Diagnostics and treatment planning.

Dr. Attila Szűcs DDS

Aim

- *Considering both surgical and prosthetic aspects in the planning of implant prosthetics*

Arrangements for implant therapy

- **Preliminary examinations and planning**
- **Dental pretreatment** (conservative, periodontal th., temporary prosthetics)
- **Surgical procedure** (implant placement, healing period, liberation of implants)
- **Prosthetic treatment**
- **Care, recalls**

Preliminary examinations and planning

- **1st examination:**
  -medical history,
  -referral to laboratory tests (blood, urine test)
  -dental, radiological examination,
  -preliminary treatment plan, information of the patient,
  -alternative prosthetic solutions
  -impression for diagnostic model

2nd, 3rd **examination:**

-discussion
-final plan, written information of the patient
-written consent of the patient

Dental examination

Extraoral examination

- Harmony of face
- Symmetry of face
- TMJ
- Masseter muscle
- Edge of lip, alveolar crest

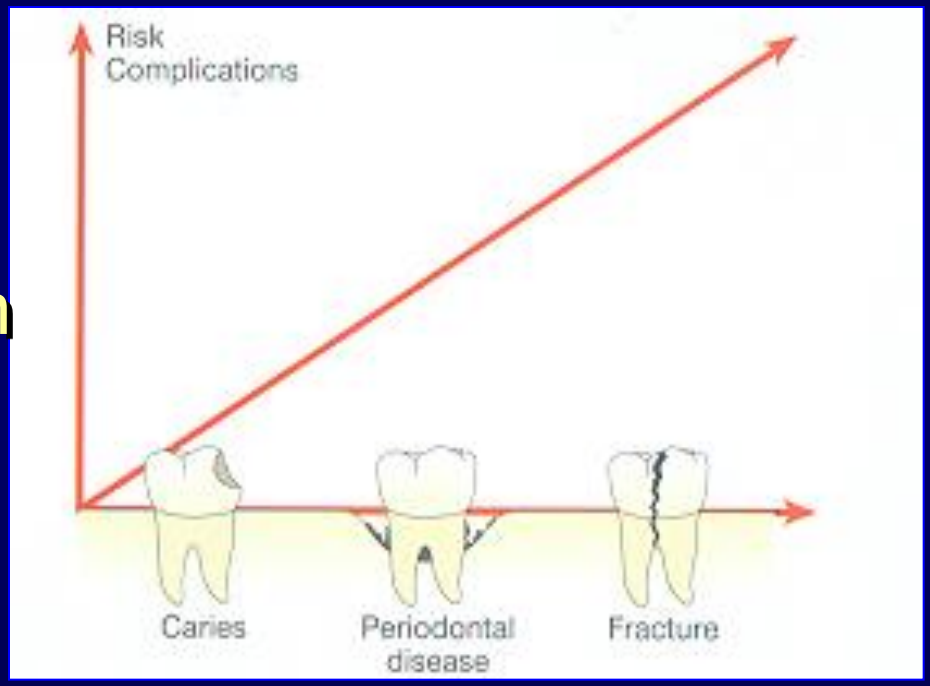
Intraoral examination

- Type of edentulousness
- Examination of soft tissues
- Examination of teeth
- Periodontal examination
- Occlusal analysis
- Central occlusion
- Opening-closing the mouth
- Parafunctional habits
- Vertical dimension
- Orthodontic anomalies

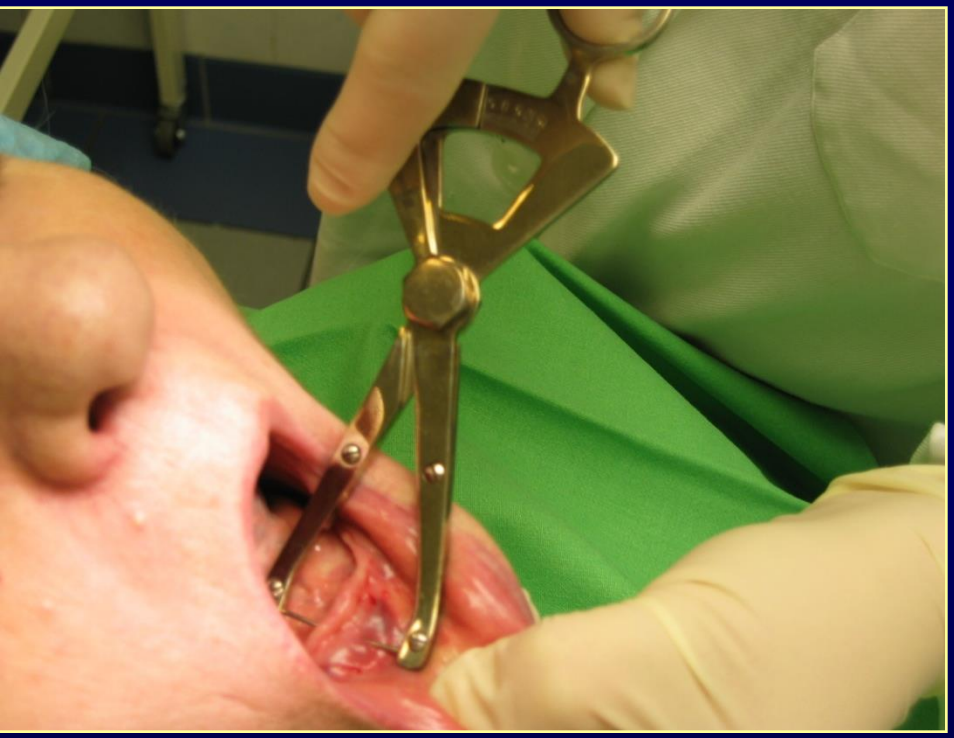
Dental examination

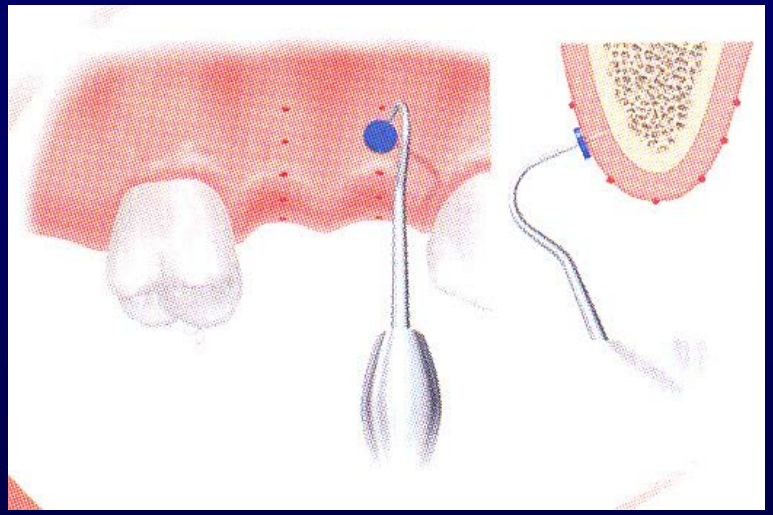
➢ Intraoral examination

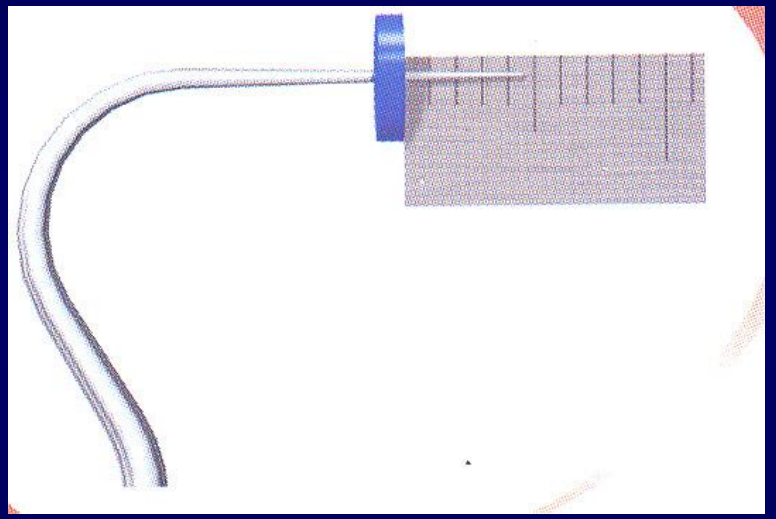
- Central occlusion
- Opening-closing the mouth
- Parafunctional habits
- Vertical dimension
- Orthodontic anomalies



