Variations In The Shape Of The Coronoid Process In The Adult Human Mandible

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Abstract. The shape of the coronoid processes of both sides of 157 dry adult human mandibles, 100 males and 57 females of Indian origin, were studied in order to classify the variations. Three types were evident : I, hook shaped; 2, triangular; and 3, rounded. Hook shaped coronoid processes were found in 86 (27.4%) sides, triangular in 154 (49%), and rounded in 74 (23.6%) sides. Hook shaped coronoid processes were found bilaterally in 35, triangular in 64 and rounded in 26 mandibles. Of the remaining 32 mandibles, the appearances were different on both the sides. The incidence of the rounded type was almost equal in male and female mandibles; in the triangular type it was slightly more in the female mandibles while the hook shaped type was slightly more in the male mandibles.

Key words : Osteology ; mandible; coronoid.

Introduction :

The coronoid process of the mandible, as described in textbooks, is a somewhat flat, triangular process projecting upwards and slightly forwards. Its margins and medial surface give attachments to temporalis muscle. The coronoid process is of clinical significance to the maxillofacial surgeon for reconstructive purposes. This study was undertaken to note the forms of presentation and their prevalence in dry adult human mandibles.

Material and Methods :

The study was conducted on 157 dry adult human mandibles (314 sides), 100 males and 57 females of Indian origin, to determine the variations in the shape of the coronoid process.

Observations and Results :

Shapes of coronoid processes

Depending on the shapes of the coronoid processes, they were classified into 3 types : I, hook shaped; 2 triangular and 3, rounded (Table I, Figs. 1-3). The hook shaped coronoid process (type 1), had a tip which was pointing backwards. This was present in 86 (27.4%) sides. In 35 Mandibles (70 sides), it was present bilaterally, while in 16 mandibles (6 right, 10 left) it was present unilaterally. Of the 6 mandibles which had a hook like coronoid process on the right side, 4 were associated with a triangular coronoid process on the left side and 2 were associated with a rounded coronoid process on the left side. Of the 10 mandibles which had a hook like coronoid process on the left side, 7 were associated with a triangular coronoid process on the right side and 3 were associated with a rounded coronoid process on the right side. The triangular coronoid process (type 2) with a tip pointing straight upwards was seen in 154 (49%) sides. in 64 mandibles (128 sides), it was present bilaterally, while in 26 mandibles (17 right, 9 left), it was found unilaterally. Of the 17 mandibles, which had a triangular coronoid process on the right side, 6 were associated with a hook shaped coronoid process on the left side and 11 were associated with a rounded coronoid process on the left side. Of the 9 mandibles which had a triangular coronoid process on the left side, 4 were associated with a hook shaped coronoid process on the right side and 5 with a rounded coronoid process on the right side. The type 3 coronoid process had a rounded tip and was present in 74 (23.6%) sides. In 26 mandibles (52 sides), the rounded coronoid process was present bilaterally and in 22 mandibles (9 right, 13 left), it was present unilaterally. Of the 9 mandibles which had a rounded coronoid process on the right side, 4 were associated with a hook shaped coronoid process on the left side and 5 were associated with a triangular coronoid process on the left side. Of the 13 mandibles which had a rounded coronoid process on the left side, 2 were associated with a hook shaped coronoid process on the right side and 11 were associated with a triangular coronoid process on the right side.
The distribution and incidence of the various types of coronoid process were noted in male and female mandibles (Table II). Of the 200 sides of mandibles belonging to males, the hook shaped type was found in 60 (30%), triangular in 93 (46.5%) and rounded in 47 (23.5%). Of the 114 sides of mandibles of females, the hook shaped type was found in 26 (22.8%), triangular in 61 (53.5%) and rounded in 27 (23.6%).

Discussion:

The coronoid process, coronoid meaning 'crow', has been described as one of the bony processes of the ramus of the mandible (Field et al., 1947). Williams et al. (1995) described the coronoid process as a flat triangular process. Triangular coronoid processes have been illustrated by Hamilton (1976), Romanes (1986) Snell (1986), and Basmajian et al. (1989). Schafer et al. (1890) described the coronoid process as beak-shaped.

In this study in 79.6% mandibles the type of coronoid process was the same bilaterally and only in 20.4% mandibles did the presentation differ between sides.

The triangular and rounded types were the most and the least prevalent in males (46.5% and 23.5% respectively), while in females the triangular and hook shaped types were the most and the least prevalent (53.5% and 22.8% respectively).

Knowledge of the morphological shapes of the coronoid process is useful for the maxillofacial surgeon. The coronoid process makes an excellent donor graft site for reconstruction of orbital floor deformities, (Mintz et al., 1998). Clauser et al. (1995) reported the use of a temporalis myofascial flap both as a single and as composite flap with cranial bone, coronoid process or skin island in all aspects of reconstructive craniomaxillofacial surgery including trauma, deformities, tumors, temporomandibular joint ankylosis and facial paralysis.

Table I. Distribution of the coronoid process in adult human mandibles (314 sides)

<table>
<thead>
<tr>
<th>Shape</th>
<th>Bilateral</th>
<th>Unilateral</th>
</tr>
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<tbody>
<tr>
<td>Type</td>
<td>Right</td>
<td>Left</td>
</tr>
<tr>
<td>1. Hook shaped (n = 86, 27.4%)</td>
<td>70</td>
<td>6</td>
</tr>
<tr>
<td>2. Triangular (n = 154, 49.0%)</td>
<td>128</td>
<td>17</td>
</tr>
<tr>
<td>3. Rounded (n = 74, 23.6%)</td>
<td>52</td>
<td>9</td>
</tr>
</tbody>
</table>

Table II. Distribution and incidence (in parentheses) of the coronoid process in males and females, bilateral or unilateral (314 sides)

<table>
<thead>
<tr>
<th>Male (200 sides)</th>
<th>Female (114 sides)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hook shaped (n = 86)</td>
<td>48 (24.0)</td>
</tr>
<tr>
<td>Triangular (n = 154)</td>
<td>78 (39.0)</td>
</tr>
<tr>
<td>Rounded (n = 74)</td>
<td>36 (18.00)</td>
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<tr>
<td>Total (n= 314)</td>
<td>162</td>
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To our knowledge this is the first study to identify and classify the different morphological shapes of the coronoid process. Along with other features of the skull known as nonmetric variants these could be used as anthropological markers to assess different populations and races (Berry, 1975).

References:

Fig. 1.
Hook shaped coronoid process (type 1)

Fig. 2.
Triangular coronoid process (type 2)

Fig. 3.
Rounded coronoid process (type 3)