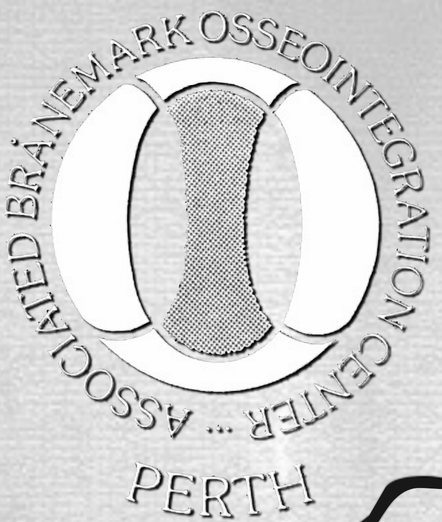




THE UNIVERSITY OF WESTERN AUSTRALIA

Management of Edentulism and the Terminal Dentition

-Mandible Fixed

Clin A/Prof Glen Liddelow

BDSc(WA), MScD(WA), DClinDent(Syd), MRACDS(Pros), FPFA, FICD, FRACDS

B R Å N E M A R K C E N T R E P E R T H

Edentulism



Usually from caries or periodontal disease

Cumulative effect - % increases with age

~25% 65-75yo, 58% over 75yo edentulous in UK, similar US, Germany

Declining by 1%/year for industrialised countries but lifespan has risen

Over 65yr demographic rising in all countries

Will outpace the decline in edentulism

Global economy may increase need

Mojon P The world without teeth: Demographic trends. In Feine et al Implant overdentures. Quintessence, 2003

Douglass CW, Shih A, Ostry L. Will there be a need for complete dentures in the US in 2020? J Prosthet Dent 2002;87:5-8.

Carlsson G, Omar R. The future of complete dentures in oral rehabilitation. J Oral Rehab 2010;37:143-156.

Thomason JM, Kelly SA, Bendowski A, Ellis JS. Two implant retained overdentures - A review of the literature supporting the McGill and York consensus statements. J Dent 2012;40:22-34

Edentulism



Maladaptive denture patients - little correlation with quality of dentures, strong psychosocial component

Progressive degeneration of supporting tissues and neuromuscular control

Progression from adaptive to maladaptive

Psychological health

Changes in food selection - Lower nutrient content, more processed foods, fats and cholesterol

Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: A mixed longitudinal study covering 25 years. J Prosthet Dent 1972;27:120-132.

Zarb GA. The edentulous predicament. In:Zarb GA, Bolender CL. Prosthodontic Treatment for Edentulous Patients. Mosby, Philadelphia, PA. 2004.

Fiske J, Davis DM, Frances C, Gelbier S. The emotional effects of tooth loss in edentulous people. Br Dent J 1998;184:90-1.

Hinds K, Gregory JR. National diet and nutrition survey: People aged 65 years or over. Vol 2: Report of the oral health survey. London: Stationary Office, 1998.

Joshipura KJ, Willett WC, Douglas CW. The impact of edentulousness on food and nutrient intake. J Am Dent Assoc 1996;127:459-467.

Allen PF. Association between diet ,social resources and oral health related quality of life in edentulous patients. J Oral Rehab 2005:32:623-628.

Carlsson G. Facts and fallacies: An evidence base for complete dentures. Dental Update 2006;33:134-142.

Carlsson G, Omar R. The future of complete dentures in oral rehabilitation. J Oral Rehab 2010;37:143-156.

Prosthodontic Treatment

Palliative therapy aimed at improving function and quality of life

Decision making process goes beyond success/survival of implants/prosthesis

Patient based measures -psychosocial function and perceived health

Locker D. Patient-based assessment of the outcomes of implant therapy: A review of the literature. Int J Prosthodont 1988;11:453-461.

Zarb GA. The edentulous predicament. In:Zarb GA, Bolender CL. Prosthodontic Treatment for Edentulous Patients. Mosby, Philadelphia, PA. 2004.

Carlsson G, Omar R. The future of complete dentures in oral rehabilitation. J Oral Rehab 2010;37:143-156.

Prosthodontic Treatment

Most complete denture wearers adapt and cope

Some suffer substantially from chronic dysfunction, pain, low self esteem and reduced OHRQOL - maladaptive



Zarb GA. The edentulous predicament. In:Zarb GA, Bolender CL. Prosthodontic Treatment for Edentulous Patients. Mosby, Philadelphia, PA. 2004.

Edentulism



Fixed or removable implant prostheses compared to conventional dentures

- Improved OHRQOL
- Higher nutritional state
- Improvement in blood parameters
- Improved anthropometric measures post treatment

Hutton B, Feine J, Morais J. Is there an association between edentulism and nutritional state? J Can Dent Assoc 2002;68:182-187.

Carlsson G, Omar R. The future of complete dentures in oral rehabilitation. J Oral Rehab 2010;37:143-156.

Prosthodontic Treatment

Minimum Acceptable Protocol (or Principle)

Variety of treatments available complying with the principles

Minimizing outlay of resources and maximising treatment outcomes from a patient perspective

Treatment options change with time

Owen CP. Appropriatech: Prosthodontics for the many, not just for the few. Int J Prosthodont 2004;17:261-262