Instrumental measuring of edentulous alveolar crest







Radiological tests

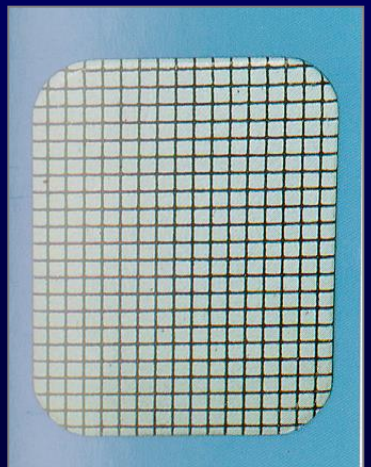
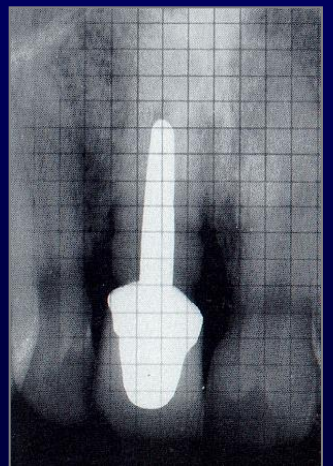
- Intraoral radiographs
- Extraoral panoramic radiographs (OP)
- Computer assisted tomography (CT, CBCT)

Radiological tests

- Intraoral radiographs:
  - for replacement of one missing tooth
  - To control a single implant (bone dimensions)

Optimal result: long-cone technique



Appliances for planning implant prostheses

- Diagnostic model
- X-ray template for OP radiographs
- Template for CT scans
- Surgical template

Radiological tests

- Extraoral panoramic radiographs (OP)

-anatomical borders are clearly visible
-vertical bone dimension measurable
-low radiation dose
-fast and easy processing

Disadvantage:
- distortion of real dimensions
- impossible to measure the width of the alveolar crest

Distortion of OP radiographs

Different magnification in the vertical and horizontal directions

Dim imaging in frontal area

Summation of different anatomic objects (e.g. vertebral column)

Measuring of real dimensions of the bone area for inserting implants

- Implant templates

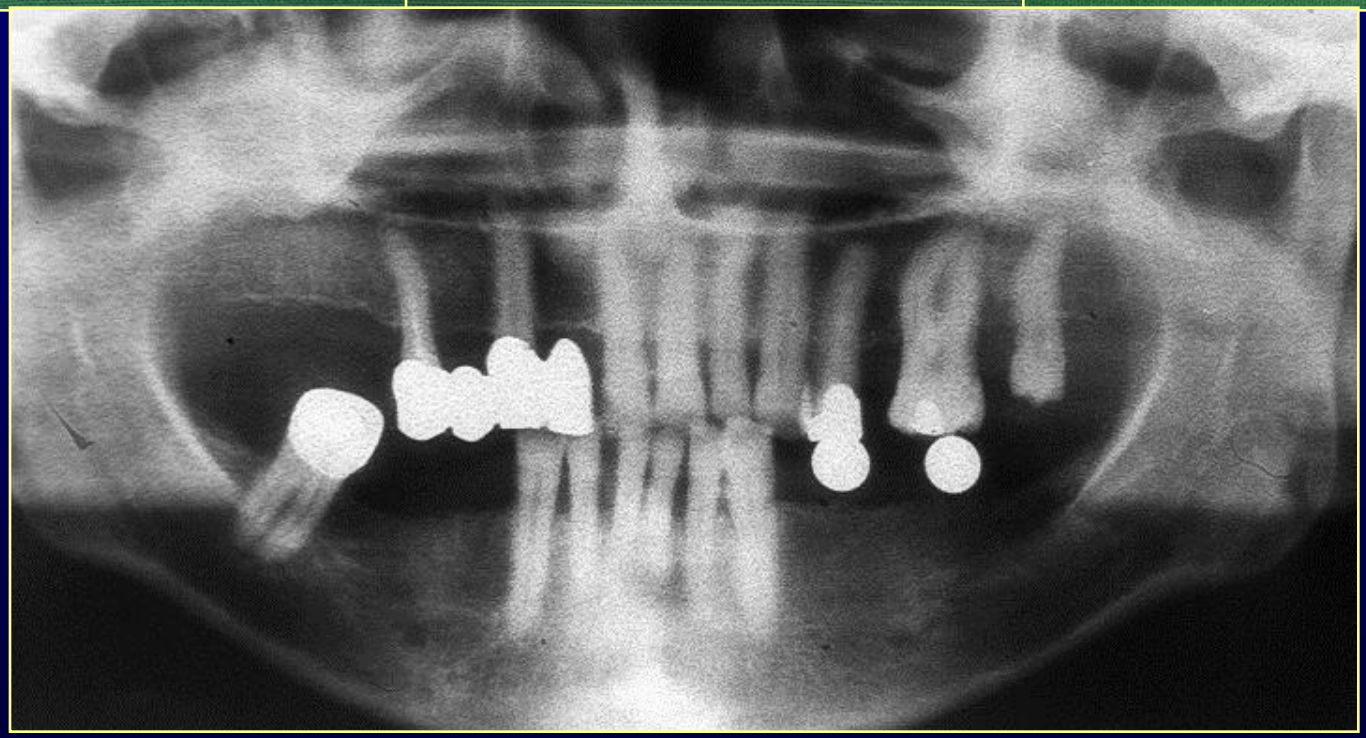
Transparent film

1:1.25 magnification

- Measuring with metal balls

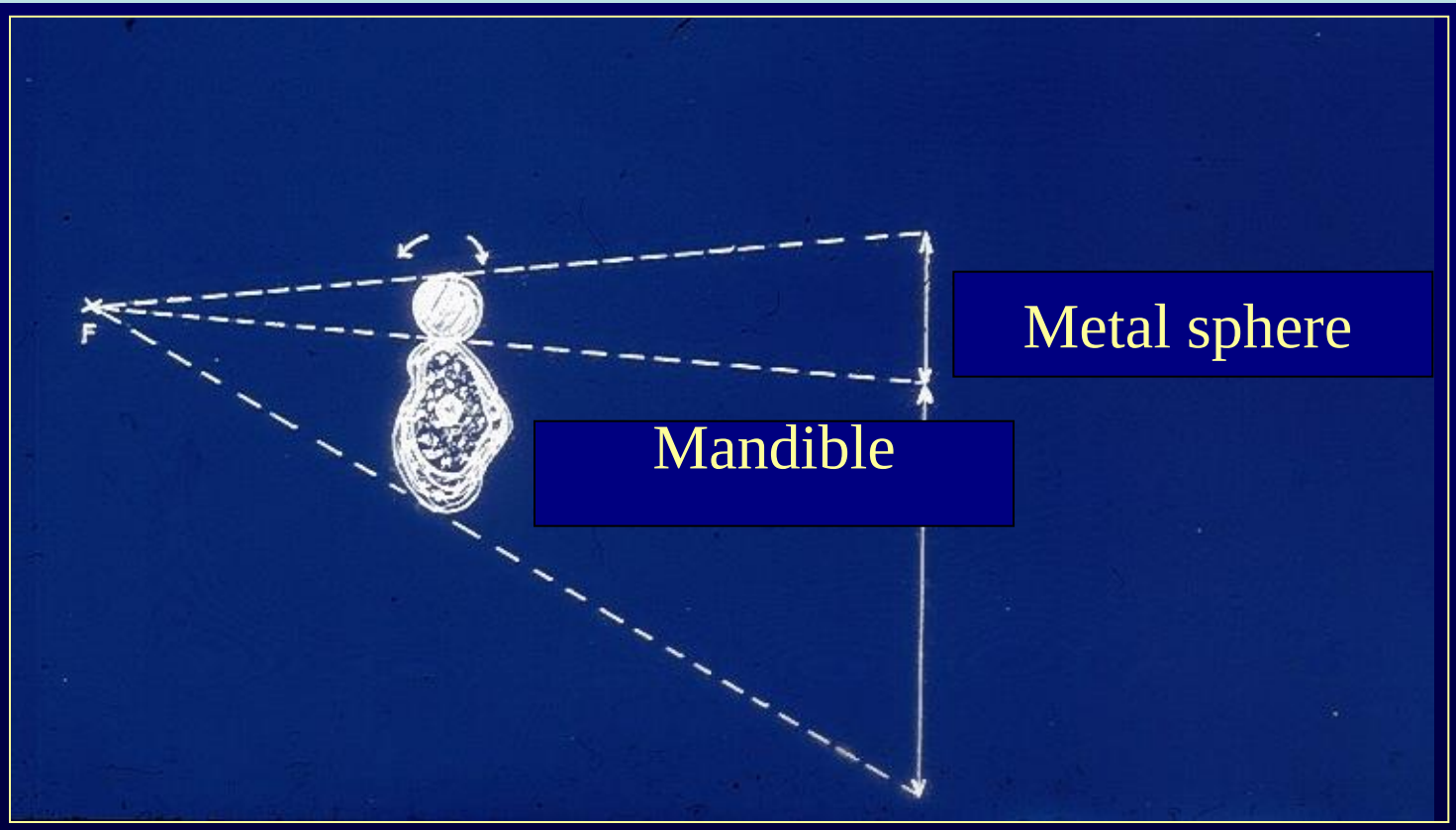
Resin plate with metal balls for OP radiographs



