

## **Tooth Size Proportions Useful In Early Diagnosis**

As the permanent incisors begin to erupt starting with the lower central, it becomes helpful to predict the sizes of the other upper and lower adult incisors to determine the required space necessary for straightness. Although there are variations in the mesio-distal widths of the teeth in any individual when proportions are used, the sizes of the unerupted permanent teeth can at least be fairly accurately pre-determined from the mesio-distal measurements obtained from the measurements of already erupted permanent teeth. As the mandibular permanent central breaks tissue, a mesio-distal measurement of the tooth is taken. The size of the lower adult lateral is obtained by adding 0.5 mm. to the lower central size (see a).

**(a) Width of lower lateral = m-d width of lower central + 0.5 mm.**

The sizes of the upper incisors then become important as well. The upper permanent central is 3.25 mm. wider than the lower central (see b).

**(b) Size of upper central = m-d width of lower central + 3.25 mm.**

The size of the upper lateral is 2.0 mm. smaller mesio-distally than the maxillary central (see c), and 1.25 mm. larger than the lower central (see d).

**(c) Size of upper lateral = m-d width of upper central - 2.0 mm.**

**(d) Size of upper lateral = m-d width of lower central + 1.25 mm.**

The combined mesio-distal widths of the lower four adult incisors are four times the width of the mandibular central plus 1.0 mm. (see e). The combined mesio-distal widths of the upper four adult incisors are 8.0 mm. larger than the corresponding widths of the lower incisors (see f).

**(e) Size of lower four incisors = m-d width of lower central x 4 + 1.0 mm.**

**(f) Size of upper four incisors = m-d width of lower four incisors + 8.0 mm.**

Once the permanent incisors have erupted, the next important area to predict is the size of the unerupted upper permanent canine. The upper adult canine is 1.25 mm. larger than the upper lateral (see g) and 1 mm. smaller than the upper central (see h).

**(g) Size of upper canine = m-d width of upper lateral + 1.25 mm.**

**(h) Size of upper canine = m-d width of upper central - 1.0 mm.**

The upper adult canine is also 1.0 mm. larger than the lower adult canine (see i)

**(i) Size of upper canine = m-d width of lower canine + 1.0 mm.**

The upper first or second adult premolar is 1.8 mm. smaller than the upper adult central (see j).

**(j) Size of upper 1st or 2nd premolar = m-d width of upper central - 1.8 mm.**

The lower adult canine is 1.5 mm. larger than the lower adult central (see k).

**(k) Size of lower canine = m-d width of lower central + 1.5 mm.**

The lower adult first premolar is 1.6 mm. larger than the lower adult central (see l).

**(l) Size of lower 1st premolar = m-d width of lower central + 1.6 mm.**

The lower adult second premolar is 1.9 mm. larger than the lower adult central (see m).

**(m) Size of lower 2nd premolar = m-d width of lower central + 1.9 mm.**

One other important comparison is the average size difference between the deciduous canine and both deciduous molars as a group compared to the adult teeth that replace them in the upper and lower arches. In the lower arch, the difference on each side in the male is 2.23 mm. (n) (permanent smaller than deciduous) and in the female it is 2.67 mm. (o). Combining both sexes, the mean difference is 2.5 mm. (p). On the upper, the male difference is 1.3 mm. (q), while for the female it is 1.46mm. (r). Combining both sexes, the mean difference in the upper is .025mm. (s).

**(n) Size of lower dec. molars & canine (per side) - perm. premolars & canine (male)  
= + 2.23 mm.**

**(o) Size of lower dec. molars & canine (per side) - perm. premolars & canine  
(female) = + 2.67 mm.**

**(p) Mean difference lower (male & female per side) = 2.5 mm.**

**(q) Size of upper dec. molars & canine (per side) - perm. premolars & canine (male)  
= + 1.3 mm.**

**(r) Size of upper dec. molars & canine (per side) - perm. premolars & canine  
(female) = + 1.46 mm..**

**(s) Mean difference upper (male & female per side) = 1.4 mm.**

Although there is too much variation between an individual's deciduous tooth and its permanent replacement for predictive purposes, one comparison that can be used to advantage to determine available space (but not to predict the actual size of the adult tooth) is between the second deciduous molar and the needed space for the second premolar. In the upper arch, the premolar is 2.25 mm. smaller mesio-distally than the deciduous second molar (see t). In the lower arch, the difference is 2.6 mm. (see u).

