



Contents lists available at ScienceDirect

## Journal of Cranio-Maxillo-Facial Surgery

journal homepage: [www.jcmfs.com](http://www.jcmfs.com)

# A novel computer system for the evaluation of nasolabial morphology, symmetry and aesthetics after cleft lip and palate treatment. Part 2: Comparative anthropometric analysis of patients with repaired unilateral complete cleft lip and palate and healthy individuals



Piotr Pietruski <sup>a,\*</sup>, Marcin Majak <sup>b</sup>, Elzbieta Pawlowska <sup>c</sup>, Adam Skiba <sup>c</sup>, Boguslaw Antoszewski <sup>d</sup>

<sup>a</sup> Department of Plastic and Reconstructive Surgery, Centre of Postgraduate Medical Education, Prof. W. Orłowski Memorial Hospital, Warsaw, Poland

<sup>b</sup> Department of Systems and Computer Networks, Faculty of Electronics, Wrocław University of Science and Technology, Wrocław, Poland

<sup>c</sup> Department of Orthodontics, Medical University of Lodz, Lodz, Poland

<sup>d</sup> Department of Plastic, Reconstructive and Aesthetic Surgery, Norbert Barlicki Memorial Hospital, Lodz, Poland

## ARTICLE INFO

### Article history:

Paper received 10 July 2016

Accepted 24 January 2017

Available online 31 January 2017

### Keywords:

Cleft lip  
Cleft palate  
Anthropometry  
Evaluation  
Aesthetics  
Nose

## ABSTRACT

**Purpose:** The aim of this study was to use a novel system, 'Analyse It Doc' (A.I.D.) for a complex anthropometric analysis of the nasolabial region in patients with repaired unilateral complete cleft lip and palate and in healthy individuals.

**Materials and methods:** A set of standardized facial photographs in frontal, lateral and submental view have been taken in 50 non-cleft controls (mean age 20.6 years) and 42 patients with repaired unilateral complete cleft and palate (mean age 19.57 years). Then, based on linear, angular and area measurements taken from the digital photographs with the aid of the A.I.D. system, a photogrammetric analysis of intergroup differences in nasolabial morphology and symmetry was conducted.

**Results:** Patients with cleft lip and palate differed from the controls in terms of more than half of analysed angular measurements and proportion indices derived from linear and area measurements of the nasolabial region.

**Conclusions:** The findings presented herein imply that despite primary surgical repair, patients with unilateral complete cleft lip and palate still show some degree of nasolabial dysmorphology. Furthermore, the study demonstrated that the novel computer system is suitable for a reliable, simple and time-efficient anthropometric analysis in a clinical setting.

© 2017 European Association for Cranio-Maxillo-Facial Surgery. Published by Elsevier Ltd. All rights reserved.

## 1. Introduction

Cleft lip and palate (CLP) is one of the most common congenital craniofacial deformities (Mossey et al., 2009). However, available treatment strategies vary greatly in terms of the timing of surgery and the technique for repair. According to the standard surgical protocol used in the 1990s at the Department of Plastic, Reconstructive and Aesthetic Surgery of the Medical University of Lodz,

Tennison cheiloplasty has been performed at 6 months of age for primary lip repair, followed by palatal repair with the Veau-Wardill-Kilner palatoplasty technique at approximately 18 months of age. If necessary, secondary bone grafting was performed at 8–11 years of age, i.e. prior to canine eruption.

Despite years of progress in surgical techniques and treatment protocols, a large body of evidence suggests that many CLP patients are not satisfied with their facial appearance due to various degrees of deformity of the nasolabial region, in particular, in regard to nasal aesthetics (Thomas et al., 1997; Marcusson et al., 2002; Semb et al., 2005). Consequently, the statement of Lindsay and Farkas (1972), according to whom residual nasal deformity remains a stigma which reflects primary cleft defect more than any other facial

\* Corresponding author. Department of Plastic and Reconstructive Surgery, Centre of Postgraduate Medical Education, Prof. W. Orłowski Memorial Hospital, Czerniakowska 231 Street, 00-416, Warsaw, Poland.

E-mail address: [pietruski.piotr@gmail.com](mailto:pietruski.piotr@gmail.com) (P. Pietruski).

feature, still remains a reality. In the Eurocleft study, nose correction was shown to be the most desirable option for further treatment among 17-year-old patients with repaired CLP (Thomas et al., 1997; Semb et al., 2005). This observation was also supported by the results of other studies. According to various authors, between 15% and 80% of cleft patients will require secondary correction of cleft nose deformity at some point in their lifetime (Matsuo and Hirose, 1990; Salyer, 1992; Matukas and Louis, 1993; Mazzola, 1996; Anastassov et al., 1998; Kane et al., 2000; Salyer et al., 2003).

Similar to cleft lip and palate treatment protocols, no consensus has been reached regarding a standardized method for the objective assessment of nasolabial esthetics in patients after surgical management of CLP (Tobiasen et al., 1991; Tobiasen and Hiebert, 1994; Ritter et al., 2002; Al-Omari et al., 2003, 2005; Schwenzler-Zimmerer et al., 2008; Paiva and Andre, 2012; Sharma et al., 2012; Freeman et al., 2013; Gkantidis et al., 2013; Sitzman et al., 2014; Ranganathan et al., 2015). Recently, we have developed a computer system, referred to as “Analyse It Doc” (A.I.D.), which is dedicated for a multicentre qualitative and quantitative evaluation of facial aesthetic outcomes after cleft lip and palate treatment. Principal features of the system, as well as the results of its validation study, are presented in the first article (Part 1) in this series (Pietruski et al., 2017).

