

Original Research Article

Postoperative complications in cleft lip and palate: a retrospective study at the General Hospital of México (2021-2023)

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ABSTRACT

Background: Cleft lip and palate (CLP) are among the most prevalent congenital malformations globally, with particularly high rates in low- and middle-income countries such as Mexico. While early surgical intervention can restore function and aesthetics, postoperative complications remain a clinical challenge. This study aims to identify the frequency and types of complications in patients referred to the General Hospital of Mexico between 2021 and 2023 following primary CLP surgery in other institutions.

Methods: A retrospective review was conducted on 122 patients with CLP sequelae referred to the Plastic and Reconstructive Surgery Department at the General Hospital of Mexico from 2021 to 2023. Medical records were analyzed to determine the type and frequency of postoperative complications. Only patients with documented complications were included.

Results: Among 122 cases, the most frequent complications were short lip (44.3%), palatal fistula (32.8%), and velopharyngeal insufficiency (19.7%). Less common issues included respiratory difficulty, lip paresthesia, dehiscence, and hypertrophic scarring (0.8% each). Complications were most often associated with patients undergoing both cheiloplasty and palatoplasty. Those with two surgeries had the highest relative risk for short lip (RR=4.0), velopharyngeal insufficiency (RR=2.2), and palatal fistula (RR≈1.92). Patients undergoing only one surgery had notably fewer complications.

Conclusions: High-quality initial surgical repair is critical in preventing postoperative complications. Our findings highlight the importance of optimizing the first surgical intervention to reduce the need for additional procedures and improve long-term outcomes in CLP patients.

Keywords: Cleft lip surgery, Cleft palate repair, Postoperative complications, Palatal fistula, Velopharyngeal insufficiency

INTRODUCTION

The history of cleft lip and palate (CLP) treatment is extensive and has evolved significantly. Early references to these malformations can be found in the texts and art of various ancient cultures. In Western scientific literature, they are mentioned in the works of Celsus (ca. 25 BC–50

AD) and Galen (129–200 AD).¹ The first documented case of cheiloplasty dates back to China around 200 BC.² During the Middle Ages, Albucasis (936–1013) and Yperman (1260–1332) described surgical indications for cleft lip. The invention of the printing press during the Renaissance allowed various authors to disseminate new surgical methods.¹ In the 19th century, significant advancements were made in cleft palate surgery, which until then had

been limited to the use of obturators to improve speech. In 1884, Werner Hagedorn established the foundations of geometric anatomical repair of the lip.³

In the 20th century, techniques such as linear repairs, quadrilateral flaps, and triangular flaps emerged, improving both functional and aesthetic outcomes. Additionally, the development of rotation and advancement principles towards the end of the century allowed for further advancements in unilateral cleft lip repair.⁴ Currently, the treatment of CLP requires an interdisciplinary approach, involving surgeons, orthodontists, speech therapists, and other specialists to address the diverse needs of patients.^{3,5}

Cleft lip and palate are among the most common congenital malformations globally, with a significant prevalence in low- and middle-income countries. In Mexico, there were a total of 23,184 new cases of CLP from 2003 to 2019, averaging 1,364 cases per year and a prevalence rate of 0.53 per 1,000 live births, with the most affected states being Hidalgo (1.59) and Jalisco (1.32), while the least affected were Nayarit (0.22) and Durango (0.29). Males are more frequently affected by CLP at a ratio of 2:1.⁶ Early surgical interventions aim to restore both aesthetics and function, but these surgeries are not without postoperative complications. This study aims to identify the frequency and types of complications in patients who were operated on in different hospitals and subsequently referred to the General Hospital of Mexico between 2021 and 2023. With the goal of optimizing surgical management and improve clinical outcomes.

In a study of 104 participants, 6.7% of school-aged children with CLP exhibited psychosocial problems.⁷

A meta-analysis conducted in 2021 reviewed the prevalence of CLP from January 2000 to June 2021, involving 21,088,517 individuals, finding a prevalence of 0.33 (95% CI: 0.28–0.38) for cleft palate, 0.3 for cleft lip, and 0.45 (95% CI: 0.38–0.52) for both cleft lip and palate per 1,000 live births.⁸

