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Epidemiology of cleft lip and palate charity mission surgery at Bandung Cleft Lip and Palate Center, Indonesia: a 14-year institutional review

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Original Article

Background: The management of cleft lip and palate aims at improving the patient's aesthetic and functional outcomes. Delaying primary repair can disrupt the patient's functional status. Long-term follow-up is essential to evaluate the need for secondary repair or revision surgery. This article presents the epidemiology of cleft lip and palate, including comprehensive patient characteristics, the extent of delay, and secondary repair at our institutional center, the Bandung Cleft Lip and Palate Center, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia.

Methods: This retrospective study aimed to determine the epidemiology and recurrence rates of cleft lip and palate at the Bandung Cleft Lip and Palate Center, Indonesia, from January 2007 to December 2021. The inclusion criteria were patients diagnosed with cleft lip and/or palate. Procedures such as labioplasty, palatoplasty, secondary lip and nasal repair, and alveolar bone grafting were performed, and data on recurrence were available.

Results: In total, there were 3,618 patients with cleft lip and palate, with an age range of 12 months to 67 years. The mean age was 4.33 years, and the median age was 1.35 years. Males predominated over females in all cleft types (60.4%), and the cleft lip was on the left side in 1,677 patients (46.4%). Most cases were unilateral (2,531; 70.0%) and complete (2,349; 64.9%), and involved a diagnosis of cleft lip and palate (1,981; 54.8%).

Conclusion: Delayed primary labioplasty can affect daily functioning. Primary repair for patients with cleft lip and palate may be postponed due to limited awareness, socioeconomic factors, inadequate facilities, and varying adherence to treatment guidelines. Despite variations in the timing of primary cleft lip repair (not adhering to the recommended protocol), only 10% of these patients undergo reoperation. Healthcare providers should prioritize the importance of the ideal timing for primary repair in order to optimize physiological function without compromising the aesthetic results.

Keywords: Cleft lip / Cleft palate / Surgery / Epidemiology / Indonesia

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INTRODUCTION

The comprehensive management of cleft lip and palate has emerged as a significant topic in the surgical literature over the past half-century. A cleft lip occurs when the right and left sides of the lip or palate fail to join completely during fetal development, creating a gap [1].

The overall incidence of cleft lip and palate is approximately 1

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in 3,000 to 3,300 live births (0.33 in 1,000), while isolated cleft palate occurs in about 1 in 2,000 live births [2]. The typical distribution of cleft types is as follows: isolated cleft lip (15%), cleft lip and palate (45%), and isolated cleft palate (40%) [3]. The incidence of clefts is higher among Asians, ranging from 0.82 to 4.04 per 1,000 live births. It is intermediate in Caucasians, with an incidence of 0.9 to 2.69 per 1,000 live births, and lower in Africans, at 0.18 to 1.67 per 1,000 live births. In China, the incidence rate is 1.76 per 1,000 live births, while the incidence in Japan is 0.85 to 2.68 per 1,000 live births for orofacial clefts [4].

According to the Indonesian Basic Health Research, the national prevalence rate of cleft lip and palate increased from 0.08% in 2013 to 0.12% in 2018 [5]. Additionally, cleft lip and palate are more common in males, with a 2:1 male-to-female ratio. The most prevalent type is left-sided cleft lip, followed by right or bilateral cleft lip, at a 6:3:1 ratio. In West Java, the Indonesian Association of Plastic Reconstructive and Aesthetic Surgeons (INAPRAS) reported 8,330 charity mission from 1997 to 2019, including 6,320 labioplasties, 1,772 palatoplasties, and 238 other revision procedures [6,7].

Cleft lip is thought to arise from a combination of genetic and environmental factors, such as maternal conditions, medications, and malnutrition. Prenatal ultrasonography is commonly utilized for the early detection of cleft lip and palate, allowing for timely planning and counseling regarding postnatal procedures. This early detection helps in preparing parents for the necessary interventions their child will require after birth. One genetic factor associated with cleft lip is linked to the interferon regulatory factor 6 (IRF6) gene. Its expression can predict the risk of cleft palate [8-10].