Prosthodontic Treatment

Principles

Safest

Least invasive

Least costly

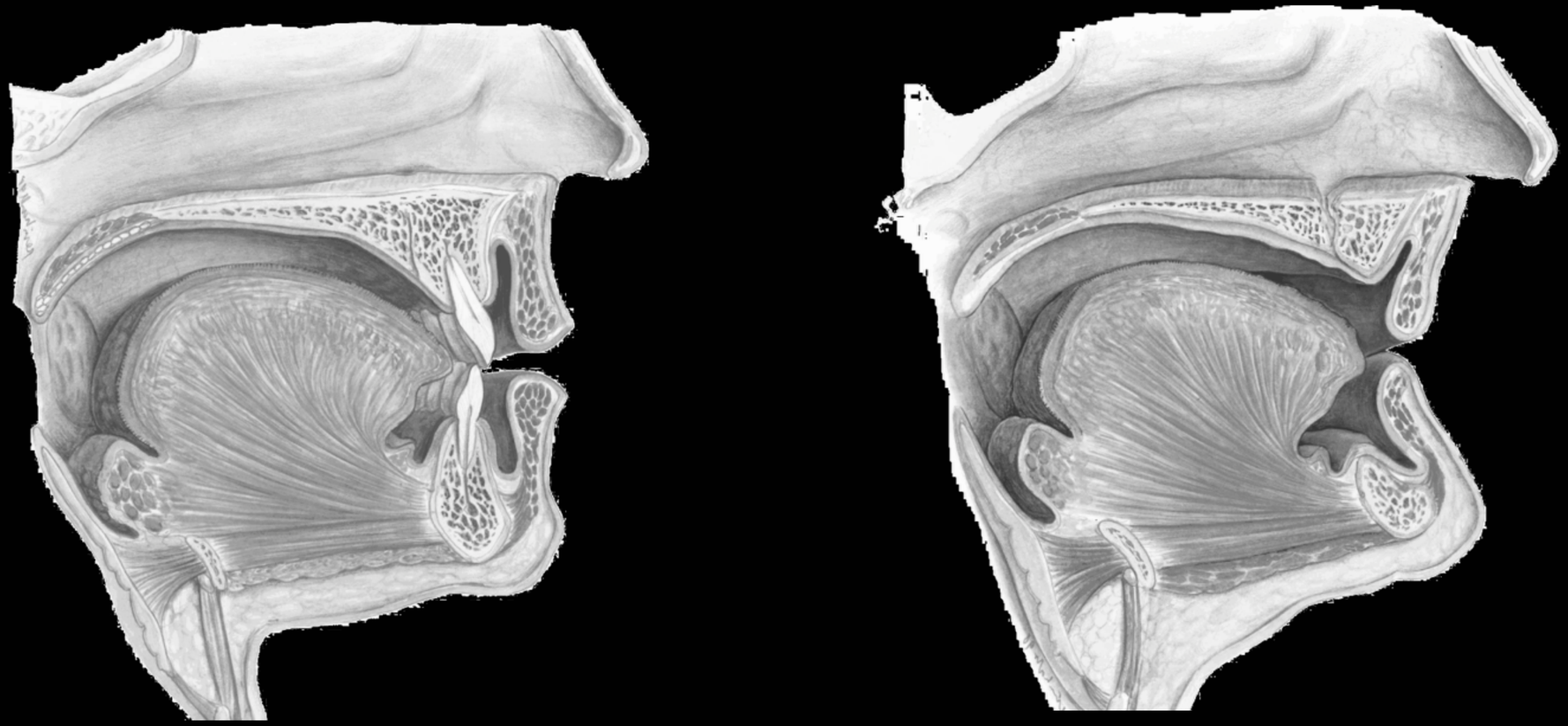
Least complex

→ *Reasonable needs and expectations*

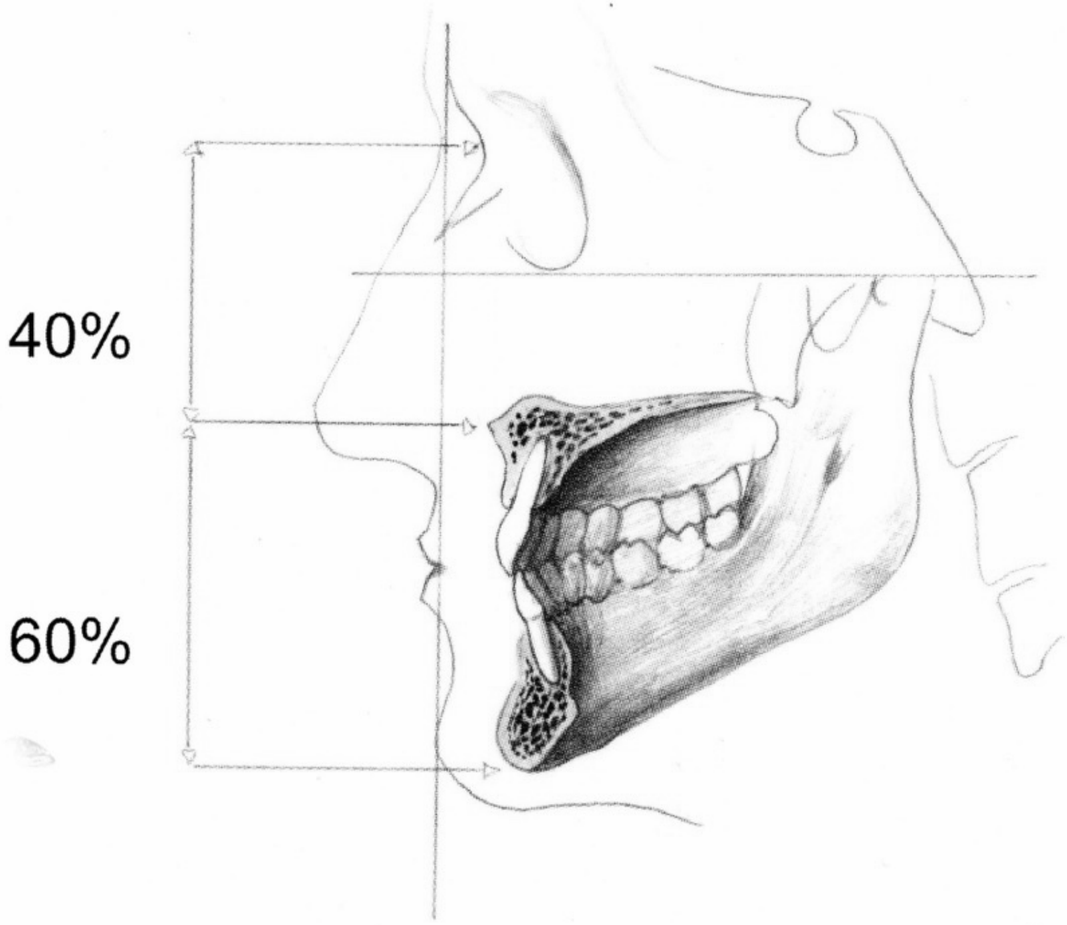
- Mechanical stability
- Biologic stability
- Longevity
- Low maintenance