Among the risk factors associated with complications in CLP surgery, malnutrition has been one of the most studied. In a study involving 855 children, of which 470 (55.0%) were male and 385 (45.0%) were female, it was concluded that height for age was associated with a decreased likelihood of palatal fistula (OR=0.78, $p=0.01$). Specifically, a decrease of one standard deviation in height for age (indicating worsening chronic malnutrition) was associated with a 22% increase in the risk of fistula. No relationship was found between weight for age, age, race, or sex and the fistula rate in cleft palate patients, concluding that chronic malnutrition significantly increases the risk of postoperative fistula formation in patients undergoing palatoplasty.⁹

Among the broad range of postoperative complications that CLP patients may experience, oronasal fistula is one

of the most significant concerning functionality and social development, as it is a common complication in patients with a history of primary cheiloplasty. Current literature lacks consensus on the best treatment for oronasal fistulas located in the alveolar region.¹⁰

Various factors contribute to the development of craniofacial defects, and with the advent of epigenetics, numerous studies have aimed to identify genetic associations with this condition. Notably, the relationship with the AT-rich sequence-binding protein 2 gene (SATB2) located on chromosome 2q33.1 has gained relevance and is currently a target of investigation.¹¹

The article concludes that in low- and middle-income countries (LMICs), there is an increasing focus on environmental risk factors compared to biological factors in studying CLP. This emerging approach aids healthcare professionals in the early identification of the cumulative effects of these risks on CLP. The research suggests that adopting contextually relevant tools is crucial for promoting early detection of at-risk infants, leading to more effective interventions and better management of associated conditions.¹²

The objective of this article is to describe the prevalence of postoperative complications in patients with cleft lip and palate who were referred to the General Hospital of Mexico "Dr. Eduardo Liceaga" from other healthcare institutions across the country. By analyzing the frequency and types of complications observed in these patients, the study aims to identify patterns associated with surgical outcomes and highlight the need for improved initial surgical interventions to enhance long-term patient care and reduce the necessity for multiple corrective procedures.

METHODS

In this study, a retrospective design was employed to analyze postoperative complications in patients undergoing primary cleft lip and palate repair across various hospitals in Mexico.

The study population consisted of a total of 122 cases with cleft lip and palate sequelae, referred from other hospitals in the country to the General Hospital of Mexico "Dr. Eduardo Liceaga," specifically to the Plastic and Reconstructive Surgery Department in the cleft lip and palate clinic during the period from 2021 to 2023.

Data were collected by reviewing the medical records at the General Hospital of Mexico "Dr. Eduardo Liceaga," extracting information from clinical histories, and using google sheets to create tables and graphs with key variables, including postoperative complications, prior surgeries performed, patient age and state of origin.

The exclusion criteria for this study were: patients who were not operated on, patients who underwent surgery but

did not attend postoperative follow-up, patients who had surgery without any complications, and cases where medical records could not be found in the clinical archive.

The inclusion criteria were: patients who presented with postoperative complications and were referred to the Plastic Surgery Department between January 2021 and December 2023.

RESULTS

The study included a sample of 122 patients undergoing primary cleft lip and palate repair across various hospitals

in Mexico (Figure 1), of whom 65 were male (53.3%) and 57 were female (46.7%) (Figure 2A). The patients with the highest incidence of complications were those aged 16 years ($n=11$), and the average age in our study was 16 years, with a range of 1 to 49 years. When grouped by age range, 17 patients (13.9%) were between 1–5 years, 12 (9.8%) between 6–10 years, 28 (23.0%) between 11–15 years, and 35 (28.7%) between 16–20 years. Fewer cases were observed in older age groups: 15 patients (12.3%) were aged 21–25, 3 (2.5%) between 26–30, 2 (1.6%) between 31–35, 4 (3.3%) between 36–40, 1 (0.8%) between 41–45, and 4 (3.3%) between 46–50 years (Figure 2B).



Figure 1: Cleft lip and palate sequelae from digital archive HGM.

