

Transpalatal distraction, a three-dimensional prospective study

Stevens S.¹, Van Hemelen G.²

^{1,2} ZMACK, Department of Cranio-Maxillofacial Surgery, GH Monica, Antwerp, Belgium

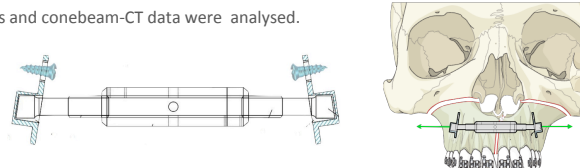


Background

In our population transverse palatal hypoplasia is common in orthognatic patients. We treat them using a minimally invasive surgical procedure and use a three-piece bone-borne distractor for surgical assisted rapid palatal expansion (SARPE) or transpalatal distraction.

In this poster presentation the preliminary results of a 3D prospective study on maxillary midline distraction with a bone borne device (smile, Titamed®, Belgium) will be discussed.

Preoperative measurements are compared to the 6 months postoperative ones; clinical measurements and conebeam-CT data were analysed.



Methods & Materials

Between 1/1/2013 and 31/7/2014 7 male and 13 female caucasian patients were included in this prospective study. All patients were in good health and patients with periodontal disease or syndromatic malformations were excluded. Ages varied from 15 – 40 years and the mean age was 22. All measurements were performed by surgeon1 and all 20 surgeries were done by surgeon2. 1 patient was excluded due to incomplete data.

2 weeks preoperative and 6 months postoperative dental-, skeletal- and periodontal parameters were measured. To obtain dental and bony three-dimensional distances a conebeam-CT was analysed. Pocket depths were measured in the second premolars and first molars in the upper jaw. Since the palatal gingiva is marginally incised and opened at these teeth to install the bone borne plates of the three-piece distractor (Smile, Titamed®, Belgium), only these dental areas were included. Pockets were measured according to the international periodontal status. Conebeam-CT measurements included distances between the canine cuspids, the mesiobuccal cuspids and distopalatal cuspids of the first upper molars, between the apices of the upper canines and between the apices of the distal roots of the upper molars. The distance between the left and right buccal boneplate in the maxilla was measured at the level of the canines and the first molars (at 1/3 of the length of the root). We also measured the maximal width of the nasal spine since this is being split at the midline before distraction. The width of the piriform aperture at the nasal floor and the lateral deviation of the nasal septum were also measured because we do not separate the septum from the nasal floor in this technique.

During surgery the distractor is installed in the palate, hinged in bony anchored plates placed in between the second premolar and first molar. A marginal incision is made from the distopalatal region of the first molar to the distopalatal region of the second premolar, there the incision continues upward in the palate. A flap is prepared exposing the bony papilla between the roots. A small round burr is used to create space for the plates of the distractor, we secure them using a self drilling screw (Titamed®). When all this is done, a small incision is made in the right and left vestibule, exposing the antral wall. The horizontal Lefort corticotomies are made using a fine Lindeman-burr. The pterygomaxillary junction is osteotomised using an Obwegeser pterygoid-chisel. A small vertical incision in the midline exposes the nasal spine and the median palatal suture is opened with a 4mm osteotome. After mobilisation of the 2 maxillary halves, the distractor is put into place and activated. Palatal incisions are sutured using a 4.0 resorbable suture. The vestibular incisions and the vertical midline incision are closed using a 4.0 PDS (Ethicon®) to close the muscular layer. The mucosal suturing is done using a resorbable 4/0.

After one week, distraction starts at a daily rate of 0,5mm (2x 0.25mm). When the desired expansion is obtained the distractor is blocked and left into place for 5 months.

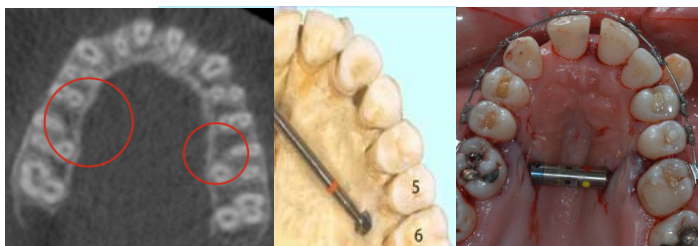
Results & Discussion

The mean pocket depth before and after surgery was 2,3 and 2,4mm. There was only one pathological pocket measured, this was due to a postoperative infection. The mean pocket depth in the region of the incision and distractor placement was slightly smaller compared to the buccal pockets: 2,2 as to 2,4mm. This could be related to the hygiene at the site of the brackets which are placed before surgery. At the Left side palatal pockets measured a mean value of 2,5mm after surgery, slightly deeper compared to the rest of the mouth. A possible explanation could be a better mouth hygiene in the right side since most people are right-handed. After distraction there was no significant difference in pocket depth and using this technique no deep pockets are created.

The proportionate widening of the maxilla is shown in the CT-data. The widening at the apical level of the canines and molars is the same (mean 4,2mm) and there is no clinically significant difference between the transverse expansion at the crown and at the apical region of the first molars (4,2 and 3,7mm). Since the crowns of the canines move back towards the midline (where the gap between the central incisors closes in the first months after surgery), the mean widening at the cusps of the canines is only 1,5mm (measured 6 months postop). The bone expands proportionate as we see in the mean widening at the buccal plate: 3,2mm at the canine and 3,7mm at the first molars. Since the force is applied directly to the bone during distraction with this bone born device, there is no tipping of the teeth which could result in relapse.

We don't release the nasal septum during the surgery and there is no significant deviation after distraction (<1mm)

The alar base slightly widens by an average 1,2mm and the nasal spine widens by 3mm.



Conclusion

Using the 3 piece distractor and this technique we can achieve a proportionate widening of the upper jaw. The distraction occurs at the bony level and no forces are applied to the teeth during distraction. The distractor is well tolerated by the patients and oral hygiene can be maintained during the postoperative consolidation period. By using this method and type of distractor there are no changes in the periodontal status.