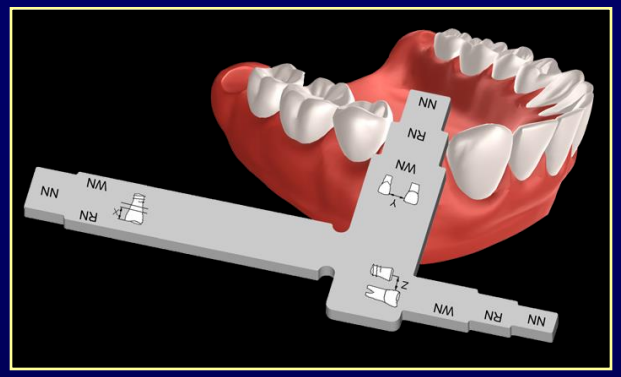



Real distance=

$$= \frac{\text{original diameter of ball} * \text{distance measured on OP radiograph}}{\text{diameter of ball, measured on OP radiograph}}$$



Measuring tools



X-ray imaging

- CT scan

-2 or 3D

-sections are available in any direction

-different sections are 2-3 mm distance to each other

-bone quality and density is measurable (Hounsfield units)

-CT template can be used

Template for CT scan

Cone Beam 3D CT (CBCT)

- Radiation dose ~1/10 of conventional CT
- Specific for head and neck region, 3D scanning needs 20 seconds
- Result is presented on CD together with the software, evaluation on the dentist's computer
- Cost ~ 20.000 HUF

Cone Beam 3D CT (CBCT)

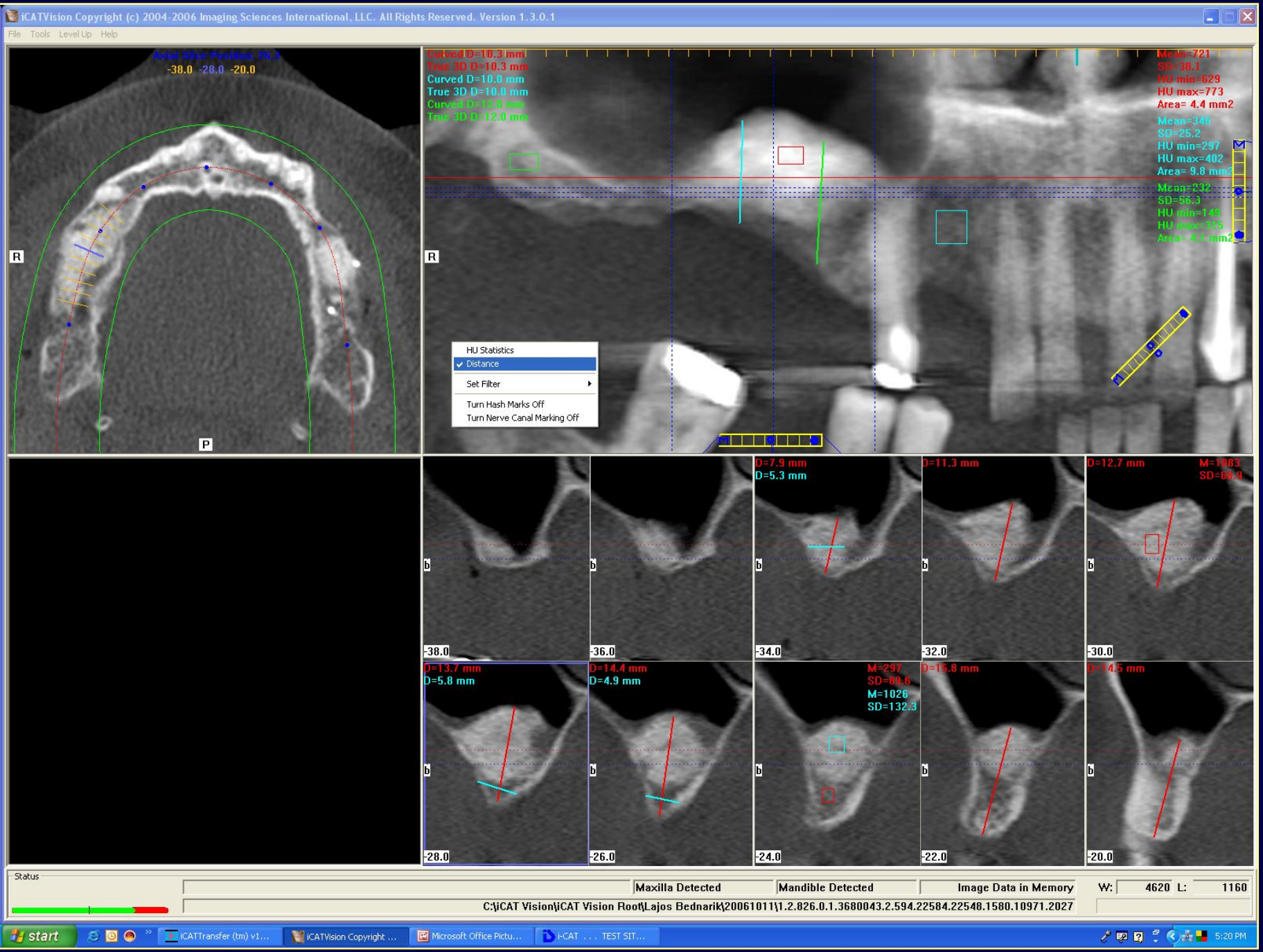
- Importance in implantology

  real dimensions are measurable

  correct 3D localisation of anatomic objects

  3D determination of the size and position of implants

  measuring of bone density


iCATVision Copyright (c) 2004-2006 Imaging Sciences International, LLC. All Rights Reserved. Version 1.3.0.1
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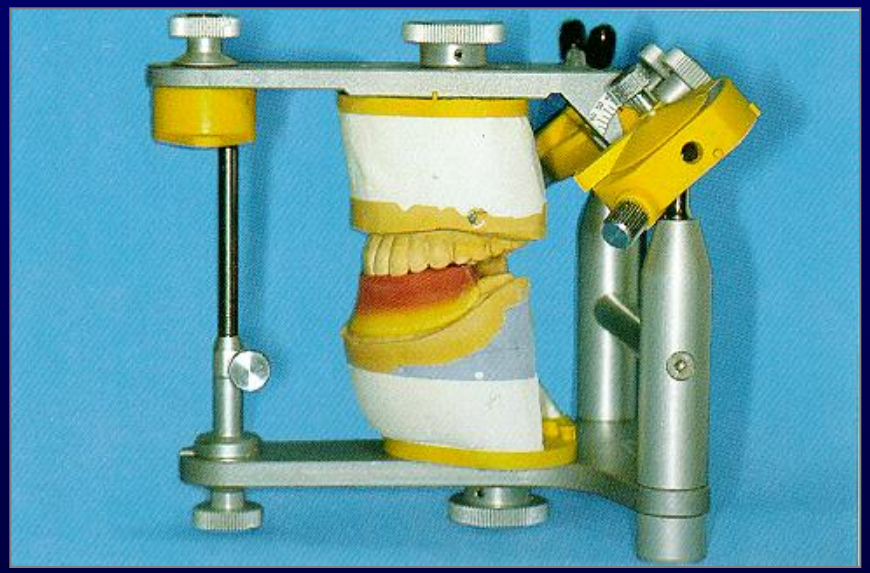
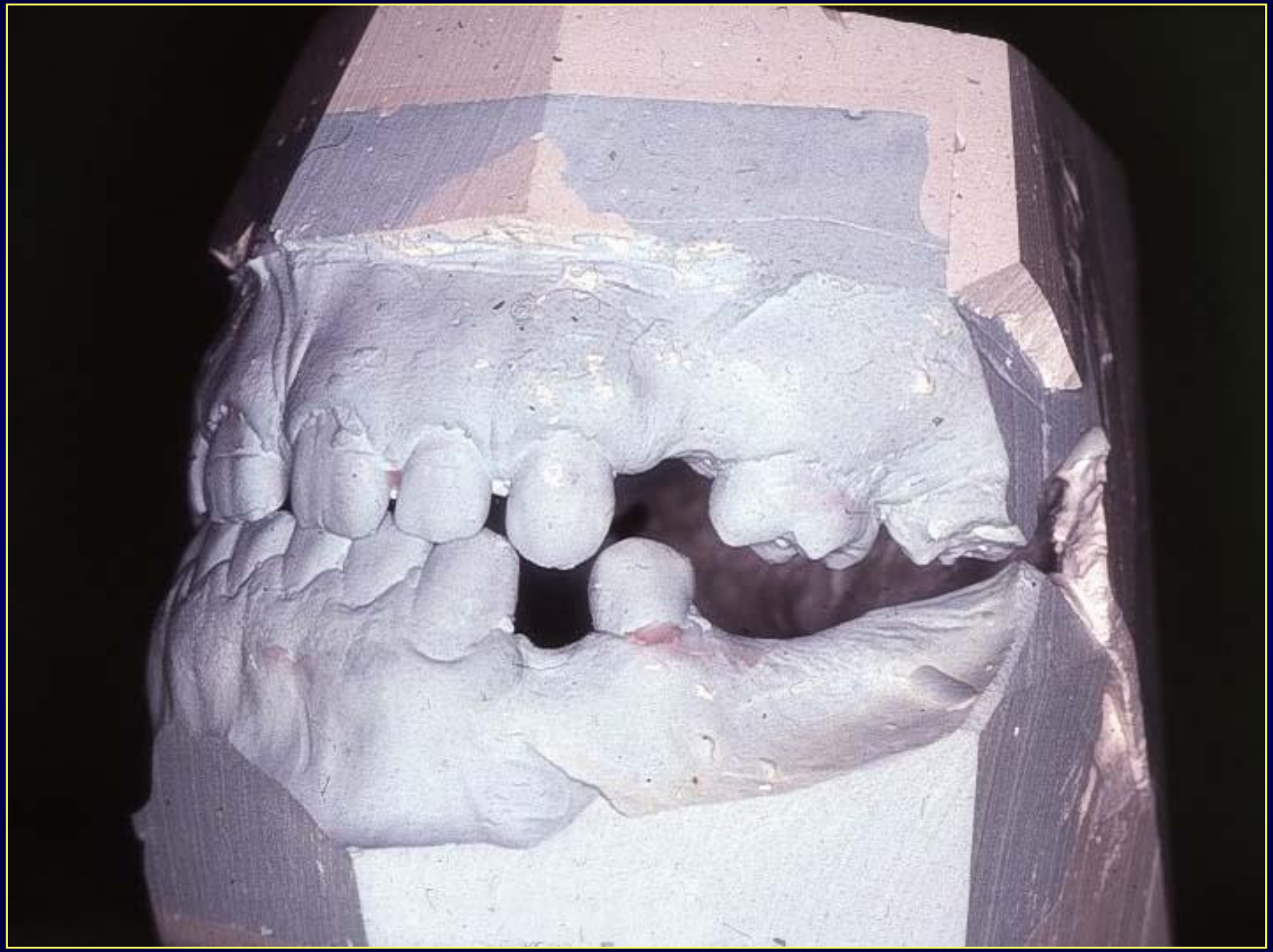
Diagnostic model