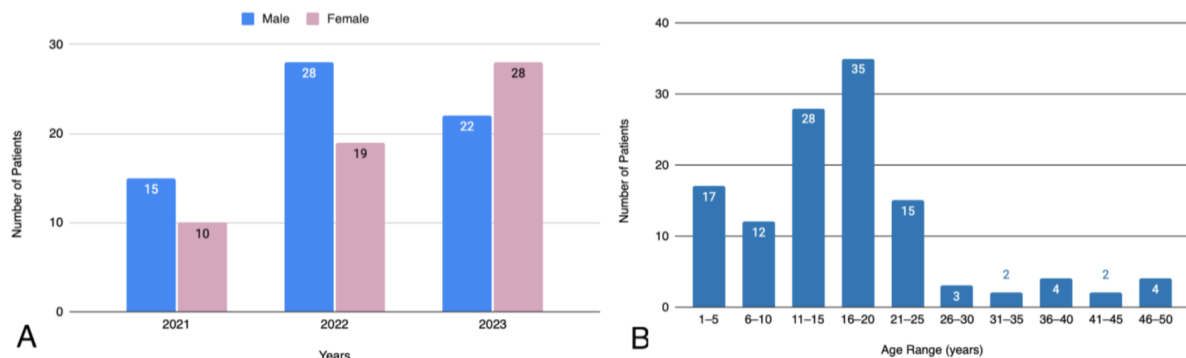


Figure 2: A) Distribution of patients with cleft lip and palate according to sex. B) Age distribution of patients by age groups.

Table 1: Geographical distribution of the population treated in the General Hospital of Mexico.

State	2021	2022	2023	Total
State of Mexico	15	30	29	74
Mexico city	7	13	10	30
Michoacan	1	0	2	3
Hidalgo	1	0	2	3
Tamaulipas	0	0	3	3
Oaxaca	0	1	2	3
Guerrero	0	2	0	2
Veracruz	0	0	2	2
Tlaxcala	1	0	0	1
Jalisco	0	1	0	1

The states where the patients arrive were State of Mexico 60.7% (74 patients), Mexico City 24.6% (30 patients), other states like Michoacan, Hidalgo, Oaxaca and Tamaulipas with less recurrence 2.5% (3 patients) each one, Guerrero and Veracruz 1.6% (2 patients) and Tlaxcala and Jalisco 0.8% (1 patient) (Table 1).

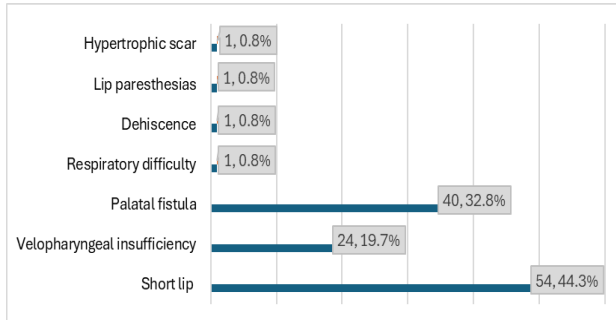


Figure 3: Total distribution of postoperative sequelae of CLP from 2021 to 2023.

Among them, 44.3% (n=54) presented with short lip, 32.8% (n=40) with palatal fistula, and 19.7% (n=24) with

Table 2: Relationship between previously performed surgeries and the number of complications developed.

Surgery performed	Short lip	Velopharyngeal insufficiency	Palatal fistula	Respiratory difficulty	Lip paresthesias	Dehiscence	Hyper-trophic scar
Cheiloplasty	17	1	1	0	0	0	0
Cheiloplasty + Palatoplasty	32	18	34	1	1	1	1
Cheiloplasty + Palatoplasty + Rhinoplasty	3	3	3	0	0	0	0
Palatoplasty + Rhinoplasty	0	2	2	0	0	0	0
Cheiloplasty + Rhinoplasty	2	0	0	0	0	0	0

The total number of patients who attended the cleft lip and palate clinic was recorded as 70 in 2021, 119 in 2022, and 124 in 2023, resulting in a total of 313 patients who sought care between 2021 and 2023. Of these, the percentage of patients whose reason for consultation was related to postoperative complications of CLP was 35.7% (n=25) in 2021, 39.5% (n=47) in 2022, and 40.3% (n=50) in 2023 (Figure 4).

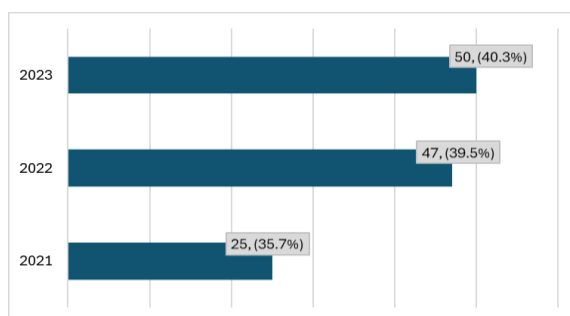


Figure 4: Percentage of total CLP consultations related to postoperative complications by year.

velopharyngeal insufficiency. In addition to these complications, other less common complications were identified, including respiratory difficulty 0.8% (n=1), lip paresthesias 0.8% (n=1), dehiscence 0.8% (n=1), and hypertrophic scars 0.8% (n=1), each recorded as a single case during the three-year period (Figure 3).