The aim of the study presented herein was to verify the practical application of the A.I.D. system during comparative objective analysis of nasolabial morphology and symmetry in healthy non-cleft individuals and patients with unilateral complete cleft and palate who underwent repair at the Department of Plastic, Reconstructive and Aesthetic Surgery of the Medical University of Lodz. Moreover, we explain how to interpret the results of the analysis, expressed as proportion indices for selected anthropometric parameters.

## 2. Materials and methods

### 2.1. Ethics and consent

The protocol of the study was approved by the Local Bioethics Committee at the Medical University of Lodz, and both verbal and written informed consent were sought from all the subjects prior to obtaining their images for the analysis presented herein. In the case of underage participants, written informed consent of their legal guardians also was obtained.

### 2.2. Study participants

Inclusion criteria for the control group and cleft group are summarized in Table 1. Control group was comprised of 50 healthy non-cleft individuals of Caucasian/white ethnicity (25 female and 25 male), with mean age of 20.6 years (range 18–25 years). The cleft group included 42 individuals of Caucasian/white ethnicity (20 female and 22 male) who underwent repair of a non-syndromic complete unilateral cleft lip and palate at the Department of Plastic, Reconstructive and Aesthetic Surgery, Medical University of Lodz between 1991 and 1999, and did not receive a secondary facial surgery. Mean age of the cleft subjects was 19.57 years (range 16–24 years).

### 2.3. Photographic data acquisition

For the purpose of this study, standardized digital photographs in frontal, lateral and basal (submental) views were taken of each participant, in line with the recommendations of the European Association for Cranio-Maxillo-Facial Surgery (EACMFS) (Ettorre et al., 2006; Schaaf et al., 2006). Frontal and lateral view

**Table 1**  
Inclusion criteria for the study groups.

Inclusion criterion	Cleft group	Control group
Age between 16 and 25 years	+	+
Caucasian ethnicity	+	+
Non-syndromic complete unilateral cleft lip and palate repaired at the Department of Plastic, Reconstructive and Aesthetic Surgery of the Medical University of Lodz	+	
Absence of any (other than CLP) craniofacial anomalies	+	
Absence of any (including CLP) craniofacial anomalies		+
No secondary corrective surgery for the lip and/or nose	+	
No history of surgical treatments in the craniofacial region		+
No history of facial trauma	+	+
Lack of any systemic disease	+	+

photographs were taken with subject's head aligned with the Frankfort horizontal line, horizontal alignment of the interpupillary line and relaxed closed lips. Lateral view photographs of the cleft side were taken of patients with unilateral CLP, and right profile lateral view images were acquired for the controls. During taking the photographs in the basal view, the subject's eyes were oriented to the ceiling. Indirect anthropometric analysis of the upper lip was not performed in this view due to the limited visibility of its contours. A uniform photographic background was used in order to obtain better contrast of facial contours and to minimize the shadows. Each photograph was saved as a separate JPEG file.

### 2.4. Evaluation method

Indirect anthropometric analysis of acquired facial photographs was carried out with A.I.D. computer system. The assessment panel consisted of three evaluators: a plastic surgeon, a plastic surgery resident and a public health student. An ‘Evaluation Plan’ containing subjects' data, their photographic documentation and guidelines for anthropometric analysis was developed by the study supervisor, encrypted and sent electronically to the evaluators. Each evaluator carried out three evaluation sessions independently. In order to minimize potential memory bias, three consecutive evaluation sessions were scheduled at 2-week intervals, and the sequence of photographs analysed during each session was random. The examiners had no access to patient data or results of their evaluation at any stage of the assessment.

The examiners manually identified specific landmarks and areas, following textual and graphic instructions from the system. All anthropometric soft tissue landmarks that were considered during the analysis are specified in Table 2. On the basis of these points, the system automatically generated additional landmarks and reference lines. A line connecting the right and left inferior pupil points was set as the horizontal reference line (HRL) on frontal and submental view photographs. Furthermore, the vertical reference line (VRL) corresponding to facial midline was set as a perpendicular line crossing the HRL at its midpoint between the endocanthion points (Fig. 1A and C). On lateral view photographs, HRL and VRL corresponded to the Frankfort horizontal line and to a perpendicular line crossing the nasion, respectively (Fig. 1B). Using the landmarks mentioned above, the A.I.D. system generated the so-called secondary constructs which corresponded to various linear, angular and surface areas parameters (Fig. 2A–C). Linear measurements were classified as horizontal (H), vertical (V) and direct (D) (Fig. 2D). Measurement of each parameter was done by the computer system automatically.

After completing the prespecified number of the evaluation sessions, each user generated an encrypted file with the results and

Download English Version:

<https://daneshyari.com/en/article/5640189>

Download Persian Version:

<https://daneshyari.com/article/5640189>

[Daneshyari.com](https://daneshyari.com)