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Surgical outcome and complications following cleft lip and palate repair in a teaching hospital in Nigeria

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ABSTRACT

Background: Measurement of treatment outcome is important in estimating the success of cleft management. The aim of this study was to assess the surgical outcome of cleft lip and palate surgery. **Patients and Methods:** The surgical outcome of 131 consecutive patients with cleft lip and palate surgeries between October 2008 and December 2010 were prospectively evaluated at least 4 weeks postoperatively. Data collected included information about the age, sex, type of cleft defects, and type of surgery performed as well as postoperative complications. For cleft lip repair, the Pennsylvania lip and nose (PLAN) score was used to assess the surgical outcome, while the integrity of the closure was used for cleft palate repair. **Results:** A total of 92 patients had cleft lip repair and 64 had palate repair. Overall, 68.8% cases of cleft lip and palate repair had good outcomes; 67.9% of lip repairs had good lip and nose scores, while 70.2% of palatal repair had a good surgical outcome. Oro-fistula was observed in 29.8% of cleft palate repairs Inter-rater reliability coefficient was substantially significant. **Conclusions:** The fact that 25.7% of those treated were aged >1 year suggests a continued need to enlighten the public on the availability of cleft lip and palate expertise and treatment. Although an overall good treatment outcome was demonstrated in this study, the nasal score was poorer than the lip score. Complication rate of about 14% following surgical repair is consistent with previous reports in the literature.

Key words: Cleft lip and palate, Pennyslvannia lip and nose score, von langenbeck

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INTRODUCTION

A wide range of surgical techniques are used for repairing cleft lip and palate, and there is no consensus among surgeons regarding the protocol, timing, and technique of repair.[1] Measurement of treatment outcome is vital in estimating the success of cleft management and quality improvement, especially in the present age, when evidence-based medical care and treatment guidelines regarding the best practice is becoming an integral part of contemporary clinical practice.[2] Many potential outcomes for comparing cleft lip and palate treatment have been reported, including dentofacial growth and development, facial appearance, speech, hearing, nasal breathing, quality of life, and patient satisfaction.[1,2] However, there is no agreement among the various specialists in cleft care regarding which one of these outcome measures is most important.[3]

Improvements in the appearance of the lip and nose are the most frequently desired aspects for further treatment by patients with clefts and their parents.[2] However, developing a reliable rating for measurement of nasolabial appearance has remained a challenge. The methods described for assessment of nasolabial appearance can be broadly divided into qualitative and quantitative methods.[4] While the latter aims to analyze objectively the extent of abnormal morphology and the degree of disproportion through facial measurements, the former (qualitative methods) are more subjective, and they analyze facial aesthetics and appearance impairment using scales, indices, scoring systems, and rankings.[4]

The goals of palatal surgery are closure of the communication between the oral and nasal cavities and construction of a functional velum that allows good speech production.[5]

There is a growing appreciation of measuring the outcome of cleft repairs to determine the chance of

negative consequences, advising patients, predicting surgical outcomes, generating policies about safe clinical care, and allocating resources.[6] This has also been reported to help in objective determination of surgeon performance.[7] Cleft lip and palate repairs outcome would serve as a benchmark for comparison with other cleft centre and may expose critical areas that require attention and training.[7] This may also facilitate the attainment of the gold standard in cleft management and adequate information of patient about expected treatment outcome after surgery.[6,7] Moreover, it might also assist in determining the need for secondary cleft surgery.[8] There are the underlying needs for follow-up, documentation, and evaluation of cleft treatment.

There is paucity of studies in Nigeria that have attempted to comprehensively and objectively document the surgical management outcome of orofacial clefts.[9-11] Hence, there is a need for reliable data generation in surgical management of cleft deformity in a developing country such as Nigeria.

The findings of this study may help add to the literature on surgical management of cleft lip and palate deformity and may serve as a useful tool for healthcare service providers in assessing the cleft care needs and provision of adequate facilities for optimal orofacial cleft treatment delivery in Nigeria.

PATIENTS AND METHODS

A total of 131 consecutive patients who had undergone cleft lip and palate surgeries at the Lagos University Teaching Hospital between October 2008 and December 2010 were enrolled in this study. All eligible subjects that presented to the clinic for primary repair of congenital cleft lip and palate deformities were included in the study. Subjects with acquired cleft deformities of the lip and palate and all orofacial cleft based on Tessier's classification[12] were excluded from the study.

The study was approved by the Research and Ethics Committee of the Lagos University Teaching Hospital.

Written informed consents were obtained from all the subjects or their parents/guardian before enrollment in the study. Prior to this, detailed information and explanations of the study was provided to each subject or their parents/guardians. An opportunity for questions was ensured and appropriate clarifications were given to each subject or their parents/guardian before the commencement of the study. Opportunity to withdraw at any stage of the study was made known to each subject or their parents/guardian without victimization or denial of treatment.

