

## OUTCOMES OF CLEFT PALATE SURGERIES AT THE NATIONAL ORTHOPAEDIC HOSPITAL, ENUGU, NIGERIA: NOVEMBER 2008 – NOVEMBER 2013

I.I. Onah, C.O. Amanari, I. Onwuagha and C.A. Jac-Okereke

Department of Plastic Surgery, National Orthopaedic Hospital, Enugu.

*Correspondence:*

**Dr. I.I. Onah**

National Orthopaedic Hospital,  
Enugu,  
Nigeria

Email: anyionah@yahoo.com

### ABSTRACT

**Background:** Despite an increase in the number of palatoplasty procedures at the National Orthopaedic Hospital Enugu (NOHE) sequel to a partnership with Smile Train, no reports on subsequent outcomes have been published. We investigated the speech outcomes and rates of fistula formation, the relationship between introduction of solids and incidence of post-operative oronasal fistulae and the benefits of post-operative honey licks.

**Objective:** To determine the outcome of palatal repairs performed at our center in relation to the timing and nature of post-operative feeds.

**Method:** This was a cohort study of patients who had palatoplasty over a five-year period and were subsequently followed up for a maximum period of 9 years. The patient's present condition, timing of first feeds, onset of solid feeds, honey licks, frequency of wound dehiscence, fistula formation, and speech outcomes were assessed. The evaluation for a fistula was made from two weeks after the surgery by a senior resident in plastic surgery. Analysis was done using SPSS version 21.0 and p value set at <0.05.

**Results:** A total of 115 surgeries: 90 primary cleft palate repairs, 6 combined cleft lip and palate surgeries and 19 secondary cleft palate repairs were done. Male to female ratio was 1:1.3. Age range of patients was 6 weeks to 36 years.

Timing of introduction of solid meals significantly affected incidence of repair breakdown; and 58% had normal to near-normal speech.

**Conclusions:** Licking honey was associated with fewer wound breakdowns. Early return to solid feeds is associated with a higher incidence of wound breakdown following palate repair.

**Keywords:** Palatoplasty; Outcomes; Fistula; Speech

### INTRODUCTION

Cleft lip and palate is the most common major craniofacial anomaly that presents to the plastic surgeon.<sup>1</sup> Cleft surgery has been on the increase at the National Orthopaedic Hospital Enugu (NOHE) since onset of partnership with the SmileTrain charity in 2006. Data shows an increase in palate repairs but no reports on outcomes of palate repair from NOHE since the inception of this partnership. Increasing volume is expected to translate to better results as the surgeon's experience is an important variable in palate surgery among fit patients. Speech and fistula formation are the most important indicators of success in palate repair. We investigated these outcomes in a nine-year period, as well as the relationship between timing of post-operative introduction of solids and development of oronasal fistulae. We also assessed the potential benefit of post-operative honey licks in reducing wound complication rates following repair.

### MATERIALS AND METHODS

This was a cohort study of patients who had palatoplasty over a five-year period and were

subsequently followed up for a maximum period of 9 years. Assessors conducted telephone interviews with patients and care-givers. The assessors were not the surgeons who performed the repairs. The patients' present condition, timing of first feeds, onset of solid feeds, post-operative honey licks, wound dehiscence and spontaneous closure, fistula formation, need for revision surgery, and speech outcomes were assessed. Analysis was done using SPSS version 21.0 and p value set at <0.05

#### *Selection of participants*

All cleft palate surgeries done at NOHE are routinely uploaded to the SmileTrain Express database. Records from November 2008 to November 2013 were used to retrieve patient data. These included isolated palatal clefts, and cleft lip with cleft palate. Interviews of patients/parents between January 2014 and October 2018 were also used to provide data. Speech quality was assessed by two methods: The parent/care-giver's ability to understand the patient's speech, and (for adults) the interviewer's assessment. There were three

interviewers. One was trained in cleft speech language pathology while the other two were residents in training. Children less than a year at the time of assessment were not assessed.

