

PREDICTABLE SURGICAL CHIN
CORRECTION AND FACIAL HARMONY

Orthognatic surgery 3.0

In the past, patients concerned about their appearance sought the advice of an orthodontist, as sagittal and vertical open bites and deep bites often have a negative impact on the facial appearance. Orthodontic treatment could improve this, although the primary aim of the treatment was to create a good occlusion and correct dental arches in the upper and lower jaws.

Combined treatments, which were developed later, involving extensive maxillofacial surgery on the upper jaw, lower jaw or a combination of both following orthodontic pre-treatment, led not only to better occlusion but also to an ‘improvement’ in appearance. This was followed by an analysis of the chin in relation to the improvement of facial harmony and the development of a software program to discuss simulations of chin corrections with the patient.

TEXT AND IMAGE: ROB MULIÉ AND ALBERT ZWEERS

When it comes to our appearance, social media have played an increasingly significant role in recent years. Platforms like Instagram and

TikTok have put appearance in the spotlight. And this has fuelled interest in cosmetic treatments. Glossy magazines also advertise all sorts of treatments we can have done to our faces. Terms such as beauty, attractiveness and harmony are used interchangeably, whilst these terms are not explained in detail and people probably do not understand what they mean. These three concepts fall within the scope of aesthetics, the branch of philosophy that deals with beauty and art. A judgement of beauty and attractiveness is subjective (it stems from our feelings) and does not rely on evidence or reasoning. Beauty evokes a sense of pleasure, attractiveness evokes a pleasant feeling, whilst harmony contributes to a sense of (self-)esteem. The degree of appreciation depends on the degree of perfection of the form (facial perfection). The concept of harmony is (the only) factor that allows for the formulation of objective, universally applicable criteria for form. The concepts of beauty and attractiveness, on the other hand, are subjective and therefore unsuitable for setting standards. Given the objective adopted here, we can therefore say that facial harmony is identical to facial aesthetics.

> Set of standards for facial harmony

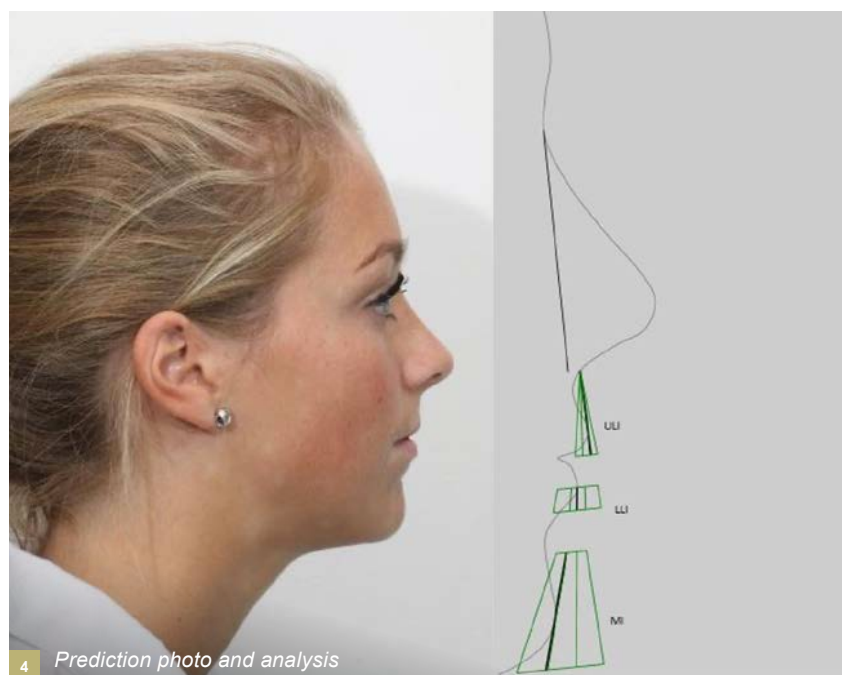
This article presents a set of standards for facial harmony that can be applied to each individual patient. This system enables you to formulate optimal aesthetic objectives and provide an accurate prediction of the final result. This means that the various parts of the face must be viewed consistently within their mutual context, and that the rules for facial harmony must consistently reflect this relationship. This coherence is expressed in the definition of facial harmony: ‘The face is harmonious if the constituent parts of the face, taken as a whole, evoke a positive, objective appreciation.

