

Retrospective study of postoperative complications in primary lip and palate surgery

RETROSPECTIVE STUDY OF POSTOPERATIVE COMPLICATIONS IN PRIMARY LIP AND PALATE SURGERY

ESTUDIO RETROSPECTIVO DE LAS COMPLICACIONES POST-OPERATORIAS EN LA CIRURGÍA PRIMARIA DE LABIO Y PALADAR

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ABSTRACT

This retrospective study addressed the complications of primary lip and palate surgeries, and was carried out at Craniofacial Anomalies Rehabilitation Hospital at University of São Paulo. The present study aimed to identify the most frequent complications, as well as verifying the relations between demographic variables and the complications observed. The sample comprised the records of 484 patients submitted to primary lip and palate surgery during the period of November 2000 to April 2001. The results demonstrated predominance of white male individuals with a median age of 12 months. The most frequent type of cleft was complete cleft lip and palate, and cheiloplasty was the most prevalent surgery. Of the 484 patients included in the study, 58.05% presented at least one or more postoperative complications. Pain was the most frequent problem in the evaluated group, followed by oxygen desaturation and tachycardia.

KEY WORDS

Postoperative complications.
Cleft lip.
Cleft palate.

RESUMO

Estudo retrospectivo das complicações de cirurgias primárias de lábio e palato, do Hospital de Reabilitação de Anomalias Craniofaciais da Universidade de São Paulo, teve como objetivos identificar as complicações mais frequentes, e verificar a associação entre as complicações identificadas e as variáveis demográficas. Foram verificados 555 prontuários de pacientes submetidos à cirurgia de lábio e/ou palato em um período de seis meses, destes foram excluídos pacientes sindrônicos, aqueles que tiveram complicações intra-operatórias e com os prontuários incompletos, resultando numa amostra de 484 prontuários. Obteve-se o predomínio do sexo masculino (60,5), a etnia branca (91,9%), eutrófica com média de idade de 37 meses, a fissura mais incidente foi a transforame (64,5%) e a cirurgia predominante foi a queiloplastia (56,6%). A dor foi a complicação mais freqüente seguida da desaturação de oxigênio e taquicardia. Não houve associação estatisticamente significativa entre as complicações identificadas e o sexo, estado nutricional e procedimento cirúrgico.

DESCRIPTORIOS

Complicações pós-operatórias.
Fenda labial.
Fissura palatina.

RESUMEN

El presente estudio retrospectivo sobre complicaciones de cirugías primarias de labio y paladar, del Hospital de Rehabilitación de Anomalías Craneofaciales de la Universidad de Sao Paulo, tuvo como objetivos identificar las complicaciones más frecuentes y verificar la relación entre las complicaciones identificadas y las variables demográficas. Fueron verificadas 555 historias clínicas de pacientes sometidos a cirugía de labio y/o paladar en un período de seis meses, de los cuales se excluyeron los pacientes sindrónicos, aquellos que tuvieron complicaciones intraoperatorias y las historias clínicas incompletas, dando como resultado una muestra de 484 historias clínicas. Se obtuvo un predominio del sexo masculino (60.5), de raza blanca (91.9%), eutrófica con un promedio de edad de 37 meses, la fisura de mayor incidencia fue la transforame (64.5%) y la cirugía predominante la queiloplastia (56.6%). El dolor fue la complicación más frecuente seguida de la desaturación de oxígeno y taquicardia. No hubo asociación estadísticamente significativa entre las complicaciones identificadas y el sexo, estado nutricional y procedimiento quirúrgico.

DESCRIPTORIOS

Complicaciones postoperatorias.
Labio leporino.
Fisura del paladar.

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INTRODUCTION

Lip or palate cleft is the most common congenital malformation, occurring among 1.2 to 1.6% of the live-born. In Brazil, some authors⁽¹⁾ report the prevalence of one case for every 650 of the live-born. Estimates show that there are roughly 260,908 people with cleft lip and palate in the country⁽²⁾.

For children born with a cleft, the reconstructing surgery is not only an esthetic challenge, but also functional. The primary lip surgery, also known as cheiloplasty, is performed to close the lip opening, caused by birth defect. If the cleft is bilateral, the closure of both sides may be performed at once, or the surgeon may opt to do it in two steps. The primary palate surgery, palatoplasty, is performed in order to close the palate opening in one or two steps.

The Rehabilitation Hospital of Cranioencephalic Anomalies at USP (HRAC-USP) recommends the minimum age of three years old in order to undergo cheiloplasty, and at least one year old when it comes to palatoplasty, if the patient meets the required organic conditions to be subjected to safe general anesthesia. These are: minimum weight of 4,500g, hemoglobin levels higher than 9.5g/dl for primary cheiloplasty and over 10g/dl for palatoplasty; white series without alterations; activated prothrombin and partial thromboplastin times, and fibrinogen doses within reference values.