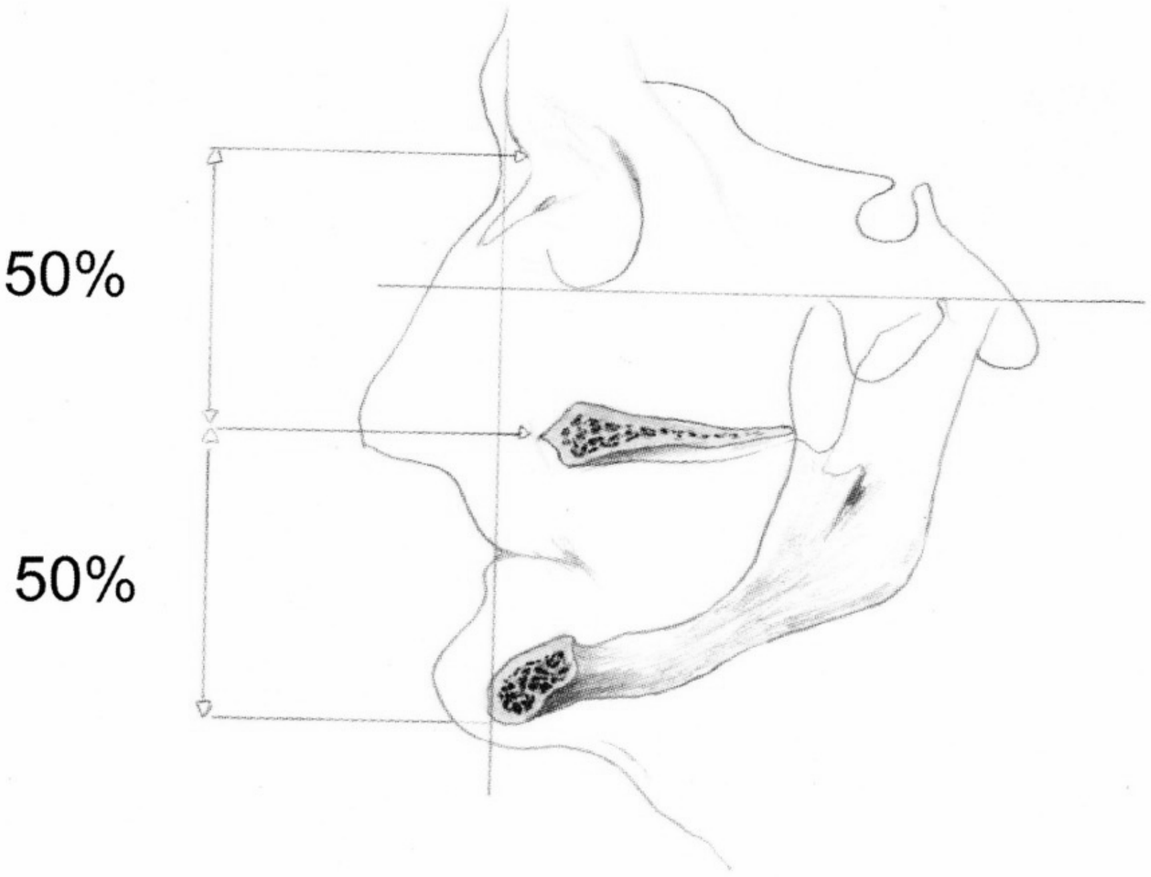
Fitzpatrick B. Standard of care for the edentulous mandible: A systematic review. J Prosthet Dent 2006;95:71-78.