A variety of therapeutic protocols exist for interventions in cleft lip and palate cases. Our treatment protocol for patients with cleft lip and palate is akin to that of the Craniofacial Center at Chang Gung Memorial Hospital, Taiwan [11].

This article reports the epidemiology of cleft lip and palate, including comprehensive patient characteristics, the extent of delay, and secondary repair at our institutional center, the Bandung Cleft Lip and Palate Center, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia.

METHODS

The medical records of all children with cleft lip and palate registered at the Bandung Cleft Lip and Palate Center, including those from Smile Train's digital records, between 2007 and 2021 were retrospectively reviewed. The data collection encompassed age, sex, type of cleft, operation histories, and operation settings. All cleft types were classified based on their anatomical involvement (cleft lip and palate, cleft lip, cleft palate), completeness (complete, incomplete, asymmetrical, and cleft palate only), side involvement (unilateral, bilateral, cleft palate only), and location. We also included categories for any atypical presentations not covered by these standard classifications, referred to as "other types." Operation histories were classified into primary cleft lip repair (unilateral/bilateral), primary cleft palate repair, secondary lip and nose revision, fistula repair, secondary palate repair, alveolar bone graft, combinations of operations, and other operations. The operation setting was categorized into operations conducted during charity missions and elective operations at our center. We employed Millard's technique for lip repairs and double flap palatoplasty for palatoplasty.

The treatment protocol for patients with craniofacial anomalies, including cleft lip and palate, follows a comprehensive, staged approach to ensure optimal outcomes throughout the patient's development. Initially, patients undergo a consultation with a craniofacial surgeon immediately after birth, which is promptly followed by presurgical orthodontic treatment designed to prepare for surgical correction. At the age of 3 months, primary repair of the cleft lip and nose is performed using rotation advancement methods combined with semi-open or open rhinoplasty techniques to achieve both functional and aesthetic improvements. By the age of 12 months, the primary cleft palate repair is conducted utilizing either the Bardach or Furlow technique, depending on the specific needs of the patient.

As the child reaches 2.5 years, speech evaluations are conducted to assess for any velopharyngeal insufficiency or the presence of a palatal fistula, with secondary palate repair being performed as required. Upon reaching preschool age, secondary revisions of the lip and nose may be undertaken to refine the results of the initial surgery. Before the age of 9, patients undergo presurgical orthodontic treatment to address any developing dental or orthodontic issues. Between the ages of 9 and 11, alveolar bone grafting from the iliac crest is performed to support the upper jaw and teeth, followed by orthodontic treatment at the age of 12 to ensure proper alignment and occlusion.

Finally, in adolescence or adulthood, a final evaluation of facial growth is conducted, with definitive repairs of the lip and nose being carried out if necessary. This long-term, phased approach allows for adjustments based on individual growth patterns and the emergence of any related issues, ensuring that each patient receives tailored and effective treatment throughout their development.

Most patients were treated and operated on at our center, the Bandung Cleft Lip and Palate Center, located in Santosa Hospital Bandung (2,450 patients), while 1,168 patients were treated and operated on during charity surgery missions across various

regions of Indonesia.

Furthermore, the collected data were grouped based on the age at presentation and the age at the time of labioplasty, palatoplasty, secondary lip and nasal repair, and alveolar bone grafting. The data were then analyzed according to age to evaluate the treatment protocol implemented at our cleft lip center. We also analyzed which reoperations were most and least performed. All data are presented in tabular form.

