CHAPTER II

LITERATURE REVIEW

Padaung, well-known as the people with long necks or giraffe-neck women, is a small minority group of the Red Karen tribe living in Kayah state of eastern Myanmar which is located near the border of northern Thailand. They called themselves "Lae Kur" or "Kayan". In Thailand, many families of Padaung have settled in Mueang District of Mae Hong Son Province.

Padaung women are often referred to "giraffe" or "long-neck" because of the custom to place brass coils around the women's necks. Various origins of the custom are mentioned, ranging from symbols of wealth and status to their believes. The Padaung myth states that a long time ago, the evil spirit was angry with the people and sent a plague of tigers to eat the women. With the fearing of the women being killed, the ancestors suggested that all of them have to wear neck-coils to protect themselves. Another myth is the story of a beautiful dragon with a long neck that was impregnated by the wind had produced the first Padaung people. In addition to brass neck-coils, most of Padaung women also wear tight-fitting brass coils around their legs and thick silver bangles on their arms.

These brass neck-coils are made of long coils of brass wire with approximately one-third inch in diameter. It is wrapped around the neck at different stages of girl's life. Most of them begin to wear the first brass neck-coils during 5-9 years old, weighing about 2.5 kg. with average 9 loops (Burutpat, 1989), and more loops are added later. Lacharoj (1993) reported the changes of brass neck-coils to increase length and/or size is done every 4 years, the average is 9 times in their lives. The last age of changing is about 45 years old, with weighing about 13-15 kg. The number of loops can be up to 32 loops. There are two different positions of the brass neck-coils, the neck part (average 20 loops) and the shoulder part (average 5-6 loops). The two parts are separated.

The brass neck-coils seem to lengthen their necks. Roekeghem stated that the length of their necks is only an illusion. He reported the effect of wearing brass neck-coils from a radiograph of the 43 years old Padaung woman who have worn brass neck-coils for 38 years. He found that brass neck-coils she wore did not rest on the collarbones as often thought, but on the ribs. Her ribs were constantly under pressure, caused by weight of the brass coils and the tension between their head and shoulders. The ribs were pressed and hanged down almost 45 degrees. Normally the ribs are connected to the vertebrae by hinge joint so the brass neck-coils slides deeper along the ribs. Whenever the brass neck-coils drop deeper into the shoulders, it becomes loose. So heavier and more coils have to be replaced. This is the only deformation that occurs and it doesn't cause any damage to the skeletal. It is not only pressing down the ribs but also giving a visible extension to the neck (Figure 1). Nevertheless, the pressure from the brass neck-coils not only pressed the ribs down but also forced the mandible up.

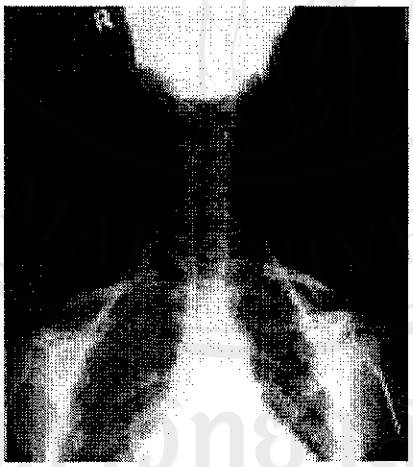

Figure 1 The radiograph of a 43 years old Padaung women who have worn brass neck-coils for 38 years (Roekeghem)

Generally, after birth the craniofacial structures are continuing to change in size and shape until at least age 20. These structures are displaced downward and forward,

whereas the direction of growth is essentially upward and backward. Scammon (1930) described the growth of four major tissue systems of the body by Scammon's curve. (Figure 2) He concluded that the growth of general body tissue, including muscle, bone, and, viscera, show an S-shaped curve, with a definite slowing of the growth rate during childhood and an acceleration at puberty. Growth of the jaws is intermediate between the neural and general body curves, with the mandible following the general body curve more closely than the maxilla. The circumpubertal growth spurt occurs at 10-12 years old in females and 12-14 years old in males (Broadbent *et al.*, 1975).

