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SUMMARY. There is sometimes controversy among colleagues over treatment plans in orthognathic surgery. This is because there are differing ideas about which part of the facial skeleton should be moved to give an optimal result. A study was therefore set up to obtain insight into the differences between surgeons.

Ten unbalanced profile drawings were given to seven experienced surgeons with the request that they draw the profile line which they would like to give these patients. It was acceptable either to draw the profiles 'artistically' off the cuff or to use additional construction lines as long as this was not the profile planning according to Brons and Mulé (1993).

The evaluation showed that some surgeons drew profiles which resembled each other to some extent in proportions and inclinations, while others produced variations without any evident regularity and basic concept. The variability per profile was very important in almost all cases. Such discrepancies are not acceptable in a teaching centre.
Fig. 1 - Two examples of the full-size profiles which were given to the surgeons.

Fig. 2 - Points of reference for evaluation. The points are defined according to the technique of Brons and Mulie (1993).

Fig. 3 - Differences between surgeons concerning the length of the upper lip.

Fig. 4 - Differences between surgeons concerning the mandibular height.

Fig. 5 - Differences between surgeons for the total height of the lower third of the face.

Fig. 6 - Ratios of upper-lip length to mandibular height with mean value (dot) per surgeon. 0.62 stands for the golden section.

The lower third of the face shows a comparable pattern with the mandible (Fig. 5), with ranges between 14.5 and 19.5 mm. While the ranges for the surgeons are again rather homogenous, the absolute measurements differ considerably.

These variations explain the wide range of ratios of the upper-lip length to lower-jaw height (Fig. 6). The most compact range for one surgeon is 0.50–0.37 while, at the other end of the scale, we have 0.70–0.40.

Even more interesting are the means which tend most evidently towards low figures, meaning deep mandibles compared with the upper lip. Only one is within 0.53 above the ratio of 1:2, while all others vary between 0.41 and 0.48.
Finally, the inclinations of the lower third with respect to a vertical line again display a good deal of variation (Fig. 7). The most prominent chin protruded +13.0°, the most receding chin measured −18.0°. The narrowest range was 8.0°, the widest 20.0°.

Furthermore, the following tendencies were observed. For two surgeons, there was an evident connection between the height of the lower third and the position of the profile with respect to the cranial base (Fig. 8); the higher the face, the further forward the profile line. For four surgeons, it could be shown that the further forward the profile line is positioned, the steeper becomes the inclination of the lower third (Fig. 9).

When summarizing these findings, it is not surprising that one surgeon has a tendency to draw almost the same profile every time, while another has tremendous variations with practically no detectable guidelines (Fig. 10).

Variations in drawings per patient profile

Similar observations can be made when comparing the proposed profiles for each case. The differences between the lengths of the upper lip are considerable (Fig. 11). The most uniform ranged between 21.0 and 23.0 mm, a difference of only 2 mm for all seven surgeons, while the other extreme was 16.5–29.0 mm, a 12.5 mm difference. The lower jaws were, generally speaking, more uniform but the smallest range was still 46.0–51.0 mm and the widest, 43.0–57.5 (Fig. 12). The difference in range of the whole lower third are larger than when comparing surgeons, ranging from 7.0 to 19.5 (Fig. 13).

The mean ratios of upper lip to lower jaw was, for nine cases, between 0.41 and 0.50, only one case showing more than 1:2, namely 0.56 (Fig. 14). Here also, the ranges were comparable with one exception, 0.35 to 0.66.
Fig. 12 - Differences in heights of the mandible for the 10 profiles.

Fig. 13 - Differences in total height of the lower facial third for the 10 profiles.

Fig. 14 - Ratios of upper lip length to mandibular height with mean value (dot) for the 10 profiles.

DISCUSSION

As demonstrated by Figure 16, the changes proposed for correction of a profile are often quite variable. Apparently we must accept that there is very little uniformity in the concept of the ideal profile in this group of surgeons. This is disturbing in those places where several specialists are involved in teaching the same group. More or less well-defined treatment recommendations will not be detected by the trainee.

However, it has to be mentioned that the set-up of this study favoured extreme results. In reality, the choices are less varied as some restricting factors may play an important role. One of them is the fact that some changes can only be realized by complex and technically-difficult operations, while in practice one
tries to normalize the profile with an intervention which is as simple as possible. The other is the occlusion, which will not allow for any movement imaginable but which has to be respected, defining quite clearly the amount of some displacements. This study, on paper, on the other hand, allowed for unrestricted freedom of choice.

There are different propositions which should help us to draw a harmonious or 'interesting' profile. One of them is the notion of a straightforward profile line, as proposed by Schwarz (1951), which is today considered to be the most attractive. This was confirmed in this study as three out of four profiles were planned accordingly. Other inclinations are described by Baud (1973) and Bütow (1984) using arcs of a circle from the ear. Lines and Steinhäusler (1981) describe ideal composites of facial angles. These techniques were not analysed further, but interdependent inclinations of the different parts (Brons and Mullé, 1993) will be checked elsewhere.

Vertically, the best known is the rule of facial thirds. The height of the nose (middle third) is equal to the height of the lower third. This rule is found in the work of Leonardo da Vinci and in Dürer. Kirchner (1961) subscribes to it, as did Bütow (1984). However, Baud (1973) and Brons and Mullé (1993) calculate with the ratio of the golden section (1.62:1:0.62) but they use different reference points. The lower third is again divided into several parts. According to Dürer, upper lip and mandibular height have a ratio of 1:3. Just one of the 70 profiles went slightly below that ratio (0.31). For da Vinci, it is basically 1:2. Fifty-two (74%) were drawn with a ratio between 1:3 and 1:2, which indicates that the advice of Kirchner (1961) is sound. She stated that it should be 1:2 or a little less. Only 17 (23%) have a ratio greater than 0.5 and only three (4%) of the drawings have more than 0.62 (which is the golden section and is the mean advice of Brons and Mullé (1993)) for the ratio of upper lip to mandibular height.

The ranges for the different values per surgeon have a wide spread. This may be explained by the variety of head forms to be corrected. Ideally, we would expect that variations are minimal between the propositions for one profile. However, this is most evidently not the case. One might conclude that a drawing of an aimed-at profile does not correspond at all to any scientific approach, which is not surprising.

This evaluation cannot be more than a first step in the analysis of this complex question. Further studies are under way which evaluate the reproducibility of these drawings. Furthermore, they will be analysed using the method of Brons and Mullé (1993) because that system allows for variations in the proportions and also takes into consideration the preservation of the characteristics of the original profile, which seems to be a unique concept. It is conceivable that a more detailed quantitative analysis will shed more light on possible errors in drawing aimed-at profiles. This will not prevent disappointing end results, as there are some insurmountable obstacles to predicting the outcome (Freihofer, 1991), but at least it would mean that the optimal starting-point for a correction was chosen.

CONCLUSION

The drawings of aimed-at profiles showed more important differences than was anticipated. If it is assumed that each drawing represents the optimal profile-line, the surgeons could imagine it must be accepted that treatment plans of different surgeons cannot become uniform and will be completely dependent on the personal views of the patient and his medical attendant. This would basically mean that one has only to bring the two dental arches into a reasonable relation to each other, and one will then always find somebody who will consider the result obtained optimal, as long as there are no extensive vertical or transverse deviations. However, the authors, being involved with teaching, would prefer if treatment recommendations could be found which on one side tend in the direction of a generally-agreed consensus, without eliminating completely the 'artistic freedom' of the surgeon and personal views of the patient. We hope that the guidelines of Brons and Mullé will prove to be a useful tool towards attaining that goal.

References

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