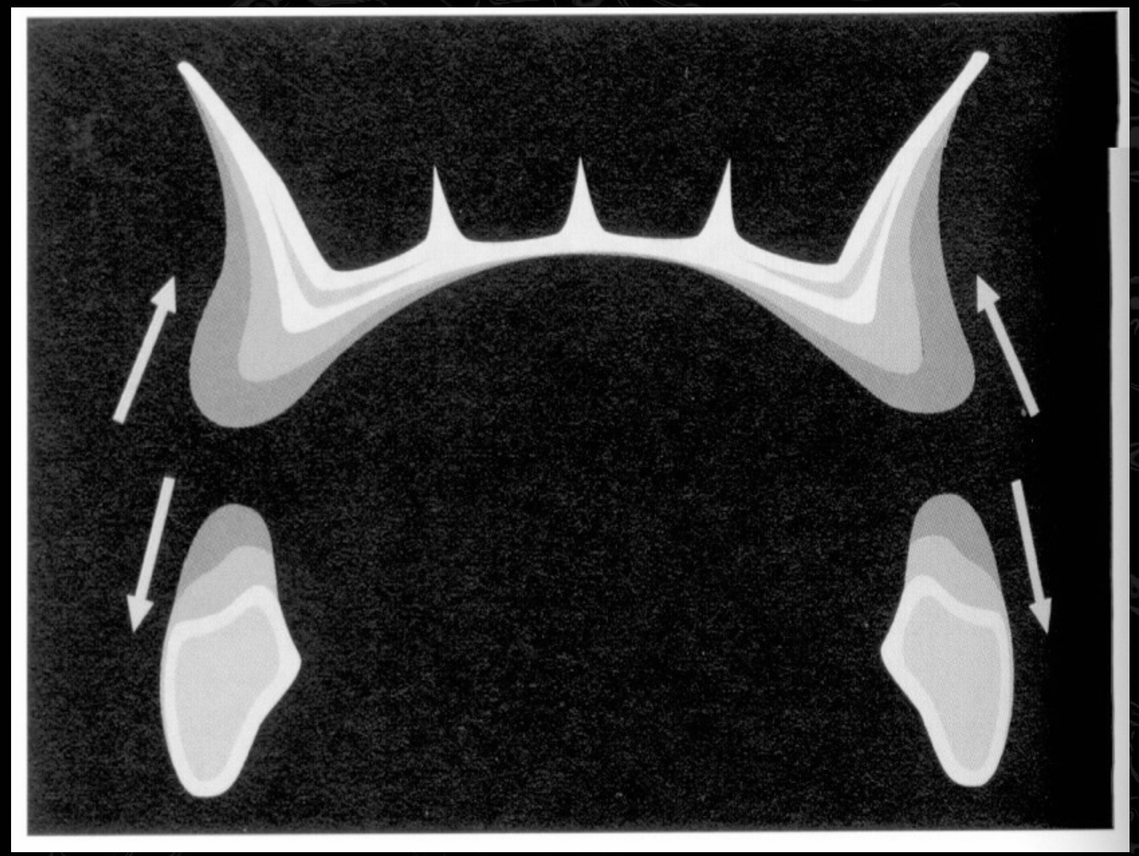
Sequelae of tooth loss



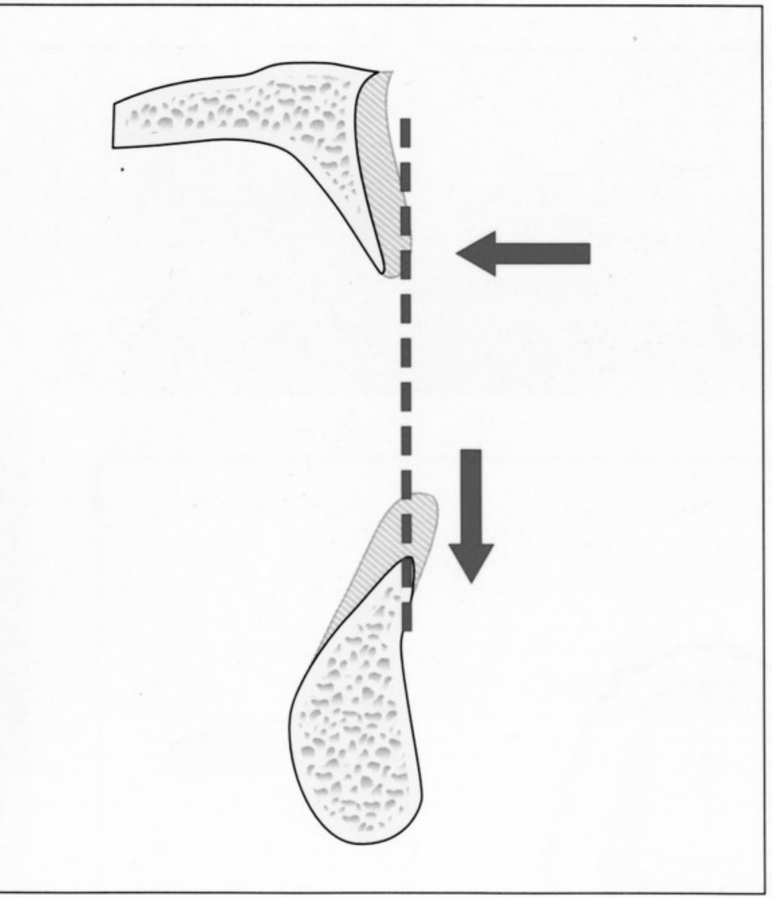
Consequences of Jaw Atrophy



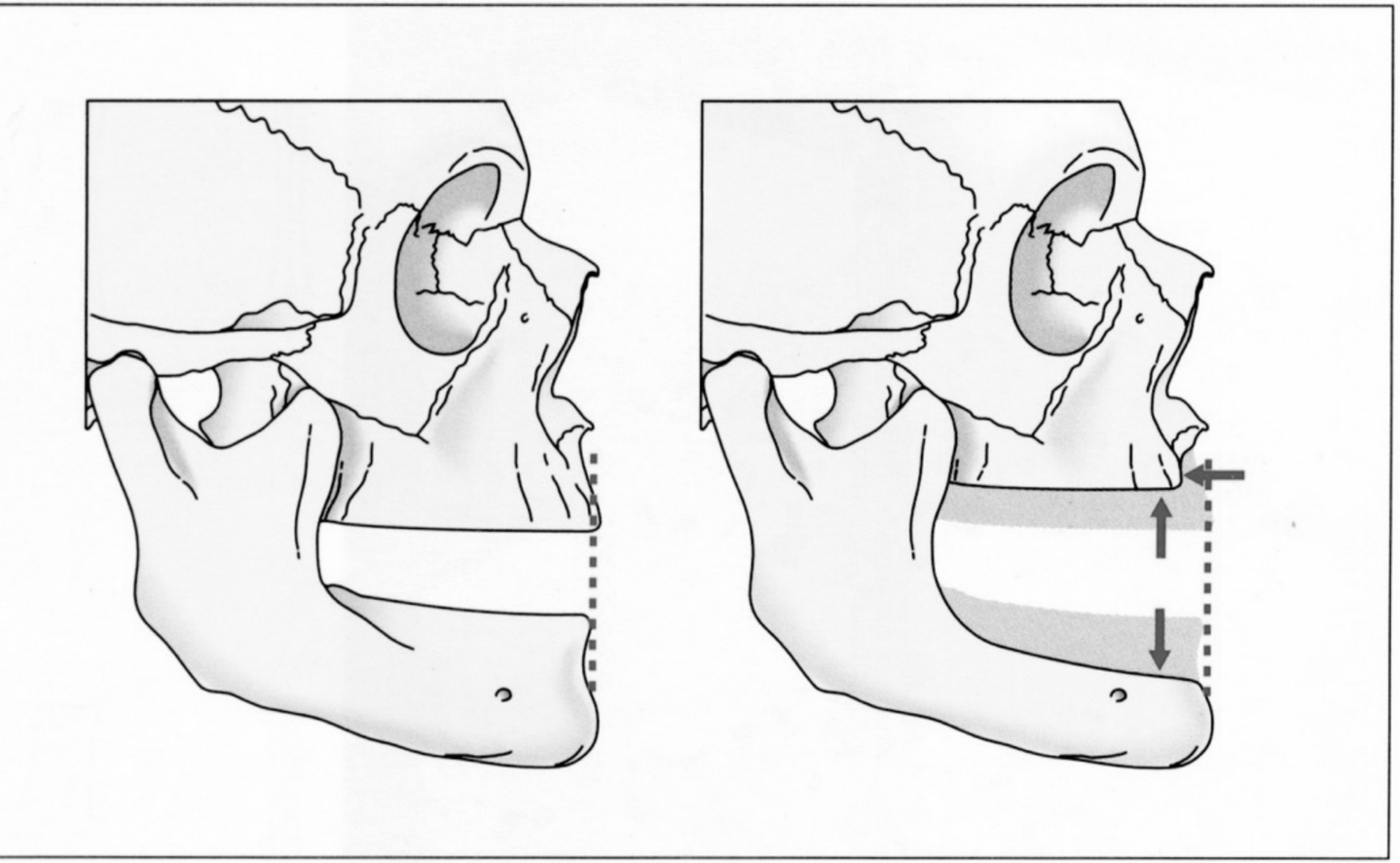




Centripetal resorption in the maxilla & centrifugal resorption in the mandible



Centripetal resorption in the maxilla & centrifugal resorption in the mandible

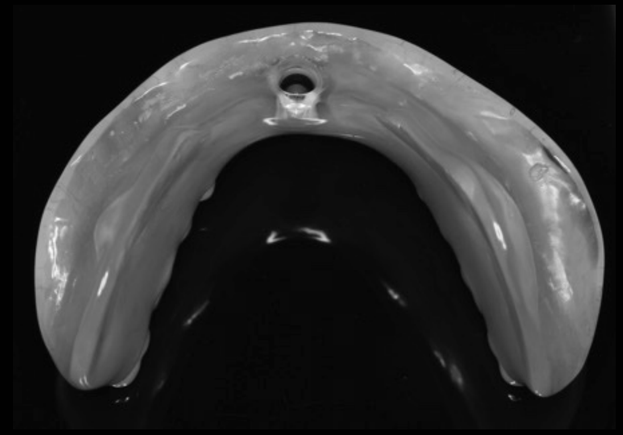


Increased inter-arch distance as a result of resorption

Treatment strategies for the edentulous jaw



Complete Denture



Implant Overdenture



Implant Detachable Prosthesis



Fixed Prosthesis

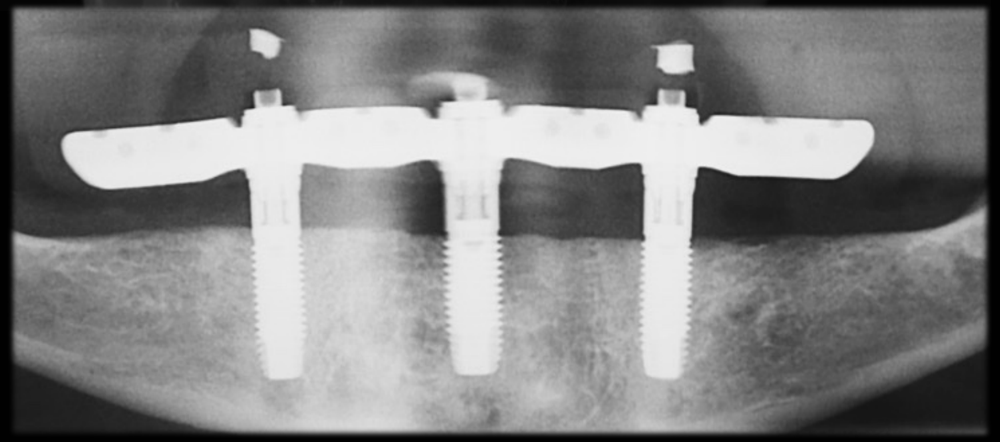
Lecture 1



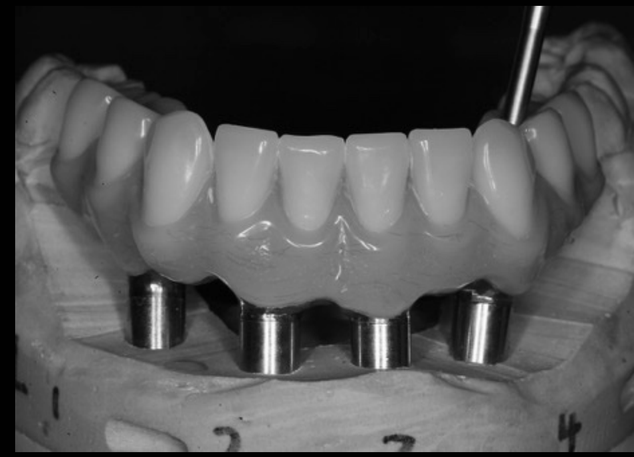