The greater the appreciation, the greater the facial perfection’. This facial perfection means that, at first glance, one perceives the face as a single whole, and only subsequently does one notice its various individual features. We then speak of an unobtrusive balance between the nose, upper lip, lower lip and chin (image 1). If individual perfection of form is lacking, then something is amiss. Attention is drawn to what is wrong, a disproportionately prominent feature in the facial form. This is referred to as the (negative) distracting aspect. We then speak of facial disharmony, the presence of one or more distracting aspects and the absence of an unobtrusive balance (image 2).





3 The Brons-Mulié-analysis



4 Prediction photo and analysis



5a Facial disharmony



5b Facial harmony

Based on the above considerations, a set of standards for facial harmony was developed in collaboration with Rijnko Brons (maxillofacial surgeon at the Red Cross Hospital in The Hague, 1980–1986) for the vertical and sagittal dimensions, using the following aspects as a starting point:

1. Facial harmony manifests itself as an unobtrusive balance, making the face appear as a single, unified whole.
2. Within established standards, each face has its own individual features. In general terms, these can be categorised as short, neutral and long in the vertical plane, and dorsal, neutral and ventral in the sagittal plane.
3. Anomalies in the individual facial perfection manifest themselves as an exaggerated (distracting, sometimes caricatured) facial form.
4. The pursuit of preservation of recognisability is a guiding principle in the restoration of facial perfection. This means that facial perfection reflects the type of face without resorting to a distracting caricature. Preservation of recognisability is important for the relationship of the patient with their social environment.
5. Caricature-like anomalies must be corrected to align with the features of the surrounding area. The corrections should preferably not cross the boundaries of the standards. In this way, the principle of preservation of recognisability is upheld.

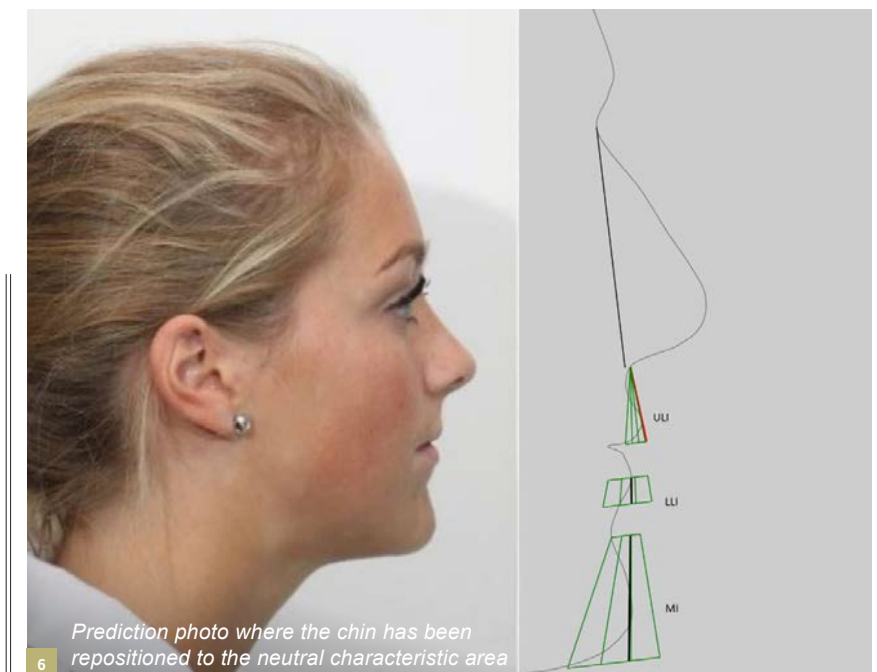
Whether the face, once restored, will evoke feelings associated with beauty or attractiveness cannot be determined objectively. This depends on the face itself, the preferences of the observer, and the ability of the individual to enhance their appearance. After all, satisfied patients may pay extra attention to their hairstyle, jewellery or make-up after treatment. Experience shows that the most distracting features are often found in the mandibulofacial region, particularly due to malpositions of the chin and the shape of the labiomental fold.