The global incidence of postoperative complications in cleft lip and palate (CLP) patients over the three-year period (2021-2023) reveals key trends. The most common complication was short lip, affecting 17.3% of patients, followed by palatal fistula at 12.8% and velopharyngeal insufficiency at 7.7%. These complications are typically associated with the surgical management of CLP. Less common complications, such as respiratory difficulty, dehiscence, lip paresthesia, and hypertrophic scarring, each had a global incidence of approximately 0.3%. These findings highlight the need for continued monitoring and intervention strategies, particularly for more frequent complications like short lip and palatal fistula, while addressing less frequent but significant issues like scarring and sensory changes (Table 2).

Overall, 38.9% (n=122) of the patients consulted over these three years for complications related to previously performed cleft lip and palate surgery.

Regarding the relationship between the type of surgery performed and the complications developed, it was observed that for short lip, velopharyngeal insufficiency, and palatal fistula, the surgery most associated with complications was the combination of cheiloplasty and palatoplasty (Table 3 and 4). The analysis of the relative risk (RR) of complications based on the number of surgeries reveals several important findings. Short Lip: Patients who underwent two surgeries had a significantly higher relative risk (RR=4.0) of developing a short lip compared to those who had only one surgery. However, the risk for patients with three or more surgeries was the same as those with one surgery (RR=1.0). Velopharyngeal Insufficiency: The risk of velopharyngeal insufficiency was higher for patients with two surgeries (RR=2.2) and slightly elevated for those with three or more surgeries (RR=1.6) compared to patients with a single surgery.

Palatal Fistula: Patients with two surgeries had a higher risk of developing a palatal fistula ($RR \approx 1.92$) compared to those with one surgery. Interestingly, patients with three or

more surgeries had a lower risk ($RR \approx 0.42$) of this complication.

Table 3: Postoperative complications and their relationship with the number of surgical interventions each patient has undergone.

Number of surgical interventions	Complication						
	Short lip	Velo-pharyngeal insufficiency	Palatal fistula	Respiratory difficulty	Lip paresthesias	Dehiscence	Hyper-trophic scar
One surgery	9	5	12	0	0	1	0
Two surgeries	36	11	23	0	1	0	1
Three or more surgeries	9	8	5	1	0	0	0

Table 4: Postoperative complications and their relative risk each patient has undergone.

Complication	Number of cases			Relative risk	
	One surgery	Two surgeries	Three or more surgeries	RR (two surgeries)	RR (three or more surgeries)
Short lip	9	36	9	4	1
Velopharyngeal insufficiency	5	11	8	2.2	1.6
Palatal fistula	12	23	5	1.92	0.42

Table 5: Annual and global incidence of postoperative complications in cleft lip and palate patients from 2021 to 2023.

Complication	Incidence			
	2021 (%)	2022 (%)	2023 (%)	Global Incidence (%)
Short lip	21.40	16.00	16.10	17.30
Velopharyngeal insufficiency	7.10	5.90	9.70	7.70
Palatal fistula	7.10	16.00	12.90	12.80
Respiratory difficulty	0	0.80	0	0.30
Dehiscence	0	0.80	0	0.30
Lip paresthesia	0	0	0.80	0.30
Hypertrophic scar	0	0	0.80	0.30



Figure 5: Preoperative and postoperative examples of cleft lip and palate sequelae from the digital archive of the Hospital General de México (HGM).

Patients who underwent a single surgery experienced 9 cases of short lip, 5 cases of velopharyngeal insufficiency, 12 cases of palatal fistula, 1 case of dehiscence, and no cases of respiratory difficulty, lip paresthesia, or hypertrophic scar.

In patients with two surgeries, there were 36 cases of short lip, 11 cases of velopharyngeal insufficiency, 23 cases of palatal fistula, and 1 case each of lip paresthesia and hypertrophic scar, with no respiratory difficulty or dehiscence reported.

Patients who underwent three or more surgeries showed 9 cases of short lip, 8 cases of velopharyngeal insufficiency, 5 cases of palatal fistula, 1 case of respiratory difficulty and no reports of lip paresthesias, dehiscence, or hypertrophic scar (Table 5).