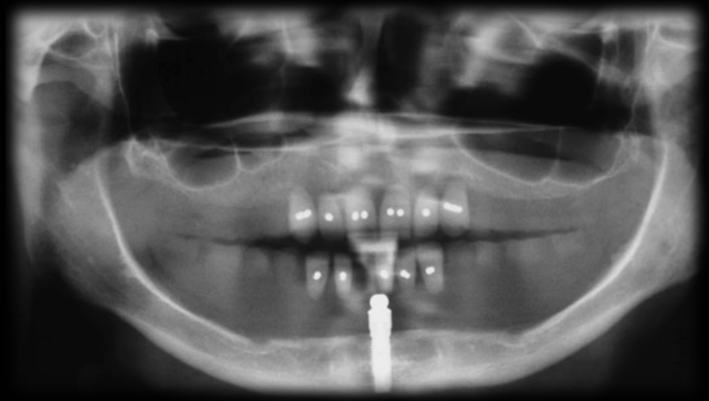


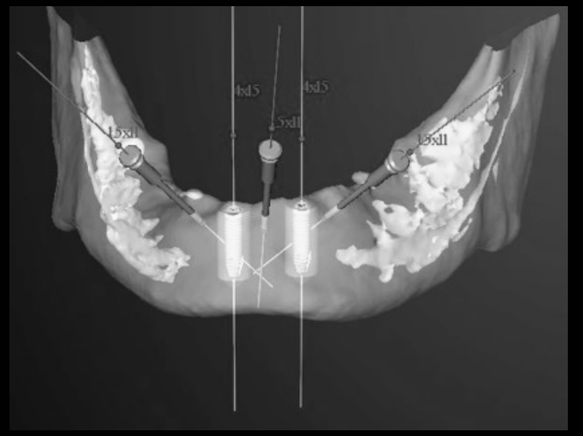


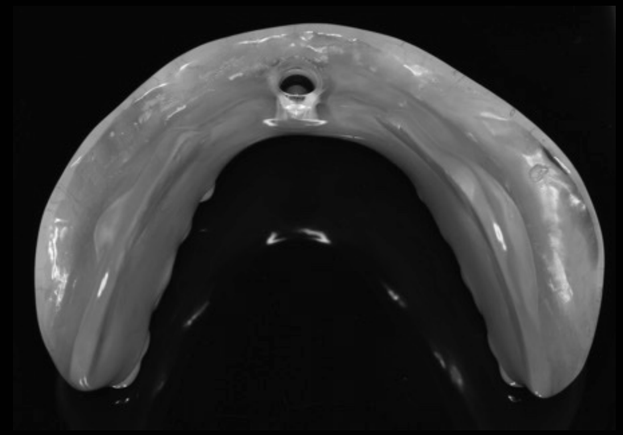
Fixed Prosthesis

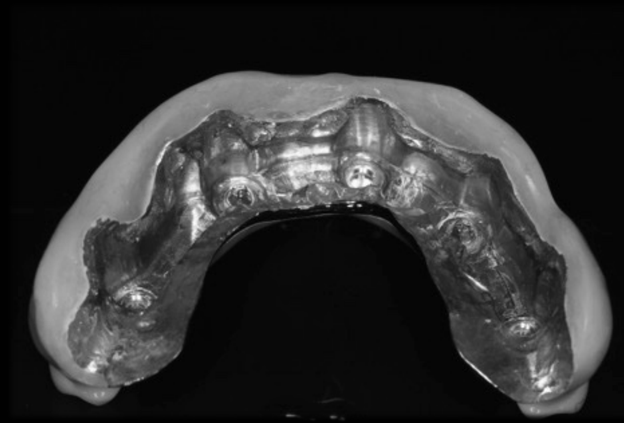
Mandible

Lecture 2

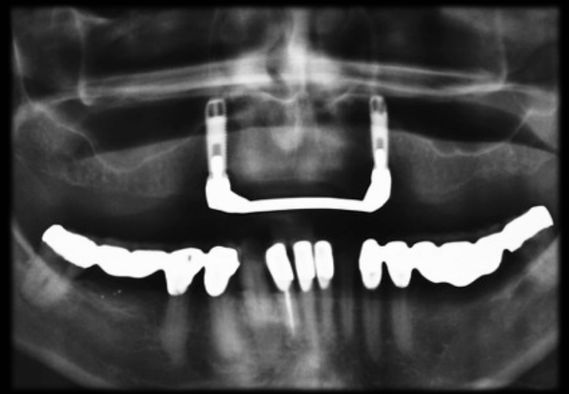






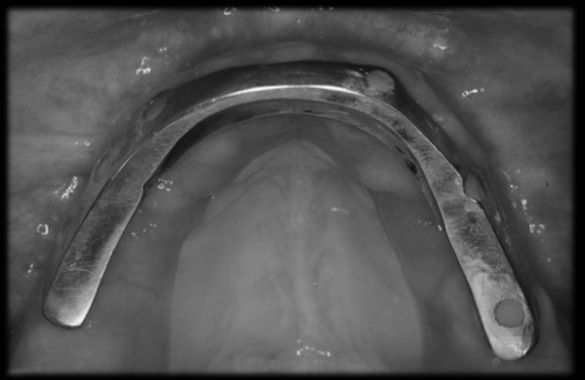




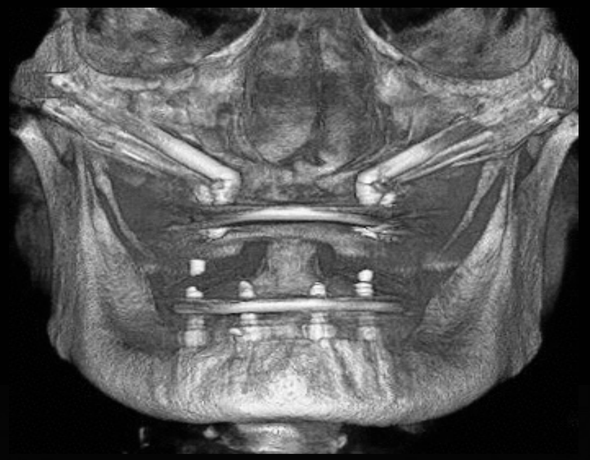


Implant
Overdenture

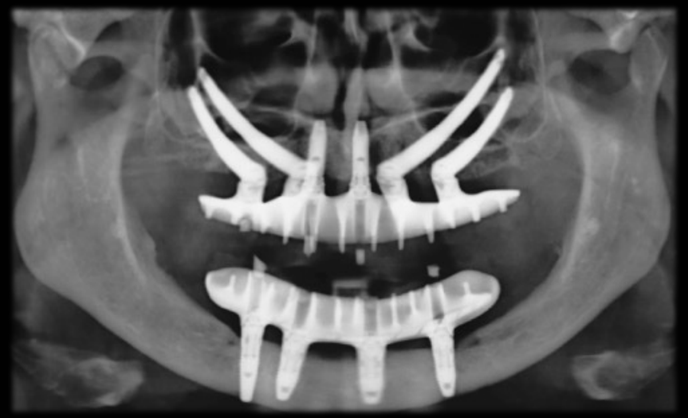
Implant
Detachable
Prosthesis



Lecture 3















Fixed Prosthesis

Maxilla

Treatment strategies for the edentulous jaw

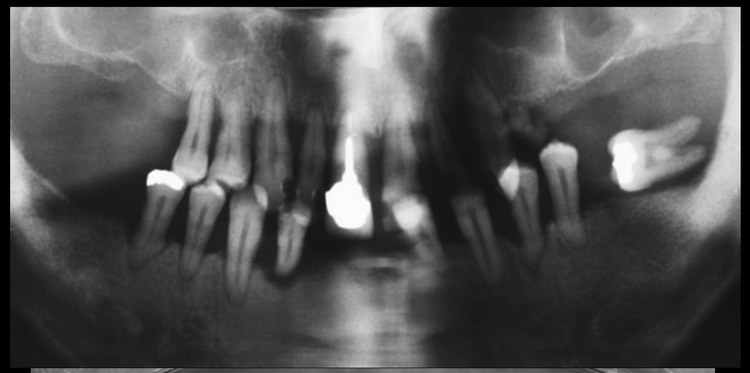


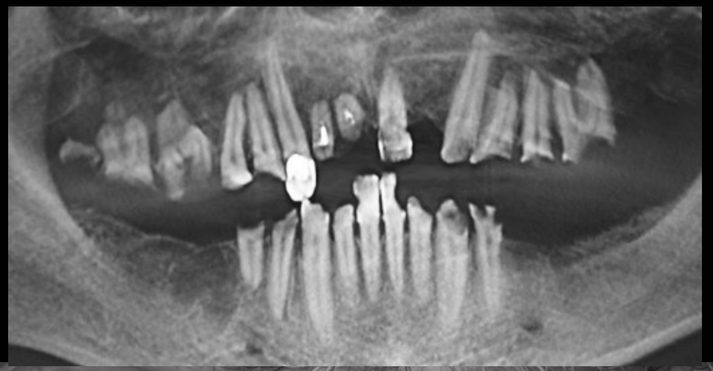
Maxillary complete denture prosthetics