Data forms were used to collect the desired information from the subjects or subjects' informants such as age, gender, types of cleft defect, occupation, reason for presentation, presence of congenital anomalies, and other relevant details as reflected in Appendix I. Other data collected include information on type of surgical intervention, repair technique, peri- and postoperative complications, and any other relevant findings (Appendix I). Relevant clinical findings of the subjects were documented after clinical examination of the subjects and on subsequent follow-up. Relevant medical and radiological investigations (full blood count, chest radiographs, and echocardiography) were requested when indicated after history taking and clinical examination.

Cleft lip and palate were classified according to Kernahan and Stark (1958), as modified by the International Confederation for Plastic and Reconstructive Surgery in 1967.[13,14] Clinical photographs were taken of each patient on presentation, at different stages of management, and on subsequent review visits within the study period to illustrate the physical defect preoperatively and its management outcome.

Routine surgical preoperative workup was done for the subjects [who met the minimum criteria of age ≥10 weeks, weight ≥10 pounds (4.5 kg) with a hemoglobin concentration of 10 gm/dl, and free from upper respiratory tract infection] before scheduling for surgical operation. For cleft palate repair, all subject were aged at least 10 months. All subjects were certified fit for surgery by the anesthetic team.

Surgical repair was performed under general anesthesia in most cases; however, some cases of consenting adult cleft lip were repaired under local anaesthesia using 2% xylocaine with adrenaline (1:80,000).

Surgical repair was carried out by 4 consultant oral and maxillofacial surgeons, assisted by senior registrars. The lead surgeon determined the surgical technique for each case [Figure 1].

Procedures

1. Unilateral cleft lips (complete or incomplete) were repaired by Millard rotation advancement[15] or Tennison Randal[16,17] (Triangular repair) techniques. Primary closed rhinoplasty was



Figure 1: Left unilateral incomplete cleft lip in a subject

performed concurrently with all primary unilateral lip repairs.
2. Bilateral cleft lips were repaired by Millard forked flap technique.[18,19]
3. Complete/incomplete unilateral or bilateral cleft palates were repaired with von Langenbeck palatorraphy[20] modified with intravelar veloplasty[21] for subjects aged 10–18 months and at time of presentation for older subjects.
4. Soft palate clefts were repaired by von Langenbeck technique with intravelar veloplasty for subjects aged 10-18 months and at time of presentation for older subjects.

The subjects were reviewed regularly after the surgery and evaluated not less than 4 weeks following repair.

Clinical evaluation of the surgical outcome of the repaired orofacial clefts were done not less than 4 weeks after surgery. Prior to the study, the two observers were trained on the use of the lip and palate assessment tools. The lip and palate assessment was done by the first author (primary investigator) and the second author (supervising surgeon). Disagreement was resolved by reassessment of the subject until there was a consensus between the investigator and the supervising surgeon.

For cleft lip repair, the Pennsylvania lip and nose (PLAN) score[22,23] was used. Lip and nose score: Surgical outcome was good when the average score was 1 (no revision was necessary), fair if it was 2 (minor revision was indicated), and poor if it was 3 (complete revision of the surgery was deemed necessary).

Lip scoring

1. Mild: Nearly imperceptible at conversational distance, not requiring any treatments.
2. Moderate: Some lip asymmetry noted at conversational distance, requiring minor reconstructive procedures.
3. Severe: Significant lip asymmetry, needing complete revision.

Nose scoring

1. Mild: Nearly imperceptible at conversational distance, not requiring any treatment.
2. Moderate: Tip asymmetry seen mostly on worm's eye tip, needing rhinoplasty.
3. Severe: Nasal asymmetry seen on anteroposterior view, at conversational distance, crooked nose. Reconstructive rhinoplasty was needed, i.e., graft may be necessary to achieve correction.

For cleft palate repairs, the outcome was judged based on the integrity of the closure, i.e., on the presence or absence of fistula. The outcome was good when there was no postoperative fistula at the operative site, fair or poor respectively when the resultant fistula was less or more than 1 cm in greatest diameter, respectively. The fistula size was determined by using a calibrated and validated Vernier caliper.[5]

Data analysis

Data was analyzed using the SPSS for Windows (version 17.0; SPSS Inc., Chicago, IL) statistical software package[24] and presented in descriptive and tabular forms. Test of significance was used as appropriate. *P* value was set at ≤0.05. An inter-rater reliability analysis using the Cohen's kappa statistic was performed to determine coherence among raters.