#### *Surgical technique*

Intravenous antibiotics were routinely administered before induction of general anaesthesia and continued for up to five days post operatively.

The patient is laid supine on the operating table and anaesthetised with a cuffed armoured tube placed securely in the midline. Continuous monitoring with non-invasive multiparameter monitors is routine. A sandbag is placed between the shoulders and the patient prepped. A self-retaining mouth gag is inserted and the head of the table turned down in extension until the entire cleft palate is clearly visualised. Oxygen saturation is rechecked and the oral and nasal cavities are cleaned with povidone iodine lotion or ointment paying particular attention to the shelves, cleft and tonsillar regions. A throat pack is inserted. Intra operative infiltration with adrenaline solution is routine. After a seven minute pause the cleft margins are pared on the oral side. Moistened gauze is cut, insinuated and pushed posteriorly and laterally to aid elevation of the shelves, separation of the oral and nasal layers as well as haemostasis. They are removed by the time of closure of the layers. Where the hard palate is involved the nasal layer is separated from the palatine bone. With good visualisation the nasal layer of the soft palate close to the bone is held taut with tissue forceps and the nasal layer teased out with a cleft palate dissector. Every attempt is made to avoid button-holing. The rest of the surgery proceeds depending on the selected technique. Intra-velar veloplasty, von Langenbeck's and Furlow's repairs, in that order of frequency, were the surgical techniques used. The throat pack is removed before extubation which is done when the patient has regained the swallowing reflex and shows spontaneous movement. The patient is turned to the side and routinely given supplemental oxygen briefly before transfer out of the theatre.

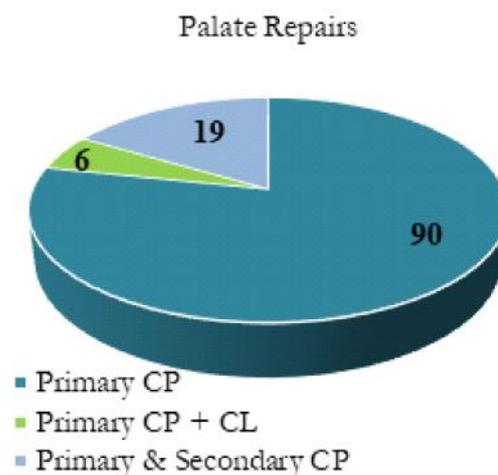
The feeding protocol was clear fluids (sugared water) upon recovery from anaesthesia on the day of surgery, and semi-solid diet based on pap for 3 weeks thereafter. Honey was encouraged from the second day. The instruction on commencement of feeds and duration of liquid diet varied between the units. One unit allowed oral intake of clear liquids within 24hours of the repair and routinely prescribed honey licks post operatively. A majority (72%) of the surgeries was done by the surgeon in this unit. Other units allowed oral intake of clear liquids after 48hours and did not recommend honey licks.

#### *Limitations of study*

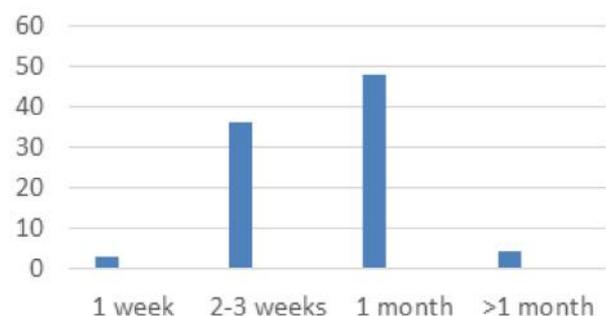
The study is retrospective in nature. Not all patients on the database had traceable contacts. There was no independent assessment by speech therapist for some patients (we report the assessment of the parents/caregivers, and the interviewer), and neither cephalometrics nor audiology were performed. The relationship of the size of cleft, type of repair, and experience of surgeon to the incidence of fistula formation was not assessed.

