

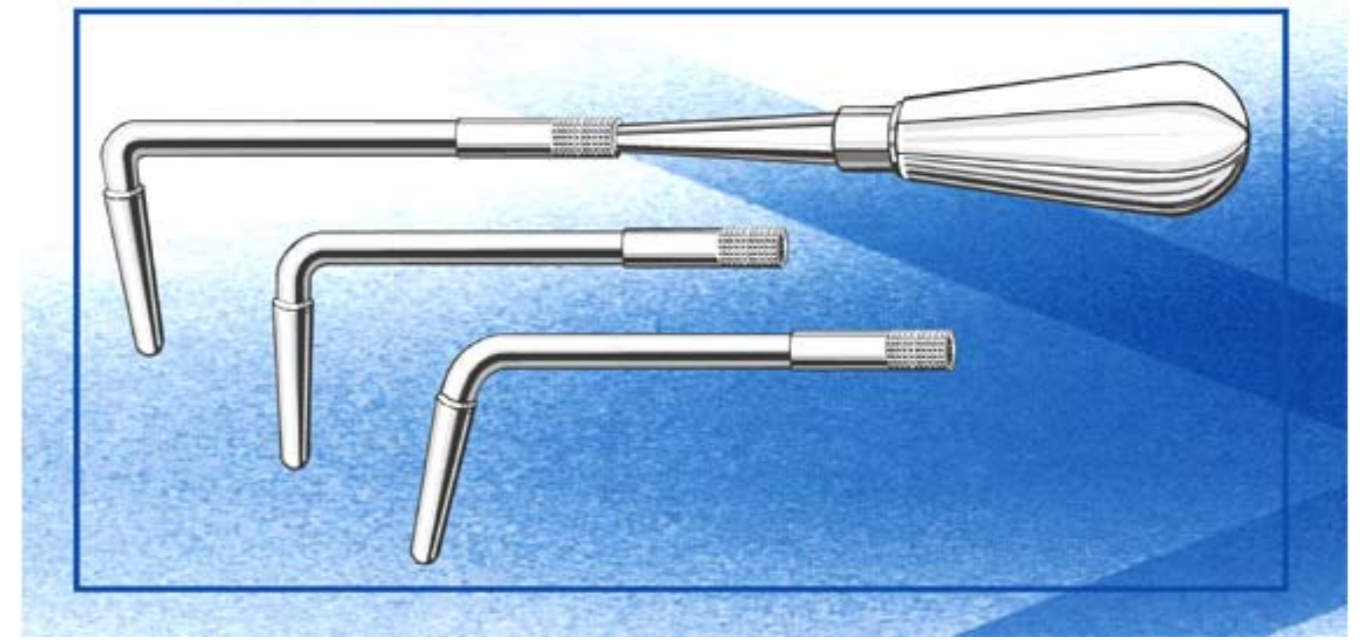
# Horizontal control

Minimal-invasive spreading of the alveolar ridge with specially developed instruments