RESULTS

The study included 62 (47.3%) males and 69 (52.7%) females. The overall male-to-female ratio was 1:1.1. Unilateral cleft lip and palate (32.8%) was the most common defect, followed by cleft lip with or without alveolus (26.7%). Unilateral cleft lip and palate was more common in males than in female, whereas unilateral cleft lip with or without alveolus and cleft palate was more common in females [Table 1].

A total of 156 surgeries were performed in 131 subjects. The age of the subjects at the time of surgery ranged between 3 months and 35 years. Overall, the mean age (SD) at the time of repair was 7.2 years (10.2). Also, 116 (74.3%) subjects presented in infancy, 29 (18.6%) presented during childhood, and 11 (7.1%) presented in adulthood. Further analysis showed that 24 (15.4%) subjects presented after 6 years of age, of which 18 (11.5%) were cleft palate and the remaining 6 (3.8%)

were cleft lip. Of the 92 primary lip repairs done, 39 (42.4%) were done within 3 months of age, while 30 (46.8%) of the primary cleft palate repairs ($n = 64$) were done within 18 months of age [Table 2].

Each subject underwent a minimum of one surgical procedure. Ninety two (58%) subjects had lip repair and 64 (41%) had palate repair. Unilateral cleft lips were repaired using either Millard rotation advancement technique in 29 (31.5%) subjects or Tennison – Randall triangular technique in 39 (42.4%) subjects; all bilateral cleft lip deformities in 24 (26.1%) subjects were repaired using Millard's forked flap technique. Three subjects (2%) were operated under local anesthesia, and all of it were lip repair.

Of the 156 surgeries, 95 (68.8%) were adjudged to have a good outcome [Table 3]. When lip and nose assessment were considered separately for cleft lip repair assessment, the lip score was better than the nose score [Table 4]. However, the overall lip and nose assessment score was lower than the lip score [Table 4]. The inter-rater reliability for the raters was found to be significantly substantial ($k = 0.60$, $P < 0.05$).

There were no cases of peri- or postoperative mortality recorded in this study. However, 22 (14.1%) postoperative complications were seen, 17 (13.0%) of the complications were oronasal fistula (Oronasal fistula rate = 29.8%), followed by 3 cases of hypertrophic scar of the lip, wound dehiscence of the nostril floor and lip notching, respectively [Table 5]. All the hypertrophic scars occurred in Millard technique of lip repair, and the notching occurred in the Tennison – Randall technique. Five (29.4%) of the oronasal fistula occurred in the anterior hard palate, 8 (47.1%) occurred at the junction of hard and soft palate, and the remaining 4 (23.5%) occurred in the soft palate.

The cases of hypertrophic scar were managed conservatively with satisfactory improvement in scar quality at 6 months of postoperative review for all cases. The case of wound dehiscence was resolved by regular cleaning of the site with gauze soaked in normal saline. The subject with lip notching subsequently underwent a successful lip revision. Spontaneous closure or reduction was achieved in 12 cases of oronasal fistulae. The other 5 cases of palatal fistulae required surgical intervention to achieve closure. Adjunct intraoral flaps (buccal fat pad, $n = 3$; tongue flap, $n = 2$) were used in the repair of the oronasal fistulae.

Table 1: Sex distribution of cleft deformity

Type of cleft	Male (%)	Female (%)	Total (%)
Unilateral cleft lip and palate	23 (17.6)	20 (15.3)	43 (32.8)
Unilateral cleft lip ± alveolus	14 (10.7)	21 (16.0)	35 (26.7)
Bilateral cleft lip and palate	10 (7.6)	8 (6.1)	18 (13.7)
Cleft palate (hard and soft)	6 (4.6)	11 (8.4)	17 (13.0)
Isolated cleft of soft Palate	4 (3.1)	6 (4.6)	10 (7.6)
Bilateral cleft lip	3 (2.3)	3 (2.3)	6 (4.6)
Microform clefts	2 (1.5)	0 (0.0)	2 (1.5)
Total	62 (47.3)	69 (52.7)	131 (100)

Table 2: Age of subjects at the time of lip or palate repair

	Frequency	%
Lip repair		
0-3 months	39	42.4
>3 months to 1 year	25	27.2
>1 year	28	30.4
Total	92	100.0
Palate repair		
10-12 months	15	23.4
>12 months to 18 months	15	23.4
>18 months	34	53.2
Total	64	100.0

Table 3: Assessment of clinical outcome for cleft lip and palate surgeries

	Assessment of surgical outcome (%)			
Type of surgery	Good	Fair	Poor	Total
cleft lip surgery (lip and nose score)	62 (67.9)	26 (28.4)	4 (3.7)	92 (100)
cleft palate surgery (palate score)	45 (70.2)	13 (21.1)	6 (8.7)	64 (100)
Overall outcome (%)	107 (68.8)	38 (25.4)	10 (5.8)	156 (100)