Since this type of procedure does not characterize an emergency, due to the routine established by institutions, it presents a postoperative period with minimum risks. However, some authors⁽³⁻⁵⁾ show that hypoxemia, respiratory obstructions, hipovolemia, tongue edema are some of the complications commonly observed in post-anesthetic recovery rooms and associated with the type of surgery, to the type of anomaly and surgical technique.

Thus, in order to scientifically support the nursing care provided to patients with cleft lip and palate, and having in mind that with the knowledge about the complications there are improvements in the healthcare quality given to the SRPA patient, the objective is the identification of the most frequent complications in primary lip and palate surgeries in the postoperative period; verifying the possible associations between the most frequent postoperative complications and variables such as gender, ethnicity, age group, anthropometric assessment, type of cleft, and anesthetic surgical procedure performed.

METHOD

The study was carried out in the Craniofacial Anomalies Rehabilitation Hospital (HRAC), localized in Bauru, SP, a specialized center for the rehabilitation of people with lip and palate injuries, hearing impairments, craniofacial deformity, extremity malformations, and also multiple, visual or language impairments.

After the legal research procedures, in a 6-month period, 555 records of patients who underwent primary lip and/or palate surgery were accessed at the Data Processing Center (CPD) at HRAC of the University of São Paulo (USP). Of them, those excluded belonged to syndromic patients and/or with Pierre Robin sequence, five with complications during the intraoperative period and 30 were incomplete. Hence, the sample was composed of 464 patient records. For data collection, a form was elaborated with the following items: identification, age, ethnicity, gender, anthropometric measurements (Z score), type of cleft, surgical and anesthetic procedures performed and also clinical parameters and symptoms considered by several authors⁽⁶⁾ as indicators of SRPA complications when altered, such as: heart rate, temperature, blood pressure, oxygen saturation, tongue edema, hypoventilation, high respiratory obstruction, bleeding, pain, nausea and vomit, agitation/dysphoria, states of consciousness. It should be noted that among these parameters, some like hypoventilation, high respiratory obstructions, tongue edema, nausea, vomit, bleeding and pain are recorded according to the judgment of the professionals (i.e., notes).

Due to the different recording notations, some criteria were established to identify possible complications and the physiological system involved, according to the chart.

In order to obtain the anthropometric measurements (Z score), the data on weight, height and age were inserted in computer software: *Anthropometric Statistical package interactive data entry program*. It uses standard deviation from NCHS population growth curves of the Center of Disease Control (World Health Organization, 1986). In this program, it is possible to calculate the Z score of patients with heights up to 140 cm.

For the statistical analysis of the study, the following was calculated: average, standard deviation and the variation coefficient as well as the absolute and relative frequencies, the McNemar association and comparison coefficient and the Pearson contingency coefficient. In all the analyses, the statistics were considered significant when $p < 0.05$.

For children born with a cleft, the reconstructing surgery is not only an esthetic challenge, but also functional.

Table 1 - Criteria for identification of complications - Bauru - 2003

Physiological System Involved	Complication	Identification Criteria
Respiratory	Hypoventilation	Observation note
	High Respiratory Obstruction	Stridor (observation note)
		Laryngospasm (observation note)
	Oxygen Desaturation	Observation note Oxygen Saturation <90%
	Tongue Edema	Observation note
Central Nervous	Pain	Agitation/Dysphoria (observation note)
		Crying (observation note)
		Tachycardia
		Did not receive pre-medication for pain (observation note)
		Did not receive surgical incision infiltration with local anesthetics (observation note)
	Needed pain medication in the SRA	
	Observation note	
Agitation/Dysphoria	Observation note	
Sleepiness	Unconsciousness for over 15 minutes after admission	
Hypothermia	Temp. <36°C	
Hyperthermia	Temp. >37°C	
Cardiovascular	Tachycardia	Heart frequency up to 11 m > 160 b/min., up to 24 m > 140 b/min., and up to 36 m > 120 b/min. and over 36 m > 115 b/min
	Bradycardia	Heart frequency up to 36 m <70 b/min and over 36 m < 50 b/min
	Hypertension	Systolic Pressure > 20% than preoperative period
	Hypotension	Systolic Pressure < 20% than preoperative period
	Hemorrhage	Observation note
Gastrointestinal	Nausea and Vomit	Observation note
Endocrinological	Malnutrition	Z Score < -2.0
	Nutritional Risk	Z Score between -1.28 and -2.0
	Overweight	Z Score higher than 1.28

RESULTS

The demographic data are represented in Table 2 and display a sample with the patients average age of 37.5 months (sd = 77 months and 5 days), average Z score of 0.02 (sd= 1.8). The majority of the sample was white (91.9%), males (60.5%), with a foramen cleft type (64.5%), and subjected to cheiloplasty (56.6%). Regarding the type of anesthesia, inhalatory general anesthesia with sevoflurane was predominance (99.2%).

