

Orthodontic diagnostics in children with congenital cleft lip and palate with dentognathic deformities

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Objective: To increasing the efficiency of orthodontic treatment by developing and implementing an examination record for children with congenital cleft lip and palate with dentognathic deformities.

Methodology: In this study, records of examination of a patient with congenital cleft lip and palate with dentognathic deformities was performed. The advantage of the proposed record is its informativeness and ergonomics. A pilot examination has been conducted to correct the form and content, to add information.

Results: We developed methods of determining the sagittal and transverse dimensions of the defect and fragments of the cleft upper jaw, the specifics of quality control of hygienic care. We used hygienic

index for determining the indicator of individual oral hygiene adjusted to account for hygiene of various qualities on the upper and lower dentition (DIOH) and speech therapy diagnostics.

Conclusion: The record of examination of patients with congenital cleft lip and palate with dentognathic deformities is advisable to use when planning and conducting orthodontic treatment. This provides an opportunity to take into account and describe all peculiarities of the dental status, justify the choice of treatment methods and trace the dynamics of rehabilitation.

Keywords: Examination record, congenital cleft lip and palate, dentognathic deformities, pilot examination.

INTRODUCTION

Malformations of the maxillofacial region rank third among all known birth defects. Congenital cleft lip and palate among them is 70%.^{1,2} There are no opportunities to timely diagnose tissue defects of the maxillofacial area at the earliest stages of intrauterine development of the fetus, because their monitoring with the help of ultrasound diagnostics of the fetus is possible only from 12 weeks. When the development of defects is detected, parents have to decide on the termination of pregnancy or the birth of a child with a congenital defect and further treatment.

Real help for newborns includes the ability to carry out complex multidisciplinary rehabilitation.^{1,3} The efficiency of rehabilitation directly depends on the coordinated actions of a team of specialists consisting of a pediatrician, pediatric maxillofacial surgeon, anesthesiologist, otolaryngologist, orthodontist, speech therapist, pediatric dentist, psychologist, neuropathologist, ophthalmologist and cardiologist.^{1,2,4-6}

In order to diagnose dentognathic deformities and to decide on the choice of preventive and therapeutic measures in the presence of cleft lip and palate in a child, the orthodontist should conduct clinical and additional methods of examination in accordance with medical care protocols.⁶⁻¹⁸ The medical records are used

to describe a single patient's medical history and care across time.¹⁹ The Objective of this study was to increase the efficiency of orthodontic treatment by developing and implementing an examination record for children with congenital cleft lip and palate with dentognathic deformities.

METHODOLOGY

Record of examination of a patient with congenital cleft lip and palate with dentognathic deformities was developed using established scientific developments in the specialty.^{8,20} Modern internationally recognized protocols for providing dental, in particular, orthodontic care based on principles of evidence-based medicine were used. The record met the requirements approved in the official medical documentation.

In order to correct the form and content, supplement the record with information, a pilot examination of 13 patients of 4 to 14 years old with congenital cleft lip and palate and dentognathic deformities at various stages of rehabilitation was conducted.

RESULTS

To assess the development of the upper jaw, to determine morphometric changes in children of all age groups, use the methods of Braumann, Huddart/

Bodenham, etc. Taking into account their advantages and disadvantages when planning and evaluating the results of orthodontic treatment of cleft lip and palate at stages of surgical interventions, use the methods of determining the sagittal,²³ (Fig. 1a) and transverse (Fig. 1b)²⁴ dimensions of the defect to determine anthropometric parameters and fragments of the cleft upper jaw in children.

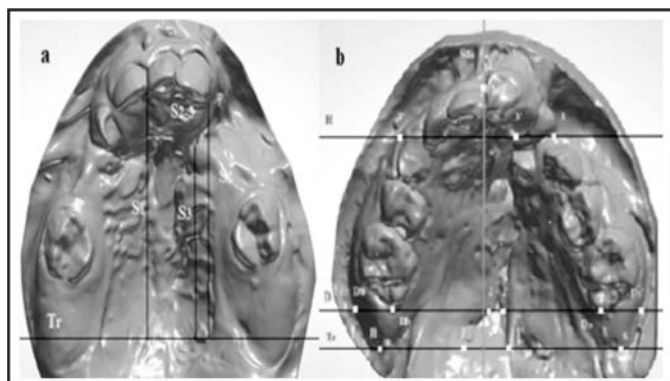


Fig. 1: Anthropometric points and linear distances for determining the length of the small and large fragments of the upper jaw, the facial occlusal deficiency (a), and the transverse dimensions of the defect and fragments of the upper jaw (b) on the scanned model.

