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Analysis of patients with a cleft of the soft palate with special consideration to the problem of velopharyngeal insufficiency

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ABSTRACT

The evaluation of therapy concepts for children suffering from cleft palate is an enormous challenge in modern oral and maxillofacial surgery and related disciplines. In the present retrospective survey 1300 patients having clefts, including the soft palate, were studied with special regard to speech improvement operations. Nine hundred fifty four patients had a cleft lip, alveolus and palate and 346 patients only isolated cleft palate. In 25.6% of the patients it was necessary to perform a secondary velopharyngoplasty for speech improvement after soft palate closure. Age of the subjects at the time of operation, primary or secondary soft palate closure, and the type of clefting were not significant factors for performing subsequent velopharyngoplasty. However, significant differences with respect to the need for a secondary velopharyngoplasty after soft palate closure were found when comparing the surgical experience of the surgeons.

1. Introduction

Speech plays an important part in communication. Abnormalities can lead to a psychological burden and social exclusion (Clifford, 1989), besides the influences of reduced facial attractiveness due to facial asymmetry (Meyer-Marcotty et al., 2011). The incidence of cleft lip and palate is approximately 1:500 (Gundlach and Maus, 2006) with both hereditary and environmental influences (Zhang et al., 2010). In 77.5% the soft palate is affected (Ehrenfeld, 2002) and there are various different protocols for the time and complexity of a combined cleft (Meazzini et al., 2011). In these cases an incomplete closure of the pharynx during phonation can lead to nasal speech, which can be as disturbing for the patients as deficits in facial aesthetics (Clifford and Clifford, 1989). Reasons for the velopharyngeal insufficiency are found in the non-union of the velopharyngeal muscle stumps (Kriens, 1975). In order to reach a relatively normal level of speech, interdisciplinary therapy (Bill et al., 2006) should be started before the beginning of speech development. Part of this interdisciplinary concept is early intensive speech therapy. If a high-grade velopharyngeal insufficiency continues to persist further surgical treatment for speech improvement is recommended. The technique used for this patient group was the secondary velopharyngoplasty by Sanvenero-Rosselli (1960), which is still the preferred method in recent cleft surgery (Pröschel et al., 1994). It can be carried out either as a primary or secondary velopharyngoplasty (Horch, 1998). In this operating technique a superiorly-based pharyngeal flap is stitched on to the nasal bed of an open or reopened velum or is fixed onto the rear surface of the velum following the establishment of a wound through epithelial removal (Andrä, 1981). The flaps are separated from the fascia praevertebralis in adequate length and width. The flap consists of fibres from the M. constrictor pharyngis superior and mucous membrane and should be large enough to be placed on the nasal soft palate and to extend sufficiently to the rear. Usually a flap of 5 cm length and 2 cm width is sufficient. The tongue-shaped flap is sewn as far into the nasal strata of the velum so as to leave sufficient access via both lateral openings. The flap bases form part of the intranasal septum and contribute to minimising the resonating cavity. Eufinger and Eggeling describe the secondary velopharyngoplasty as a functional fully-fledged speech-improving operation, which is most advantageous when carried out by the age of 7 in order to obtain an optimum result (Eufinger and Eggeling, 1994). According to Heiner et al. (1981) the result of the velopharyngoplasty (hereafter referred to as VPP) is a spontaneous improvement in speech; the elimination of the hypernasal components is of special importance (Heiner et al., 1981). In a longitudinal study Persson et al. also established an improvement in the velopharyngeal situation through the VPP (Perrson et al., 2006).

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This retrospective survey of a large group of all cleft patients treated at the Bremen-Mitte Clinic cleft centre over 25 years (1974–1999) allows for a precise observation of the distribution model of cleft types, the operative approach and their results within a geographical region and allows conclusions to be drawn from any resulting developments, which can lead to important findings both for the present and the future.

2. Material and methods

In order to standardise the compilation and evaluation of data, the standard questionnaire of the Clinic for Oral and Maxillofacial Surgery, Plastic Surgery and Special Pain Therapy of the Klinikum Bremen-Mitte gGmbH was used. The first part of the questionnaire gives general information about name, date of birth and doctor treating the patient. The second part documents the cleft diagnosis using the LAHSHAL-classification as per Kriens (1989), as well as a written description with information regarding deformities and syndromes. Part three refers to details of the family's medical history, pregnancy and birth, risk factors (e.g. alcohol, smoking, medication), as well as the age of the mother and father. The fourth part gives information about surgical procedures, e.g. operative indications, operative methods, date of operation, surgeon, intra- and post-operative specifics, healing difficulties and complications. ENT and speech therapy results, X-rays and documentation concerning additional therapy are also included (e.g. orthopaedic treatment).