Table 4: Lip and nose outcome following lip repair

	Clinical outcome (%)			
	Good	Fair	Poor	Total
Lip score	55 (60.5)	33 (35.8)	4 (3.7)	92 (100)
Nose score	46 (50.6)	42 (45.7)	4 (3.7)	92 (100)
Overall outcome (lip and nose score)	62 (67.9)	26 (28.4)	4 (3.7)	92 (100)

Table 5: Postoperative complications following primary cleft lip and palate surgeries

Complications	Frequency	Percentage (%)
Hypertrophic scar	3	13.7
Oronasal fistula	17	77.3
Notching	1	4.5
Dehiscence	1	4.5
Total	22	100.0

DISCUSSION

Cleft lip and palate is the most common congenital defect in the head and neck region.[25,26] In the present study, cleft deformity was more common in males than in females. While similar observations have been reported in the literature,[9,25,27] there are also reports female preponderance.[10,28] There is no consensus on the most common type of cleft deformity.[29] This study however revealed combined unilateral cleft lip and palate as the most common type of cleft. The male dominance observed in subjects with cleft lip and palate in the present study agrees with reports of several other studies,[9,10] it contrasts sharply with others [Figures 2 and 3].[25,30]

In the current study, about 75% of subjects presented before the age of 1 year, and most of these subjects presented within 3 months of age. This relatively early presentation is an improvement over earlier studies done in the same institution.[31,32] Factors responsible for this relativity may include enhanced cleft treatment expertise, increased public awareness of cleft lip and palate, and free cleft treatment available in the hospital. However, reports from developed countries showed fewer patients presenting late for surgical repair.[33,34] One of major reasons for the late presentation of cleft lip and palate patients in developing countries has been financial constrain.[35] In a Nigerian study, this was attributed to the low earnings of most Nigerians and the poor economic situation of the country. In a Nepalese study, lack of awareness, remoteness of available health services, and lack of finance has been found responsible for late presentation of cleft lip and palate patients for treatment.[36] Other reasons suggested are superstition, health belief system of the people, and the fear of death.[35,36]

It is widely accepted that the repair of cleft lip should be done in early infancy (aged 10–12 weeks) and cleft palate repair should be done before speech development (before 18 months of age).[37,38] Reports of early timely surgical closure of the cleft lip suggest that there are improved cosmetic, psychosocial adjustment, and better quality of life in cleft patient.[33,35,36] Early timely closure of cleft palate has demonstrated improved speech outcome, while late palate closure, although conferring better maxillary growth, has shown poor speech outcome.[35,36,38] Surgical management of patients with late or delayed presentation is challenging, especially during adulthood and adolescence.[35,38] Aggressive tissue mobilization to achieve closure of the wide palatal cleft, which may often require adjunct intraoral flap and relatively greater cost of adult cleft repair than that of the infant, has been reported in the literature.[29,33,35,38] Nwoku emphasized that the possible damage to vital growth centers in the primary operation of infants and children, such as detachment of vomerine mucosa, mutilations of the cartilaginous ala, or injuries of tooth germs, are not an issue in the repair of adult cleft. On the other hand, adult cleft tend to get larger, and the closure of especially large clefts of the palate with local flaps may present some problems.[38] In this study, while the larger tissue available in adult cleft was helpful, the large defect especially in the cleft palate was a hindrance, as observed in an earlier study.[38]

The data that 42.4% cleft lip repair was done within 3 months of age and 46.8% of cleft palate repair was done under 18 months age are improvements over previous reports from the same institution.[31] Sowemimo[32] reported that the time of surgery partly depend on the age of presentation, available surgical expertise, and the type of cleft; our results support this assertion. Another reason might be the availability of free cleft treatment in the hospital.



Figure 2: Good surgical outcome in repaired right unilateral incomplete cleft lip



Figure 3: Isolated cleft of soft palate in a subject

Generally, the repair of cleft lip and palate is performed under general anesthesia. However, some cases of cleft lip repair in individuals aged >12 years in our study were successful under local anaesthesia.[10,11,35] This study agrees with the reports of some workers that showed some cases of cleft lip repair can be done under local anaesthesia.[10,11] This approach has been demonstrated to be safe, cost effective, and not inimical to the surgical outcome.[11]

All our subjects met the minimum weight criteria of 4.5 kg, especially applicable in lip repair. Surgery was immediately performed once all the criteria were met. Hence, we did not include predictive variable of treatment outcome as a factor in the present study; we hope to incorporate predictive factor of treatment outcome of cleft repair in a future study.

