

# Modified distraction protocols in vertical distraction osteogenesis

## Is an improvement of bone quality possible?

**Language:** English

**Authors:**

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**Introduction**

Vertical distraction osteogenesis (VDO) has become an important technique to improve vertical height and width of the atrophic mandible/ maxilla. The creation of new bone within the distraction gap is the major effect of distraction itself. Improvements of the basic technique have been described during the last decades. Positive effects of modified distraction protocols like callusmassage, distraction-compression-technique, dynamisation etc. on bone quality and healing process have been widely published in the field of orthopaedic surgery. The use of modified protocols for VDO in our field has not been published yet. However there is a wide range of imaginable applications and modifications of these concepts. Patients presenting with (infected) non-unions, irradiated patients and those suffering from depressed healing tendency like old patients require different treatment protocols rather than the (original) Ilizarov distraction protocol.

Step 1: vertical distraction, callusmassage

Panoramic radiographs



Fig. 1: 65-year-old, edentulous male patient prior to ablative tumour therapy and pre-op radiation (gingival ulcer located in the right, lower mandibular region).

Fig. 2: Tight mandibular non-union after removal of a reconstruction miniplate (Manufacturer: Martin Medizintechnik Tuttlingen, Germany), small picture: shows reconstruction plate.

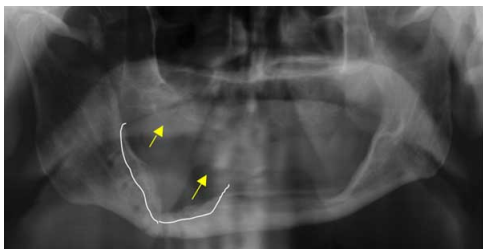


Fig. 3: Treatment plan: vertical alveolar distraction

Fig. 4: Following placement of a TRACK 1.5 vertical distractor prior to distraction and in combination with an additional supporting miniplate for higher stability (TRACK 1.5,length: 15 mm, Manufacturer: Martin Medizintechnik Tuttlingen, Germany)

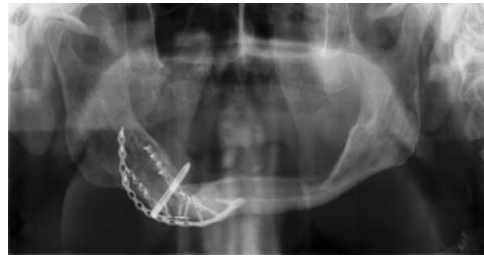


Fig. 5:  
After distraction and callusmassage, showing vertical elevation of 11 mm after callusmassage, consolidation not yet visible.

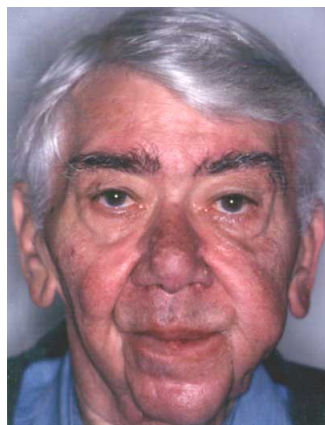
Fig. 6:  
4-months postdistraction, showing calcification as a sign of complete consolidation of the regenerate

Step 2: horizontal distraction



Fig. 7a:  
After removal of the vertical distractor, the cortical bone structure presented substantially enough to attach a second horizontal distractor (MOD line, Manufacturer: Martin Medizintechnik Tuttlingen, Germany) for additional compensation in the sagittal plane (panoramic radiograph and intraoral photograph)

Fig. 7b:  
Subsequent distraction resulted in 13 mm elongation in the sagittal plane (panoramic radiograph postdistraction)