- -Mandibular prosthodontics
- -Mn IOD
- -Mn IFP (Least maintenance)
- -Review at 12 months (75% satisfied)

Large numbers of patients with downhill dentitions, but not yet edentulous













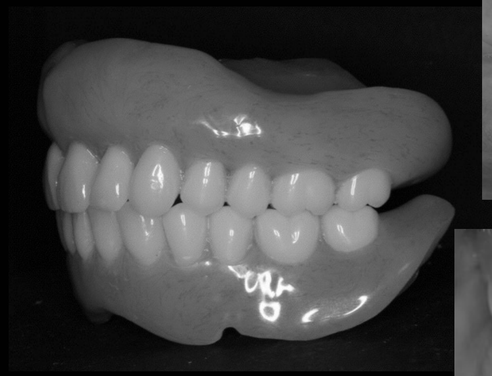
Terminal dentition - Definition

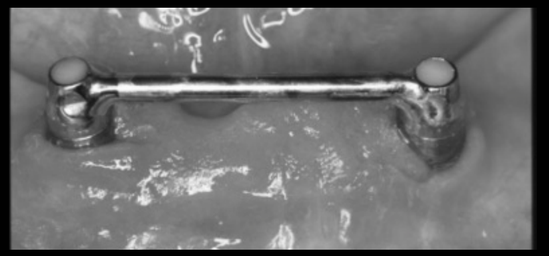
A residual dentition considered by clinical parameters or economic rationalism, unable to be restored for a reasonable prognosis

Wait until self destructs

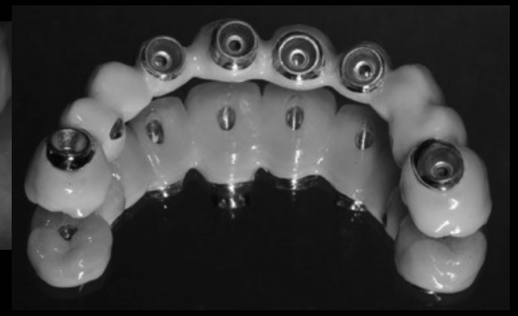
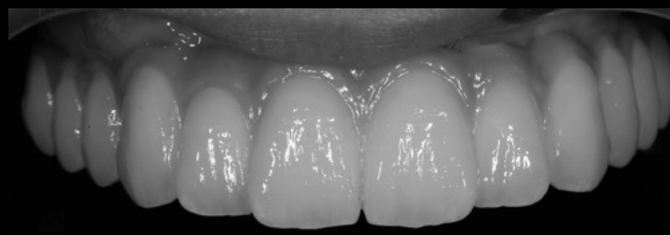
Intervene earlier
- retain some teeth
- maintain facial form, speech
- limit bone resorption

What are patients satisfied with?





