

CHAPTER V

DISCUSSION AND CONCLUSION

The anatomy of mandible is extremely important in the practice of surgeon and dentist with a map to guide in surgical procedures involving the mandible and accurately locating the mandibular foramen and mental foramen during a local anesthetic block of the inferior alveolar nerve and mental nerve, respectively [12-13].

1. The mandibular foramen

In the past, various authors used different reference points and different populations. On the position of the mandibular foramen, Heyward's study has found no significant difference between Asiatic group and mixed group (black and white American) [12]. For gender difference, Huang's study has reported no significant difference between male and female [21]. Regarding side and age, Kilarkaje's study has found no significant difference between right and left sides. The distance between the mandibular foramen and other landmarks gradually increased with advancing age with significant intergroup difference [23]. In contrast, this study showed significant differences in some distances between sides.

Most studies use the constant landmark at the mandibular foramen, because it is easily palpable. The inferior alveolar nerve which passes through the foramen must be avoided. In this study, the distance from the mandibular foramen to the condyloid process was similar to that of Kilarkaje's [23] and Captier's studies [24]. Nicholson reported the distances from mandibular foramen to the mandibular notch were 23.6 mm on the right side and 23.3 mm on the left side [17], Captier's result were 24.88 mm on the right side and 24.13 mm on the left side [24]. However, in this study, this distance was shorter. The distance between the mandibular foramen and the coronoid process in this study was 38.78 ± 4.09 mm. These findings were in agreement with the work of Nicholson [17]. The present showed that the distance from the mandibular foramen to the internal oblique ridge was 12.71 ± 2.10 mm. This is similar to the data shown by Nicholson [17], but shorter than that reported by Boonpiruk [16]. The distance from the mandibular foramen to the third molar in this study was shorter than those of Nicholson [17] and Kilarkaje [23]. This may be explained by the different races.

In addition, the distances from the mandibular foramen to the symphysis menti and to the pre-angular notch were shorter than previous studies [23, 24]. When consider about the distance from the mandibular foramen to the inferior border of the ramus, it was shorter than that presented by Oquz [20]. The distance between the mandubular foramen and the angle of the mandible in this study was similar to that of Kilarkaje's study [23], but longer than that reported in Nicholson's study [17]. Furthermore, we found that the distance from mandibular foramen to the anterior border of the mandibular ramus was longer than those of Hayward [12], Nicholson [17], Huang [21] and Kilarkaje [23]. This discrepancy may be due to different races of mandibles. The distance between the mandibular foramen and the posterior border of the mandibular ramus was 14.49 ± 1.99 mm. This result was similar to the data shown by Nicholson [17] and Oquz [20]. Our results shows that the mandibular foramen width were 7.75 ± 2.97 mm on the right side and 7.44 ± 1.16 mm on the left side, whereas Hayward's study were 8.10 mm on the right side and 8.52 mm on the left side in the Asiatic group, 8.60 mm on the right side and 8.90 mm on the left side in the mix group (black and white Americans) [12].

Regarding the incidence of accessory mandibular foramen in human mandibles, Narayana found that the accessory mandibular foramen was present posterosuperior to the normal mandibular foramen in 1 out of 335 (0.3%) mandibles observed. The dimensions of this accessory were 10 mm anteroposteriorly and 5 mm vertically. The normal mandibular foramen was 7 mm in the anteroposterior axis and 5 mm in the vertical axis. The distance between the normal mandibular foramen and the accessory mandibular foramen was 11 mm [22]. There was no accessory mandibular foramen in this study.

According to the above data, we proposed the simple way to determine the location of the mandibular foramen. It is 14 mm from the posterior border of the mandibular ramus, 26 mm from the inferior border of mandible and 18 mm from posterior socket of third molar tooth (Figure 7).