Predistraction frontal radiograph showing facial asymmetry

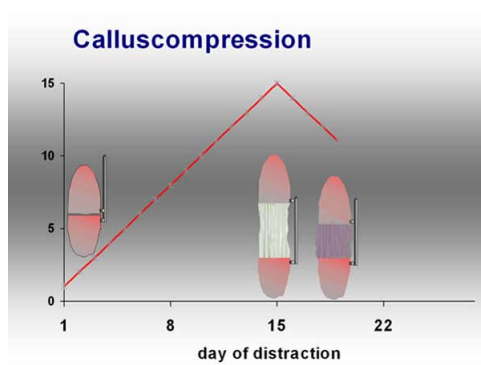
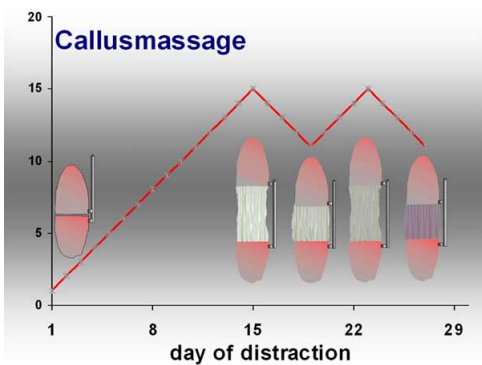
Postdistraction frontal photograph showing improved facial symmetry

## Material and Methods

Two clinical cases will be presented as examples for possible applications.

### Case 1

A 62-years old male patient presenting with a non-union of the right lateral mandible combined with a vertical defect after ablative tumour surgery and moderate preoperative irradiation (50 Gy) underwent TRACK 1.5 distraction. Following a delayed latency period of 10 days distraction started at a rate of 0.5 mm twice daily followed by a compression of 1.0 mm for a 4-day period and a re-distraction to a total length of 10 mm. 5 reiterations each as a complete compression-and-re-distraction-process were performed.



**Protocol I**

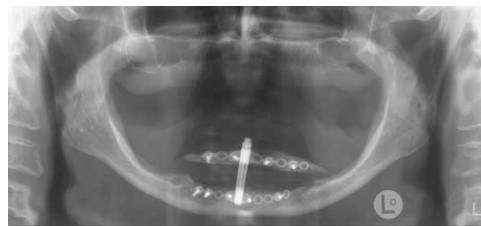
for callusmassage, during this specific period the transport segment is moved backwards and forwards gradually a certain number of times (1 cycle = two 360° anti-clockwise turns/ day) over 4 days, then a redistraction upwards back to the final position resulting in a cyclic, low-frequency stretching of the regenerate

**Protocol II**

for calluscompression, the transport segment is moved backwards in one single step (3-4 mm) with no re-distraction following (diagram shows compression backwards over a period of 4 days which is incorrect)

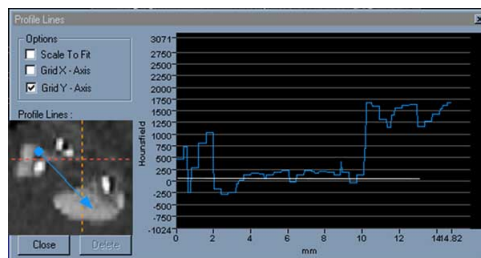
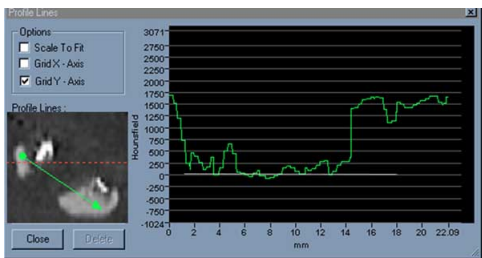
**Case 2**

A 71-years old female patient underwent TRACK 1.5 distraction for the correction of vertical mandibular atrophy. A 3,5 cm big alveolar segment had been osteotomised and distracted at a rate of 0,25 mm 4 times daily following a conservative latency period of 7 days. Compression of 4 mm (single step!) and re-distraction were performed after additional 5, 21 and 35 days.