In our analysis, we structured the patient age categories to align with critical clinical developmental milestones and optimal times for surgical interventions for cleft lip and palate. This allows us to evaluate how the timing of surgeries correlates with these developmental stages (Tables 1-3). These Tables detail the distribution of operations across various age groups, providing insight into the adherence to recommended surgical timelines and highlighting any deviations that may influence patient outcomes. This categorization allows for a focused analysis on when specific interventions are typically performed and how the distribution of surgical interventions across age impacts treatment outcomes.

The 0 to 6 months category reflects the early intervention window for cleft lip repair, in line with clinical guidelines recommending cleft lip repair within the first few months of life to maximize aesthetic and functional outcomes. The more than 6 months to 1 year category shifts focus to primary palate repair, timed to support optimal speech development and reduce the risk of speech impairments. Subsequent age categories accommodate secondary surgeries and other interventions, such as alveolar bone grafting and lip and nose revisions, which are planned based on the patient's developmental needs and the specific requirements of their condition. This age-based framework facilitates a clearer understanding of the treatment timeline and its implications for patient care strategies.

We conducted a statistical analysis of the patients' ages for each type of operation. Since the average age data did not follow a normal distribution, we utilized the Mann Whitney test to compare the average age of patients for each operation between elective operation and charity mission surgery.

Using SPSS version 20.0 (IBM Corp.), statistical tests were conducted to determine whether the data were normally distributed. Subsequently, the mean and standard deviation, as well as the median value, were obtained. For comparing continuous data between groups, analysis of variance and the student *t*-test were utilized, while the chi-square test was used for categorical data.

Table 1. Age group comparison for each operation

Age category	Primary lip, unilateral	Primary lip, bilateral	Primary palate	Secondary lip and nose revision	Fistula repair	Secondary palate repair	Alveolar bone graft	Combination of operations	Other (facial clefts)
0 to 6 mo	859	175	0	0	0	0	0	0	0
>6 mo to 1 yr	427	100	28	19	0	0	0	1	0
>1 to 2 yr	212	46	834	27	3	2	0	41	0
>2 to 5 yr	196	38	322	74	21	56	1	42	1
>5 to 10 yr	93	29	129	81	8	32	1	30	2
>10 to 18 yr	77	17	82	78	6	10	2	20	0
>18 yr	79	20	50	64	0	4	3	4	0
Total	1,941	425	1,444	343	38	104	7	138	3

Table 2. Age comparison of patients who underwent secondary lip and nose revision

Age	No. of patient	With lip and nose revision	Without lip and nose revision
0 to 6 mo	392	49 (66.2)	343 (61.6)
>6 mo to 1 yr	188	19 (25.7)	169 (30.3)
>1 to 2 yr	35	4 (5.4)	31 (5.6)
>2 to 5 yr	13	2 (2.7)	11 (2.0)
>5 to 10 yr	3	0	3 (0.5)
Total	631	74 (100)	557 (100)
Average (yr)	0.57	0.52	0.58
p-value	-	0.237	

Values are presented as number (%) unless indicated otherwise.

Table 3. Age comparison of patients who underwent secondary palate/fistula revision

Age	No. of patient	With secondary palate repair	Without secondary palate repair
6 mo to 1 yr	18	17 (2.8)	1 (1.4)
>1 to 2 yr	540	487 (79.1)	53 (74.6)
>2 to 5 yr	99	86 (14.0)	13 (18.3)
>5 to 10 yr	17	16 (2.6)	1 (1.4)
>10 to 18 yr	6	4 (0.6)	2 (2.8)
>18 yr	7	6 (1.0)	1 (1.4)
Total	689	616 (100)	71 (100)
Average (yr)	1.98	1.95	2.33
p-value	-	0.261	

Values are presented as number (%) unless indicated otherwise.

A *p*-value of <0.05 was considered statistically significant. The study adhered to the provisions of the Helsinki Declaration.

RESULTS

This descriptive observational study was conducted with the aim of determining the characteristics of cleft lip and palate patients treated by the cleft lip and palate center at the Bandung Cleft Lip and Palate Center from 2007 to 2021. The study analyzed secondary data obtained from the medical records of patients with cleft lip and palate.