Liddelow GJ, Henry PJ. The immediately loaded single implant retained mandibular overdenture:A 36-month prospective study. Int J Prothodont 2010;23:13-21.

Brennan M, Houston F, O'Sullivan M, O'Connell B. Patient satisfaction and oral health-related quality of life outcomes of implant overdentures and fixed complete dentures. Int J Oral Maxillofac Implants. 2010;25:791-800.

Turkyilmaz I, Company AM, McGlumphy EA.Should edentulous patients be constrained to removable complete dentures? The use of dental implants to improve the quality of life for edentulous patients. Gerodontology. 2010;27:3-10.

Carlsson GE, Omar R.The future of complete dentures in oral rehabilitation. A critical review. J Oral Rehabil. 2010;37:143-56.Clin Oral Implants Res. 2009 Jun;20(6):533-44.

Emami E, Heydecke G, Rompré PH, de Grandmont P, Feine JS. Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: a meta-analysis of randomized-controlled trials. Clin Oral Implants Res. 2009;20:533-44.

What are patients satisfied with?

- Currently edentulous patients are satisfied with a one or two implant mandibular overdenture and complete maxillary denture
- Comparison with fixed mandibular prosthesis equivocal, younger patients prefer fixed and generally better function
- No studies on terminal dentition and satisfaction with various prostheses

If patients are financial, fixed is far more predictable with less maintenance long term and greater patient satisfaction

Liddelow GJ, Henry PJ. The immediately loaded single implant retained mandibular overdenture:A 36-month prospective study. Int J Prothodont 2010;23:13-21.

Brennan M, Houston F, O'Sullivan M, O'Connell B. Patient satisfaction and oral health-related quality of life outcomes of implant overdentures and fixed complete dentures. Int J Oral Maxillofac Implants. 2010;25:791-800.

Turkyilmaz I, Company AM, McGlumphy EA.Should edentulous patients be constrained to removable complete dentures? The use of dental implants to improve the quality of life for edentulous patients. Gerodontology. 2010;27:3-10.

Carlsson GE, Omar R.The future of complete dentures in oral rehabilitation. A critical review. J Oral Rehabil. 2010;37:143-56.

Emami E, Heydecke G, Rompré PH, de Grandmont P, Feine JS. Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: a meta-analysis of randomized-controlled trials. Clin Oral Implants Res. 2009;20:533-44.


The mandible

Fixed



Brånemark PI, Hansson BO, Adell R, et al. Osseointegrated implants in the treatment of the edentulous jaw. Experience from a 10-year period. Scand J Plast Reconstr Surg Suppl 1977;16:1-132.

Ekelund JA, Lindqvist LW, Carlsson GE, Jemt T. Implant treatment in the edentulous mandible: a prospective study on Brånemark system implants over more than 20 years. Int J Prosthodont 2003: 16: 602-608.

Brånemark P-I, Svensson B, van Steenberghe D. Ten-year survival rates of fixed prosthesis on four or six implants ad modum Brånemark in full edentulism. Clin Oral Impl Res 1995;6:227-231.

Immediate Loading

Fixed

Henry P, Liddelow G. Immediate loading of dental implants. Aust Dent J 2008;53:S69-S81

Jokstad A, Carr AB. What is the effect on outcomes of time-to- loading of a fixed or removable prosthesis placed on implant(s)? Int J Oral Maxillofac Implants 2007;22(Suppl):19-48.

Aparicio C, Rangert B, Sennerby L. Immediate / early loading of dental implants: a report from the Sociedad Espanola de Implantes World Congress consensus meeting in Barcelona, Spain, 2002. Clin Implant Dent Relat Res 2003;5:57-60. 26.

Attard NJ, Zarb GA. Immediate and early implant loading protocols: a literature review of clinical studies. J Prosthet Dent 2005;94:242-258.

Nkenke E, Fenner M. Indications for immediate loading of implants and implant success. Clin Oral Implants Res 2006; 17 Suppl 2:19-34.30.

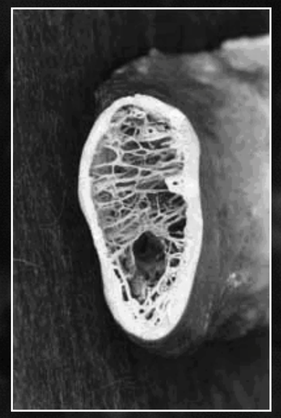
Lekholm and Zarb Classification of Bone Quality



1



2



3



4

Quality 1: Nearly entirely cortical bone.
Quality 2: Thick cortical bone, dense trabecular bone.
Quality 3: Thin cortical bone, dense trabecular bone.
Quality 4: Thin cortical bone, low density trabecular bone.

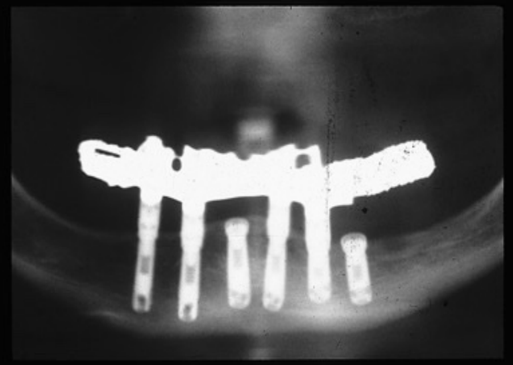
Lekholm U, Zarb GA. Patient selection and preparation. In: Tissue Integrated Prosthesis: Osseointegration in Clinical Dentistry. Brånemark P-I, Zarb GA, Albrektsson T. (Eds). Chicago: Quintessence; 1985. p. 199-209.

How many implants?

All-on-4 ?