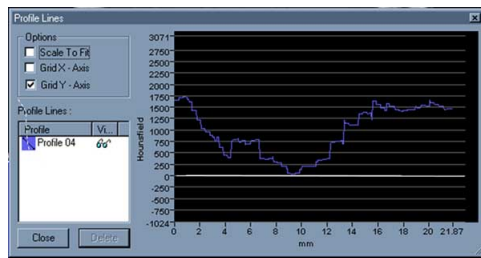
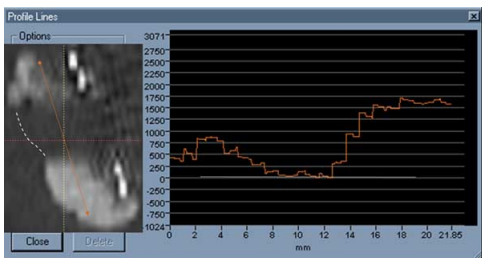
panoramic radiograph **prior** to vertical distraction of a severe atrophic mandible

panoramic radiograph **after** vertical distraction prior to the consolidation period



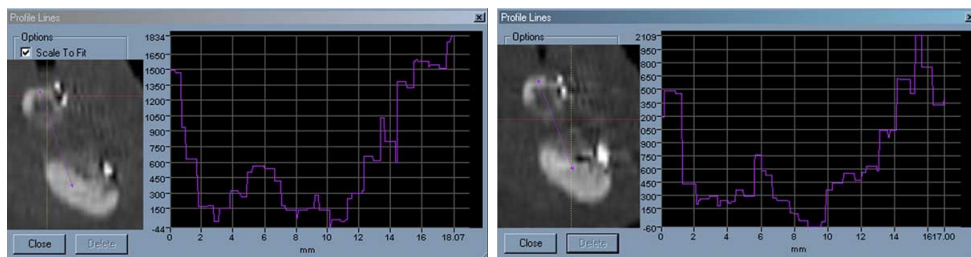
Day 5 after distraction, **pre**-compression CT scan, cross-section through the distracted mandible, measurement of bone density and distances

Day 5 after distraction, **post**-compression CT scan, cross-section through the distracted mandible, measurement of bone density and distances



Day 21 after distraction, **pre**-compression CT scan, cross-section through the distracted mandible, measurement of bone density and distances

Day 21 after distraction, **post**-compression CT scan, cross-section through the distracted mandible, measurement of bone density and distances



Day 35 after distraction, **pre-compression** CT scan, cross-section through the distracted mandible, measurement of bone density and distances

Day 35 after distraction, **post-compression** CT scan, cross-section through the distracted mandible, measurement of bone density and distances

## Results

### Case 1:

No signs of infection or increased mobility of fragments were noted in the consolidation period that lasted 16 weeks. At the time of reintervention intraoperative exposure of the distracted area revealed a complete osseous consolidation that had been noticed also in x-ray control prior to the removal. Indeed a simultaneous second step distraction for horizontal correction of the existing asymmetry was possible by fixing the distractor's screws into the previously distracted bone.

### Case 2:

CT-scans showed an early effect and increase in bone density and an extended outline of the regenerate especially between week 3 and 5 post distraction.

## Conclusions

Modifications of the original distraction protocol for vertical distraction osteogenesis seem to be most efficient under depressed healing conditions. The first clinical applications lead to the necessity for a controlled experimental evaluation of the numerous possibilities of dynamisation.

## Literature

Literature is available from the author, [Dr. med. Frank Christian Lazar](#).

## Abbreviations

VDO = Vertical distraction osteogenesis

*This Poster was submitted by [Dr. med. Frank Christian Lazar](#).*

### Correspondence address:

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## MODIFIED DISTRACTION PROTOCOLS IN VERTICAL DISTRACTION OSTEOGENESIS IS AN IMPROVEMENT OF BONE QUALITY POSSIBLE?

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### Introduction and Aims

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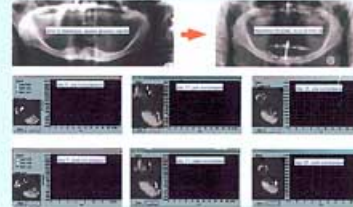
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### Conclusion

Modifications of the original distraction protocol for vertical distraction osteogenesis seem to be most efficient under depressed healing conditions. The first clinical applications lead to the necessity for a controlled experimental evaluation of the numerous possibilities of dynamisation.