This study showed a higher proportion of cheilorraphy than palatorraphy, which is in concordance with previous African studies.[9-11,27] The reasons for this may be higher number of cleft involving the lip than palate in this series as well as that cleft lip repair precedes palate repair. Furthermore, Orkar *et al*.,[9] and Olasoji *et al*.,[10] observed that parents placed premium on lip repair than palate repair due to the perceived aesthetic windfall.

In contrast to studies by Olasoji *et al*.,[10] and Onasanya[23] that showed a dominance of Millard technique for cleft lip repair, both Millard and Tennison–Randall techniques of cleft lip repair were freely employed in this study. Some workers prefer the use of Millard technique in cleft lip repair owing to the ease of mastery, flexibility, and the minimal loss of lip tissue.[11,23] Millard technique has however been criticized for its propensity to cause vertical scarring.[38] Others have, on the other hand, adopted Tennison–Randall technique in their cleft lip repair because of its geometrical predictability and reliability, consistency in decreasing vertical lip contraction, and its application in wide cleft.[38,39] The basic demerit of Tennison–Randall method is the violation of the curved philtral column on the non-cleft side, which creates a scar that disturbs known anatomic subunits and the rigid exact presurgical measurements required [Figures 4 and 5].[39]

Measuring surgical outcomes is vital in estimating the success of cleft management and quality improvement.[2,40] Many potential outcomes for comparing cleft lip and palate treatment have been reported, including dentofacial growth and development, facial appearance, speech, hearing, nasal breathing, quality of life, and patient satisfaction.[41] However, there is no agreement among the various specialists in cleft care regarding which one of these outcome measures is most important.[3] Reports from various centers suggest a lack of consensus on agreed methodology for assessing outcomes.[2] Other areas of debates in cleft outcome measurement include the timing of measurement and appropriate instrument to use for the outcome measurement.[3]

Facial appearance has been reported to be an important outcome of cleft treatment by the patient.[42] Improvements in the appearance of the lip and nose are the most frequently desired aspects for further treatment by patients with clefts and their parents.[43] Various reports have suggested the central role played by facial appearance in developing normal peer relationships, healthy personal adjustment, and success in school and in career.[41,43,44] However, developing a reliable rating for measurement of nasolabial appearance was a challenge in many studies.[2,40] This has been attributed to the notion that facial appearance is subjective, complex, and

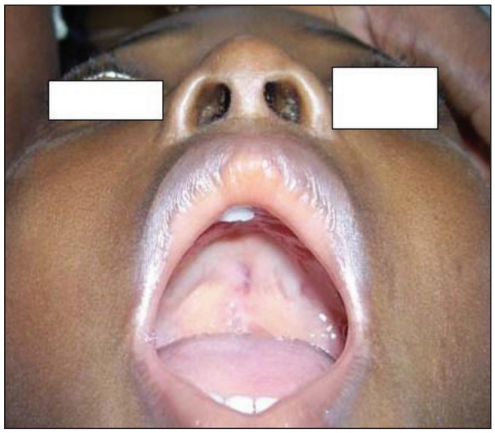


Figure 4: Good surgical outcome in repaired isolated cleft of soft palate



Figure 5: Bilateral cleft lip and palate in a subject

multivariate.[40,44] It is difficult to objectively and reliably assess the facial appearance because of the three-dimensional (3D) components of the face (transverse, vertical, and sagittal).[2] In addition, intercenter comparison is hampered by reports on facial aesthetics using different aesthetic indices.[41] The PLAN index has been reported in the assessment of facial aesthetics in cleft lip repair,[22,23] and has been found to be reliable and valid in facial aesthetic measurement.[22,23] Also, it has been reported to be simple to use and reconcile the professional and public perceptions of facial aesthetics.[22]

Numerous methods of facial aesthetics assessment have been reported, and they are based on lip and nose form, facial profile, or dental arch relationship.[41] Assessment of aesthetic outcome is both quantitative and qualitative.[39] 3D or 2D techniques have been reported in facial aesthetics measurement.[41] The 3D techniques include direct clinical analysis, facial casts, stereo-photography, laser scanning, 3D computed tomography (CT), videos, subjective qualitative rating scales, photogrammetry, anthropometric analysis, soft tissue profile analysis, or GOSLON yardstick.[41] 2D assessment techniques include standardized photographs and computer image analysis.[39,41] Anthropometric analyses have been criticized for ignoring features that the patient consider relevant, while qualitative scales, although not as objective as the former, have succeeded in satisfactorily reconciling the public perception of aesthetic outcome with that of the clinical findings. However, it must be noted that no method has achieve wide acceptability, reliability, and validity.[39]