- Impression of upper and lower jaw
- Bite registration
- Mean value articulator
- Diagnostic denture



Analysis of diagnostic models

- Vertical distance
- Relation of jaws sagittal and transversal direction
- Measuring the width of the edentulous alveolar crest
- Section of cast models
- Surgical template



Diagnostic denture

- Diagnostic set up
- Determining the optimal location of implants according to the type of the prosthesis

Section of cast models

Classification of bone quality

(LEKHOLM, ZARB)

1. **2.** **3.** **4.**

Misch C.E.: Bone character: second vital implant criterion, Dent. Today 39-40, June/July 1988.

Bone quality class D1

composition

- solid compact bone

occurrence

- interforaminal area of atrophic mandible

Bone-Implant Contact (BIC) ~ 80%

Bone quality class D2

composition

- solid compact bone
- hard, roughly-grained trabecular bone

occurrance

- interforaminal and lateral area of mandible
- Frontal area of maxilla

Bone-Implant Contact (BIC) < 70%

Bone quality class D3

composition

- thin porous compact bone
- thin trabecular bone

occurrence

- frontal area of maxilla
- posterior region of mandible

Bone-Implant Contact (BIC) < 50%

Bone quality class D4

composition

- thin trabecular bone

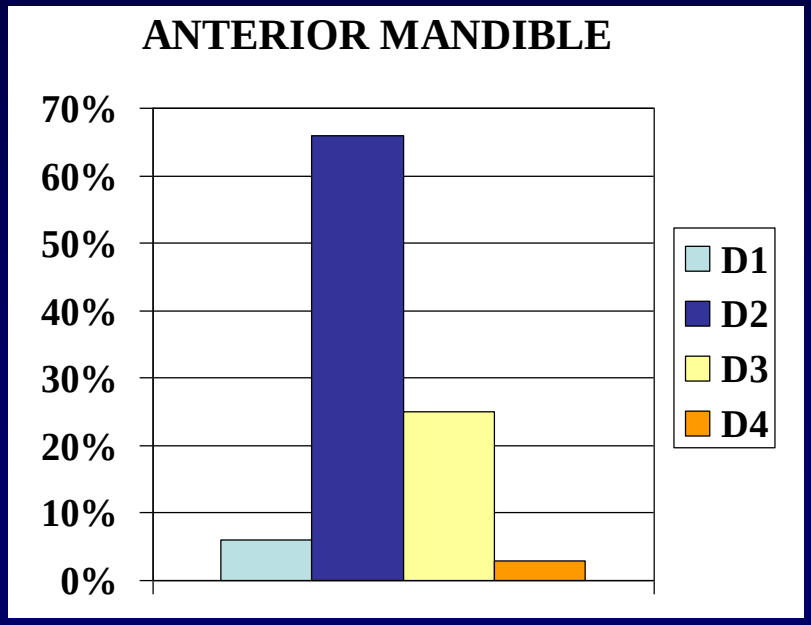
occurrance

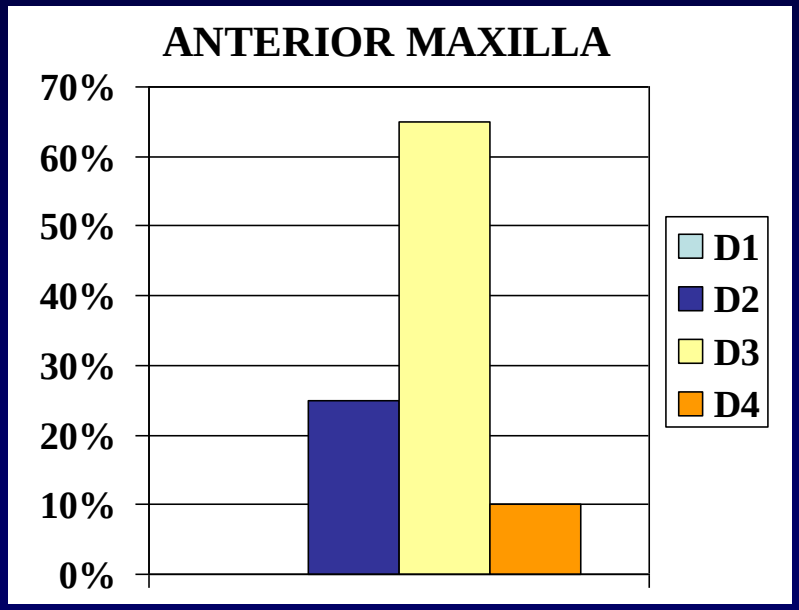
- premolar and molar region of maxilla

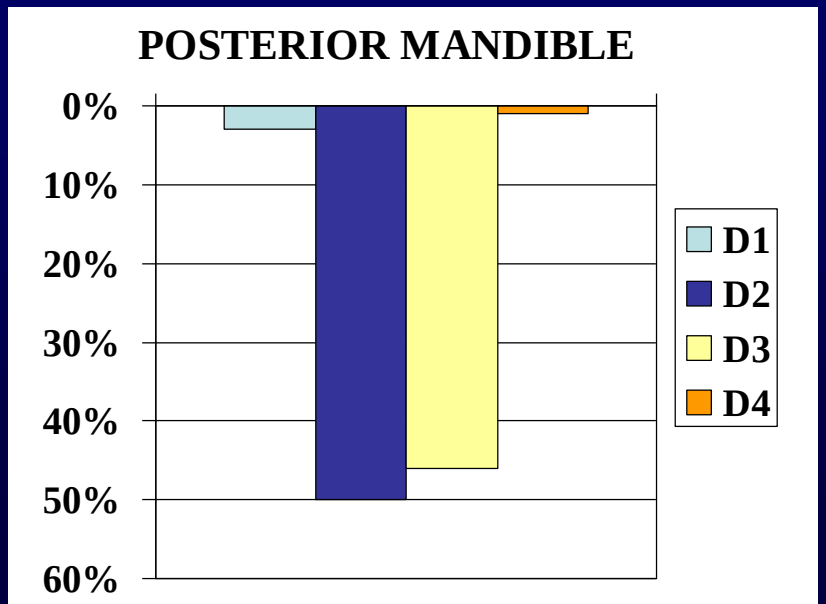
Bone-Implant Contact (BIC) ~ 25%

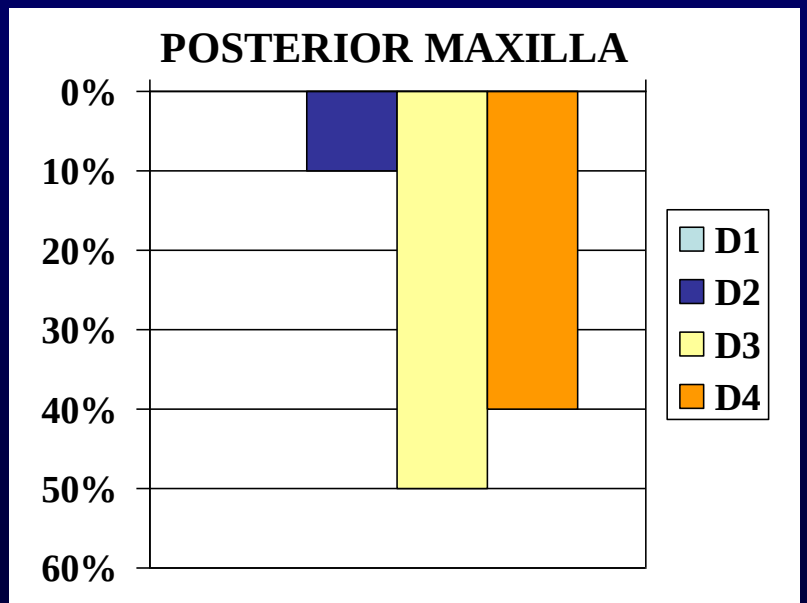
Distribution of bone quality

/Misch C. E.: Contemporary Implant Dentistry 1999/







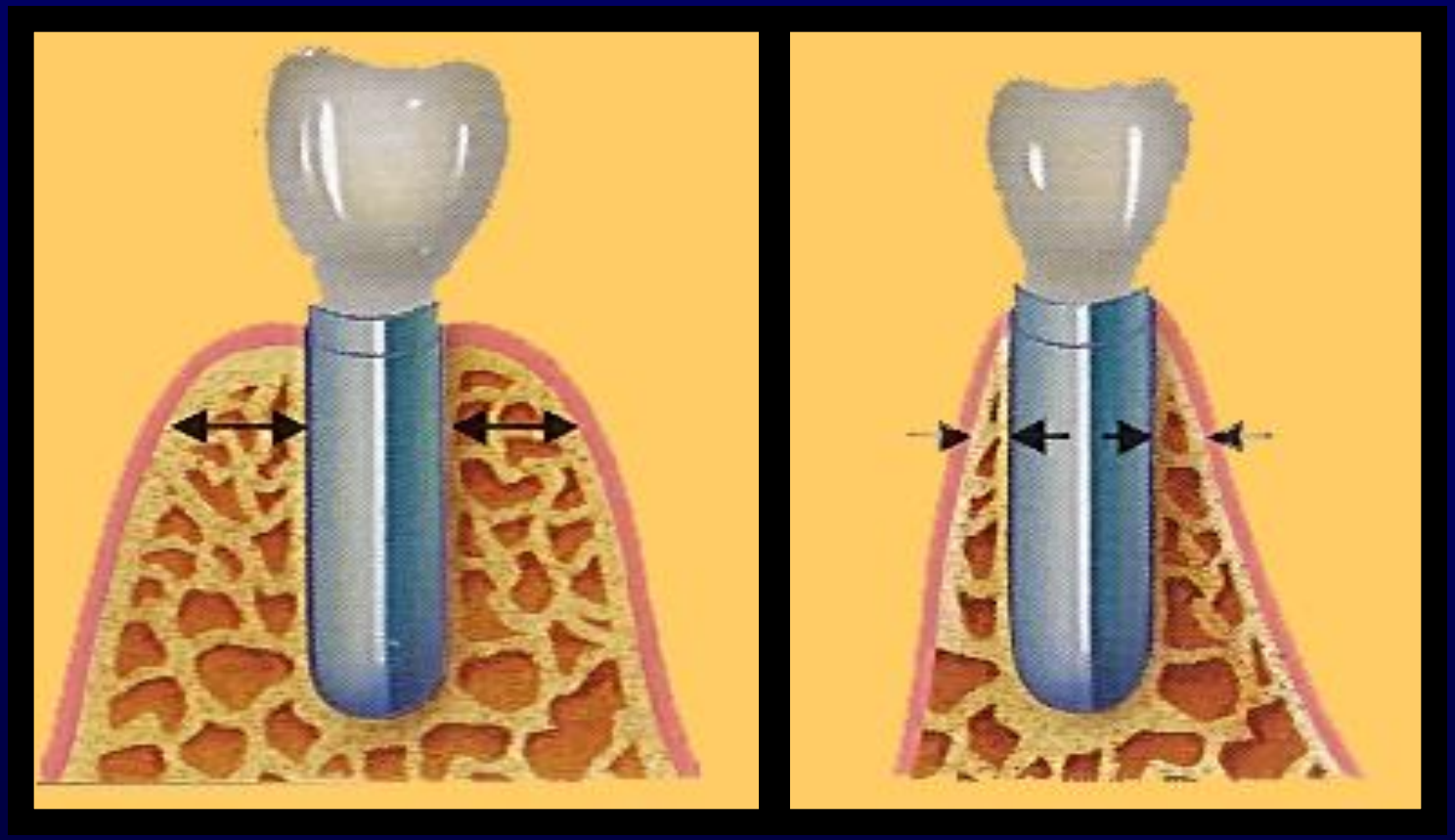


Bone quality and density test by CT

→ quantitative measuring:
Hounsfield-units (-1000 - +4000)

Bone quality class D1	1300-600 HU
Bone quality class D2	500-200 HU
Bone quality class D3	250-100 HU
Bone quality class D4	100-50 HU

Periimplant bone dimension

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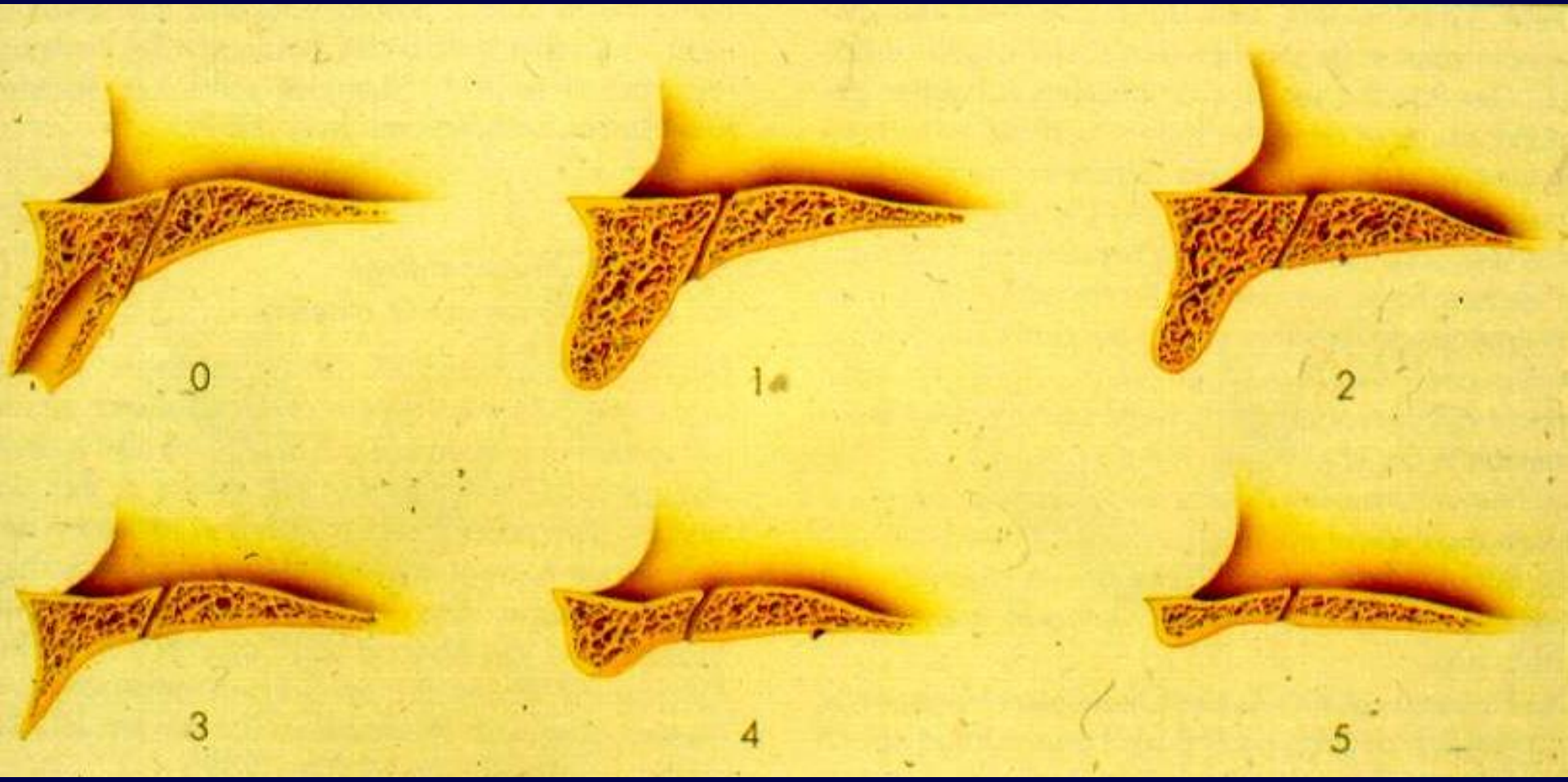
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Treatment plan

