THE DEVELOPMENT OF THE DENTITION AND THE POSSIBILITY OF CONTROLLING THE DEVELOPMENT OF A MALOCCLUSION AND THE ESTABLISHMENT OF AN IDEAL OCCLUSION

Many factors affect a developing occlusion such as heredity and environment as to the size and morphology of the facial skeletal and soft tissue structures, particularly the jaws and lips, the musculature, the alveolar processes, the position of the tooth buds and their path of eruption, the presence of habits, as well as speech and function just to name a few. Some of these factors can well be altered or controlled by the orthodontist, while others at present are beyond our control. What is of primary interest would be to determine what major factors are essential in developing an ideal occlusion and what variations in these factors cause the most frequent malocclusions to develop. In this context, there are four basic elements that are of primary importance, namely growth and facial morphology, the development and relative stability of the overjet, the overbite and the variations in the teeth themselves as to their size, the size of the arch, and their unerupted and erupting positions.

Facial growth and morphology have an initial impact on the size and position of the jaws relative to each other and as the deciduous teeth erupt into the mouth, this jaw position has an influence on the initial occlusion relative to the antero-posterior position as seen in the molar relation, overjet and, indirectly, overbite. Silman stated that the ultimate occlusion of a

Slide	Silman, J.H., 1945	N =
	Silman, J.H., 1956	N =

child is established probably by 20 months of age as the first deciduous molars first come into contact. In fact, several investigators have indicated that the molar relation in the deciduous dentition stays

Soderman, H. (1937)	N = 50
Silver, E. I. (1944)	N = 342
Barrow, G.V. and White, J.R. (1952)	N = 51
Frolich, F.J. (1961)	N = 51
Heckman, V. (1973)	N = 82

the same or actually gets worse by the time the permanent dentition has completely erupted in place about 75% of the time. This is particularly interesting when in most cases the mandible is growing at a faster rate than the maxilla. This supports the premise that an excessive overbite might restrict the full forward movement of the mandible during its anterior directed growth and create the rotational effect typical in shorter-faced individuals and

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may even be a contributing factor in TMJ problems associated with deep overbites. There seems to be an association between an excessive overjet established at 2½ years of age with the development of a deep overbite since there is a statistically significant correlation between the overjet at 2½ years of age and the severity of overbite at 18 years of age.

[Bergersen, 1889 N = 50]

This is an important finding since to allow an uncorrected excessive overjet to remain during the transition period of permanent incisal eruption at 5 to 7 years of age will encourage a deep overbite to be established at this critical period.

[diagram]

It is for this reason that in order to prevent an overbite from developing during the eruption of the permanent incisors, it is essential to correct the overjet at this critical period in order to stop excessive elongated eruption of the permanent incisors. Research into the cause of overbite indicates that it is probably due in most cases to excessive

Slide	Deep bite cases	N = 100
	Normal in 93%	Excessive in

eruption of the incisors rather than reduced eruption of the posterior teeth.

N = 50

82% have normal freeway spaces

Distance ANS-PNS to upper molar

Distance ANS-PNS to upper

overbite is also established early in the deciduous dentition and tends to either remain the same or get worse in the transition period from the deciduous to the permanent dentition.

Baume, L.J. (1950)	N = 30
Frohlich, F.J. (1961)	N = 51
Leighton, B.C. (1975)	N = 15

In fact, there is evidence that during the transition from the deciduous incisal segment to the permanent dentition there is a mean increase in the anterior overbite of about 1.75 mm.

Barrow, G.V. and White, J.R. (1952)	N = 51	
Moorrees, C.P.A. (1959)	N = 70	
Methenitou, S., Shein, B., Ramanthan, G. and Bergersen, E.O. (1990)	N = 35	1.75 mm.

Since it takes such minimal force to stop the eruption of erupting teeth, it would appear

Miura, F. and Ito, G. (1968)	Rabbit Incisors
Bergersen, E.O.	

possible to prevent an excessive overbite from developing that is due to excessive eruption of the anterior permanent teeth with relatively little effort.

The fourth important factor is the development of the dentition is that of crowding. There is evidence that most deciduous dentitions have little crowding.

Barrow, G.V. and White, J.R. (1952)	N = 51
Foster, T.D. and Grundy, M.C. (1986)	N = 60

In fact, there is evidence that the number of deciduous dentitions with crowding is fairly rare

Barrow, G.V. and White, J.R. (1978)	N = 51	14%
Heckman, W. (1973)	N = 82	31%

and in the permanent dentition it is considerably more common particularly in the anterior region.