Assessment of speech quality remains one of most important outcomes in successful cleft palate surgery. A number of parameters have been reported to be relevant to cleft palate speech, such as repair before speech formation (age: 18-24 months), mobility of the soft palate, optimal separation of nasal and oral cavities, intelligibility, and hearing and articulation.[5,45] Except the optimal separation of the nasal and oral cavities and mobility of the soft palate, other parameters require long-term evaluation. The optimal separation of the nasal and oral cavities is determined by the absence of oronasal communication.[5] This has been reported to cause hypernasality if critical size of 5 mm is exceeded.[46] The use of Vernier caliper to measure the dimension of this palatal fistula has been well validated [Figure 6].[5,45]



Figure 6: Good surgical outcome in repaired bilateral cleft lip and palate

Assessing surgical outcome of cleft repair is challenging due to variability of factors that affect outcome of cleft surgery.[2,4,40,41,43] These includes the type and severity of cleft, patient peculiarity, race, experience, and expertise of the surgeon, timing of the surgery, the technique adopted in repair and postoperative management.[4,43] In this study, cleft repairs were evaluated at least 4 weeks after surgery, by which time, inflammation would have subsided and healing would have well progressed. The PLAN scoring system for cleft lip and nose deformities is a validated, user friendly, and simple technique post-operative qualitative method for analysis of cleft lip and nose surgical treatment outcome.[22,23] The PLAN score separates the lip and nose deformities into 3 classes, based upon the treatment needed to correct any residual deformity. For reasons previously stated, speech remains the gold standard for cleft palate surgery.[35,36] However, because of the short period of the study and non-availability of trained speech pathologist, this important indicator could not be evaluated in the present study. We hope to get a trained speech therapist in subsequent follow-up study and continue to monitor the subjects until when speech can be properly and objective assessed. However, in the present study, over 50% of cleft palate repair were done after 18 months of age, which is regarded as detrimental to good speech outcome in the literature.[45,46]

In addition, two unblinded raters performed the postoperative assessment of surgical outcome to minimize observer error. Tobiasen found that multiple raters' assessment in cleft repair is more reliable than in single rater.[44] Multiple raters' evaluation was recommended for qualitative variable than single rater evaluation, because the chance of observer error is substantially minimized.[47] In the present study, two unblinded raters were used in the evaluation of lip repair in contrast to a Nigerian study that employed a single rater.[23] In addition, the inter-rater reliability coefficient for the lip and nose scores among the two raters in this study was substantial, which may possibly

strengthen and make the findings of this study more reliable.

The overall good treatment outcome demonstrated noted in this study is comparable to the figures from several previous studies.[9-11] This might be attributed to the experience of the surgeons in this centre. The nasal score was poorer than the lip score in this study, despite the concurrent rhinoplasty done with primary lip repair to achieve nasal symmetry. The poor nose scores recorded in this study may be attributed to the dissimilarity among the clefts, especially bilateral clefts nasal deformity, which is more severe than unilateral and the timing/technique of rhinoplasty. Presently, there is no consensus on timing of rhinoplasty. While some authors advocate rhinoplasty at the time of primary lip repair,[48] as was the case in this study, others advocate rhinoplasty after the completion of facial growth to avoid harmful scarring and poor long-term results.[49] Rhinoplasty can be classified into closed or open rhinoplasty.[48,49] Technically, a closed rhinoplasty is simpler than an open rhinoplasty, however, an open rhinoplasty allows direct vision and is therefore more accurate approximation of the lower lateral nasal cartilages and a better approach for redistributing the central segment tissue.[49] In this study, closed primary rhinoplasty was the technique of choice as it is simple to master, less invasive, and cost effective.

In the present study, von langenbeck palate repair, the oldest palatorraphy[20] technique, was adopted. It is a simple technique that does not attempt to lengthen the palate and has undergone modifications to preserve the greater palatine vascular pedicle, thus, reducing scar formation that is inimical to facial growth and causes velopharyngeal incompetence.[46] Owing to the limitation of the classical von Langenbeck technique, the concept of intravelar veloplasty was proposed following Kriens anatomical studies.[21] This technique aimed to restore the transverse muscular anatomy of the soft palate. It frees the levator veil palatinii from its attachment to the posterior border of the cleft hard plate and brings it to the midline to be reattached to its pair. This has improved substantially the issue of velopharangeal insufficiency and subsequently, speech [Figures 7 and 8].

Studies have revealed that the modified von Langenbeck procedure works well in many palatal clefts with success rates of 51-73% (mean: 60%).[5,50] Our finding of 70.2% good palate closure is consistent with the abovementioned figures.