Anthropometric methods main parameters are the narrowing/widening, lengthening/shortening of the tooth rows, which accompany the dentognathic deformities. Determine the width of the tooth rows before and after treatment (stage of treatment) in the areas of teeth 13-23 (53-63), 14-24 (54-64), 15-25 (55-65), 13-23, 14-24, 16-26 of the upper jaw and teeth 31-41 (73-83), 31-41 (74-84), 35-45 (75-85), 33-43, 34-44, 36-46 of the lower jaw (Fig. 2a). Determine the length of the tooth rows as the length of a perpendicular drawn from the contact point between teeth 11 and 21 (51 and 61) of the upper jaw and 31 and 41 (71 and 81) of the lower jaws to the line passing behind the distal surfaces of temporary or permanent molars (Fig. 2b). With the help of a photo protocol, assess the soft tissues, which allows determining changes in the upper jaw in all planes, to predict the severity of deformities (Fig. 3).

MRI of the velopharyngeal complex parameters is carried out in order to assess the anatomical and topographic relationship of the defect with the structures of the upper jaw and to determine the volumetric characteristics, changes in the muscles around the area of the cleft, length, thickness and volume of soft tissues, to predict the development of velopharyngeal insufficiency (Fig. 4a, b).

CBCT of the skull determines the volume and length of

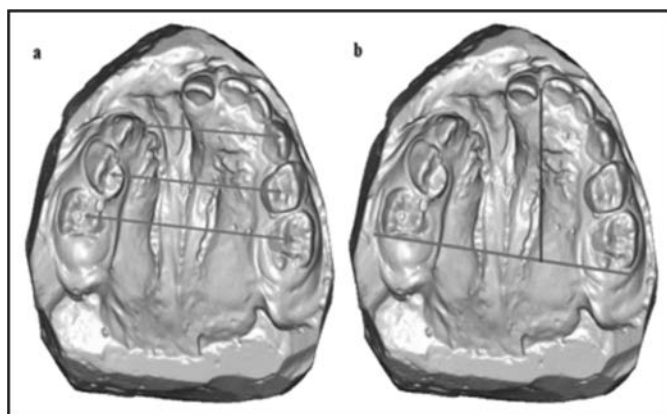


Fig. 2: Determination of the width (a) and length (b) of the tooth row of the upper jaw.

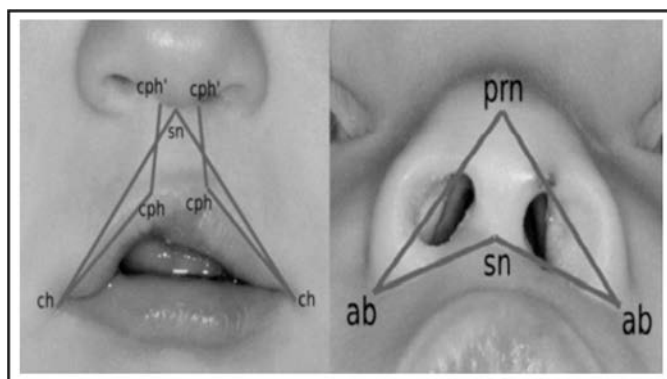


Fig. 3: Photogrammetric assessment of the nasolabial complex.

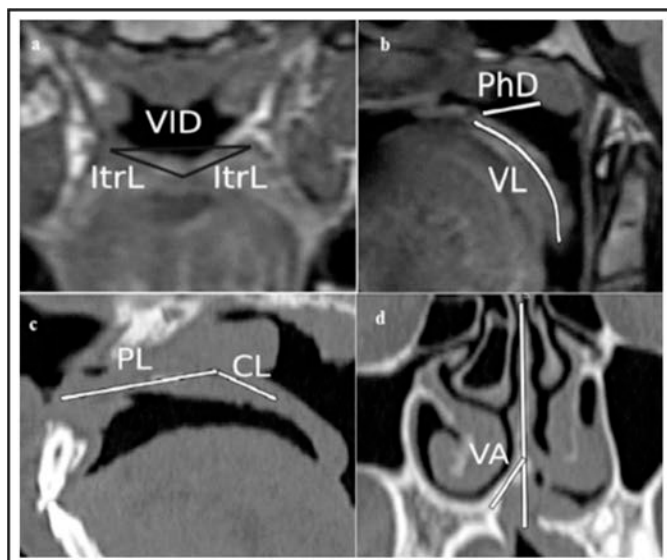


Fig. 4: Determination of the velopharyngeal complex parameters (a, b) and the length of the hard palate (PL) and the length of the upper third of the soft palate (CL) scar (c) and the displacement of the nasal septum (VA) (d).

