

# Considering the second primary molar as the sole clinical index of growth condition

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## Abstract

**Background and Aim:** Assessment of skeletal maturity is an integral part of interceptive diagnosis and treatment planning. The present method of skeletal maturity assessment like handwrist or cervical vertebrae radiographies are expensive, require elaborate equipment and account for high radiation exposure, especially for growing children.

This study tried to consider the value of the 2nd primary molar in growth stage.

**Material and Method:** 40 samples aged 8-13 were tested by their panoramic and handwrist radiographs.

**Result and Conclusion:** there was a coincidence between presence calcified sesamoid and 2nd primary molar as the last tooth. The result showed that it could be a reliable index to predict the growth stage in 1st visit without radiography. (IJO 2006; 1: 58 - 60)

Human growth shows considerable variation in the chronologic ages at which individual children reach similar developmental events. In practice, we may distinguish among four physiologic or developmental indices: somatic, skeletal, dental and sexual maturity. Theoretically, strong relationships among indices imply a concordance of controlling mechanisms, which serve clinicians in diagnosis and treatment planning. Valid associations also provide a means of prediction, allowing judgment to be based on a single examination. This is particularly important

during adolescence when changes in growth rate can influence treatment results.

The pubertal growth spurt is considered to be an advantageous period for certain types of orthodontic treatment and should be taken into account in connection with orthodontic treatment planning<sup>6</sup>. Because of the wide individual variation in the timing of pubertal growth spurt, chronological age cannot be used in the evaluation of pubertal growth spurt. A close relationship has been shown to exist between the circumpubertal increase in stature and acceleration in the growth of the craniofacial structures<sup>7,14,20,21</sup> in the planning of orthodontic treatment, anticipation of future growth potential of the facial skeleton is essential to ensure the successful outcome of mechanotherapy in the treatment of dentofacial deformities.

Skeletal maturity, perhaps the most commonly used index in routine clinical work, is closely related to sexual and somatic maturity<sup>1</sup>. Suitable maturation indicators for clinical orthodontics have been devised, and the associations between

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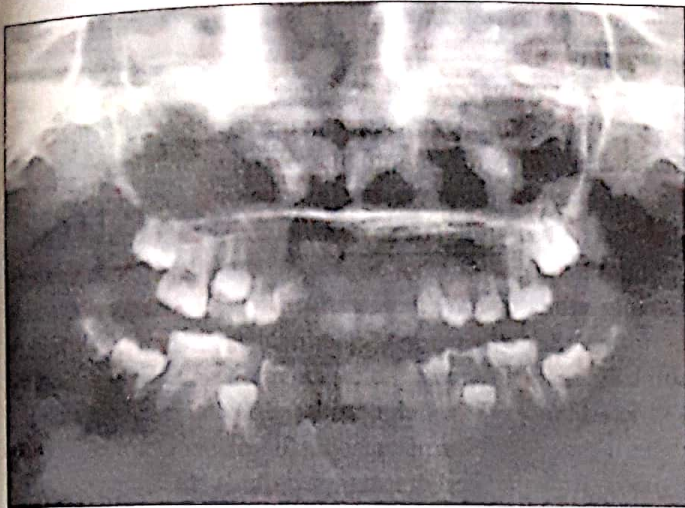


Fig 1.

these indicators and the peak of growth have been reported. Many studies have shown a strong correlation between the peak of facial growth and peak height velocity<sup>2-4,6,14</sup>. Lamparski in 1972 concluded that even cervical vertebrae as seen on lateral cephalogram could be used for this purpose<sup>16</sup>. Chertkow in 1980 showed that the completion of root formation of the mandible canine tooth may be used clinically as a maturity indicator with a similar degree of confidence as the hand-wrist radiograph<sup>9</sup>(fig-4). Hagg and Taranger had reported similar finding in dental emergence stages and the pubertal growth spurt in 1980(12). Kraiassiri et al. had found that tooth calcification stages might be clinically used as a maturity indicator of the pubertal growth period, in 2002.<sup>15</sup> The purpose of this study was to verify the relationship between second primary molar as the last tooth of transitional dentition and growth stage.

### Method and material

This research was designed as a cross-sectional descriptive study. The samples were derived from dental panoramic and hand-wrist radiographs of forty female subjects aged between 8 to 13 registered as patients at orthodontic treatment.

#### The selection criteria included:

The subjects were all Iranian, well nourished, and free of any known serious illness with normal dental conditions without any previous orthodontic treatment or extraction of any teeth and no previous history of trauma or injury to the face, the hand and wrist regions.

The second primary molar as the last tooth of transitional dentition existed in all of them and in 10 children there was both first and second molar in their dentition.(fig-1)

Panoramic dental radiographs together with radiographic views of the right hand and wrist, taken from clinical records of these patients were examined.