In total, 3,618 patient medical records that met the inclusion criteria were obtained. This study predominantly involved male patients (60.4%), with left-sided (1,677; 46.2%), unilateral (2,531; 70%), and complete (2,349; 64.9%) clefts, as well as cases of cleft lip and palate (1,981; 54.8%). The average age at initial presentation for treatment was 4.33 years (range, 0.12–67.5 years).

The frequency distribution of clefts was as follows: cleft palate, 11.6%; cleft lip and palate, 54.8%; and cleft lip, 33.6%. At our center, males predominated over females in all cleft types (60.4%). There was also a higher prevalence of unilateral clefts (70.0%) than bilateral ones. Additionally, the left side (66.25%) was found to be more frequently affected than the right side (Tables 4, 5).

Our center conducted a total of 4,443 operations, including 2,366 primary lip repairs, 1,444 primary palate repairs, 343 secondary lip and nose revisions, 142 secondary palate/fistula repairs, seven alveolar bone grafts, three facial cleft reconstructions, and 138 combined operations. The Bandung Cleft Lip and Palate Center successfully conducted 3,275 elective operations at Santosa Hospital Bandung Central, a private facility in West Java, demonstrating our commitment to providing specialized care. Additionally, in alignment with our dedication to broader community service, our team embarked on 1,168 charity missions, extending our services to various government hospitals across rural areas in the West Java region. These missions aim to offer critical surgical interventions to underprivileged communities, ensuring that distance and financial constraints do not impede access to essential healthcare.

Table 4. Cleft type characteristics

	Description	Total, No. (%)	Sex	
			Female	Male
Sex		3,618	1,430	2,188
Average age (yr)		4.33	5.68	2.98
Side involvements	Left	1,677 (46.4)	684	993
	Right	854 (23.6)	324	530
	Bilateral	666 (18.4)	222	444
	Cleft palate only	418 (11.6)	197	221
	Others	3 (0.1)	3	0
Anatomy involved	Cleft lip and palate	1,981 (54.8)	745	1,236
	Cleft lip only	1,216 (33.6)	485	731
	Cleft palate only	418 (11.6)	197	221
	Others	3 (0.1)	3	0
Completeness	Complete	2,349 (64.9)	934	1,415
	Incomplete	805 (22.2)	286	519
	Cleft palate only	418 (11.6)	197	221
	Asymmetrical cleft	46 (1.3)	13	33

Table 5. Sex distribution according to cleft lip type

Anatomy involvement	Cleft side						Total
	Left		Right		Bilateral		
	Female	Male	Female	Male	Female	Male	
Cleft lip and palate	405	552	176	317	164	367	1,981
Cleft lip	279	441	148	213	58	77	1,216
Total	684	993	324	530	222	444	3,197

Table 6. Case distribution for elective operation and charity mission

Description	Total		Elective operation		Charity mission		*p*-value
	No.	X age	No.	X age	No.	X age	
Primary lip, unilateral	1,941	3.02	1,334	1.45	607	6.35	0.000
Primary lip, bilateral	425	3.25	282	1.57	143	4.75	0.000
Primary palate	1,444	3.71	1,190	3.11	254	6.50	0.000
Secondary lip and nose revision	343	10.24	229	8.17	114	14.4	0.000
Fistula repair	38	5.42	33	5.27	5	6.43	0.531
Secondary palate repair	104	5.93	78	5.43	26	7.34	0.002
Alveolar bone graft	7	15.42	7	15.42	0	0	NA
Combination of operations	138	5.71	120	5.52	18	6.96	0.059
Other (facial clefts)	3	5.91	2	6.90	1	3.93	0.221
Total	4,443		3,275		1,168		

X age: average age in years.