**(t) Size of upper perm. 2nd premolar = dec. upper 2nd molar - 2.25 mm.(approx.).**

**(u) Size of lower perm. 2nd premolar = dec. lower 2nd molar - 2.6 mm. (approx.).**

Most of the differences between males and females are quite minor and can generally, in most instances, be disregarded with the possible exception of those between the lower deciduous and permanent canines and premolars (per side).

Although there are variations in the mesio-distal widths of the adult teeth in any individual when proportions are used, the sizes of the unerupted teeth can at least be fairly accurately pre-determined from the measurements of already-erupted permanent teeth. An alternative approach is to obtain measurements from intra-oral or panorex radiographic films. Since these films have varying degrees of enlargement, compensations should be individually calculated for each tooth based on the actual enlargement of a deciduous tooth in the same view (preferably the deciduous predecessor of the adult tooth in the X-ray film). This can be done by comparing the enlarged size of the deciduous tooth in the film to the actual size of the same tooth either in the mouth or study cast. Obviously, this technique is more time consuming and less accurate than using simple proportions based on statistical correlations once a permanent incisor has partially erupted into the mouth. The radiographic films, however, should be carefully studied to determine possible abnormal tooth size, positional variations present in unerupted teeth, as well as for missing permanent teeth.

#### References:

1. Moorees, C.F.A., The dentition of the growing child, Harvard Universtiy Press, Cambridge, Mass, 1959.

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**PREDICTING SIZES OF NON-ERUPTED PERMANENT TEETH FROM  
THE SIZES OF ALREADY ERUPTED ADULT TEETH**

Predicting mesio-distal sizes of adult teeth:

Lateral (lower)	=	Central (lower)	+	0.5 mm.
Central (upper)	=	Central (lower)	+	3.25 mm.
Lateral (upper)	=	Central (upper)	+	2.0 mm.
Lateral (upper)	=	Central (lower)	+	1.25 mm.
Incisors (lower 4)	=	Central (lower) x 4	+	1.0 mm.
Incisors (upper 4)	=	Incisors (lower 4)	+	8.0 mm.
Canine (upper)	=	Lateral (upper)	+	1.25 mm.
Canine (upper)	=	Central (upper)	-	1.0 mm.
Canine (upper)	=	Canine (lower)	+	1.0
mm.				
Premolar (upper 1st or 2nd)	=	Central (upper)	-	1.8 mm.
Canine (lower)	=	Central (lower)	+	1.5 mm.
1st Premolar (lower)	=	Central (lower)	+	1.6 mm.
2nd Premolar (lower)	=	Central (lower)	+	1.9 mm.
2nd Perm.Premolar (upp.)	=	Dec. 2nd molar (upper)	-	2.25 mm.(approx.)
2nd Perm.Premolar (low.)	=	Dec. 2nd molar (lower)	-	2.6 mm.(approx.).
Leeway space lower per side (canine, both premolars)	=	2.5 mm.*		
Leeway space upper per side (canine, both premolars)	=	1.4 mm.*		
Low. dec. canine & molars per side (male)	=	23.55 mm.		
Low. perm. canine & premolars per side	=	21.32 mm.		
Difference per side = 2.23 mm. MALE				
Low. dec. canine & molars per side (female)	=	23.03 mm.		
Low. perm. canine & premolars per side	=	20.36 mm.		
Difference per side = 2.67 mm. FEMALE				
<b>Mean difference lower (male &amp; female per side) = 2.5 mm.</b>				
Upp. dec. canine & molars per side (male)	=	23.08 mm.		
Upp. perm. canine & premolars per side	=	21.78 mm.		
Difference per side = 1.30 mm. MALE				
Upp. dec. canine & molars per side (female)	=	22.46 mm.		
Upp. perm. canine & premolars per side	=	21.00 mm.		
Difference per side = 1.46 mm. FEMALE				
<b>Mean difference upper (male &amp; female per side) = 1.4 mm.</b>				

\*Average of Male & Female

Above figures from Moorrees, C.F.A.: The Dentition of the Growing Child, Harvard University Press, Cambridge, Mass, 1959.