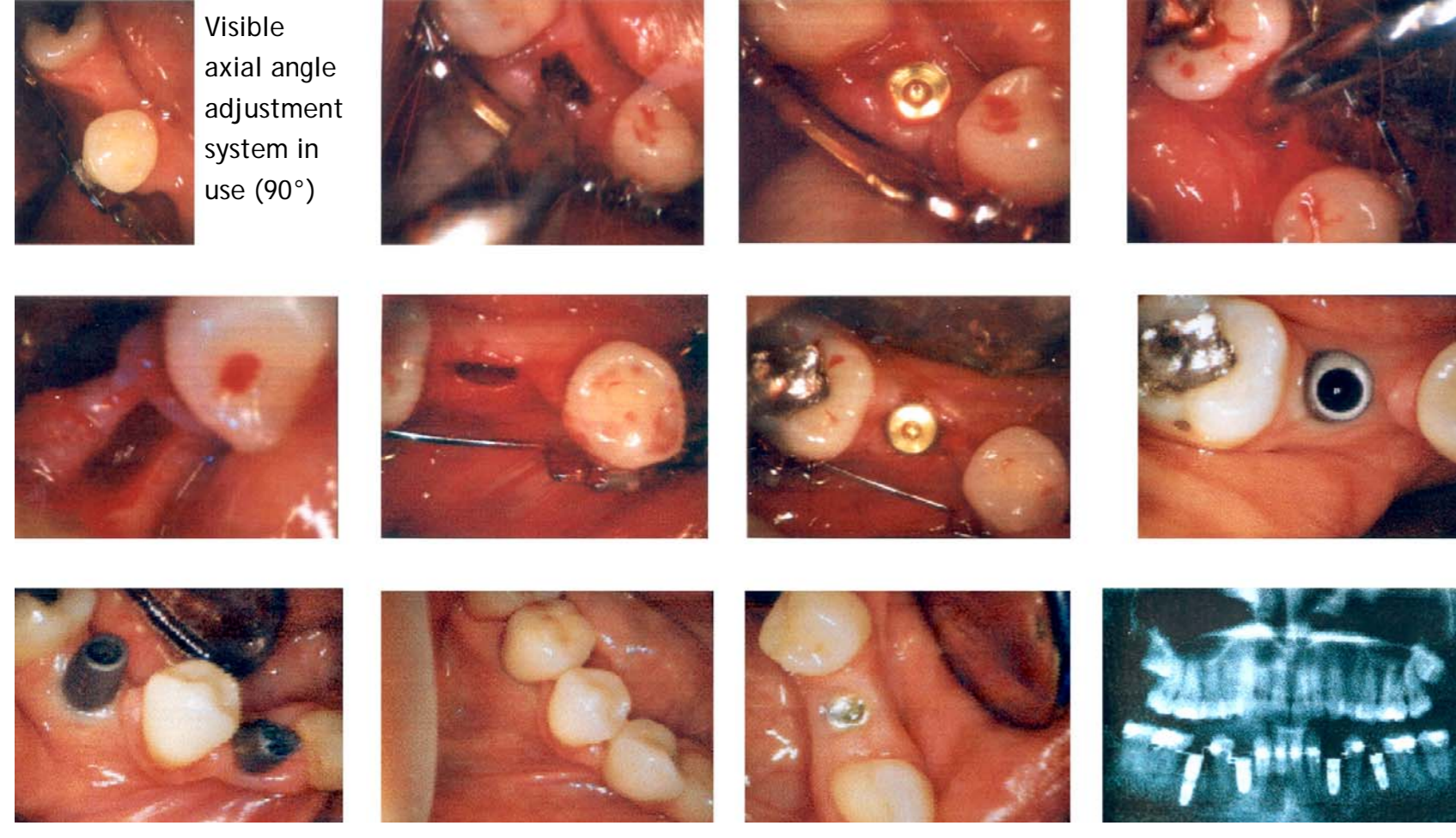
Maximal spreading under maximal bone protection to provide the bed for implantation in axial direction (prosthetic driven implantology)

An axial translocation of the mobilized cortical plate to lateral:

The mobilization can be achieved through two intern vertical osteotomies in a fan-shaped way, which means it follows the direction of the roots of the neighbouring teeth. The rotation of the mucogingival and mucoperiosteal connected cortical lamella can be carried out through various calibrated instruments of different sizes and angles (80°, 90°, 100°). This technical procedure is especially indicated in spreading the alveolar ridge in the posterior mandible. These tools are fitted perfectly to the split control system (Hager & Meisinger Corp.) A fundamental advantage of this procedure is being able to avoid raising a full thickness flap in order to keep the periost in place (Grünholz-fracture). The healing is better guaranteed and faster achieved because the mucosa and the periost stay better protected. This procedure is less traumatic.