We found significant age differences between the patients who underwent elective and charity primary surgery (unilateral cleft lip repair, bilateral cleft lip repair, and primary palate repair) and some secondary operations (secondary lip and nose revision, secondary palate repair) ($p = 0.000$). However, there were no significant age differences in fistula repair ($p = 0.531$) and facial cleft reconstruction ($p = 0.221$) operations between elective and charity mission (Table 6).

The average age for primary labioplasty (unilateral and bilateral cleft repair, n = 2,366) was 4.33 years, and for primary palatoplasty (n = 1,444), it was 3.71 years. Out of the 2,366 patients who underwent cleft lip repair, 1,034 (43.7%) underwent the procedure during the first 6 months of life, 527 (22.3%) at the age of 6 months to 1 year, and 258 (10.9%) at the age of 1 to 2 years.

In our comprehensive review of cases at our center, encompassing a total of 4,443 instances of primary surgical interventions, we observed a necessity for secondary surgical procedures in a subset of these cases.

A total of 343 patients underwent secondary lip and nose revision surgery. Of these, 19 patients (5.5%) received the procedure within the first year of life. Additionally, 27 patients (7.9%) underwent this revision at the age of 1–2 years, 74 patients (21.6%) at 2–5 years, 81 patients (23.6%) at 5–10 years, 78 patients (22.7%) at 10–18 years, and 64 patients (18.7%) at ages above 18 years. Most patients who underwent lip and nose revision received primary cleft lip repair at another center as charity missions. As the second operation, we performed repeated labioplasty with a semi-open approach to the nose.

Thirty-eight patients underwent fistula repair surgery. Of these, three patients (7.9%) underwent the procedure within the first 2 years of life, 21 patients (55.3%) at the age of 2–5 years, eight patients (21.1%) at 5–10 years, and six patients (15.8%) at 10–18 years (Table 1).

Some patients who underwent initial surgery at our center later required secondary procedures, such as secondary cleft lip-nose procedures and secondary palate repairs/fistula repairs. The 140 secondary lip-nose procedures involved 135 patients, predominantly with unilateral cleft lip (88 unilateral vs. 47 bilateral clefts), complete clefts (128 complete vs. 7 incomplete), and cleft lip and palate (123 cleft lip and palate vs. 12 cleft lip only), with a plurality being left-sided (67 left-sided vs. 26 right-sided vs. 47 bilateral).

Of these patients, 74 underwent primary lip repair at our center, while the remaining 61 received primary lip repair at another center and came to us for lip and nose revision. Out of the 631 primary cleft lip repairs performed at our center, 74 patients (11.09%) returned for secondary lip and nose revisions. Additionally, there were no significant differences in the age at primary lip repair between these patient groups ($p = 0.237$, Mann Whitney *U* test) (Table 2).

In total, 81 secondary palate/fistula repairs were performed on 78 patients, predominantly with unilateral cleft palate (56 unilateral, 10 bilateral, and 12 cleft palates only). The average age at the time of primary cleft palate repair for these patients was 2.33 years. Of these patients, 71 underwent primary palate repair at our center, while seven received primary palate repair at another center and came to us for revision. From this data, we can conclude that out of 689 primary cleft palate repairs performed at our center, 71 patients (10.23%) returned for secondary cleft palate operations. Additionally, there were no significant differences in the age at primary cleft palate repair between these patients ($p = 0.261$, Mann Whitney *U* test) (Table 3).

DISCUSSION

Numerous epidemiological studies from various countries and regions have investigated the distribution of cleft lip and palate. These studies have demonstrated that the incidence and distribution of cleft lip and palate vary among different countries, regions, ethnic groups, and races.