### **RESULTS**

There were 115 patients; 49(43%) male and 66(57%) female giving a M: F ratio of 1:1.3. There were 90 primary palate repairs (Figure 1). Age range of surgery was six weeks to 36 years. Twenty-five patients were done at one year, 18 patients were done between one and two years, 29 patients were done between two and 12years, while 18 patients were done between 12 and 36years. We found that very early repair in a fit baby at six weeks did not result in respiratory embarrassment. Reports of such early repairs have been published<sup>1</sup>. Six plastic surgeons were involved in this study. The distribution of patients according to the six surgeons are as follows: 79:4:9:11:4:2 (two patients not identified). Two patients received blood transfusions post-operatively based on the anaesthetist's recommendation.



**Figure 1:** Pie chart of palatoplasties done 2008-2013



**Figure 2:** Bar chart of time of onset of solid feeds

Three patients had died by the time of evaluation from complications following cardiac anomalies and sepsis up to a year post operatively. The complications were unrelated to the surgery or anesthesia.

Up to 80% commenced oral intake within 48 hours of surgery. Some commenced semisolid/solid diet as early as one week, and over 20% were advised to wait for at least one month before commencing semisolids/solids (Figure 2).

Majority (47.3%) of the patients were considered to have near normal speech. Eleven patients were too young to have developed significant speech and so this could not be assessed (Figure 3).

There were 44 patients (39%) that had wound dehiscence. Of these 24 developed a fistula; giving a

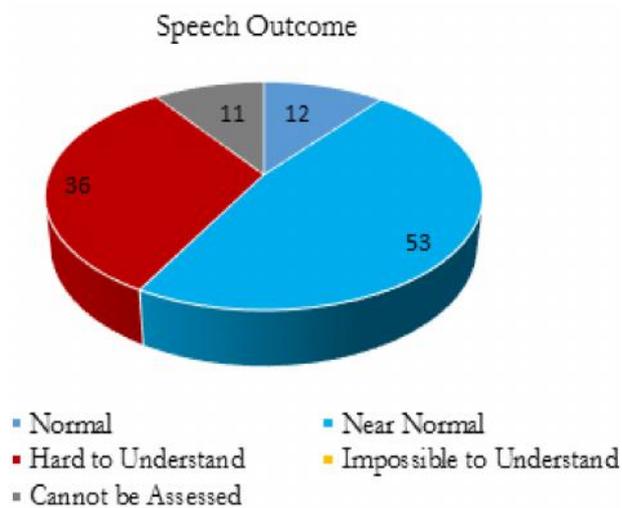


Figure 3: Pie chart of speech outcomes

Table 1: Test of significance feed onset vs breakdown

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.356 <sup>a</sup>	2	.000
Likelihood Ratio	41.528	2	.000
N of Valid Cases	112		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.82

Taking P-value to be 0.05% and confidence interval of 95%, the result showed a chi square value of 37.356, with a significant p-value of <0.001. Therefore, one can say that there is an association/difference between the onset of feeding before and after 3 weeks and after 4 weeks and wound breakdown.

Table 2: significance of honey licks and wound breakdown

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	166.527 <sup>a</sup>	4	.000
Likelihood Ratio	82.240	4	.000
N of Valid Cases	115		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .08

THE ABOVE TWO TABLE SHOW THE RELATIONSHIP BETWEEN HONEY LICK AND WOUND BREAKDOWN.

Chi-square value = 116.527, p-value is <0.001, which is significant. Therefore, the occurrence of wound breakdown is not just by chance but also has association with whether a patient licked honey or not.