In this study, the most frequent complications were considered to be those with over 77 citations in the examined records. Notes about pain were found in 108 records (22.3%), oxygen desaturation in 84 (17.4%) with an average of 75 (sd=0.1), tachycardia in 81 (16.74%) with an average rate of 175 beats per minute (sd=23).

Table 2 - Characteristics of the patients subjected to surgery - Bauru - 2003

Characteristics	No (%) or Average ± SD
Age	37,5 ± 77,5
Z Score	0,02 ± 1,8
Ethnicity	
White	445 (91,9)
Black	10 (2,1)
Mixed	29 (6,0)
Gender	
Male	293 (60,5)
Female	191 (39,5)
Type of cleft	
Foramen	312(64,5)
Pre-foramen	10(22,7)
Post-foramen	12(6,6)
Pre and Post foramen	30(6,2)
Type of surgery	
Cheiloplasty	274(56,6)
Palatoplasty	208(43,0)
Cheilo+Palatoplasty	2(0,4)
Type of Anesthesia	
General inhalant	480(99,2)
General intravenous	4 (0,8)
Total	484

Table 3 - Distribution of the most frequent complications and the involved physiological systems, after primary cleft lip and palate surgery - Bauru - 2003

Physiological System	Complications	N	%
Central Nervous System	Pain	108	22,3%
	Hypothermia	53	10,9%
	Agitation/Dysphoria	41	8,5 %
	Hyperthermia	21	4,3%
	Sleepiness	8	1,6%
	Shaking	0	0%
Respiratory	Oxygen Desaturation	84	17,4%
	Hypoventilation	30	6,2%
	High Respiratory Obstruction	14	2,9%
	Tongue Edema	6	1,2%
Cardiovascular	Tachycardia	81	16,7%
	Hemorrhage	27	5,6%
	Bradycardia	3	0,6%
	Hypertension	1	0,2%
	Hypotension	1	0,2%
Gastrointestinal	Nausea and Vomit	5	1,0%

Table 4 - Distribution of patients according to gender, type of surgery, anthropometric measurements and complications - Bauru - 2003

	Complication		Total
	Yes	No	
Gender			
M	172	121	293
F	109	82	191
Type of surgery			
Cheiloplasty	163	1	274
Palatoplasty	116	92	208
Cheilo+Palatoplasty	2	0	2
Anthropometric Measurements*			
Malnutrition	8	5	13
Eutrophic	221	139	360
Obese	18	17	35
Nutritional Risk	20	21	41

*35 patients with heights over 140 cm were excluded from the sample

Association among the studied variables

The analyses presented herein are those whose sample population could be treated statistically.

Regarding the 293 male patients, 172 had complications within the studied period. Of the 191 female patients, 109 showed some type of complication. However, there was no significant association between gender and post-operative complications. ($\chi^2 = 0.128$ and $p > 0.50$). The same applies to the occurrence of complications in function of the type of surgery, the statistical tests ($\chi^2 = 0.672$ and $p > 0.30$) and the anthropometric measurements ($\chi^2 = 3.466$ and $p > 0.10$), i.e., there was no association between these studied variables.

Pain is the most-often cited complication, as the data in Table 4 show, and there is higher occurrence of pain in cheiloplasty ($\chi^2 = 7.730$; $p < 0.05$ e $\phi = 0.13$).

Table 5 - Distribution of patients in function of the occurrence of pain and oxygen desaturation, by surgery type - Bauru - 2003

Type of surgery	N (A)	Pain			O ₂ Desaturation		
		Sample (B)	A/B	N (A)	Sample (B)	A/B	
Cheiloplasty	74	274	27,0%	41	274	14,0%	
Palatoplasty	34	208	16,3%	42	208	20,2%	
Cheilo+Palatoplasty	0	2	0,0%	1	2	50,0%	
Total	108	484	22,3%	84	484	17,3%	

It does not apply to the second most-often cited complication, oxygen desaturation ($\chi^2=2.269$; $p > 0.10$).

Oxygen desaturation also showed a statistically significant relationship with the age group from 6 to 12 months and from 12 to 18 months ($c^2 = 12.864$; $p < 0.02$ and $C=0.16$) whose occurrence proportions were 25.9% and 23.1%, respectively (Table 6).

