POPOVIC & KOLLEGEN

Praxis für Kieferorthopädie

Adult treatment

5. Pre- and postsurgical orthodontics - background

The perfect face shows harmonic proportions of the midface and the lower face and a balanced relationship of the upper to the lower jaw. Both halves of the face are completely symmetrical, in all spatial dimensions. Everything fits perfectly as to aesthetics and function. Yes, there is a “but”. A perfect face requires something: an undisturbed, fully balanced interaction of all factors relating to the development and growth of the upper and lower jaw. You may already suspect what the hinge is… there is no such thing, and there can’t be any such thing, not even in the most beautiful VIPs and celebrities. If it appears so in magazines, you may safely assume this to be the result of heavy Adobe Photoshop use or the like. Any conclusions from that are, of course, left to your own discretion…

Something, if only one tiny detail, always gets in the way. An indefinite number of things can go wrong already during embryonic development: Both jaws consist of two halves, one right, one left half, that gradually grow together to form the upper or lower jaw. What is left as a reminder of this is a natural seam or suture in the middle. Initially, these sutures are cartilaginous and later replaced by bony tissue (they “ossify”) in adults. Every tissue – cartilage, bone, all soft tissues, all “supply lines” (blood vessels, nerves) – must be coordinated. Genetic factors provide the underlying tendency or potential; random, sporadic external influences modify the course and outcome, and they are *per definitionem* impossible to predict. Among these random modificators are e.g. hormonal or nutrition-associated influences during pregnancy and the passage through the birth canal, in the course of which massive forces act on the skull which may disturb craniofacial symmetry. Growth of the facial bones happens during childhood and adolescence, and it is subject to an ever-changing interplay of inherited, genetic predisposition and tooth development, tongue function and the upper respiratory tract (nasal breathing, tonsils, adenoids, etc.). Injuries caused by accidents or bad habits like thumb sucking or lip licking can disturb this finely tuned ensemble of factors immensely, even if the action was only very temporary in nature. Infections of the upper respiratory tract or allergies cause obstruction of the upper nasal air passage und thus indirectly disrupt craniofacial growth. At the end of this “rollercoaster ride” between genetics and life influences is the adult, fully grown skull: more or less symmetrical, with slight imperfections that normally go unnoticed and don’t disturb anyone.

It so happens, however, and not so very rarely, that jaw development gets disrupted more than just barely noticeably. Lower jaw growth may be inhibited, causing it to appear receded in relation to the upper jaw. This is the typical receding chin or retrognathic profile. Orthodontists define this as “class II”, after the famous US-American orthodontist Edward Angle. The complete opposite can also happen: There is too little upper jaw growth in relation to lower jaw growth. The lower jaw will then appear too big and protrusive, although, in fact, it may be very normal in size. Orthodontists define this as “pseudo class III” after Angle. In other patients, the upper jaw is normal in size, but the lower jaw grows too much. A constellation like that is usually hereditary. Called a “true class III”, it is often known as “Habsburg chin”, in reference to the old Austrian royal family, in which this feature was something of a trademark. In most cases, however, jaw malrelations are caused by a functional imbalance between upper and lower jaw, due, for instance, to a dysfunctional tongue, the bad oral habits mentioned above, frequent upper respiratory tract infections

during childhood, a fall on the chin, and orthopaedic considerations such as a poor body posture.