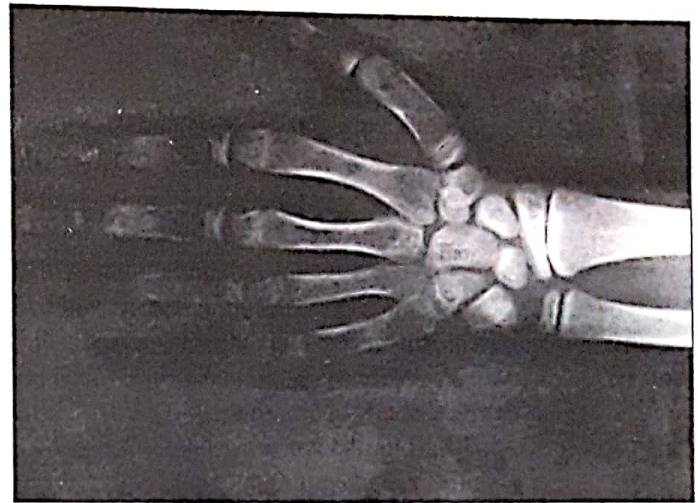


Fig 2.

Selection of participants was based on the observation of radiographic evidence of early calcification of the adductor sesamoid of the thumb on the hand-wrist radiograph(fig-2). Although the sesamoid varies in size from one person to another, the following criteria were applied in the assessment of early calcification.

1. A sesamoid diameter of approximately 1 mm.
2. The presence of an ill-defined feathery outline.
3. Incomplete calcification resulting in poor radiopacity<sup>10</sup>

As the presence of sesamoid was important for us, all these criteria were used in the study.

The dental radiographs were examined to seek for any missing or pathologic problem.

### Result

The whole of the sample consisted of 30 female subjects with second primary molar ranging in age from 8 to 13 years showed the coincidence of the second primary molar as the last tooth of transitional dentition and presence of the ulnar sesamoid of the thumb, but there was no evidence of sesamoid calcification in 10 patients who have their first primary molar.

#### Discussion

To obtain a reliable estimate of pubertal growth in which the acceleration period is too small to be clinically discernible and only can be made at PHV or after, existence of a clinical index is so important to help the clinicians.<sup>17</sup>(fig-3)

There is a sex difference of 2 years in age at the beginning (ONSET) peak(PHV) and end(END) of the pubertal growth spurt whit in each sex the range for each pubertal growth events was about 6 years<sup>12</sup>. Bjork and Helm also reported a difference of the ulnar sesamoid and PHV<sup>4</sup>.

These associations allow clinicians to assess a person's developmental status better and make future prediction of the growth stages, so the timing of ulnar sesamoid ossification



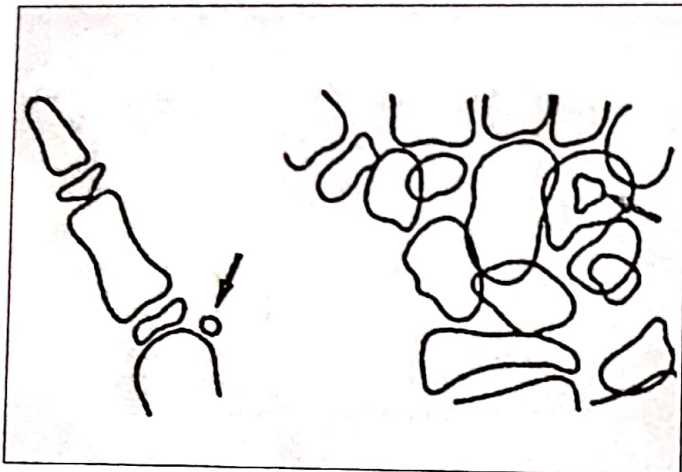


Fig 3.

appears to be a good prediction of PHV.<sup>10</sup>

The role of adductor sesamoid of the thumb as an indicator of the pubertal growth spurt has been described by numerous workers<sup>4,6-8,11,13</sup>. Using cervical vertebrae as seen on lateral cephalogram cannot be more accessible because in a pediatric patient use of thyroid collar masks the cervical vertebrae<sup>18</sup>. Alara forms the important principle of diagnostic radiology, which states that the diagnostic radiation exposure for any patient has to be kept at a minimum that is as low as reasonably achieved<sup>1</sup>. The coincidence between sesamoid and second primary molar can prove this tooth as a sole clinical index for growth assessment without any radiography.

#### Conclusion

A close association exists between skeletal maturity (ossification of the sesamoid) and presence of second primary molar because of the coincidence of them. This tooth could be used as a sole indicator in growth assessment as the last tooth of transitional dentition without any radiograph.

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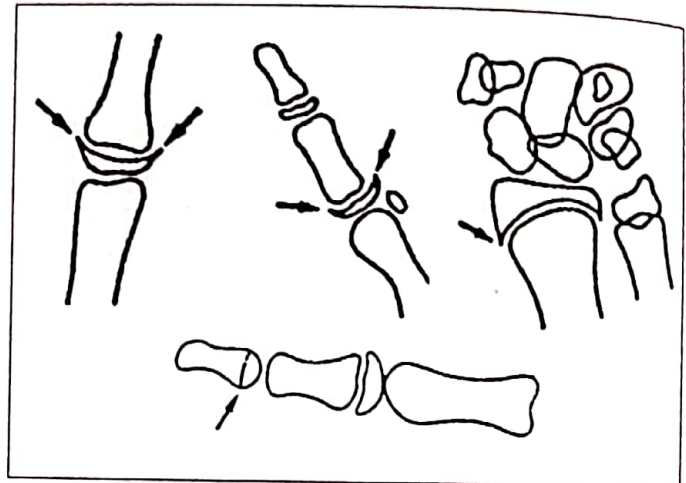


Fig 4.

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