‘Facial harmony identical to facial aesthetics’

It is precisely the chin that offers many possibilities for correction, both in the sagittal and vertical planes. Therefore, the isolated chin correction offers many possibilities for restoration and plays a crucial role in the creation of facial harmony. In collaboration with a master's student from Delft University of Technology, we have developed a computer model that can be applied to each individual patient whilst preserving their individual features.

It provides immediate insight into the sagittal and vertical proportions and uses red lines to indicate where corrections need to be made (image 3). Here, the mandibulofacial region lies outside the dorsal characteristic area of the harmonic field. Viewed vertically, the chin lies within the long characteristic area. Vertically, therefore, there is no problem, although the chin gives a long impression. Correction must take place from the dorsal caricature (red line) into the nearest characteristic area. The computer therefore immediately displays the corresponding prediction image (image 4).

Image 5 shows the simulation in which the disharmonious face with negative distracting features (image 5a) has been transformed into a harmonious face with an unobtrusive balance between the nose, upper lip, lower lip and chin (image 5b). This is what we refer to as facial harmony. Image 6 shows the computer simulation of the effect of simply moving the chin to the neutral characteristic area. At first glance, this does not appear to be a problem, but when we compare it with the initial situation (image 7a), we see that issues arise with preservation of recognisability (image 7b).



6 Prediction photo where the chin has been repositioned to the neutral characteristic area



7a Initial situation and prediction photo

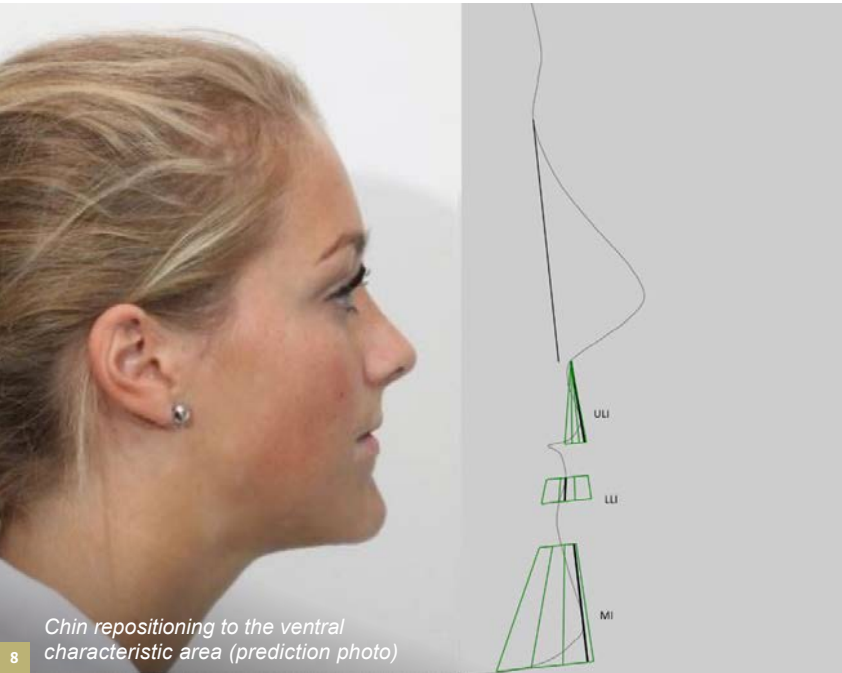
7b

ROB MULIÉ

studied dentistry in Groningen and specialised in orthodontics after graduating in 1973 under Professor Dr Cees Booij. From 1977 to 1998, he ran an orthodontic practice in The Hague. He subsequently moved his practice to Zoetermeer. In 1993, he co-authored the book ‘Facial Harmony: Guidelines for Aesthetic Diagnostics and Treatment Planning’ with Dr Rijnko Brons. In 2008, he founded the Orfeo Clinic in Zoetermeer, a centre for multidisciplinary dental treatments provided by specialists. His particular interest lies in the treatment of dentofacial anomalies through chin corrections. He continues to give numerous lectures on this subject both at home and abroad.