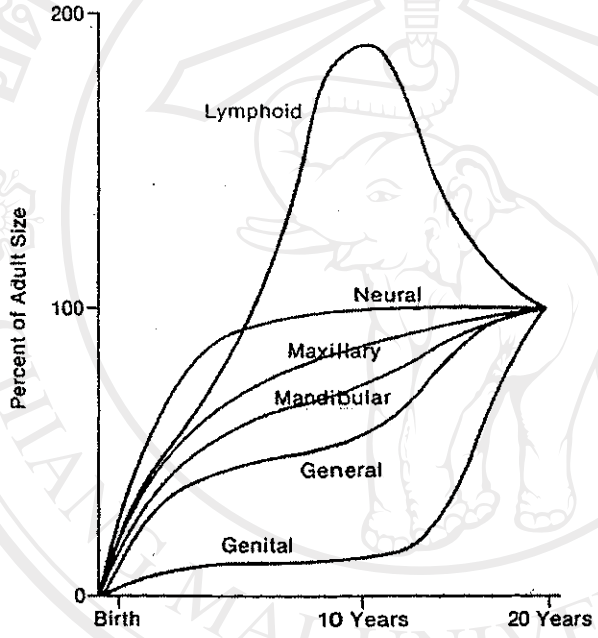

Figure 2 Growth curves of the maxilla and mandible showed against the background of Scammon's curve (Proffit *et al.*, 2000)

Growth of the mandible consists of endochondral and periosteal activities. Cartilage covers the surface of the mandibular condyle at the temporomandibular joint. The overall pattern of growth of the mandible can be represented in two ways, depending on the frame of reference. First, if the cranium is the reference area, the chin moves downward and forward. Second, it apparents that the principal sites of growth of the mandible are the posterior surface of the ramus, the condylar and coronoid process. There is little change along the anterior part of the mandible. Both are correct. As a growth site, the chin is almost inactive. It is translated downward and forward, as the

actual growth occurs at the mandibular condyle and along the posterior surface of the ramus. The body of mandible grows longer by periosteal apposition of bone on its posterior surface, while the ramus grows higher by endochondral replacement at the condyle accompanied by surface remodeling. Conceptually, it is correct to view the mandible as being translated downward and forward, while at the same time increasing in size by growing upward and backward (Proffit *et al.*, 2000).

Lewis *et al.* (1982) analyzed mandibular growth from annual cephalometric radiographs of 67 children. They reported that the growth spurts in mandibular dimension are common but not universal. They were more common in boys, and occurred about 1.5 years earlier in the girls. They tended to be larger in boys, although the mean increments in the two sexes were similar before and after the spurts. First pubertal spurts usually occur before peak height velocity (PHV), but there was a considerable variation in this relationship. Almost of all first pubertal spurts occur after ulnar sesamoid ossification and before menarche. The variability of their timing was less in relation to PHV than in relation to skeletal age, menarche or ulnar sesamoid ossification.

Force applied to the mandible with chincap appliances in order to improve facial growth in Class III patients with mandibular excess became of great interest to clinical orthodontists in the 1960s. Since then, chincap therapy has been widely used as a method for treating developing Class III malocclusion in young patients. A number of clinical and experimental studies have reported that chincap force had several short-term effects, 1) redirection of mandibular growth, 2) backward repositioning of the mandible, 3) retardation of mandibular growth and, 4) remodeling of the mandible and the temporomandibular joint (Janzen and Bluher, 1965; Joho, 1973; Irie and Nakamura, 1975; Graber, 1977; Asano, 1986). The short-term and long-term studies on the effects of chincap force showed that, on average, the skeletal profile is greatly improved during the initial stages of chincap therapy, but such changes are often not maintained thereafter.

Another appliance so called 'Milwaukee brace' was introduced in 1958 for the therapy of scoliosis (the term applied to lateral curvature of the spine) (Blount *et al.*,

1958). The Milwaukee brace (Figure 3) which combines the most effective forces used in the correction of scoliosis, is constructed so that the pelvic girdle fits tightly around the waist and rides atop iliac crests instead of pressing against the sides of the pelvic. Vertical bars are attached to the girdle, two posteriorly and one anteriorly, and extend to the neck region, where supports for the mandible and occiput are engaged. These bars can be lengthened to exert a greater amount of pressure upon the mandible and occiput as the curvature of the spine decrease during treatment.