## Anodontie 45, 43 and 35, 33 - step by step

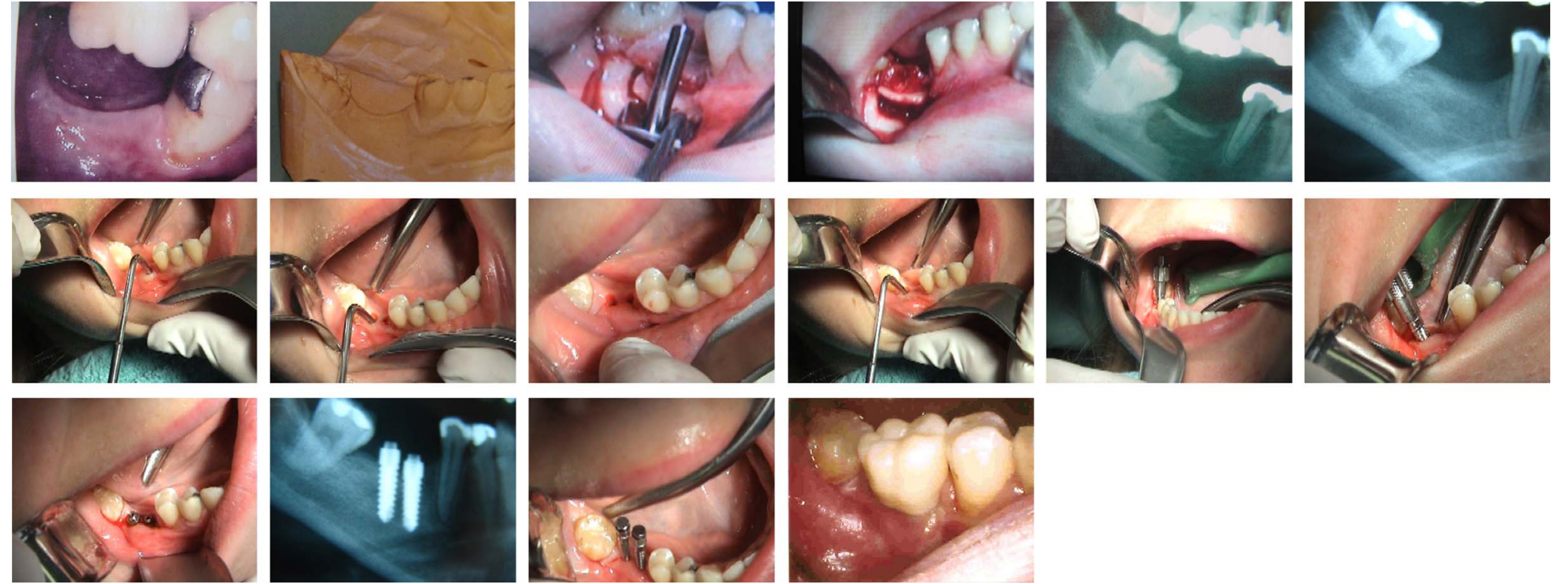


### Advantages of the axial angle adjustment system (=horizontal control)

- The posterior mandible is an ideal place to carry out the procedure.
- Through the specially angulated and calibrated instruments a secure spreading and widening of the alveolar ridge can be realized.
- This procedure guarantees a good protection against the bite forces.
- The protected treatment of the periost and the stabilization of the segment are secured.
- A limit for spreading is determined by the corpus of the alveolus. If a spreading of more than 8 mm is needed, it would be better to carry it out in several steps.
- With this minimal-invasive treatment it is also possible to perform the procedure in several sittings.

### Case - report

Following up regio 46 treated with Vertical and Horizontal Control 2 compress-implants (Dr. Dr. Streckbein) Ø 4.0, L 10mm



### Biomechanical aspects

Numerous studies focus on the cell-biology, molecular biology and the biochemical influences of the bone-healing process by defining the BMU (Beta-TGF and BMP-2; = bone morphogenetic units), but neglect the local mechanical influences. Through this atraumatic procedure by minimal-invasive spreading of the alveolar ridge with erection and rotation of the nutritive-supplied and basal-connected cortical plate, a "mechanical shell" and therefore a "guideline" for the new-regenerative bone can be achieved. These mechanical givens seem to interfere with the osteogenic cells in a positive way and seem to be the ruling force for the new-regenerative bone. The atraumatic procedure, affiliated with the protection of the periost and the surrounding tissue, and carried out by two intern osteotomies - like a "predetermined breaking point" - decisively influences the success of the new-regenerative bone. Usually the periost is after a full thickness-flap procedure and an osteotomy not functionally intact prior to six weeks. This can be avoided by the horizontal control procedure. ("Form follows function" = Wolff's law) An ossification can be better carried out, if the cortical plate stays stabilized and micro-movements are avoided. Oral implants can be incorporated in order to keep the spreading gap open for stabilization and splint (as a space-holder). The healing process can be achieved by an open granulation or, if desired, a primary wound closing can be carried out by mobilizing the lingual mucosa.