Knowledge

Clinical



8 Chin repositioning to the ventral characteristic area (prediction photo)



9a Preservation of recognisability completely missed, initial situation and prediction photo



10a Before, prediction photo and profile seven years later

If we reposition the chin to the characteristic ventral area (image 8), little remains of the preservation of recognisability. Moreover, a new phenomenon arises, namely that of the optical illusion (a perceived reality that does not actually exist). This position of the chin gives the impression that the upper and lower lips are increasingly turning inwards. This once again creates a disharmonious face with a new distracting aspect, namely the chin. The preservation of recognisability is completely lost, there is no longer any unobtrusive balance as in image 5. We have gone too far in the characterisation and an optical illusion has arisen, namely that the lips appear to be set further back compared to the photo on the left (image 9a). When correction is made from the dorsal caricature to the nearest characteristic area, an unobtrusive balance is created between the nose, upper lip, lower lip and chin, which creates facial harmony (image 10b). Even seven years after the chin correction (image 10c), the profile still resembles the prediction photo and the same unobtrusive balance remains. We can certainly speak of facial perfection here.

Situations often arise where there appears to be a clear dentofacial anomaly and where osteotomy of the upper and/or lower jaw may be necessary. However, if the occlusion is good and there is no horizontal or vertical overbite, combined treatment does not appear to be indicated (images 11a and 11b). Furthermore, the patient states that she does not want braces or jaw surgery at all. A solitary chin correction may then be a good solution.

'The caricature must be removed, but the characteristics must be preserved' (Rijnko Brons)

ALBERT ZWEERS

studied dentistry in Utrecht. From 1983 to 1996, he ran a dental practice in Andijk. He also obtained a master's degree in medicine. He completed his specialisation in maxillofacial surgery in Leiden (graduating in 2005) and was a member of staff at Leiden University Medical Centre (LUMC) until 2012. He then went on to work at the Slotervaart Hospital and the Orfeo Clinic, where he remains affiliated to this day. His particular interests lie in osteotomy of the upper and lower jaw and performing mentoplasty.

Image 12 shows a disharmonious profile with several distracting features. It appears that the nose protrudes too far forward, that the upper and lower lips are everted, and that the receding chin is too long, partly due to the stretched fold. The sagittal analysis (image 12) shows that the upper and lower lips protrude too far forward and that the chin is set too far back (red lines). The chin appears too long, but the vertical analysis shows the opposite, sitting neatly within the neutral zone. An example of an optical illusion. An isolated chin correction appears to be the solution. The chin is repositioned from the dorsal characteristic to the border area between the dorsal and neutral characteristics. The prediction photo shows what the result will look like (image 13b). Following the chin correction, the chin now lies sagittally at the transition between the dorsal and neutral characteristics and vertically within the short zone (image 13c). An unobtrusive balance has been created between the nose, upper lip, lower lip and chin. The nose appears less prominent, and the upper and lower lips also appear less everted. This is yet another example of an optical illusion. A disharmonious face has been transformed into a harmonious one. Without the application of these guidelines and the use of this analysis, you would never be able to achieve this kind of result.