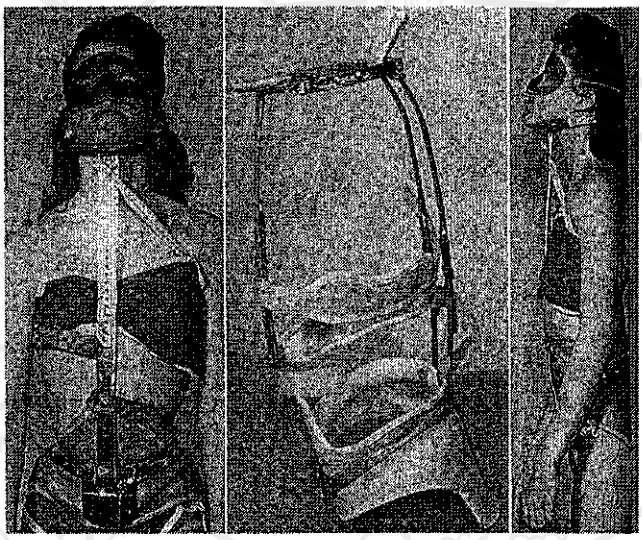

Figure 3 The Milwaukee brace (Alexander, 1966)

However, the Milwaukee brace is in use during the period of growth, there may be certain detrimental effects on the dental occlusion and possibly on the normal development of the lower face. Logan (1962) reported the case of a child who had worn the Milwaukee brace for more than 9 years. This patient's facial appearance was such that the chin and nose were much closer to each other than usual.

Alexander (1966) determined the effects upon the dentition and surrounding maxillofacial complex during treatment of scoliosis with the Milwaukee brace. He reported that, a shortening of vertical height, especially lower anterior face height, was noted in all patients. Vertical growth seemed to be affected in the lower border of the mandible, with possible growth occurring at the gonial angle and symphyseal area

(Figure 4). The palatal plane was elevated with a tendency of flatten the palatal vault. The Milwaukee brace also affected the dentition by extruding the incisor teeth and depressing the molars. The effect was more pronounced in the lower molars.

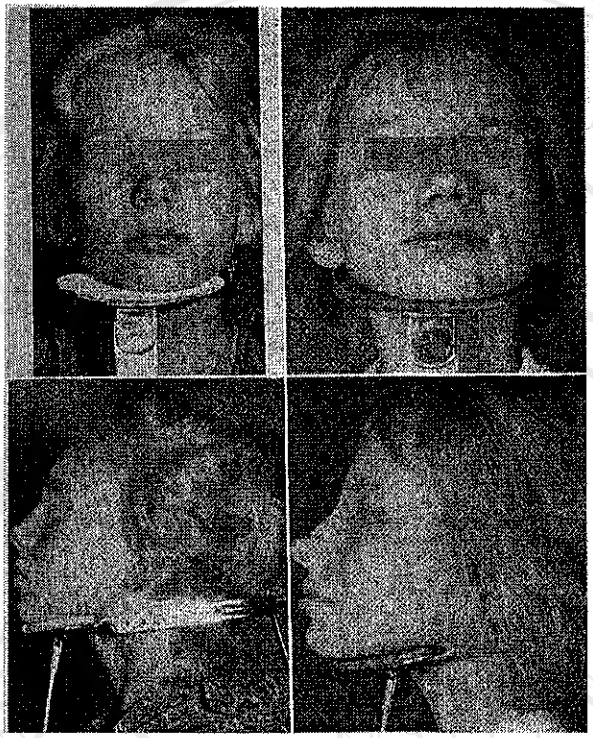

Figure 4 Facial photographs of patients with the Milwaukee brace (Alexander, 1966)

Since the brass neck-coils worn by Padaung may produce the pressure mimicking the chincap and/or the Milwaukee brace to the mandible. This pressure producing from the brass neck-coils which occurs from 5 years of age to the rest of their lives, might influence the mandibular growth. This might affect the relationships between maxilla and mandible and its related structures such as occlusion, facial proportion, facial profile etc.