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Classification of nasolabial folds in Asians and the corresponding surgical approaches: By Shanghai 9th People's Hospital

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Summary Introduction: One of the earliest signs of aging appears in the nasolabial fold, which is a special anatomical region that requires many factors for comprehensive assessment. Hence, it is inadequate to rely on a single index to facilitate the classification of nasolabial folds. Through clinical observation, we have observed that traditional filling treatments provide little improvement for some patients, which prompted us to seek a more specific and scientific classification standard and assessment system.

Methods: A total of 900 patients who sought facial rejuvenation treatment in Shanghai 9th People's Hospital were invited in this study. We observed the different nasolabial fold traits for different age groups and in different states, and the results were compared with the Wrinkle Severity Rating Scale (WSRS). We summarized the data, presented a classification scheme, and proposed a selection of treatment options.

Results: Consideration of the anatomical and histological features of nasolabial folds allowed us to divide nasolabial folds into five types, namely the skin type, fat pad type, muscular type, bone retrusion type, and hybrid type.

Conclusion: Because different types of nasolabial folds require different treatments, it is crucial to accurately assess and correctly classify the conditions.

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The most distinctive changes in human senescence occur in the face, where the earliest signs of aging appear in the area surrounding the eye and the nasolabial fold. However, the nasolabial fold is a unique structure such that, although it gradually deepens as the body ages and when the person smiles, causing muscle movement, it is distinctively different from regular wrinkles around the eyes and on the forehead. The formation of nasolabial folds is caused by many factors, which vary considerably among individuals. Moreover, their anatomical peculiarities make surgical correction a daunting task for plastic surgeons. Currently, the most widely employed and convenient operational approach is to use facial fillers, such as hyaluronic acid,^{1,2} to fill the nasolabial fold, thereby re-plumping the sunken tissue and improving facial appearance. However, this method has the drawbacks of having short maintenance duration, being prone to relapse and imposing high costs.³

Thus far, the treatment of nasolabial folds is mainly conducted according to the standard of the Wrinkle Severity Rating Scale for classifying nasolabial folds,⁴ and improvement is assessed via the standard of the Global Aesthetic Improvement Scale (GAIS).^{5,6} The efficacy of response is defined by a 1-grade improvement over the baseline in the WSRS system. Such a treatment criterion is established based on the theory that a nasolabial fold is a type of wrinkle. However, a nasolabial fold is not simply a wrinkle. In fact, it is a special anatomical region that requires many factors for collective assessment. Hence, it is inadequate to rely on a single index to facilitate the classification of nasolabial folds. Through clinical observation, we have observed that traditional filling treatments provide little improvement for some patients, which prompts us to seek a more specific and scientific classification standard and assessment system.

Patients and methods

Patients

A total of 900 patients who sought facial rejuvenation treatment in Shanghai 9th People's Hospital from 2009 to 2013 were invited in this study. The study was approved by Ethics Committee of Shanghai 9th People's Hospital, Shanghai Jiao Tong University, School of Medicine. No patient had a history of surgical facial trauma, apparent scars, or pigment patches. The patients were divided into three groups based on their ages, namely the young group (20–35 years old), the middle-aged group (36–50 years old), and the elderly group (51–65 years old), with each group comprising 300 individuals.

Methods

Each patient was asked to sit, maintain a fixed natural head position, and look straight forward to allow the capture of front-view and side-view pictures of the natural and smiling expressions. In addition, while presenting a natural expression, the zygomatic area was hand-gripped to lift the facial tissue upward and outward, and the improvement of the nasolabial fold was documented (i.e., more "+" signs

indicate a better amelioration level). Afterward, the patient was asked to lie in the supine position and look straight upward, and the front-view and side-view pictures of the natural and smiling expressions were again captured. We observed the different traits of nasolabial folds for different age groups and in different states. The results were compared with WSRS, and we summarized the data, presented a classification scheme, and proposed a choice of treatment options.

Results

Clinical types of nasolabial folds

The properties of nasolabial folds were observed under five states of standing upright and still, standing upright and smiling, lying supine and still, lying supine and smiling, and with hand lifting of the facial tissue. The results, in conjunction with the anatomical and histological features of nasolabial folds, allowed us to divide nasolabial folds into five types, namely the skin type (Figure 1), fat pad type (Figure 2), muscular type (Figure 3), bone retrusion type (Figure 4), and hybrid type. Their characteristics are summarized in Table 1.

Age distribution of nasolabial fold types

In the 20–35-year-old age group, nasolabial folds of the bone retrusion type represented the highest proportion, 38.24%, followed by the hybrid type, which accounted for 32.4%, among which the most frequent subtype was fat pad combined with bone retrusion. In the 36–50-year-old age group, the hybrid nasolabial fold type contributed the greatest percentage, 73.7%, and the dominant subtype was sagging skin combined with bone retrusion. In the 51–65-year-old age group, the hybrid type represented the overwhelming majority of 92.3%, and the most common subtype was sagging skin combined with bone retrusion (Table 2).

Discussion

The nasolabial fold is an exceptionally peculiar and complex anatomical site, and its anatomical conception remains controversial to this day. Many clinicians simply treat it as a normal wrinkle, which sometimes does not generate the anticipated efficacy. Its generally accepted anatomical features are as follows: i). there is very low content of subcutaneous fat in the medial side of the nasolabial fold; ii). a dense layer of superficial fascia is tightly associated with the muscle fibers, and therefore the skin of the upper lip in its medial side displays no apparent sagging during the aging process; iii) the lateral side of the nasolabial fold accommodates significant subcutaneous fat accumulation and is very mobile, which results in considerable age-related changes.⁷ In addition, the formation of the nasolabial fold is also closely related to the movement of facial muscle.⁸ Because a variety of factors contribute to their

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