Also tooth development and dentition are quite susceptible to hazards and rely upon a harmonic interaction between genetics and function. It is known that the number of teeth is being reduced in the course of evolution. This evolutionary trend can also, of course, be observed in humans and is mirrored in the fact that many people don't even grow those notorious wisdom teeth - or if they do, "the eighths" do not erupt correctly. Also, the striking variety of size and form supports this trend. And quite logical at that, because teeth in full biting and chewing function must meet certain "construction guidelines" – i.e. requirements regarding size and shape – to function optimally. This is why teeth in full function look relatively similar in all of us. (One calls that "selective pressure" in biology.) Conversely, if this pressure is absent, teeth can become quite polymorphic. Another example of this evolutionary principle is the tendency to loose the lateral front tooth or incisor. In most cases, this tooth is simply smaller than average, in other cases it is completely absent as permanent tooth. By the way, similar processes work on the second laterals (bicuspids, premolars or "fifths"). All this has to do with the fact that our food choices have undergone a fundamental change within the last fifteen to twenty thousand years. There is, first, the discovery of the use of fire to cook food and, then, the transition from nomadic hunter-gatherer societies to a sedentary farmer's lifestyle, all promoting the consummation of food that demands less and less chewing action. You are guessing something? Yes, a very clever and very economical principle of nature is behind all that: What is no longer useful is first reduced and then discarded (as if nature were essentially reluctant to dispose of anything without first making sure it's really useless). People in our trade somehow love this dogma and miss no opportunity to quote it: "Form follows Function." As simple as that. A disturbed function automatically changes form, meaning anatomy. This will occasionally lead to strange, disparate developments where, for instance, genetic factors promote 32 teeth, while at the same time jaw growth is reduced due to functional factors. It is plain to see why this type of patients must experience problems with their dentition caused by lack of space. This discrepancy between spatial requirements and availability is encountered quite often and the reason why today many people only have space for 28 or even only 24 teeth. This trend, by the way, is even more pronounced in Asian populations: Facial profiles are frequently rather flat and the jaws and chins relatively small. In contrast, the teeth are large in proportion. This sometimes causes the mouth to appear protruded, because the tooth-bearing part of the upper and lower jaw adapts to dentition (form follows function). In orthodontics, this is called "bialveolar protrusion".

So, here they are, the fully-grown jaws, their individual history at times quite evident. Adults with jaw malrelations or certain types of malocclusions sometimes find themselves being faced with the fact that orthodontics alone may be reaching its limits here. Certain circumstances may necessitate surgical intervention, at least for a part of the required corrections – this being the part that involves repositioning of the craniofacial bones. Depending on the case, this may mean shortening or lengthening of the lower jaw or a forward-downward repositioning of the upper jaw or a surgical expansion of the upper jaw by surgical suture split.

It is the orthodontist's – our - job in cases like these to start by aligning the dental arches both in the upper and lower jaw so that the surgeon can position the facial bones optimally. This is done with modern brackets, i.e. with fixed braces. In cases with jaw joint (TMJ) problems it is equally important to decompress the TMJs pre-surgically. To ensure that, several methods are available, depending on the signs and symptoms present and the underlying disease(s). Such patients are usually fitted with so-called build-ups on the back teeth and sometimes with a MARA if indicated.

Detailed planning – together with the surgeon - follows these preliminary procedures. So-called “splints” are made, meaning surgical jigs that dictate to the surgeon precisely how both jaws and the teeth should fit together after surgery. We are always glad to explain the planned steps and procedures to you and to provide you with a virtual simulation of how you will look after the surgery. It is our and the surgeon’s goal to make sure that the patient fits into the splint and that planning is implemented with the greatest possible precision.

The surgery itself is usually performed in hospital, with the patient admitted as in-patient. Admittance is then followed by an in-depth patient briefing wherein all details pertaining to the surgery and questions about follow-up care can be discussed. After surgery, the patient remains in hospital for about a week. There may be facial swelling and haematomas, depending on the individual healing progress. Speaking may be difficult, because the lower jaw is usually fixed to the upper jaw during initial healing. Also, the patient will have to drink liquid foods or eat soft foods for some weeks.

We orthodontists resume our treatment after healing is finished. At this stage, both jaws fit perfectly in all dimensions (length, width, etc.), but the teeth still don’t. This is when our actual “job” begins: orthodontic treatment with full braces and bands on the first molars, with the aim to adapt tooth position to the new jaw position.

Treatment is concluded when the optimal functional and aesthetic result has been achieved and secured.