Knowledge

Clinical



11 Dentofacial anomaly



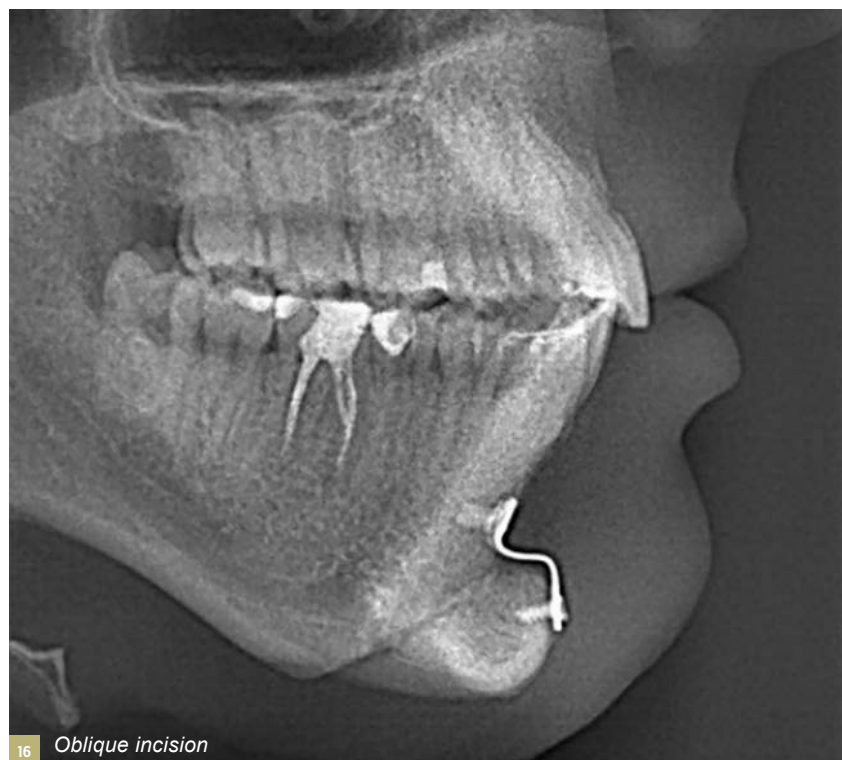
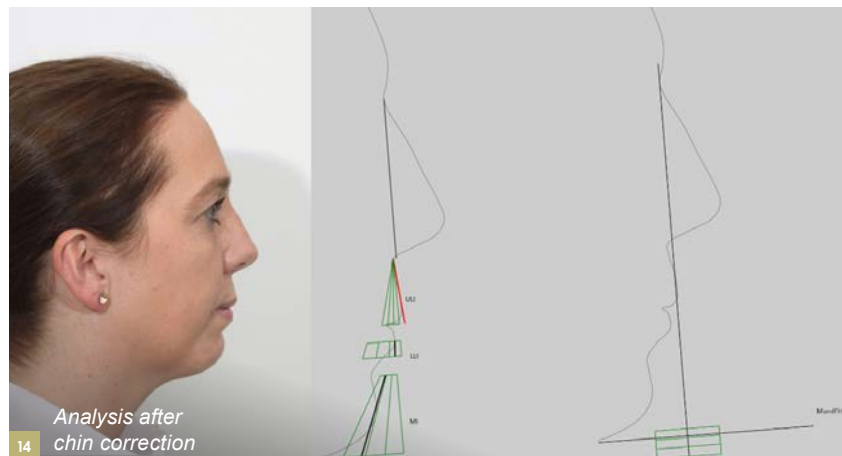
12 Sagittal and vertical analysis