# Vertical control

Distraction device for the predictable alveolar osteogenesis by determinable plains and predefined three-dimensional direction with vital bone as a base for oral implantation

An improved distraction device designed to achieve an easier performance of the procedure

The vector stabilized alveolar distraction osteogenesis in the posterior mandible as an obvious advantage over the onlay-craft

### Various possibilities of application

- The distraction device is incorporated in the basal segment, as well as in the transport segment, of the bone with parallel plains in a parallel level to guarantee the three-dimensional vector. Therefore, the distraction can be carried out by a predictable vector. Both segments are stabilized by the incorporated plains, which are connected by a cardanic. (Bone substance 8mm of vertical dimension above the alveolus nerve)
- The transport segment of the distraction device is incorporated in the horizontal osteotomy and the basal segment of the distraction device is incorporated in a parallel way in the basal bone rectangular to the distraction level. (Basal bone substance 4 - 8 mm above alveolus nerve)
- The transport segment of the distraction device, as well as the basal segment, is incorporated in the horizontal osteotomy, provided the osteotomy is made right below the cortical plain of the alveolar crest. It is, therefore, possible to guarantee a vector stabilized distraction even with a minimal bone height. (Basal bone substance 4mm; Cawood class 7 and 8)
- If there is only a minimal remainder of the alveolar crest left, it is possible to place the basal part below the level of the canalis alveolaris inferior.

### Special advantages of the distraction device through parallel plains

The bi-directional alveolar distraction osteogenesis, which means small vertical activations alternating with horizontal activations by other distraction devices on the market, interferes with the fragile equilibrium of the regenerative bone. (Jenssen, 2001) Therefore, it is recommended to determine accurately the three-dimensional vector before insertion of the device. If the plain-distractor is incorporated at a determined angle, then by activating the distraction device the regenerative bone augments vertically and horizontally in calm steps. This has a better effect on the regenerative bone. A so-called jiggling or callus-massage can be achieved in calm determined steps, which improves the quality of regenerative bone. This can be securely achieved because the three-dimensionality is guaranteed. The way to activate the distraction device by drilling the screw back and forth is perfect for jiggling. (Jiggling and callus-massage by Hidding, Lazar, Zöller, 1999)

### Advantages using the plain-distractor by Fuchs /Cierny

- Easy placement by homologized and calibrated rotation instruments. Using the FD-shape and the diamonded profile, a smooth cutting can be realized. A secure handling is achieved by using these new rotation instruments. Even the force on the weak bone is less intensive. Also, the time vector and the over-heating and, therefore, the trauma of the bone are lessened.
- Avoiding a second bone-grafting procedure increases the clients' acceptance, because their well-being is much less affected. The future acceptance of small distractions will be more common. The two different variations of the plain-distractor There are two possibilities: one-step or two-steps procedure.
- The one-step procedure is recommended to keep the plain-distractor in place. In this case the distractor is constructed with interrupted plains, which guarantees an osteointegration. In this case the device is shaped with a central vertical post. After a complete osteointegration the vertical part can be used as a prosthetic post by screwing an abutment.
- The two-steps procedure demands a non-osteointegration distraction device with flat non-interrupted plains. To avoid interfering with the callus it calls for an eccentric shape of the device with fork-like plains, open in the direction of the spongiosa. The basal plain of the distractor is recommended to be bigger than the transport plain. The sharp angles of the basal plain guarantees a fixation like a pressfit, even if both parts are incorporated in the horizontal osteotomy. In these special cases it is recommended that the vertical osteotomies be cut at a smaller distance to each other, smaller than the total width of the basal part. This handling supports the pressfit.

### NEW AUGMENTATION DEVICES

#### 1. Vertical Control

Distraction device for the predictable alveolar osteogenesis by determinable plains and predefined three-dimensional direction with vital bone as a base for oral implantation.

-An improved distraction device designed to achieve an easier performance of the procedure-