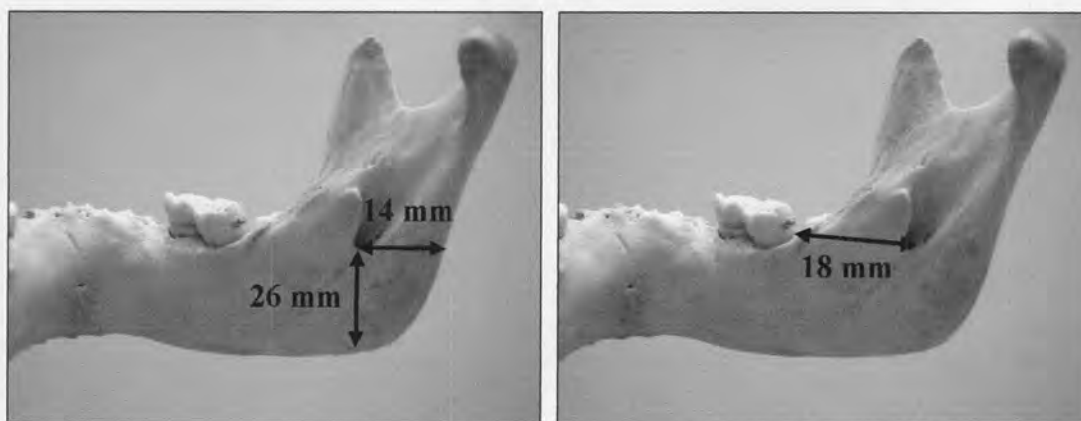


Figure 7. Estimation of position of the mandibular foramen

2. The mental foramen

The mental foramen is sometimes multiple, located on the lateral body surface, near midbody, below the premolar region. [1]. Obviously it is important to be able to localize the mental foramen when attempting to achieve regional anesthesia of the incisive nerve, (the other terminal branch of the inferior alveolar nerve), and to avoid it during periapical surgery involving the molars and premolars [15]. In this study, the distance between the mental foramen and the inferior rim of the mandible was 13.53 ± 1.56 mm. This is similar to the data shown by Captier [24], but shorter than that reported by Oquz. The distance between the mental foramen and the mandible symphysis was similar to Agthong's (28.00 ± 0.02 mm on the right side and 27.80 ± 0.02 mm on the left side) [28], and Wang's studies (28.06 mm) [25], but longer than that reported of Captier (26.05 ± 1.95 mm on the right side and 26.10 ± 2.02 mm on the left side) [24] and Cutright (22 mm) [27]. On average, the distances from the mental foramen to the posterior border of the ramus and to the condyloid process were shorter than previous studies [24, 25]. In addition, the distance across the mental foramen between the alveolar crest and the lower border of the mandibular body has found 29.31 ± 6.60 mm whereas Wang's study [25] was 30.29 mm. The mental foramen width in this study was similar to the reported of Oquz [20].

Moreover, we found 7 cases (3.8%) with accessory mental foramen (3 right and 4 left). These additional foramens were present posteroinferiorly (5 cases), superiorly (1 case) and anterosuperiorly (1 case). Sawyer et al. [26] investigated the frequency of accessory mental foramen in four ethnic groups, including, 234 dry adult Indian mandibles, 50 dry adult Nazca mandibles (100 B.C.-A.D.800), 166 dry adult African American and 255 dry adult American White mandibles. They found less frequent of accessory mental foramen in the American White and Asian Indian populations than in the other groups (American White, 1.4%; Asian Indian, 1.5%; African American, 5.7% and Nazca, 9.0%). The majority of mental foramen was located below the second premolar (70%) which was similar to the reported of Oquz [20] and Wang [25]. In contrast, Moiseiwitsch [15] and Cutright [27] found that the most frequent position of mental foramen was located between the first and second premolars.

According to the above data, we suggested the simple way to determine the location of the mental foramen. It is 13 mm from inferior rim of the mandible and 27 mm from the mid point on the mandible symphysis (Figure 8).



Figure 8. Estimation of position of the mental foramen

3. The mandibular dimensions

The mandibular dimensions are important in mandible surgery including vertical ramus osteotomy, sagittal split osteotomy and genioplasty [4]. In the past, the mandibular dimensions were studied in different races, such as East Indian, Chinese, Brazil, France and Zimbabweans [17, 18, 19, 24, 29], which varies between ethnic groups. For comparison between races, the length of the mandible, menton-gonian distance, the length and height of the ramus in this study were shorter than France [24], but the height of the ramus was longer than Brazil [19]. In Asiatic group, the width and depth of the mandibular notch in this study were similar to Chinese [18]. The minimal width of mandibular ramus was longer than East Indian and France [17, 24]. The mandibular angle was the largest in Zimbabweans (128° in female and 123° in male), the second in this study ($119.6^\circ \pm 4.65$ on the right side and $119.8^\circ \pm 4.64$ on the left side), the third in East Indian ($115.8^\circ \pm 11.0$ on the right side and $116.1^\circ \pm 7.3$ on the left side) and the last in France ($106.3^\circ \pm 11.54$), respectively [17, 29, 35]. We found that the intercondyloid and intercoronoid distances in this study were shorter than Zagreb and Japan [36, 38]. In addition, the intergonial distance was shorter than France.

Comparison of distances from the mandibular foramen and the mental foramen to surrounding bony landmarks on the mandible and mandibular dimensions, in the previous studies are shown in Appendix C.

4. Torus mandibularis

In our study, the torus mandibularis was presenting mandibles 17 bilateral and 1 on the left. Moreover, we found that 17 mandibles were of the multiple types and 1 mandible was of the solitary type. With respect to shape, most of the torus mandibularis were round (11 mandibles) and the rest were elongated (7 mandibles). Ihunwo has found the torus mandibularis in 61 (21.5%) cases in which 37 (61.7%) cases were bilateral, 42 (70%) cases were solitary type and 31 (51.7%) cases were round shape [43].

Conclusion

Our study showed significant differences in some distances between sides that included the distance from mandibular foramen to the condyloid process, the distance to the coronoid process, the distance to the internal oblique ridge, the distance to the pre-angular notch and the distance to the posterior border of the mandibular ramus. For the mental foramen, the significant difference were found in the distance to inferior rim of the mandible, the distance to mandible symphysis in the mid line, the distance to posterior border of the ramus and the distance to the condyloid process. In addition, the mandibular dimensions showed the significant differences in the total length of the ramus, the width and depth of mandibular notch.

These data described different variations between sides is valuable in identifying the danger zone of surgical procedures that involve the mandible and accurately locating the mandibular foramen and mental foramen during a local anesthetic block of the inferior alveolar nerve and mental nerve, respectively. The data from this study will be also useful as standard reference for Thai people.