Table 6 - Distribution of patients with oxygen desaturation, according to age group - Bauru - 2003

Age Group (months)	O ₂ Desaturation Frequency (A)	Sample Population (B)	Percentile Proportion (A/B)
I ₁ : <6	17	125	13.6
I ₂ : 6 – 12	21	81	25.9
I ₃ : 12 – 18	30	130	23.1
I ₄ : 18 – 120	12	105	11.4
I ₅ : ≥ 120	4	43	9.3
Total	84	484	17.4

$\chi^2 = 12.864$, $p < 0.02$ and $C=0.16$

DISCUSSION

The age of the group in the study showed an average age of 37.5 months. The higher concentration of patients in the age group from 0 to 18 months is justified because it is the right moment to perform the cleft lip and palate correction, that is, the cheiloplasty procedure, starting at three months old and palatoplasty, starting at 12 years old, are considered by surgeons as favorable, concerning the surgical anesthetic procedure⁽⁷⁾.

The anthropometric measurements showed an average Z score (weight in relation to height, regarding gender and age) of 0.02. It should be pointed out that from the sample of 484 patients, it was possible to calculate the Z score of 449, given that the height of 35 individuals was over 140 cm.

Among these 449 patients, 360 (80.2%) were classified as eutrophic. The nutritional and metabolic status of the surgical patient is an important variable when it is related to postoperative complications, since the organism greatly depends on recovery, mainly regarding healing the surgical wound, showing evidence of interference in the organism's defense mechanisms⁽⁸⁾.

It has been demonstrated, in the present study, that there was no significant statistical association between the nutritional status of the anthropometric measurement and postoperative complications. This finding should be further investigated in other studies, since it was not possible to properly analyze the patients' nutritional status, as the survey was limited to anthropometrical data, with-

out considering other biochemical, clinical and dietary information.

Concerning gender, there was a higher incidence of males (60.5%). This finding corroborates others found in literature, in which there were 60% of clefts in males⁽⁹⁾.

Regarding the cleft, the incisive foramen cleft (64.5%) was the most common. This is often the most common type in the population. It has been found that white patients are predominant (91.9%), which contrasts to other authors⁽⁶⁻⁹⁾ who indicate a higher prevalence of cleft lip and palate in yellow patients (1:674 live-born), followed by white patients (1:1000 births) and lower incidence in black patients (1:1821 births).

Considering the type of primary surgery performed, cheiloplasty appears in higher numbers (56.6%), followed by palatoplasty, 43.0%.

Regarding the type of anesthesia performed in the surgical procedures, the general inhalatory procedure appears in 99.2%, with sevoflurane used as the main agent. This drug determines good cardiopulmonary stability and predictable response, both in the induction period and anesthetic emergency, with properties such as absence of pain, no irritation of the airways, low blood/gas partition coefficient and little depression of the cardiovascular and respiratory systems. The low blood/gas partition coefficient provides rapid increase in the alveolar concentration during the anesthesia induction, and fast drops during the elimination of the inhalatory agent, providing faster induction and recovery⁽¹⁰⁾.

Postoperative Complications in the Postanesthetic Recovery Period

More specifically, in a retrospective study on lip and palate surgery complications, some authors⁽¹¹⁾ obtained complication rates from 14.2% to 17.4%. Thus, the constant presence of complications is detected, with an occurrence variation that is determined not only by the specificity of each procedure, but also related to the patient risks.

In the present study, 58.0% of the 484 patients subjected to primary lip and palate surgery at HRAC-USP showed at least one complication at the SRPA. Despite its high incidence, when compared to specific literature, there was no significant statistical association ($\chi^2 = 0.672$ and $p > 0.30$) between postoperative complications and the type of surgical procedure. This fact may be associated with the methodology employed, i.e., despite the seriousness and legality of the records used for the research, the likelihood of different judgments of an observed fact should be noted.

Among the cited complications, the most frequent was pain, followed by oxygen desaturation and tachycardia.

When the patients with pain are associated with the type of surgical procedure, the higher occurrence of this symptom was found in cheiloplasty, with 27.0%. This type of surgery often occurs, at the HRAC-USP, before patients are 12 months

old. Nevertheless, in this age group, the verbal answer is impaired. Thus, the measurement and evaluation of complications in pediatric patients are challenges to the professionals working with this type of clientele. For this analysis, several factors should be considered, such as the nature of harmful stimuli, physiological, behavioral and emotional responses and environmental and situational factors.

