CHAPTER I
INTRODUCTION

1. Background and Rationale

The mandible or lower jaw, articulates through its condyles with the temporal bones at the temporomandibular joint. The function of this bone is mastication (chewing). The mandible holds the lower teeth and provides insertion surfaces for the muscles of mastication [1].

The mandible consists of a horseshoe-shaped body and a pair of rami. The body of the mandible meets the ramus on each side at the angle of the mandible. On its external surface in the midline, there is a faint ridge indicating the line of fusion of the two halves during development at the symphysis menti. The mental foramen can be seen below the second premolar tooth. It transmits the terminal branches of the inferior alveolar nerve and vessels.

The ramus of the mandible is vertically placed and has an anterior coronoid process and a posterior condyloid process or head. The two processes are separated by the mandibular notch. On the medial surface, there is a mandibular foramen for the entry of the inferior alveolar nerve and vessels. In front of the foramen, there is a projection of bone called the lingula. The foramen leads into the mandibular canal which opens on the lateral surface of the body of the mandible at the mental foramen [2]. (Figure 1.)

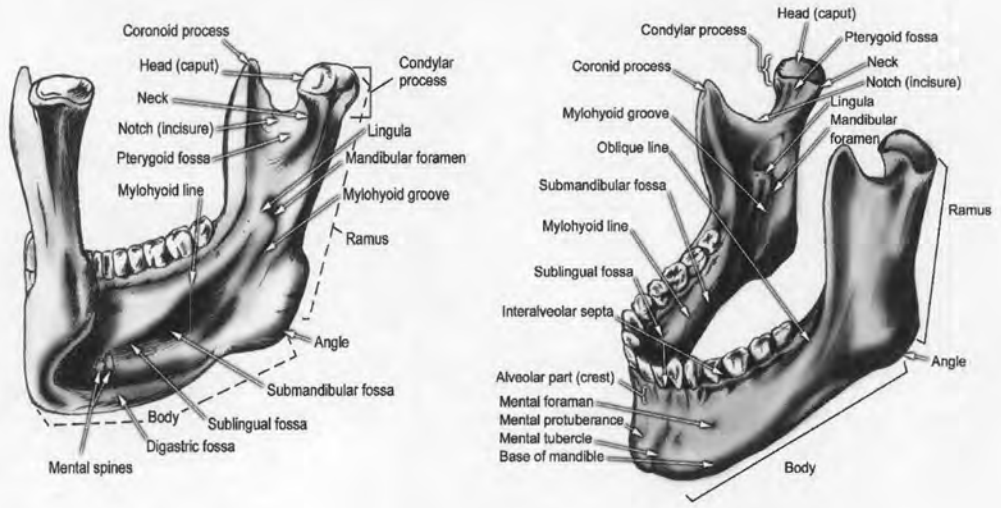

Figure 1. Structure of the mandible [3].

In clinical aspect, there are many procedures for operating the mandible, such as vertical ramus osteotomy (VRO), sagittal split osteotomy (SSO) and genioplasty (GP). VRO and SSO often involve the mandibular canal. It is obvious that the inferior alveolar nerve runs a higher risk of damage during SSO than during VRO and GP. If GP is adds to SSO or VRO the nerve trunk may be damaged at two spots and so the incidence of neurosensory disturbance may be further increased. Irrespective of whether nerve damage has occurred at the mandibular foramen, along the mandibular canal or at the mental foramen, the symptoms of a nerve lesion are usually varying degrees of numbness of the lower lip and chin, which is the distribution area of the mental nerve [4].

Of facial injuries, the mandibular fracture is the most common [5]. Fracture of the coronoid process is uncommon and usually single. Fracture of the neck of the mandible is often transverse and may be associated with dislocation of temporomandibular joint on the same side. Fracture of the angle of the mandible is usually oblique and may involve the bony socket or alveolus of the 3rd molar tooth. Fracture of the body of the mandible frequently passes through the socket of a canine tooth [6]. The main causes of mandibular fracture are road traffic accidents, assault, falls from heights and sport injuries [7-10]. Moreover, mandibular fracture is often associated with severe morbidity, loss of function, and disfigurement [11].

The location of the mandibular foramen is extremely important in the practice of dentistry when inferior alveolar nerve block is required [12-13]. In order for a specific technique such as this block to be accomplished successfully, the dentist must have the knowledge and ability to be able to deposit the local anesthetic at the exact anatomical site. There are many reasons put forth as to why local anesthesia and the mandibular nerve block fail. Dover suggested that incorrect techniques such as injecting too high, too superficial and too deep, are all reasons why dentists are having failures in accomplishing adequate block of the inferior alveolar nerve [14].

The mental nerve is a terminal branch of the inferior alveolar nerve that passes through the mental foramen, supplying sensory innervations to the lower lip, buccal vestibule and gingival medial to the first mandibular molar. 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].

Consequently, an understanding of anatomy and variations is extremely significant in surgical procedures that involve the mandible and accurately locating the mandibular foramen during a local anesthetic block of the inferior alveolar nerve. In Thailand, there are a few studies on the mandible. Thus, the aim of this study is to elucidate the morphometry of the human mandible from Thailand with special attention on the mandibular foramen.

2. Research Questions

2.1 How to locate the mandibular foramen and the mental foramen by referring to surrounding bony landmarks on the mandible from Thailand?

2.2 What are the mandibular dimensions?

2.3 Are there any asymmetries in the location of the above foramina?

3. Objectives

3.1 To determine the distances from the mandibular foramen and the mental foramen to surrounding bony landmarks on the mandible.

3.2 To determine the mandibular dimensions.

3.3 To investigate asymmetries in the above measurements.

4. Hypothesis

4.1 There are asymmetries in the distances from the mandibular foramen and mental foramen to the surrounding bony landmarks on the mandible.

4.2 There are asymmetries in the mandibular dimensions.

5. Key Words

Mandible

Mental foramen

Torus mandibularis

Mandibular foramen

Mandibular dimensions

Inferior alveolar nerve block

6. Research Design

Descriptive study

7. Expected Benefits and Applications

An understanding of anatomy and variations are extremely significant in providing surgeons and dentist with a map to guide in surgical procedures involving the mandible and the mandibular foramen. The data from this study will be also used as a standard references for Thai people.