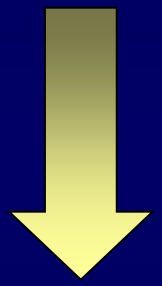
Surgical aspects in planning of implant prosthetics:

- The site of implants
- The number and size of implants
- The direction of inserting the implants
- The depth of inserting the implants

The number & site of enosseal implants from a prosthetic point of view:

is determined by optimal biomechanical and aesthetic considerations.

The number & site of enosseal implants from the surgical point of view:



is determined by anatomical considerations

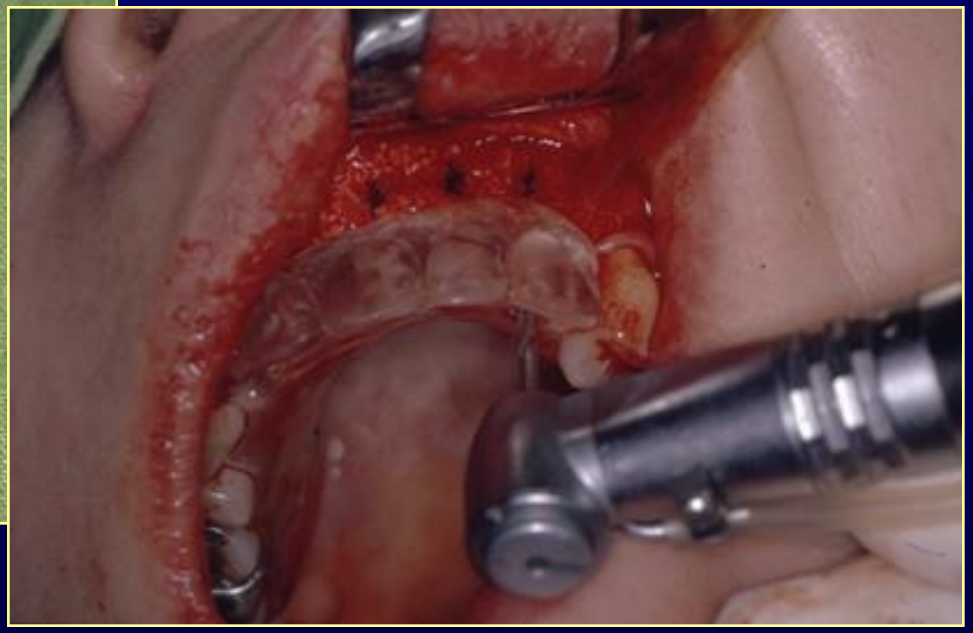
Planning

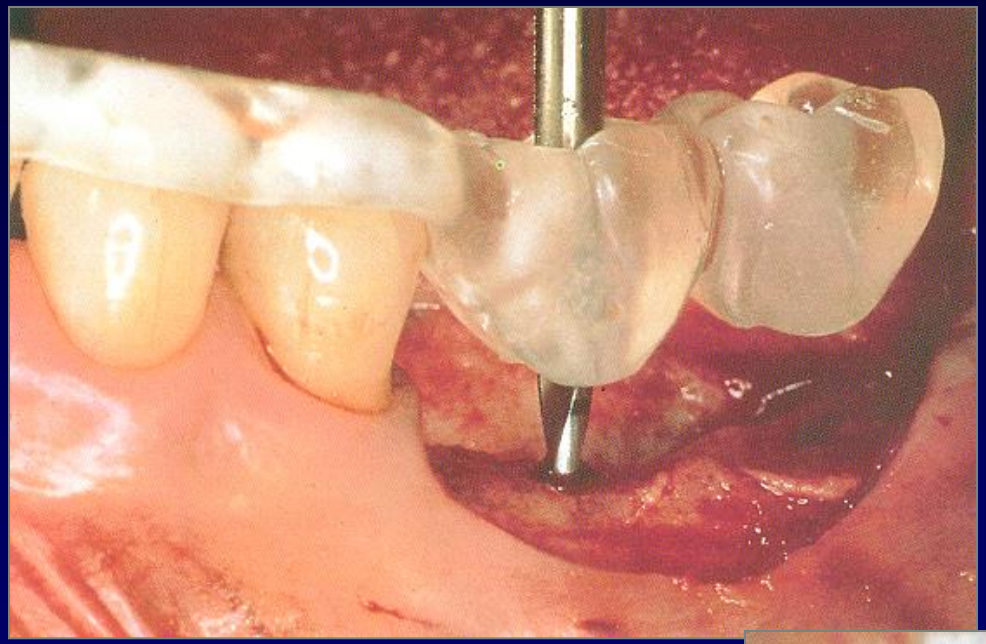
- The number and site of implants
- The type of prosthesis

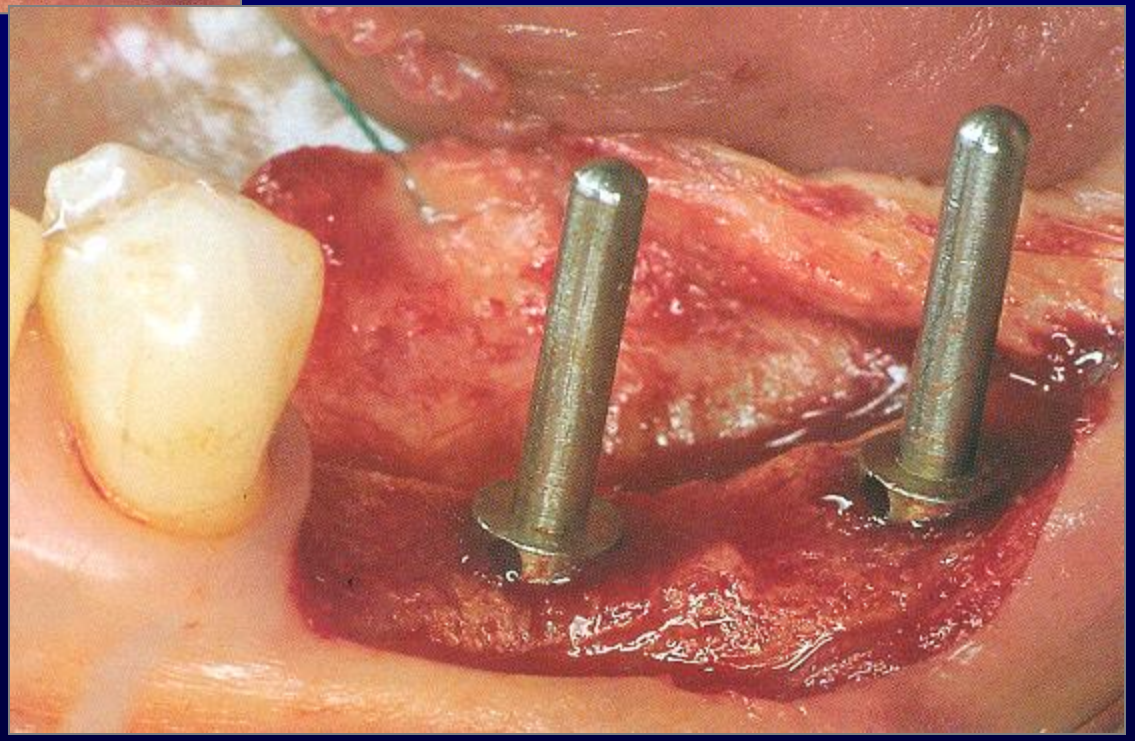
Surgical template

Surgical template

Surgical template







NobelGuide technique

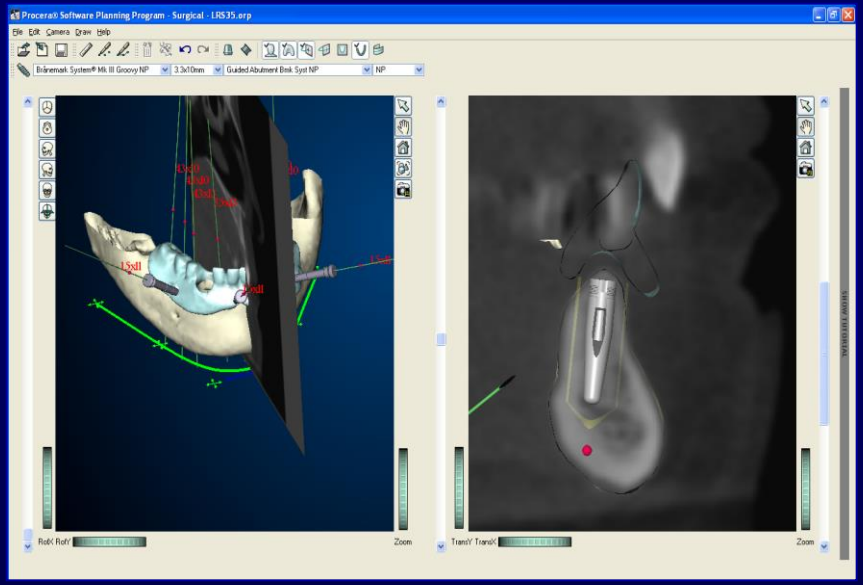
I. CT scan - Double Scan Technology - with guttapercha markers