13a Initial situation

13b Prediction photo

13c After chin correction



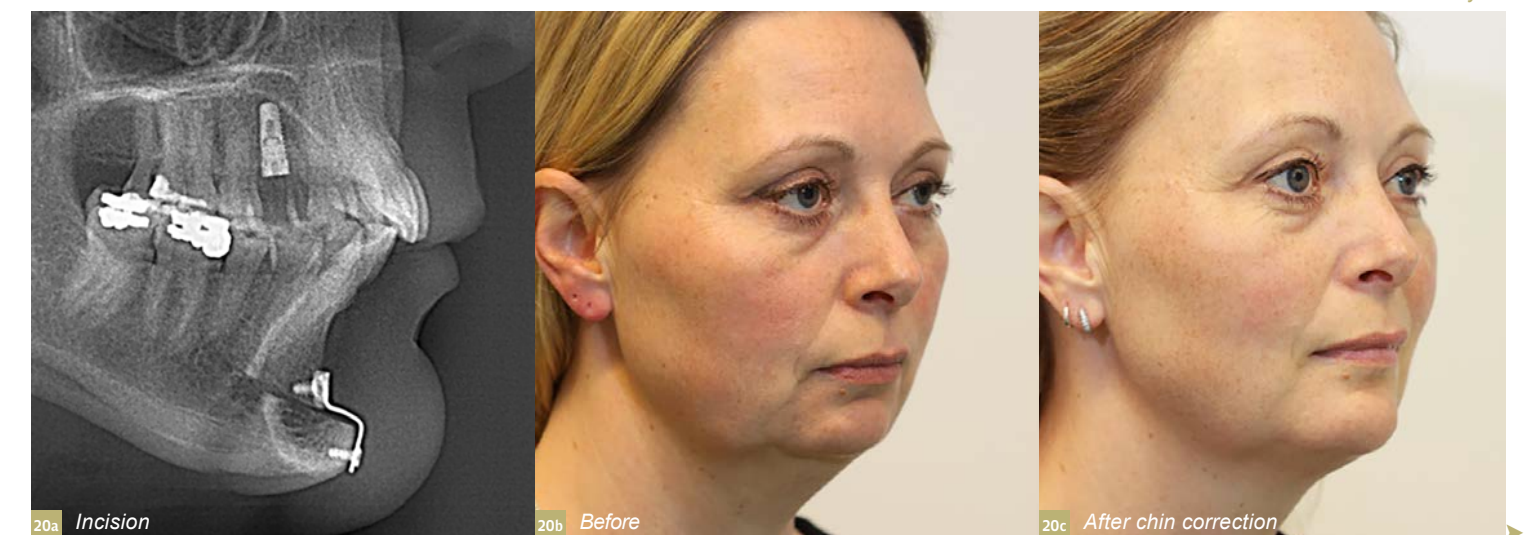
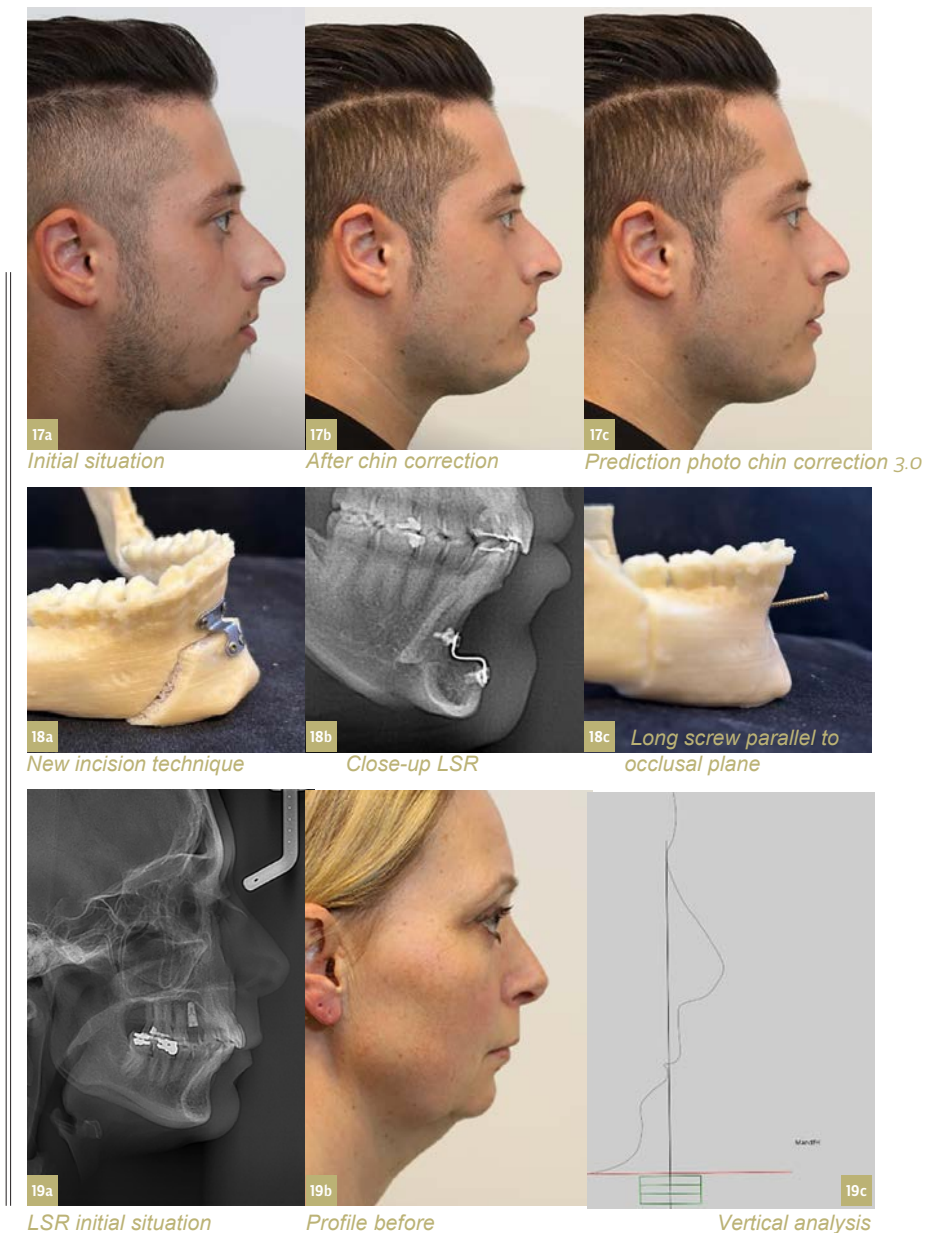
The lateral skull radiograph (LSR, image 15a) shows that vertical growth of the lower jaw is the cause of a (long) receding chin, in combination with a stretched labiomental fold. As a result, the mandibular part of the face appears long and massive. Had a treatment plan been drawn up for this patient involving surgery to the upper and lower jaw, this would not have led to facial harmony without a chin correction as well. Experience has shown that a chin correction alone can often lead to an optimal aesthetic result (image 15b).

