

# CHAPTER I

## INTRODUCTION

### 1.1 Rationale

It is widely recognized that treatment outcomes in cleft lip and palate care need to be continually monitored from infancy to adulthood. Treatment protocols in the stages of lip and palate closure are carried out to build a normal anatomic structure for the maxilla.

The purposes of cleft lip and/or palate repair are to produce anatomic closure and to induce normal function of the oral tissues with minimal effects on maxillary growth and dento-alveolar deformity.<sup>1</sup> The effect of lip repair, however, is reduction of the height and protrusion of the upper lip, as well as restraining maxillary growth.<sup>2</sup> Palate repair has also been claimed to affect growth of the maxilla. Han<sup>3</sup> found less forward growth of the maxilla after eight years of age in patients with unilateral cleft lip and palate who received palatoplasty, and a larger vertical growth increment in the anterior maxilla compared to patients with cleft lip. Even patients with an isolated cleft palate may have midfacial hypoplasia, which is related to the inherent growth limitation of the congenital anomaly and operative closure of the cleft palate.<sup>4</sup> Surgical procedures which unavoidably result in a scar are, therefore, crucial steps influencing facial growth and maxillary arch development, especially in patients with complete cleft lip and palate.<sup>2</sup>

Surgical treatments in the early period of life are very important. Innumerable surgical techniques and different procedures have been used up to now.

There are two major protocols to close the lip and palate, one-stage closure and two-stage closure. The concept of one-stage repair, or simultaneous repair, is based on the early repair of the entire in the first year of life, whereas that of two-stage repair is separated into two procedures, i.e., the lip repair at the three to six months of age and palatoplasty at the age of twelve to eighteen months.<sup>5</sup> Although the latter approach is commonly used, the best timing of treatment, the most reliable treatment regiment, and the efficacy of surgical techniques currently used are still controversial.

The concept of one-stage repair was first introduced in 1966 by Davies.<sup>6</sup> Subsequently, experimental and clinical studies have been published regarding this concept.

Bardach, *et al.*<sup>7</sup> studied the influence of simultaneous cleft lip and palate repair on facial growth in rabbits. They found the repair resulted in the inhibition of anterior-posterior and transverse maxillary growth. The rabbits developed anterior crossbites and functional shifts to the cleft side. Bardach *et al.* also studied simultaneous cleft lip and palate repair in beagles. It was found that simultaneous cleft lip and palate repair resulted in more severe deformation of craniofacial growth<sup>8</sup>, and maxillofacial aberrations<sup>9</sup> than lip repair or palate repair performed separately. They found that the commonly accepted sequence of repairing cleft lip first and cleft palate second is less detrimental to maxillary growth than repairing the palate first and the lip second or simultaneous closure of both defects. However, these studies were experimental studies in animals. Their results cannot be adapted to the clinical setting.

In 1996, Hognimann<sup>10</sup> presented a preliminary report of an 'all-in-one' one-stage closure of cleft lip and palate during the first year of life. The one-stage repair included the anatomical reconstruction of the soft palate, hard palate closure in two

layers, alveoloplasty with bone grafting and lip repair. The results showed that growth problems were not seen, but, of course, these patients were only in the primary dentition period. Deng<sup>11</sup> also reported in 2002 about the preliminary observation. They concluded that simultaneous repair of complete cleft lip and palate in infancy (three to 12 months) was safe and reliable. Acceptable and/or excellent lip appearance and speech function could be obtained in the procedure.

Moreover, many studies used cephalograms of patients with clefts to assess craniofacial structures. De Mey *et al.*<sup>12</sup> concluded that there were no significant differences in anteroposterior midfacial morphology between the Malek surgical treatment protocol (soft palate closure at the age of three months followed by simultaneous repair of the lip and hard palate at the age of six months) and one-stage “all-in-one” closure (closure of lip, hard and soft palate) at 10 years of age. However, one-stage closure resulted in less downward inclination of the maxillary plane to the anterior cranial base. Corbo *et al.*<sup>13</sup> also reported no significant differences were observed between the Malek technique (a single operation of lip and palate at three months) and two-stage operation (soft palate closure at three months followed by lip and hard palate closure at six months). De Mey *et al.*<sup>14</sup> also reported that one-stage all-in-one closure provided good anteroposterior midfacial morphology and resulted in less opening of the maxillary plane to the anterior cranial base at 15 years of age. Fudalej *et al.*<sup>15</sup> claimed that simultaneous one-stage closure of the unilateral cleft lip and palate resulted in good maxillary-mandibular relationship, with 81% of subjects having adequate overjet. However, both maxilla and mandible were retrognathic compared to normal controls. In addition, Fudalej *et al.* evaluated the symmetry of craniofacial structure using the posteroanterior cephalograms. The

results showed that the craniofacial structures in 10-year-old patients with clefts after a one-stage repair are symmetrical.

Furthermore, some studies have evaluated the results from one-stage closure using the dental arch relationship (Goslon Yardstick measurement). Fudalej *et al.*<sup>16</sup> reported that dental arch relationship following the one-stage repair was comparable with the results of treatment provided at the 13 European cleft palate treatment centers with the best outcomes. That study showed that 57% of patients with unilateral cleft lip and palate had favorable facial growth. Only 11% of patients demonstrated unfavorable growth of the craniofacial complex that might require orthognathic surgery during treatment. Afterwards, Fudalej *et al.* compared the dental arch relationship of patients with clefts following one-stage repair (Warsaw protocol) and the Oslo Cleft Team's protocol. The results showed no differences in dental arch relationship. The distribution of the Goslon grade was similar in both groups. Long-term follow-up after growth was completed, of children with unilateral cleft lip and palate subject to one-stage repair, especially regarding craniofacial and maxillofacial growth, was limited.

According to the previous reports, most authors were concerned about speech development, hearing problems, craniofacial structure and maxillary growth. Study of occlusal features has so far rarely been found. In addition, nearly all data were collected in other countries. In Thailand, fundamental information on cleft treatment outcomes is still insufficient, especially from the northern part. At Chiang Mai University, both one- and two-stage repair are considered as ordinary surgical treatment protocols.

## 1.2 Objectives

The aim of this study was to compare the treatment outcomes, in terms of dental occlusion, between patients with complete unilateral cleft lip and palate who had undergone one-stage or two-stage closure. Besides that, the severity of the resultant malocclusions of those patients was evaluated, in order to develop an optimal, time-specific surgical protocol for one-step and two-step repair procedures.

## 1.3 Hypotheses

$H_0$ : Dental occlusions at the mixed dentition in patients with complete unilateral cleft lip and palate after one-stage and two-stage operations are not different.

$H_1$ : Dental occlusions at the mixed dentition in patients with complete unilateral cleft lip and palate after one-stage and two-stage operations are different.

## 1.4 Anticipated benefits

To define the suitable time of optimal surgical treatment protocol for closure of lip and palate in patients with complete unilateral cleft lip and palate.