1723 patients were taken into account who, between 1974 and the summer of 1999, were treated for a cleft deformity at the Clinic for Oral and Maxillofacial Surgery, Plastic Surgery and Special Pain Therapy in the Klinikum Bremen-Mitte gGmbH. The data were taken from the medical files, outpatient cards and operation reports and complemented through drawings of the type and scale of the clefts, X-rays, photos, speech therapy reports and consultant reports. These data were then processed using a modified version of the Leipzig "LKG-Doku"-Program 1.23, a software which was specifically designed for cleft lip and palate classification. In this program it was possible to use data taken from medical records, cleft palate and other deformities, as well as details concerning operations, risk factors and methods of documentation. The standardized form and drop-down menus of the program helped by the compilation of a homogenous entry system, hindered discrepancies and facilitated the evaluation. The statistical relevance of the data was checked using the χ^2-test. At the same time, with the help of the four-field-test, the observed frequency of a symptom was compared with the expected frequency in the null hypothesis. The level of significance for a random sample of this magnitude of 5% ($p < 0.5$) was applied. If the calculated value was smaller than the prescribed significance level the null hypothesis could be discarded, which meant a statistical significance was then available (Monka and Voß, 1999).

3. Results

3.1. Separation of the cleft with distribution of the clefts with soft palate share

Of the 1723 patients included in this study, 1300 had a cleft with soft palate. This corresponds to a percentage of 75.45%.

These 1300 patients were sub-classified into 2 groups; 501 female and 799 males, corresponding to a percentage sex distribution of 38.5% (f) to 61.5% (m) – showing a significantly larger male patient group ($p < 0.05$).

The 1300 patients with soft palate clefts were also divided into two groups epidemiologically. The first consisted of cleft lip and palate patients ($n = 954$) and the second of isolated cleft palate patients ($n = 346$).

In the group containing the lip-maxilla-soft palate cleft significantly more defects, 63.1% ($n = 315$) were recorded on the left. 32.2% ($n = 184$) right sided defects showed considerably less pathological deformities ($p < 0.05$). In both the left-hand sided (m 66.9%, w 33.1%) and the right-hand sided lip-maxilla-soft palate cleft (m 66.3%, w 33.7%) male patients were significantly more affected ($p < 0.05$).

Bilateral lip-maxilla-soft palate clefts were significantly higher ($p < 0.05$) in the male group at 67.5% ($n = 307$) in comparison to the females with 32.5% ($n = 148$).

The isolated soft palate cleft accounted for 46% ($n = 159$) of the male patient clientele. 54% ($n = 187$) of the patients were female. 24.9% ($n = 251$) of all male patients in the patient case-files evaluated were cleft palate afflicted persons. The ratio of female patients affected with an isolated soft palate cleft was 41.9% ($n = 300$). Therefore, the proportion of females with an isolated soft palate cleft in relation to the whole is significantly higher than those males with an isolated cleft palate in relation to the rest of their male group ($p < 0.05$) (Fig. 1).

3.2. Results taking into account speech-improving operations

3.2.1. Cleft type, age and operative method

Of the 1300 patients who suffered from soft cleft palate syndrome, 333 had a VPP following the successful repair of the soft cleft palate (Fig. 2). Of the 954 patients with lip-jaw cleft palate 233

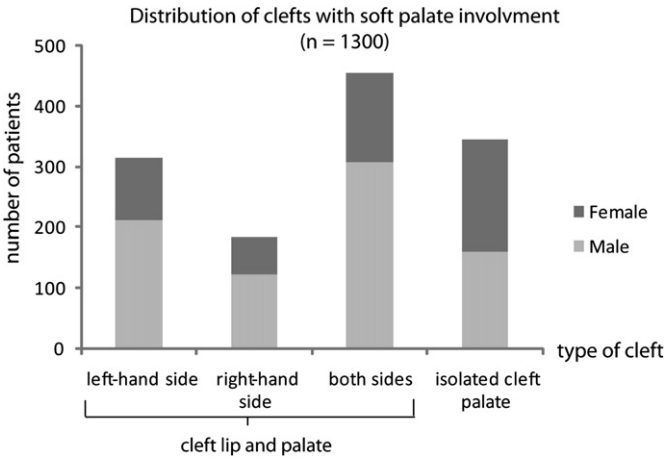

Fig. 1. Distribution of phenotypes of cleft palate ($n = 1300$).

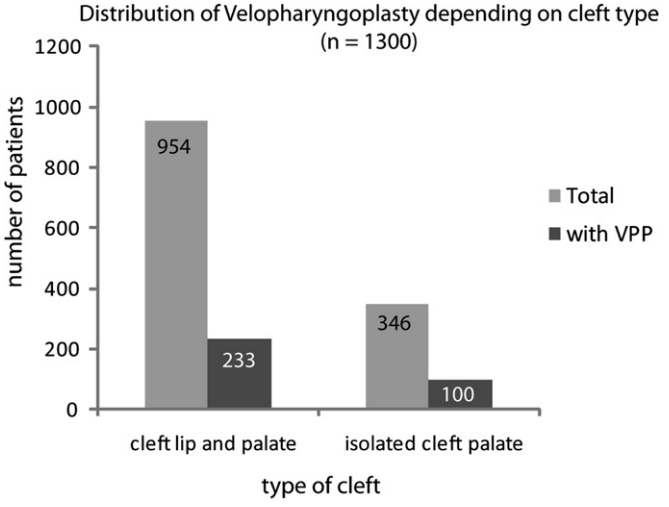

Fig. 2. Phenotypes of clefts and VPPs following soft palate closures.