> Chin correction 3.0

In recent years, several hundreds of patients have undergone chin correction in accordance with our guidelines. The results of these procedures have been evaluated. This has led us to refine our surgical technique. A frequently used method for accentuating the chin is the oblique incision (image 16). In doing so, the chin moves forwards, but also always tilts slightly upwards. This can have an unfavourable effect on the profile, particularly if the chin should not have been shortened. The front of the jawline curves upwards, and it is clearly visible that the chin has also become shorter (images 17a and 17b). The result is certainly not bad, but could have been better (image 17c).

The oblique incision has been abandoned and a different technique has been introduced. This surgical technique (3.0) offers many advantages and greater flexibility. It is now possible to determine exactly how many millimetres the chin needs to be repositioned sagittally and also provides greater flexibility in the vertical plane. By (temporarily) placing a long screw parallel to the occlusal plane of the lower jaw during the surgery, the direction of the incision relative to the occlusal plane can be determined. This makes it possible to shorten or lengthen the chin slightly (image 18c). Furthermore, the chin contour is improved. The jawline continues smoothly and does not curve upwards, and the chin retains a full contour. Had the patient in image 17 been treated using this modified surgical technique, his profile would likely have looked better (image 17c).

The following patient is a good example of our modified technique. She feels that her lower jaw is set too far back and would like to undergo surgery to bring it forward. This patient has good occlusion and the anterior relationship is normal (image 19a). The chin is clearly set back and the vertical analysis shows that the chin is too short, see red line (images 19b and 19c). A chin correction appears to be a good solution here. The chin needs to be repositioned ventrally and from the short caricature to the short characteristic area. Image 20 shows the result. Using the long screw and the occlusal plane of the lower jaw, the direction of the incision could be precisely determined (image 20a). The chin has been repositioned ventrally but has also become longer vertically. Images 20b and 20c show the difference between the initial situation and after the chin correction. A clear improvement in contour, partly thanks to the vertical increase. A disharmonious face has been transformed into a harmonious one, with an unobtrusive balance between the nose, upper lip, lower lip and chin.