A 2018 review of the global rates of these conditions reported that the incidence of cleft lip and palate was 0.35 per 1,000 births and that of cleft palate was 0.34 per 1,000 births. According to estimates, these conditions collectively occur in 0.88 per 1,000 live births, of which 0.21 per 1,000 live births are cleft palate, 0.24 are cleft lip, and 0.43 are cleft palate and cleft lip. It was discovered that the incidence of oral clefts may be influenced by a lack of knowledge about preventive measures and genetic counseling in regions where the condition is relatively common. This lack of awareness can affect early detection and timely intervention, potentially leading to a higher reported incidence of cleft conditions in these areas [3]. Boys had a higher frequency of this disorder than did girls. The discrepancy between our study and previous research may be attributed to the considerable variability among different countries, regions, ethnic groups, and races. Of note, developing countries have a higher incidence of cleft lip and palate [12,13].

To address the backlog of cleft lip and palate patients globally and support their ongoing healthcare needs, a comprehensive strategy is essential. This approach should encompass interventions that strengthen all components of the surgical healthcare system, including workforce, service delivery, infrastructure, leadership and governance, funding, and information. Additionally, it should be tailored to suit the specific needs and challenges of each high-burden region [14-16].

In the current study, the frequency distribution of clefts was as follows: cleft palate, 11.6%; cleft lip and palate, 54.8%; and cleft lip, 33.6%. At our center, males predominantly presented with all types of clefts, comprising 62.4% of cleft lip and palate cases, 60.1% of cleft lip cases, and 52.8% of cleft palate only cases. Additionally, the study found a higher prevalence of unilateral clefts (70.0%) compared to bilateral ones. Numerous studies have also found that cleft lip more frequently occurs on the left side [16-18]. In our study, the left side was affected more frequently (66.25%) than the right side. Another study reported that cleft lip represented approximately 25% of all cleft cases, while combined cleft lip and palate accounted for about 45%. Cleft lip and palate tend to occur more frequently and with greater severity in boys than in girls. Unilateral clefts are more common than bilateral clefts, with a ratio of 4:1, and among unilateral clefts, about 70% occur on the left side of the face. Cleft palate is observed more frequently in females than in males. Our study's results align with these findings [19].

Our center has performed a total of 4,443 operations, predominantly consisting of primary cleft lip (53.2%) and palate repair (32.5%). Most operations were conducted in an elective setting at our main hospital (73.7%), while the remainder were carried out during our charity missions throughout the Indonesian archipelago. Both in elective operation and charity mission settings, primary cleft lip and primary palate repairs were the most frequent operations.

Our treatment approach involves a sequence of interventions. We start with primary cleft lip and nose repair at 3 months old, followed by primary cleft palate repair at 12 months old. Secondary palate repair, fistula repair, and secondary lip and nose revision are typically performed at preschool age. The final stage of intervention involves alveolar bone grafting from the iliac crest, which is usually done at 9 to 11 years of age [20].

Further analysis reveals that secondary labioplasty and palatoplasty were required in 447 of these cases, accounting for approximately 10% of the total cases. This underscores a relatively low rate of secondary intervention following the initial surgical treatment, suggesting effective initial management and careful patient selection for primary interventions. This aspect of our findings is critical as it highlights the efficiency of our surgical protocols and patient care strategies [21,22].

In this study, the significantly lower incidence of alveolar bone grafting compared to primary and secondary palate repairs is likely influenced by a few key factors. These include the challenges associated with longer travel distances for treatment, the reduced frequency of alveolar bone graft procedures in charity mission groups due to limited access to well-equipped healthcare facilities, and the impact of patients who discontinue treatment or are lost to follow-up.