the defect, its relationship with the nasal cavity and cleft fragments of the upper jaw. Measure the length of the hard palate (PL), the length of the upper third of the soft palate (CL) scar (Fig. 4c), the volume of the respiratory tract, the presence of a displacement of the nasal septum (VA) and choanal hypertrophy (Fig. 4d).

Determination of the peculiarities of the growth and development of the facial skeleton, the structure and relationship of the bone base with the soft tissues of the face; type of face and detection of deviations from the average sizes typical for a normal bite with the same type; morphological peculiarities of various types of bite deformities; the shape of the face profile and the influence of craniometric ratios on it are carried out on cephalograms generated from CBCT according to Sadao Sato and Hasund analysis.

DISCUSSION

Clinical examination consists of subjective and objective methods. The subjective part includes the passport part and the collection of anamnesis. During the interview, it is important to clarify the state of mother's health during pregnancy, the influence of chemical, physical, pharmacological, radiation factors on pregnancy, past infectious or viral diseases, stresses, the type of nutrition, bad habits.

It is important to establish of a natural way of feeding a newborn.

The timing of eruption of temporary and permanent teeth and their number are of significant importance.

It is necessary to determine the presence of harmful habits, which do not have a physiologically adaptive meaning (sucking fingers, lips, cheeks, tongue, various objects) and can cause the development of more severe forms of dentognathic deformities. If clefts are present, the risk of diseases of the ENT organs increases 4-5 times. Children often suffer from rhinitis, sinusitis, tonsillitis, which requires medical and/or surgical treatment.

The difference in the anamnesis of children with cleft lip and palate is data on surgical interventions on the lip, soft or hard palate, alveolar process (cheilorhinoplasty, months; veloplasty, months; uranoplasty, years; uranostaphyloplasty, years; elimination of alveolar process defect, years), which are possible, respectively, of one-, two-, or three-stage protocols.

During an objective intraoral examination, the oral cavity should be examined. Special attention should be paid to changes in color (changes in the vascular pattern, areas of pigmentation) and relief (the presence of elements of the lesion: aphthae, erosions, etc.). Examine the condition of periodontal tissues by determining the BoP index (Bleeding on Probing), the PSR index

(Periodontal Screening and Recording). To control the quality of hygienic care, use hygienic indices (Green-Vermillion, Silness-Loe, Ramfjorda, Quigley and Hein, Lange, Axelsson, Kuzmina, DIOH, etc.). Differentiated index for determining the indicator of individual oral hygiene, adjusted to take into account the different quality of hygiene on the upper and lower dental rows (DIOH) is the most effective.^{21, 22}

The intensity of caries (df, DMFt + df, DMFt) is an important stage of orthodiagnostics in determination of the effect of a congenital malformation and dentognathic deformity on speech disorders. Use additional examination methods like anthropometry, photogrammetry, magnetic resonance imaging (MRI) of parameters of the velopharyngeal complex, cone beam computed tomography (CBCT) of the skull, cephalometry.

The implementation of complex treatment involves keeping the necessary documentation, which allows following its dynamics and efficiency at each stage by different specialists. Considering the specifics of patients, the medical records of dental clinics do not always include all the necessary sections for recording the performed diagnostic and rehabilitation manipulations.⁶⁻¹⁹

The orthodontic practice uses generally accepted records and examination schemes described in the scientific literature. Most of them do not include the collection of information about the development of dentognathic deformities in children with cleft lip and palate. The advantage of the proposed record is informativeness and ergonomics. The filling time allows using it in the process of outpatient visits.

CONCLUSION

The "Record of examination of a patient with congenital cleft lip and palate with dentognathic deformities" is advisable to use when planning and conducting orthodontic treatment that will provide an opportunity to take into account and describe all peculiarities of the dental status of children, justify the choice of treatment methods, and follow the dynamics of rehabilitation.

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