> Who attends a dental consultation?

The average age of women and men attending a chin consultation is 38. Two-thirds are women and one-third are men, although this ratio has been shifting towards a 50-50 split in recent years. Five per cent have already undergone orthodontic treatment and jaw surgery and are dissatisfied with the aesthetic result, often due to insufficient or no chin projection. The jaws have been surgically repositioned and the occlusion has been neatly restored after first achieving good arches through orthodontics, but no chin correction has been performed. Eighty per cent have already undergone treatment with fixed appliances and do not want jaw surgery or braces any more. Chin correction certainly seems an option, all the more so because, as mentioned earlier, unsightly, distracting features are often localised in the chin region, and the chin offers many possibilities for correction.

There is also a group of young adults who have already undergone orthodontic treatment and now feel that their chin is set too far back. The reason for this is that an increasing number of fixed appliance treatments are now carried out without extractions, which means that at the end of treatment the lips protrude too far forward, creating the impression that the chin is set further back (an optical illusion). There are patients who would like to have their chin implants, obtained elsewhere, removed and then opt for a chin correction using our method.

> The chin consultation

During the initial consultation, the options and preferences regarding jaw correction are discussed. A slight sagittal overbite may be present, but no more than three millimetres, and the patient must be able to close their lips more or less naturally. Portrait and X-ray photos are taken. Based on these, a treatment plan is drawn up and discussed with the patient, with a prediction photo of the expected result providing valuable insight.

Although it is often advised against sharing prediction photos with the patient, this has never led to any problems following many hundreds of treatments in which prediction photos were shown when discussing the treatment goal. Patients often say afterwards that they are even happier with the final result than they were with the prediction photo. We must realise that we are going to be making changes to the patient's face, and our treatment team is therefore of the opinion that the patient has the right to see what they are likely to look like after treatment.

> Performance of the chin correction

The procedure is carried out under general anaesthetic and takes about an hour. After a recovery period of around an hour and a half, the patient may go home. The face will be somewhat sore and swollen for the first few days following the surgery. After a week, most of the swelling has subsided, making the results increasingly visible. Partial numbness of the lower lip may occur. This usually disappears after a week as well. In about two per cent of cases, a small area of numbness remains in the corner of the mouth near the lower lip. Follow-up photos are taken after a week and again after three months. After a chin correction, we ask how those around you reacted. Your immediate circle, family and friends involved in the process, react positively. Others, such as friends or colleagues at work, often do not even notice. They do notice something, but they cannot quite put their finger on it. 'Are you wearing contact lenses instead of glasses, or have you done something to your hair?' The fact that they notice something but cannot quite put their finger on it is a very good sign. The disharmony caused by the distracting features has given way to a harmonious appearance with an unobtrusive balance, whilst retaining the characteristic features and ensuring continued recognisability. It has become what it should always have been.

> Long-term stability

Long-term stability is guaranteed. There is no relapse of the repositioned bone segment and the contour of the chin is preserved, as can be seen in this patient after 33 years (image 21).

> Conclusion

After decades of experience treating patients with dentofacial anomalies, it has become increasingly clear that chin correction can be an important factor in achieving facial harmony. We have succeeded in formulating optimal aesthetic objectives and providing an accurate prediction of the final result. This has led us to conclude that even a relatively simple surgical correction of the chin can lead to good results. In addition to all the technical and measurable aspects of such treatments, the patient's well-being plays an important role. A lasting good result, relapse does not occur, and insight into the patient's experience from start to finish are the responsibility of the treatment team.

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Informed Consent Statement: van alle bij dit artikel betrokken patiënten is een informed consent aanwezig.

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