Fillies *et al.*,[51] reported that cleft surgery in infancy is occasionally accompanied by severe perioperative complications. They found that a body weight of >4.5 kg at the time of surgery, hemoglobin of >10 g/dl, and white blood cell count of <10,000/ ml was associated with less risk of complications. This study did not show any severe or fatal perioperative complications, possibly due to adherence to the above strict presurgical requirements criteria and modern advances in anaesthesia. However, 14.1% postoperative complication was recorded in this study, which is consistent with published figures.[9-11,23] The reasons for this low figure may be attributed to the strict selection criteria, good preoperative screening of subjects, good theatre/anesthetic and ward facilities, and competent surgical/medical staff of the hospital.

Hypertrophic scar, dehiscence, and notching are well-reported complications of lip repair,[9,38] while oronasal fistula is the most common complication in palate repair.[5] Hypertrophic scar rates following cleft lip repair ranges from 0% to 1.9% in Caucasian studies.[38]



Figure 7: Left unilateral cleft lip and alveolus in a subject



Figure 8: Poor surgical outcome and lip notching in repaired left unilateral cleft lip and alveolus

The findings of 3.7% of hypertrophic scar following cleft lip repair in this series is higher than these published figures.[11,38] Plausible cause of hypertrophic scar in this study is the genetic predisposition of these subjects to this problem. Hypertrophic scars and keloid have been established to be relatively common among people of black African descent; the aetiology is however, not clear [Figure 9].[52]

In this series, there was satisfactory improvement in scar quality after months of postoperative review in all the cases of hypertrophic scar without any active intervention. Measures suggested to prevent hypertrophic scar include the use of 6-0 atraumatic sutures and removing alternate sutures on the 4th and the rest on the 5th postoperative day.[38] Management of hypertrophic scars varies from observation, pharmacological to surgical approaches, all with varying contradictory results.[11,38] Nwoku[38] reported some success with cortisone cream in the treatment of hypertrophic scar following cleft lip repair [Figure 10].

The occurrence of oronasal fistula following palate repair has been attributed to the surgical technique, expertise of the surgeon, large width of cleft palate, poor wound healing, tension or absence of multilayered closure, or infection of the operated site.[5] In this study, the reasons for oronasal fistula could not be objectively identified. However, it can be speculated that the large width of some cleft palate may result in tension closure, which could have caused the oronasal fistula. However, it is difficult to conclusively derive from this study whether the choice of von Langenbeck technique was responsible for the oronasal fistula occurrence as there were interplay of other co-founders intrinsic and extrinsic to the subjects and surgeons. Hence, a randomized controlled study may be required to resolve this question. The junction of the hard and soft palate was the commonest site of occurrence in this study, and this is consistent with reports in the surgical literature.[5,50] The 29.8% rate of oronasal fistula in this study is within reported figures of 0-63%.[5,46] Management of oronasal fistula varies from observation to surgery[50] [Figure 11]. In the early time, following palate repair, the fistula can be observed and monitored for spontaneous narrowing or closure.[5,46] Conservative treatment is also indicated for an asymptomatic fistula.[46,50] It is advised to wait 6-9 months before contemplating any surgical option to allow proper wound healing.[5] The indications for fistula repair relate to the associated symptoms, as described previously. It has been reported that fistulae causing disturbance in speech should undergo early repair,[5,45,46] or delayed if possible until the completion of orthodontic maxillary arch expansion, when it can be combined with secondary alveolar bone grafting.[52] Surgical management is a popular and effective method of closing palatal fistula.[53] Two layers and tension-free closure have been reported with immense success.[5,54] Options vary from local flaps to free tissue transfer.[5] These local flaps include palatal



Figure 9: Bilateral cleft lip, alveolus, and palate in a subject



Figure 10: Good surgical outcome in repaired bilateral cleft lip, alveolus, and palate

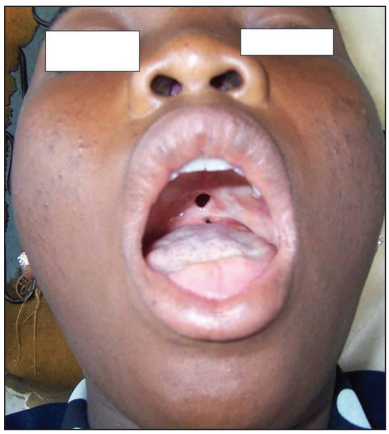


Figure 11: Fair surgical outcome and oronasal communication in repaired cleft of the hard and soft palate in a adult subject

mucoperiosteal flap, buccal flap, tongue flap, and buccal fat pad.[5,38,45,46,54] Others are tongue, turbinate, and facial artery musculomucosa flaps.[5,54] Prosthetic option remains an option in managing those fistulas not amenable to earlier mentioned treatment regimes.[55] In this study, there were spontaneous reduction in some of these fistulae, which rendered some asymptomatic and facilitated primary surgical closure. In others, closure was achieved with the mobilization of local flaps such as buccal fat pad and anterior-based tongue flap.

