant, shows that in mentally retarded children there is more variation in maxilla to mandible when related to each other, than that obtained in the normal children. The fault can be in the maxilla, the mandible, or in the cranial base. As the last growth spurt is still to take place, there might occur further variation depending on that growth.

Looking at angle SNA and angle SNB, it can be seen that the maxilla and mandible of mentally retarded children are within the normal ranges when comparing their cranial bases, but when their difference is taken (angle ANB) to evaluate their relationship to each other, it is not significant.

Angle FMA

Taking the three angles of Tweed's triangle into consideration, the mean for angle FMA for the mentally retarded children is 31.15° ± 5.88 with a range of 18° to 42°. The mean for the normal group is 29.30° ± 6.03 with a range of 14° to 38°. The "t" test is again not significant.

Angle IMPA

The mean angle IMPA for the mentally retarded children is 100.85° with a standard deviation of 8.74 and range of 91-124.° The mean angle IMPA for the normal children is 100.35° with a standard deviation of 4.92 and a range of 92-110°.

The "t" test is not significant and the readings are quite similar. The standard deviation of mentally retarded subjects is 8.74 which is very high possibly due to the size of the sample.

Angle FMIA

This angle indicates the proclination of lower anterior teeth to the Frankfurt plane. The FMIA on an average for the mentally retarded children is 48.10° ± 6.57 with a range of 38-60°, and in the normal children is 50.35° ± 8.42 with a range of 39-70°.

On application of the statistical test, which is not significant, it indicates that FMIA angle, though small in mentally retarded children, is not small enough to make it significant. The slight decrease of FMIA angle for mentally retarded children may be attributed to the fact that in these subjects the anterior part of the maxillary apical base is anteriorily placed and lower incisors are proclinated more to meet the demands of function.

Y Axis

The Y axis is considered to determine if there is a significant difference between the groups in the vector of forward and downward growth of the mandible. The mean angle for the mentally retarded is 63.60° with a standard deviation of 5.91, having a range of 56-79°, while the mean for the normal group is 63.25° with a standard deviation of 5.24 and a range of 58-74°.

The "t" test, though not significant, means that the growth of the mandible is more or less the same in mentally retarded and normal children in this study.

S (F-E)

This linear measurement was made because it was felt that sella turcica is slightly at the lower level in mentally retarded children.

The mean for the mentally retarded is 17.65 mm with a standard deviation of 3.41 and a range of 12.5 to 27.0 mm. The mean range for the normal children is 18.98 mm with a standard deviation of 2.75 and a range of 14.0 mm to 24.0 mm. The "t" test is not significant. It is seen that there is no difference in the position of sella turcica between the groups.

There is very little difference between the mentally retarded and the normal children in this study. The only reading which is of significance is angle SNA, the relation of anterior apical limit of maxillary base to cranial base. The growth of the mandible seems to be more downward than forward in direction in all subjects of this study. There also seems to be proclination of lower anteriors. However, it must be understood that the subjects of this study, normal as well as mentally retarded, were selected irrespective of occlusion and hence the readings obtained here must not be taken as norms for these subjects.

If orthodontics is to be extended for the benefit of the mentally retarded, it is essential to first establish norms for these children and determine if there is a significant difference between the two groups which would be of clinical value.

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