DISCUSSION

This study revealed a significant prevalence of postoperative complications among patients referred to the General Hospital of Mexico. These findings align with previously published literature, where only 66 out of 408 studied patients developed complications: 25 cases (8%) of fistulas, 24 cases (7%) of dehiscence, and 17 cases (5%) of infections, with fistulas being the most common complication. In contrast, this study identified short lip as the most prevalent complication, followed by palatal fistula, likely due to differing surgical techniques used in patients from Nicaragua and Mexico. The discrepancy with the prospective cohort in Nicaragua lies in the complication rate, which was only 16.2%, compared to a significantly higher prevalence in our study (38.9%), with short lip being the most frequent complication. This may stem from differences in complication definitions, follow-up duration, or surgical complexity, particularly since our cohort included patients with multiple prior interventions referred from external institutions. Furthermore, the mission-based setting in the Nicaraguan study involved standardized surgical protocols, while our sample reflected a wider variety of surgical backgrounds, which may contribute to outcome variability.¹³

Various risk factors during pregnancy have been identified that predispose individuals to the development of cleft lip and palate, including a family history of the condition (143% higher risk), lack of folic acid supplementation (184% higher risk compared to those who take it), maternal age over 35 years, and exposure to high temperatures exceeding 39°C (116% higher risk compared to women without such exposure).¹⁴

From a clinical perspective, these findings highlight the need for standardized protocols to guide perioperative and postoperative management, particularly in patients at higher risk for complications. Close and continuous follow-up is crucial for the early identification and treatment of complications, such as fistulas or velopharyngeal insufficiency, which impact both the patient's quality of life and social integration.

Our results align partially with those of Hashemi Hosseinabad et al, who found a 23.7% incidence of palatal fistulas, especially in patients with bilateral clefts, underscoring the role of cleft type in predicting complications.¹⁵ Meanwhile, Jodeh et al, analyzing over 7,000 cases in the U.S., reported lower rates of fistula repair (6.4%) and secondary speech surgeries (18.5%), suggesting the benefits of institutionalized care protocols and early interventions.¹⁶ A particularly striking contrast is found in the work of Losee et al., who achieved a fistula rate of just 0.76% using a comprehensive algorithm that included techniques such as complete intravelar veloplasty and the use of acellular dermal matrices.¹⁷ These comparisons reinforce the importance of unified protocols and consistent definitions across studies.

Sink et al recently proposed a universal classification for cleft-related complications, which could help harmonize outcome reporting globally and facilitate more reliable benchmarking.¹⁸ Additionally, Mossey et al emphasized disparities in access to multidisciplinary care and surgical quality in low- and middle-income countries, factors that directly influence complication rates.¹⁹ This is supported by Poenaru et al, who identified malnutrition and comorbidities as significant contributors to poor outcomes in pediatric surgical care in resource-limited settings.²⁰ These contextual factors should be considered when interpreting the variability in complication prevalence between studies.

Finally, this work underscores the need for further research into factors influencing the development of complications, including genetic and environmental aspects not assessed in this study. Integrating these variables in future studies could allow for more personalized surgical treatments and improved long-term outcomes for patients with cleft lip and palate. Such efforts aim to optimize care for this vulnerable population and reduce complication rates, enhancing both functional and aesthetic results.

This study has several limitations. Its retrospective design inherently restricts the ability to establish causal relationships, and the reliance on complete clinical records may have led to selection bias or incomplete data capture. Additionally, the lack of consistent postoperative follow-up for some patients likely resulted in an underestimation of complication rates. Another important limitation is the inability to control for surgical variables such as technique, operative time, or surgeon experience, as many patients were referred from external institutions without detailed operative reports. Furthermore, no multivariate analysis was conducted to adjust for potential confounding variables, which may have influenced the observed associations. These limitations should be considered when interpreting the findings and underscore the need for future prospective studies with standardized follow-up and comprehensive data collection, as systematic and continuous monitoring could provide more accurate information on the factors associated with complications and their management.

CONCLUSION

The findings emphasize the importance of achieving an optimal surgical outcome from the initial procedure, as patients who underwent a single surgery experienced significantly fewer complications compared to those requiring multiple interventions. This highlights the need to prioritize high-quality primary surgery to minimize the risk of subsequent complications and reduce the need for additional procedures, ultimately improving long-term patient outcomes. Additionally, we included images of preoperative patients to underscore the importance of proper identification and management of cleft-related sequelae, as shown in Figure 5, which illustrates how early

recognition and intervention can contribute to improved surgical and functional results.

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