The ideal age for cleft lip repair varies depending on the country. In high-income nations such as the UK, the recommended age for cleft lip repair is typically between 3 and 6 months, assuming there are no significant clinical contraindications. In contrast, a study conducted in Egypt, a lower middle-income nation, found that most cases of cleft lip were resolved within 3 to 6 months [23]. According to our study, the average age for primary labioplasty (unilateral and bilateral cleft repair, n = 2,366) was 4.20 years, and for primary palatoplasty (n = 1,444), it was 3.71 years. Out of the 2,366 cleft lip repair patients, 1,034 (43.7%) underwent cleft lip repair during the first 6 months of life, 527 (22.3%) between 6 months and 1 year of age, and 258 (10.9%) between 1 and 2 years of age. Among the 1,444 primary palate repair patients, 862 (59.69%) underwent palate repair before the age of 2, while 322 patients (22.3%) underwent palate repair between the ages of 2 and 5. Consistent with our research, a study conducted in Brazil by Sousa and Roncalli [24] also reported delays in initiating labioplasty in 66.4% of cleft lip and palate patients and palatoplasty in 71.2% of patients.

The average of delayed presentation is highest in low-income countries [25]. Several factors contribute to the poor ideal labioplasty rate, including the low level of public and socioeconomic knowledge, the inaccessibility of health facilities that can provide comprehensive treatment, and the criteria that patients must satisfy to be involved in the management of cleft lip and palate, such as the Rule of Ten. The "Rule of Ten" is an established guideline used to determine the optimal readiness of infants for cleft lip and palate surgery. This rule stipulates that the infant should have at least 10 weeks of age, weigh at least 10 pounds, and have hemoglobin levels of at least 10 g/dL. This guideline ensures that the infant is in a stable condition to undergo the procedure, minimizing surgical risks and improving recovery outcomes [13,19]. The level of education can affect the perceptions of the patient's family, who may not yet be aware of the importance of initiating treatment for patients with cleft lip and palate. Carrying out labioplasty earlier leads to better final results for the patient. Additionally, the limitations of cleft lip and palate centers can also be another inhibiting factor because patients from rural areas may have difficulty finding qualified healthcare service providers [24,25]. For instance, in Indonesia, there are only 262 plastic surgeons serving a population of 250 million [26].

Charity mission repair programs should consider including additional, ongoing costs for speech therapy and other forms of rehabilitation. Residual limitations can be more severe in nations like Indonesia, where access to speech therapy and other rehabilitation care is limited. Given the scarcity of such rehabilitation treatment, it may seem acceptable to exclude this ex-

pense. One study found no complications from operations performed by a charity mission repair program. Over the 15 years of treating cleft lip and palate patients, no fatal sequelae have been recorded. However, it is important to note that data on non-fatal complications may not be complete [27].

A study on secondary and nasal revision procedures found that the patients ranged in age from 6 to 17 years, with an average age of 11.6 years, at the time of surgery. At the time of the survey, their ages ranged from 8 to 18 years old, with a mean age of 13.3 years. On average, there was a 1.7-year gap between the time of surgery and survey. The most common type of cleft observed in the study population was unilateral cleft lip and palate [28].

A study analyzing secondary cleft palate procedures in 724 different patients found that 54% of them were males (n = 388). The average age of patients undergoing secondary procedures was 59 months. Patients with diagnoses of cleft lip and palate had a significantly higher revision rate (1.92) than those with cleft palate alone (0.54) ($p < 0.05$) [29].

In this study, the average age for palate surgery was 3.71 years. Typically, a 4-year-old child has begun to talk and shows signs of appropriate development and growth. In cleft lips and palate patients, speech and daily activities, particularly eating and drinking, may be limited, which can be challenging for the family. Consequently, parents may start seeking the appropriate treatment for their child. Limited speech can also impact activities both at home and outside. Communication difficulties can disrupt activities in the home environment, which should provide opportunities for the patient to learn to speak. Similarly, school activities can be hindered by limited speech function. Additionally, reduced nutritional intake may occur due to difficulties in eating and drinking [30].

In this study, the elective operation and charity mission settings showed significant differences in the average age for most types of operations, including primary lip repair, primary palate repair, secondary lip and nose revision, and secondary palate repair. In the charity mission setting, the average age tends to be older than in the elective operation setting due to difficulties related to geographical access to the cleft center from their homes, socioeconomic challenges, and a lack of knowledge within families.