The limitations encountered during this study include the following: The study was time bound, hence, the subjects in this study could not be evaluated for a longer period. Long-term evaluation (≥10-20 years) would made it possible to assess other variables like speech and facial growth. It would also make the in-depth assessment of aesthetic possible. Also, speech assessment could not be performed due to the non-availability of speech therapist.

In addition, multiple surgeons were involved in the study. These surgeons have various years of experience in cleft surgery. The different level of skills possessed by these surgeons and their adeptness at techniques of cleft repair may have possibly impacted the outcome of the cleft surgeries. Although this was not tested in this study, it might be a focus of future studies.

CONCLUSIONS

Satisfactory surgical outcome and low complication rate recorded in this study may be a reflection of the close collaboration and cooperation of the cleft team in our centre. Regular continuous audit of cleft management should be encouraged to enhance or improve cleft care.

APPENDIX I

PROFORMA FOR THE STUDY OF THE SURGICAL MANAGEMENT OF CLEFT LIP AND PALATE DEFORMITIES AT THE LAGOS UNIVERSITY TEACHING HOSPITAL

Preoperative Data

Section I

Name of the Subject:……

Hospital number:……

Weight:…… Height:…… Date of Birth:……..

Age at the time of presentation:…….....

Age at the time of surgery:…..……

Sex Male ☐ Female ☐

Ethnic group:……..

Number of children in the family:……..

Position of the child with cleft in the family:…….

Section II

Gestational history

Full term ☐

Premature ☐

Place of antenatal care:

Hospital ☐ Church ☐ Mosque ☐

Home ☐ Herbal home ☐

Birth weight: .....

Drugs taken during pregnancy: Folic acid ……

Mother drinking alcohol during pregnancy ☐ ☐

Smoking ☐ ☐

Drugs ☐ ☐

Antiepileptic ☐ ☐

Section III

Age of the father:……

Age of the mother:……..

Occupation of the father:……..

Occupation of mother:……

Socioeconomic status of Subject/Parents/Guardian:

Low ☐ Middle ☐ High ☐

Consanguinity of parents: Yes [ ] No [ ]

(*continued*)

Previous history of clefts in the family: Yes [ ] No [ ]

(a) Presence of cleft in siblings: Yes [ ] No [ ]

If Yes, how many?

(b) Presence of cleft in parents:

Father Yes [ ] No [ ]

If Yes, type of cleft?

Mother Yes [ ] No [ ]

History of cleft in extended family: Yes [ ] No [ ]

Any other congenital anomalies in the extended family: Yes [ ] No [ ]

Subject's/or Parent's/or Guardian treatment expectation:

Section IV

Types of cleft deformity:

Unilateral cleft lip ± alveolus: Right [ ] Left [ ]

Complete Incomplete Simmonart band

Unilateral cleft lip and palate: Right [ ] Left [ ]

Bilateral cleft lip ± alveolus:

Bilateral cleft lip and palate:

Median cleft lip: [ ]

Isolated cleft palate: Hard [ ] Soft [ ] Both [ ]

Microform [ ] Unilateral [ ] Bilateral [ ] Submucous [ ]

Diameter of cleft wide: [ ] Narrow [ ]

Other congenital anomalies:

(a)

(b)

(c)

(d)

Associated health problems on presentation:

(a)

(b)

(c)

(d)

Intraoperative

Date of surgery:…….

Delay in surgery: Yes No

if Yes, Reason for Delay:……..

Surgical procedure:

Unilateral cleft lip: Tennison–Randall [ ]
Millard [ ]

Bilateral cleft lip: Millard [ ] Manchester [ ]

Cleft palate: Von-langenbeck [ ] Furlow [ ]

Others [ ]

Duration of Surgery:……...

Complications: …….

Estimated blood loss:…….....

Post-operative

Lengths of hospital stay:……..

Subjectt/Parent/Guardian satisfaction at management outcome:

Very satisfied [ ]

Satisfied [ ]

Dissatisfied [ ]

PLAN Score:

Lip: Good (1) Fair (2) Poor (3)

Nose: Good (1) Fair (2) Poor (3)

Total score……..

Quantitative Palatal Score:

Good (no fistula)

Fair (Fistula <1 cm)

Poor (Fistula >1 cm)

Complications

Infection:……

Dehiscence: Partial [ ] Total [ ]

Whistling deformity:……. Others:……..

Fistula: Pre-maxilla [ ] Anterior Hard Palate [ ]

Hard and Soft Palate Junction [ ]

Soft Palate [ ] Uvula [ ]

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