Taking tachycardia into consideration as an adopted criterion to identify pain, it was found that, of the 108 patients who presented it, 25 showed tachycardia, which demonstrated the existence of an association ($\chi^2 = 4.108$; $p > 0.05$ e $\phi=0.09$) between tachycardia and pain. Tachycardia is caused by pain due to cardiovascular effects initiated catecholamine, aldosterone, cortisol and anti-diuretic hormones. These hormones have direct effects on the heart and its vascularization, increasing salt and water retention, which increases the cardiovascular system load⁽¹²⁾. Besides the alterations in the cardiovascular parameters, significant alterations in the transcutaneous oxygen and palm perspiration have been observed in children subjected to painful clinical procedures. These physiological variations have been useful to examine the painful experiences associated with short-term medical procedures; however, there are no physiological responses that directly reflect the perception of pain in children⁽¹³⁾.

The same was observed in relation to these patients with pain and the records of agitation/dysphoria ($\chi^2 = 9.472$ and $p > 0.01$). The subjective suffering status caused by pain can be observed in behaviors such as facial expressions (making faces), posture (guard) and focalization (crying and moaning).

Regarding the routinely use of pre-emptive analgesia at the HRAC-USP to reduce postoperative pain, 423 of the 484 patients in the study received pre-medication. Even so, 52 patients had new records, meaning that they required other strategies to relieve pain.

The HRAC-USP surgeons, as an alternative to reduce postoperative pain, performed infiltrations in the surgery wounds with local anesthesia, which has shown to effectively reduce immediate postoperative pain. However, empirically, its adoption in the clinical practice has been slow, which can contribute to increasing the immediate postoperative pain.

Oxygen desaturation, as the second most frequent complication (17.4%), is also mentioned in another study⁽¹⁴⁾, which identified, among the 24,157 patients who received general anesthesia, a occurrence roughly 1.3% of other respiratory complications. The most critical complication was hypoxemia, followed by hypoventilation and respiratory obstruction.

The physiological changes during anesthesia and surgery are not immediately reversed after the end of the procedure, and several associated complications occur during the first hours after anesthesia. This is the postoperative period, when the patients are prone to develop oxygen desaturation. Some authors⁽⁶⁾ found evidence of hypoxemia in the immediate postoperative period of 23.8% in

1,213 children subjected to elective plastic surgery, with 2.9% showing severe hypoxemia (oxygen saturation lower or equal to 85%). One study⁽³⁾ found a 14.8% incidence of hypoxemia, and 6.2% of severe hypoxemia in 420 children subjected to simple plastic surgery.

The age between 44 and 74 weeks after birth is when children have demonstrated greater vulnerability to events of oxygen desaturation in the postoperative period⁽⁴⁾. In this study, the age group in which there was oxygen desaturation was from 6 to 18 months, with a significant statistical association ($\chi^2 = 12.864$ and $p > 0.002$ and $C= 0.16$) between age group and oxygen desaturation.

The palate closure is a type of surgery with high risks of postoperative hypoxemia, when compared with other plastic surgeries⁽⁵⁾. However, in the present study, both cheiloplasty and palatoplasty showed similar frequencies of oxygen desaturation and no statistical significance ($\chi^2 = 2.269$; $p > 0.10$). The palate closure procedure, associated with the result obtained, cannot be considered responsible for the occurrence of oxygen desaturation in the studied sample.

The incidence of oxygen desaturation, in this study, may also be related to other factors such as upper airway malformation and absence of oxygen during patient transportation from the operating room to the SRPA, a procedure that is not a routine of this institution, contributing to increasing the incidence of oxygen desaturation.

Regarding the third most commonly mentioned complication, cardiovascular complications in the postoperative period have been reported by several authors⁽¹⁵⁻¹⁶⁾ as the most common at SRPA admission, i.e., in 13.1% of 1,047 cases treated within a year.

In this study, tachycardia stands out in 81 patients (16.7%), with average heart frequency of 179 beats/minute.

CONCLUSIONS

Based on the findings related to the demographic data of this retrospective study on postoperative complications of primary lip and palate surgery, it may be concluded that the studied group showed an average age of 37 months; patients were predominantly white, 91.9%; patients were predominantly males; the anthropometric measurement showed that most were eutrophic; the most common type of cleft was transforamen; cheiloplasty stands out as the most commonly performed type of surgery; general inhalatory anesthesia was predominant.

The most frequent postoperative complications were pain during cheiloplasty, followed by oxygen desaturation and tachycardia. There was no significant statistical association between these complications and gender, nutritional status and surgical procedure. There was a significant association between pain and pre-medication for pain, type of surgery, tachycardia and agitation/dysphoria, as well as oxygen desaturation and age group.

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