#### Advantages and characteristics of the improved distraction device by Fuchs/Cierny

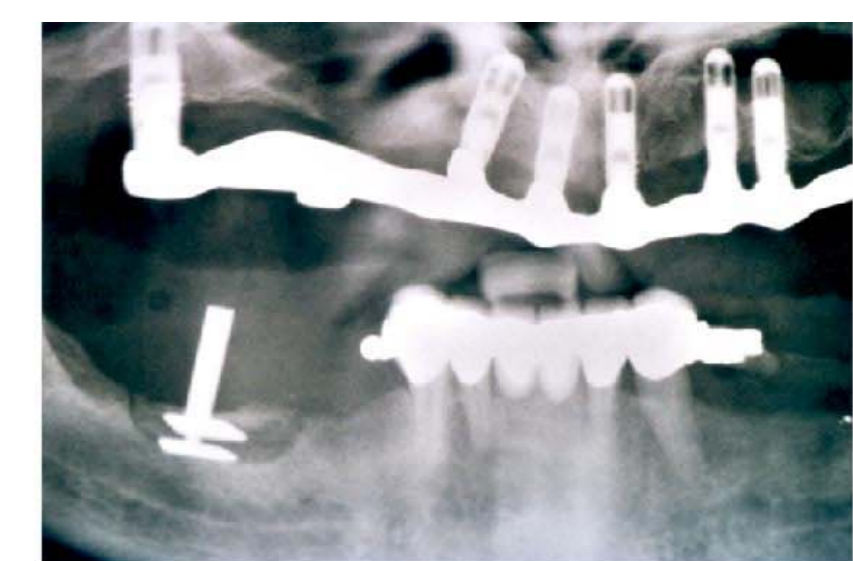
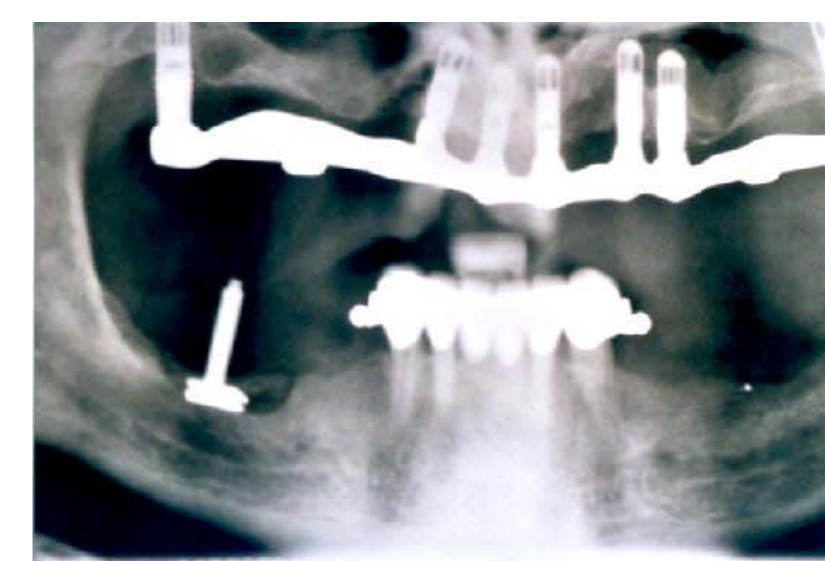
- Most important advantage: predictable and stabilized distraction vector of the vital bone segment.
- Even with low bone height a vertical augmentation is practicable.
- Alveolar crest augmentation for single tooth implantation is possible by using the small shaped device.
- The method is very useful in performing the procedure near the nervus alveolaris inferior or near the sinus maxillaris.
- In definable cases the lateral sinus lift procedure can be replaced.
- A spreading of the alveolar width is possible by changing the angle of incorporation of the device.
- A minimal-invasive, one-time treatment concept can be achieved.
- If the distractor should be used as an oral implant, it has to be manufactured out of Titan ASTM F 67 grade 1 or 2 (or Titan AL4Va)
- If manufactured out of surgical steel 1.4021 the device has to be explantated.
- A wide and safe anchoring, even with minimal height of the alveolar ridge, is possible and, therefore, a precise augmentation direction can be determined.

#### Results

The aim of the development of a new device for alveolar distraction osteogenesis was to guarantee the vector of the distraction and also a simpler application of the device. The smaller design and fixation is an advantage. The stabilisation is guaranteed through parallel plains. In the period 2001 till 2003 16 cases of alveolar distraction osteogenesis were carried out ( nine in the maxilla and seven in the mandible). 27 implants were incorporated; 2 implants were lost during healing phase. The survival rate was 92,6%.

#### Conclusion

With this small device an augmentation of the anterior segment of the maxilla and the distal segment of the mandible in severely resorbed alveolar ridge cases can be achieved and a proper bed for incorporation of dental implants can be installed.



#### 2. Horizontal Control

Minimal-invasive spreading of the alveolar ridge with specially developed instruments

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- A limit for spreading is determined by the corpus of the alveolus. If a spreading of more than 8 mm is needed, it would be better to carry it out in several steps.
- With this minimal-invasive treatment it is also possible to perform the procedure in several sittings.
- The method guarantees a better acceptance by the client.

#### Results

Since 1999, 86 cases of the alveolar extension plastic were carried out by horizontal control. Three of 86 implants were lost during healing period. The implant survival rate was 96.52 %.

#### Conclusion

The horizontal control system is a successful tool to spread the alveolar ridge of the mandible in a precisely controlled manner and guarantees a better nutritive supplied bed for the implant. It should be carried out in connection with the split control system (Meisinger, Germany by Dr. Dr. Streckbein)