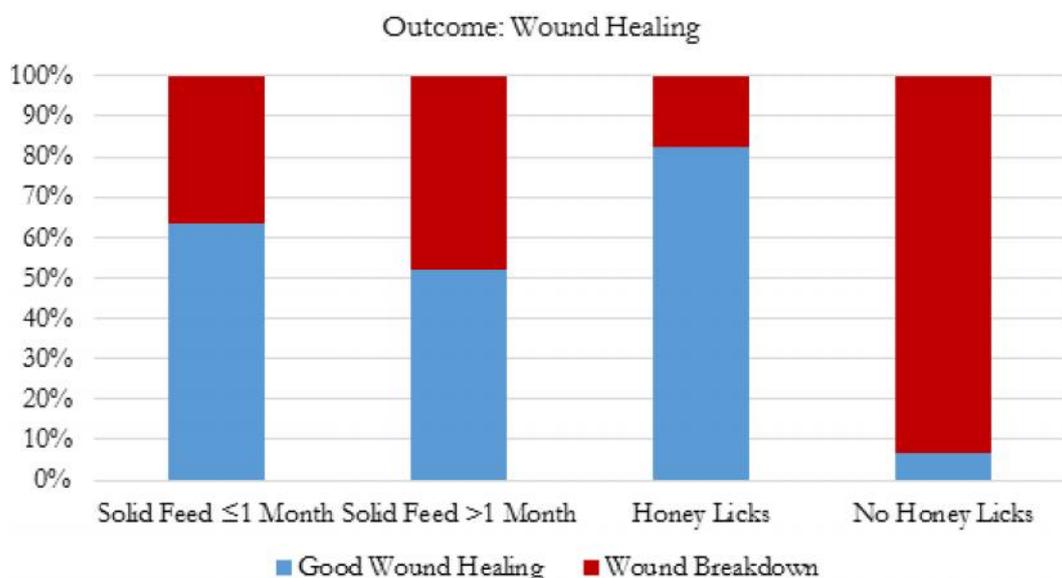


Figure 4: Wound healing and onset of solid feeds/use of honey

fistula rate of 21%. There was a significant association between the time of return to semisolid/solid feeds and wound breakdown (Figure 4, Table 1), and honey licks with wound breakdown (Table 2). Only six revision surgeries had been done at the time of evaluation. Patient compliance with appointments was a continuing challenge.

## DISCUSSION

Cleft palate is the third most common major congenital anomaly after club foot and cleft lip.<sup>2</sup> The female sex predilection for cleft palate (isolated and in combination with cleft lip) is in keeping with previous reports from this institution<sup>3</sup> but not from the Nigerian national data<sup>4</sup>. The age range is wide, with an upper age limit similar to reports from outreach surgeries in developing nations,<sup>5</sup> and probably represents a desire for correction once affordability is assured by free treatment. It has previously been noted that 40% to 90% of patients fail to return for palate repair after cheiloplasty.<sup>3</sup> The adult cleft palate patients desire correction and improvement even when it was not done in childhood.

Preoperative intravenous antibiotics are commonly used in cleft surgery. Our routine postoperative use is not new<sup>5</sup> and based on the assumption that presumptive therapy is indicated following their high predilection for recurrent upper airway infection and wound contamination by oral flora. It reduces the incidence of fistulae and other post-operative morbidities.<sup>6</sup>

Palatoplasty aims at successfully separating the nasal and oropharynx, and providing a mobile velum with velopharyngeal competence. Failure of these could result in fistulae and velopharyngeal insufficiency with subsequent speech defects.<sup>7</sup>

Our study showing 39% of patients with wound breakdown is higher than some others<sup>8,9</sup> but is within the range in literature (0 to 45%).<sup>9,10,11</sup> Nutrition may have played a role in our fistula rate. African children, more frequently than their Caucasian counterparts have nutritional challenges which have negative impacts on surgical outcomes. Children with cleft palate are expected to be similarly affected. A higher age at surgery has also been shown to increase the likelihood of wound dehiscence.<sup>8</sup>

Fistula formation depends on the experience of the surgeon,<sup>10</sup> the surgical technique,<sup>2</sup> and the severity of the cleft;<sup>11</sup> a higher incidence being found among less experienced surgeons, using the Veau-Wardill-Kilner

technique, and in the more severe Veau cleft types. This association could not be explored in our study. Advancing age at surgery may also increase the wound breakdown and fistula rate from greater difficulty in surgery following repeated infection in the area, fibrosis and resultant increased bleeding.<sup>5</sup> Poorer compliance with post-operative liquid diet protocol in older patients may be contributory. Our series included palate surgery in adults up to 36 years.