For elective operation procedures, our center conducted 1,548 operations on 735 patients at Santosa Hospital Bandung Central, with primary lip and primary palate repair predominating. Among the returning patients, only 11.09% (74 out of 631 patients) underwent secondary cleft lip and nose revision. Importantly, there was no statistically significant difference in the age at which primary cleft lip repair was performed between patients who received secondary lip and nose revision and those who did not ($p = 0.237$). These findings demonstrate a low recurrence rate, which is a positive and quantifiable aspect of cleft lip and palate surgery. This study specifically showed that the age at which the initial primary lip repair was carried out did not influence the need for secondary surgery. This suggests that our center has performed successful procedures with a low recurrence rate.

We identified that 10.23% (71 out of 686) of primary cleft palate repair patients returned to our center for secondary palate/fistula repair. There was no statistically significant difference in the age at which primary cleft palate repair was performed between patients who underwent secondary palate/fistula repair and those who did not ($p = 0.261$).

A palatal fistula is an epithelialized opening in the repair between the mouth and nasal cavity, which can have significant functional consequences. The incidence of fistulas can vary widely, ranging from 4.7% to 60% [31]. The development of postoperative fistulas can be influenced by various factors, including sex and the timing of the repair [32]. The size of the defect is an important factor, with bilateral clefts, clefts of the hard palate, and clefts of the soft palate all increasing the likelihood of developing a fistula. The width of the cleft, the presence of missing palate segments, improper cleft location, and distortion of the cleft section have also all been linked to postoperative fistula development. A study from 2006, conducted by Cole et al. [33], found that larger defects, such as bilateral and full cleft palate deformities, had a higher likelihood of developing fistulas. Most experts agree that the extent and magnitude of the preexisting cleft are the strongest predictors of the development of postoperative oronasal fistulas.

The current study, which involved 3,618 patients treated in our center, provides valuable insights into cleft care in Indonesia. The majority of cases were male and involved unilateral left-sided complete clefts that affected both the lip and palate. These findings align with results from studies conducted in various other centers. However, it is worth noting that these characteristics can vary across different countries, regions, ethnic groups, and races.

The average age at which patients underwent primary labioplasty, primary palatoplasty, secondary lip and nose repair, and secondary palate repair/fistula repair in our study is similar to the average ages reported in other developing countries. Patients in developing countries often receive treatment at an older age than patients in developed countries. It was observed that in our study, the majority of patients underwent primary cleft lip repair after reaching 6 months of age.

At our center, secondary labioplasty and palatoplasty were performed in rate approximately 10% of cases. Primary repairs may need to be adjusted as the patient grows, which does not preclude

the possibility of secondary repairs. Notably, 35% of these patients ultimately underwent secondary repair procedures, which included alveolar bone grafts, fistula repairs, lip nose revisions, unilateral lip nose repairs, and secondary cleft palate repairs.

Postponing the initial labioplasty procedure can have an impact on daily functioning. Several factors contribute to delays in primary repair for cleft lip and palate patients, including low levels of knowledge, socioeconomic factors, limited access to facilities, and poor adherence to treatment recommendations. Despite variations in the timing of primary cleft lip repair (not adhering to the recommended protocol), only 10% of these patients undergo reoperation. Healthcare providers must stress the critical importance of timely primary repair to optimize physiological functions and achieve aesthetic results without compromise.

The management of cleft lip and palate can be significantly more effective when there is collaboration between the community and sustainable health service providers. Healthcare providers should prioritize the importance of the ideal timing for primary repair in order to optimize physiological function without compromising aesthetic results.

NOTES

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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None.

Ethical approval

The study was approved by the Institutional Review Board of Universitas Padjadjaran(No 193/UN6.KEP/EC/2021) and performed in accordance with the principles of the Declaration of Helsinki. The informed consent was waived because this study design is a retrospective chart review.

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