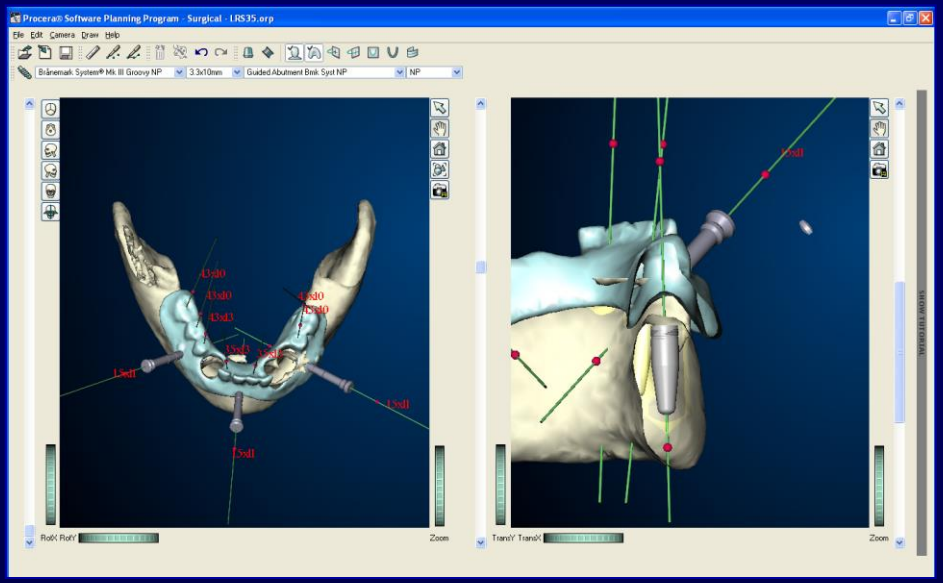
1st scan: the template, only

2nd scan: patient+template

NobelGuide technique

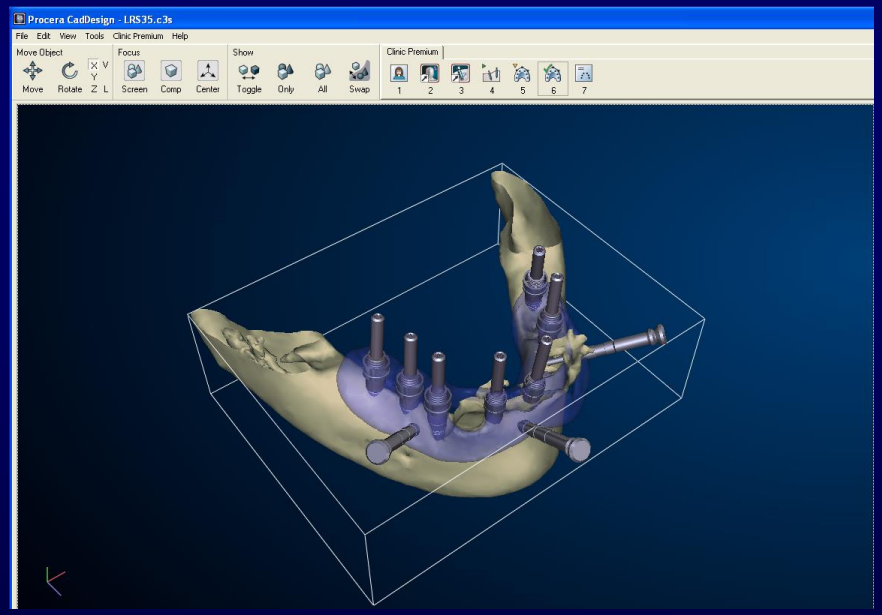
II. Planning on the computer





NobelGuide technique

III. Stereolithography: surgical template



Műtét utáni állapot

Straumann Guided Surgery

1

Mestermodell elkészítése

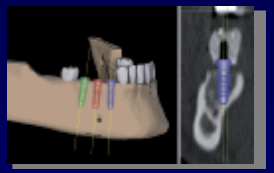
2

CT sablon elkészítése

3

CT/DVT felvétel

4

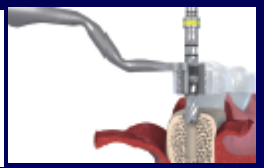


diagnózis& 3D tervezés