Post-operative feeding regimens following cleft palate surgery remain controversial.<sup>12</sup> Studies have suggested that unrestricted feeding with liquid diet is appropriate immediately after surgery<sup>12,13</sup> Some authors advocate feeding with liquids postoperatively for 10 – 14 days followed by semisolid diet for the next three – four weeks,<sup>14</sup> while others will continue with liquid diets for three weeks, transitioning to a semisolid diet for an additional three weeks.<sup>15</sup> Our study showed a significant increase in wound breakdown in patients commenced early (one-three weeks) on semisolid/solid diets as compared to those commenced on semisolid/solid diet later at one month. Particulate matter from semisolid/solid food gaining access to the repair site could evoke inflammatory changes that impair wound healing and predispose to wound dehiscence, wound breakdown and subsequent fistula formation.

Also, there was a significant reduction in wound breakdown in patients that were given honey to take compared to those that were not. Honey, apart from being nutritive across the age ranges when licked, also serves as wound dressing for the repaired palate and may well promote healing. It contains high levels of glycine, methionine, arginine, and proline, which are all necessary for collagen formation and fibroblast deposition, the essential factors needed for healing.<sup>16</sup> When licked, the honey invariably smears the repair site and serves as wound dressing. Though it is quickly diluted by saliva, dilute honey still exerts antibacterial properties.<sup>17</sup> Its efficacy in promoting healing in cutaneous wounds is well documented; and its efficacy has been suggested to improve by frequent application when used as a dressing agent.<sup>18,19</sup> Frequent licks therefore may be of benefit. A study done in Indonesia showed that honey given as oral drops significantly improved the epithelialization process of the lateral palatal defects post palatoplasty.<sup>20</sup> According to the study, the epithelialization with honey was 2.1 times faster than without it. This study suggests that honey could improve the healing process following palatal surgery resulting in better outcomes as suggested by our study. However since only one unit routinely requested honey licks, the impact of the surgical skill

of that unit may have been important; though some studies have found no significance in outcomes with varying experience of the same operator. Care needs to be taken in advocating the routine use of honey in infants as it has been associated with rare botulism in this age group.<sup>21</sup>

In our study 58% of patients had normal to near normal speech based on assessment given by their caregivers in the absence of an assessment by a speech therapist. This is an assessment by the “end users” rather than by professionals. It is the people in the patient’s immediate environment that assess and utilize the speech every day and their evaluation we believe is relevant. It represents a limitation in the study as some languages are less dependent on fricatives which are difficult for the cleft palate patient. However this gives an indication of how well adjusted the patients are post-surgery with regard to speech. Various studies report between 25% - 37% of children that had cleft palate repair with persistent speech problems.<sup>22,23</sup> The age at palate repair also affects the speech outcomes.<sup>24</sup> This would have contributed in part to the over 30% who had difficult to understand speech in our series. However speech improvement still occurred after repair well into adulthood. Studies will be necessary to quantify the benefit patients derive regarding speech improvement when primary cleft palate surgery is performed in adulthood. A particular study reported that two-thirds of these children had significant speech production problems and were enrolled for direct speech therapy.<sup>23</sup> Some speech problems are attributable to impaired hearing which is a possible complication of middle ear disease. They are not as a result of velopharyngeal incompetence. Our lack of audiology makes it impossible to determine what percentage, if any, of our patients had speech problems associated with impaired hearing.

## CONCLUSION

In this study, we discovered that very early return to solid feeds is associated with a higher incidence of wound breakdown following palate repair, while introduction of honey licks was associated with reduced incidence of this complication. More studies are indicated to explore a direct cause and effect relationship. More studies also would be needed to define, in this environment, the relationship of fistula formation to the type of cleft palate encountered, the surgical technique used, and the experience of the surgeon. Also more rigorous objective assessment of speech outcomes of cleft palate repairs by a speech pathologist in our center will need to be done.

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## Conflict of interest statement

None

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