Sodermans, H. (1939)	N = 50	67%
Barrow, G.V. and White, J.R. (s1952)	N = 51	51%
Cryer, B.S. (1965)	N = 647	75.8%
Haynes, S. (1970)	N = 596	79.6%
Heckman, V. (1973)	N = 82	28%

Adult incisor crowding, however, is typically not severe. Of those with crowding, the majority has

Cryer, B.S. (1965) N = 410

Mandibular Incisor Crowding, Class I occlusions

3 mm. or less	81.7%
over 3 mm.	18.3%

The development of crowding usually occurs during the transition period from 6 to 7½ years of age when the permanent incisors erupt and is considered to be due to two major reasons. The first is that the adult incisors are larger in size than their deciduous predecessors,

Moorrees, C.F.A. (1959)	N = 128 - 174	
Upp. perm. incisors	Male	Female
	7.1 mm.	6.4 mm.
Low. perm. incisors	5.1 mm.	4.8 mm.

Seipel, C. (1946)	N = 500
Upp. perm. incisors	7.0 mm.
Low. perm. incisors	5.0 mm.

while the second is that there frequently is not enough such enlargement during the transition period due to forceful eruption to accommodate the size difference in these teeth or an initial deficiency in the early lateral development of the alveolar process

Baume, L.J. (1950)	N = 60

which is too great to be overcome by the forceful expansion occurring from 6 to 7½ years of age.

Most agree that expansion of the arches occurs during the transition period while the period while the permanent incisors are forcefully making their way into the mouth

Lewis, S.J. and Lehman, I.A. (1929)	N = 170
Lewis, S.J. (1936)	
Korkhaus, G. and Neumann (1931)	N = 44
Goldstein, M.S. and Stanton, F.L. (1935)	N = 300
Cohen, J. T. (1940)	N = 28
Baume, L.J. (1950)	N = 60
Speck, N.T. (1950)	N = 53
Barrow, G.V. and White, J.R. (s1952)	N = 51
Burson, C.E. (1952)	N = 24
Holcomb, A.E. and Meredith, H.V. (1956)	N = 106
Knott, V.B. (1972)	N = 35
Heckman, V. (1973)	N = 82

Lewis, in 1936, indicated that a typical mandibular intercuspid growth

Lewis, S.J. (1936)

curve had arch expansion of about 3 mm. between 5 and 7½ during the eruption of the adult centrals and laterals and none afterwards. In

Fig. 3 p. 283

another case with the congenital absence of one lower incisor it is seen that no such

Fig. 10 p. 285

enlargement has occurred and yet, a typical expansion has occurred in the maxilla in the same case.

Fig. 10 p. 285

Lewis explained that without the force exerted by erupting adult teeth placing pressure against each other, there would probably be little expansion. Lewis further illustrated that when the erupting adult incisors erupt straight, they can exert force laterally and get increases in arch width of up to 5.0 mm. However, when they erupt lingually or rotated, the lateral force was not exerted and the arch enlargement was reduced.

Slide p. 340 [quotation or slide of models]

It has been shown that those individuals with interproximal incisal spaces in the deciduous dentition have less interarch expansion than those with no spaces.

Baume, L.J. (1950) N = 60

Also, in those cases where the germs of the permanent incisors are not rotated in, the crepts were found to have more arch expansion than those that were rotated.

Schwartz, M. [discussion] from
Lewis, S.J. and Lehman, I.A. (1932)

In statistically analyzing data from Lewis & Lehman between good adult incisor alignment cases and poor

Lewis, S.J. and Lehman, I.A. (1929) N = 31

alignment cases, there was statistically less

Arch increase - non-crowded 3.44 mm.
Arch increase - crowded 2.13 mm.

non-crowded arches, while there was no difference in the size differential between the deciduous and permanent teeth in either group.

Mean difference in dec./per m. tooth size:

non-crowded 5.11 mm.
crowded 5.23 mm.

non-significant difference.

These findings simply indicate that when the permanent incisors erupt into the arch rotated and malpositioned, they do not exert sufficient force laterally against adjacent teeth to get as much arch enlargement and erupt crowded. On the other

Slide showing progress - try to use Bolton

hand, when the adult incisors erupt well-aligned, they exert greater force and force the arch itself in order to accommodate the teeth in proper alignment.

There is evidence that also shows that crowding usually remains constant or increases as further eruptions occur at a later age, namely the canines and bicuspids

Heckman, U. (1973) N = 82

8 - 12 years crowding did not improve

Cryer, B.S. (1965) N = 100

11 - 24 years 51.2% increased crowding

0% decreased crowding

Brown

:DEVELOP