5

Sebészi sablon előállítása

6



Guided Surgery & irányított implantáció

2 5

gonyX/TempliX

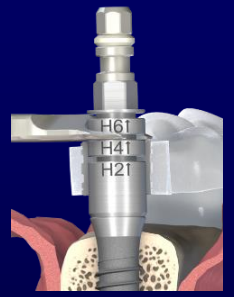
4

coDiagnostiX

6

Guided Surgery Kit

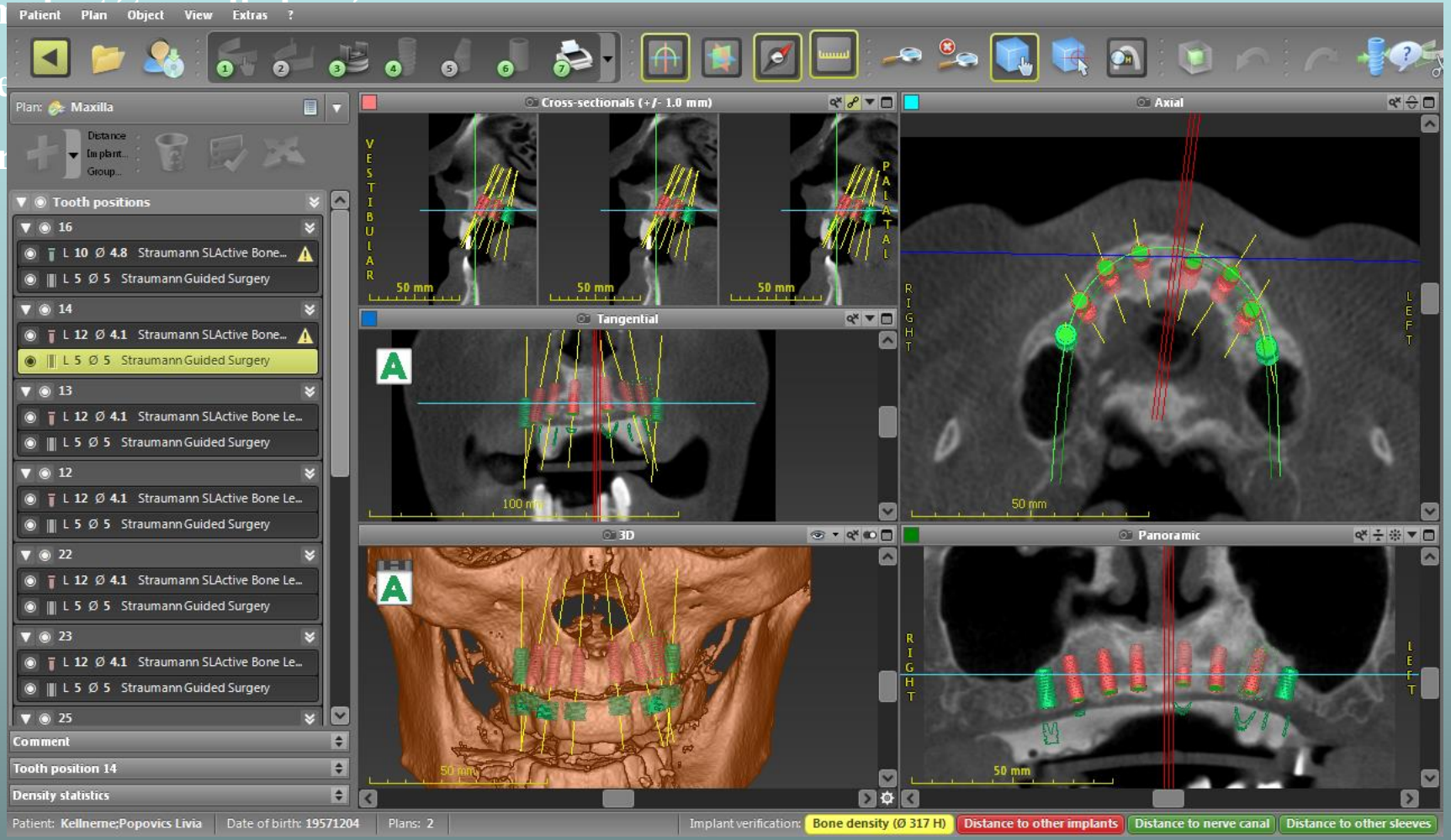
6



Guide(G) implantátum

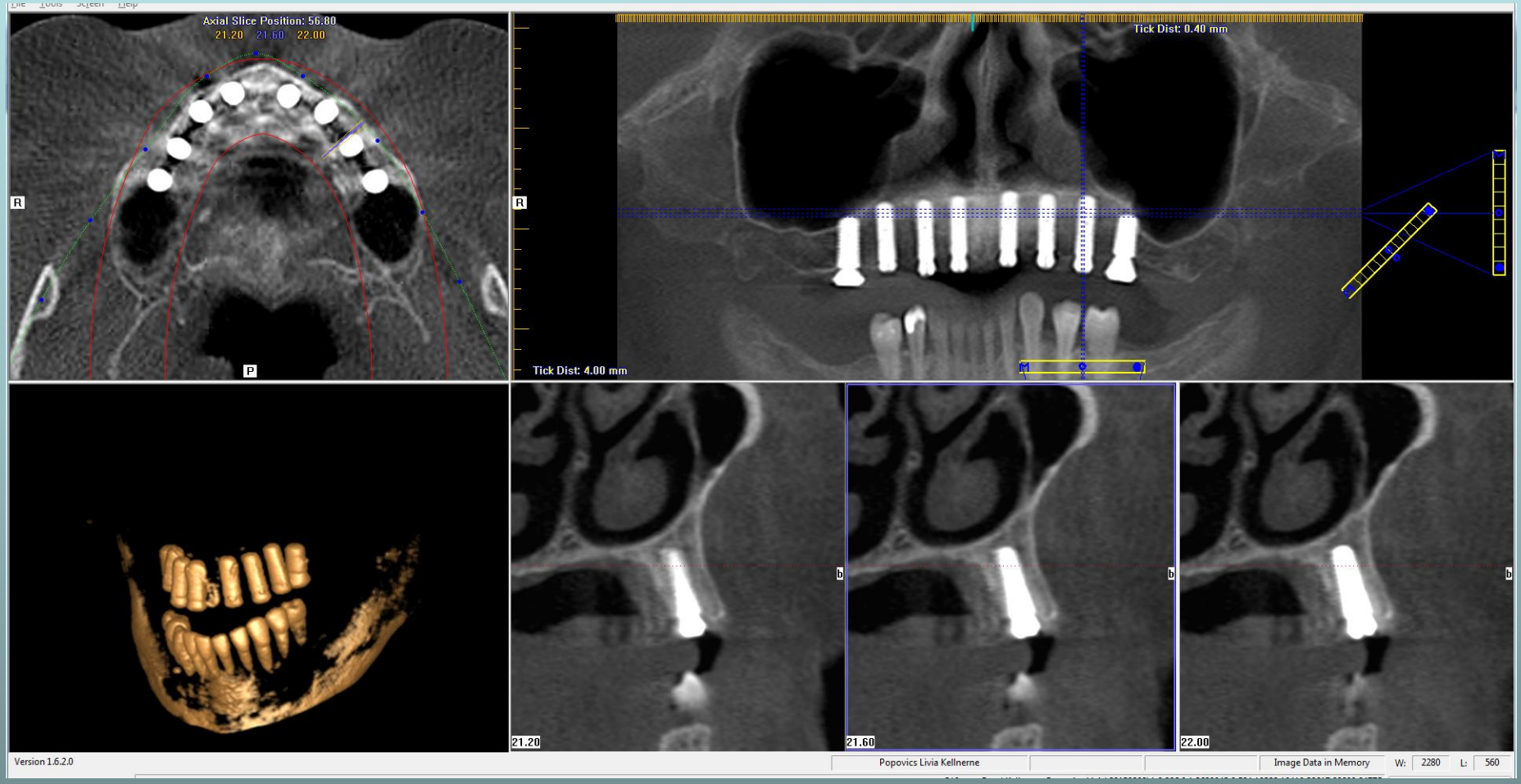
Planing by coDiagnostiX software

- In
- Fe
- Pr

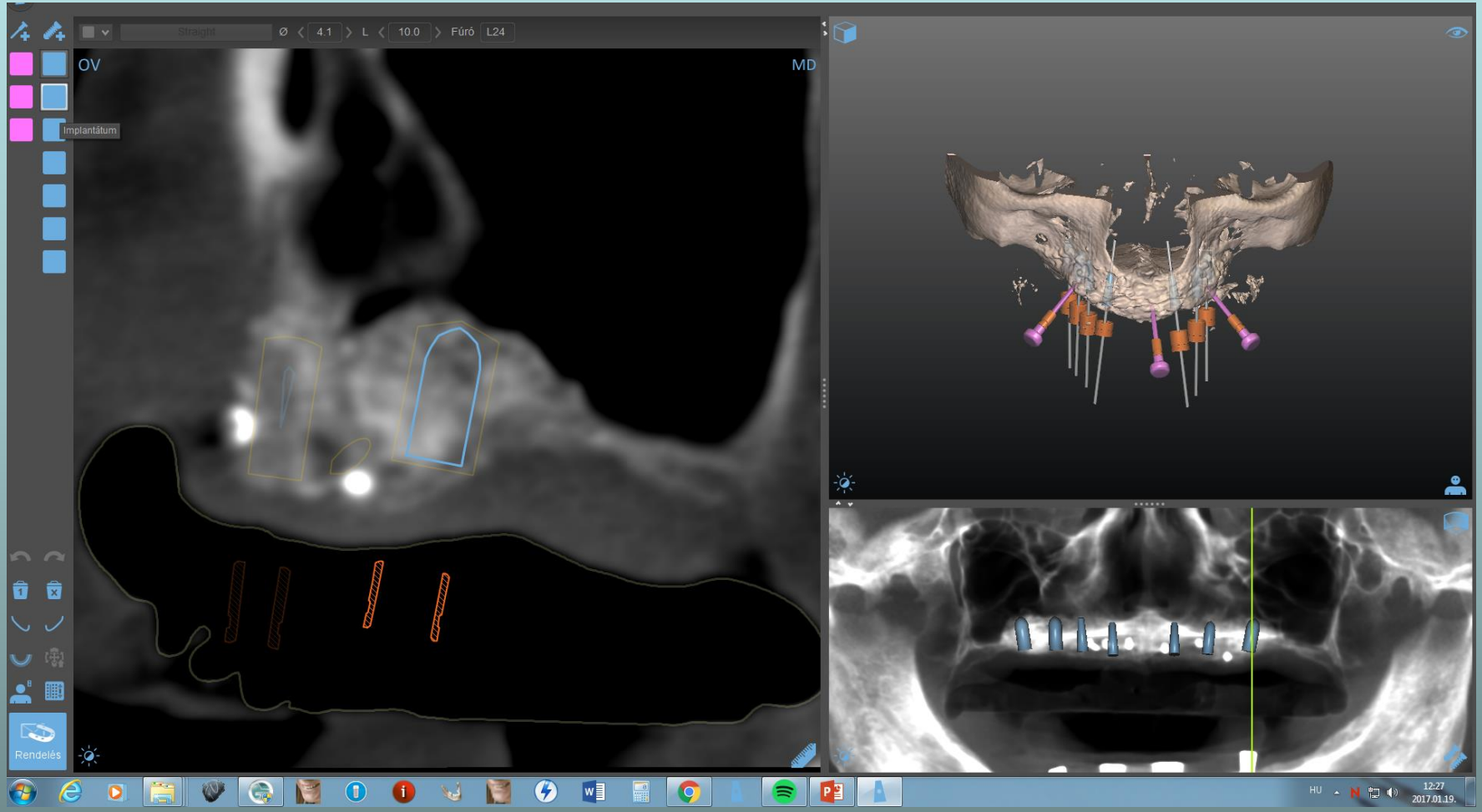


Surgical template

Recall, by CBCT



Planing by Smart Guide



Surgical template

Postoperative OPTG