CRESTAL BONE LOSS





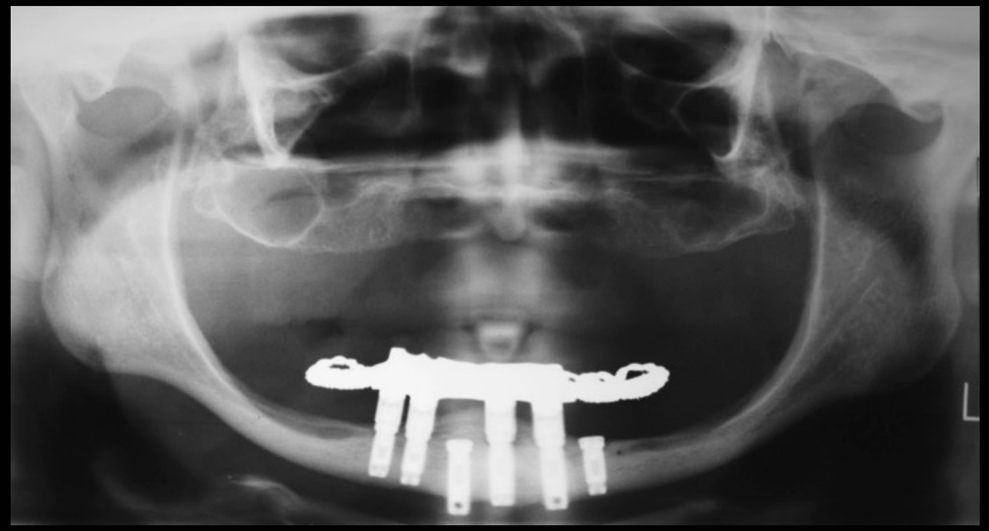
CRESTAL BONE LOSS T -033C LOADED IMPLANTS

Time	Mesial	Distal
0 - 1 YR	0.5 ± 0.5	0.4 ± 0.8
1 - 3 YR	0.0 ± 0.4	0.1 ± 0.5
0 - 5 YR	0.0 ± 0.5	0.5 ± 0.8

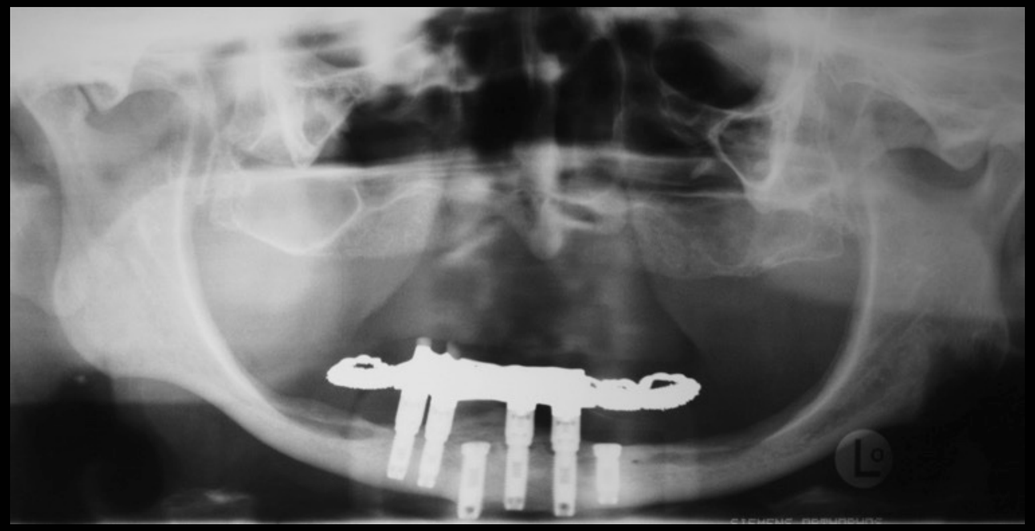
HENRY, PJ & ROSENBERG I. Immediately loaded implants in the edentulous mandible. Pract Periodont & Aesthet Dent 1994; 6:15-22. (Nobel Biocare Study T-033C)

Maló P, Rangert B, Nobre M."All-on-Four" immediate-function concept with Brånemark System implants for completely edentulous mandibles: a retrospective clinical study. Clin Implant Dent Relat Res. 2003;5 Suppl 1:2-9.

How many implants?



Baseline



20 years

Carlsson GE, Lindquist LW, Jemt T. Long-term marginal periimplant bone loss in edentulous patients. Int J Prosthodont. 2000 Jul-Aug;13(4): 295-302.

Rangert B, Jemt T, Jörneus L. Forces and Moments on Brånemark Implants. Int J Oral Maxillofac Implants 1989;4:241-247.

Henry PJ, Rosenberg I. Single stage surgery for rehabiltation of the edentulous mandible: Preliminary results. Pract Periodont Aesthet Dent 1994;6:15-24.

Henry P, Liddelow G. Immediate loading of dental implants. Aust Dent J 2008;53:S69-S81

Brånemark P-I, Svensson B, van Steenberghe D. Ten-year survival rates of fixed prosthesis on four or six implants ad modum Brånemark in full edentulism. Clin Oral Impl Res 1995;6:227-231.

All-on-4

First All-on-4 patient treated 2002 - over 500 pts treated since

Cumulative Success Rate of 320 Replace Select TiUnite implants (75 pts) 5 -11 years : 99.6%

Mean age of treatment: 7.2 years

One implant failure was observed - Early altered healing

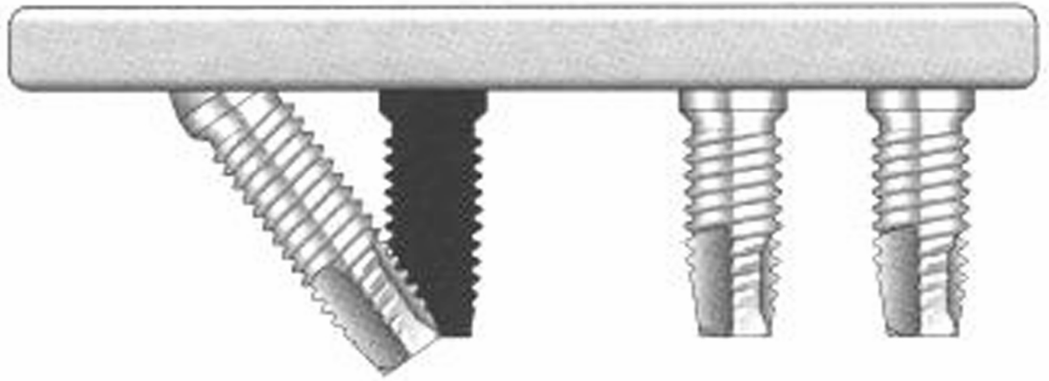
No peri-implantitis, 40% peri-implant mucositis

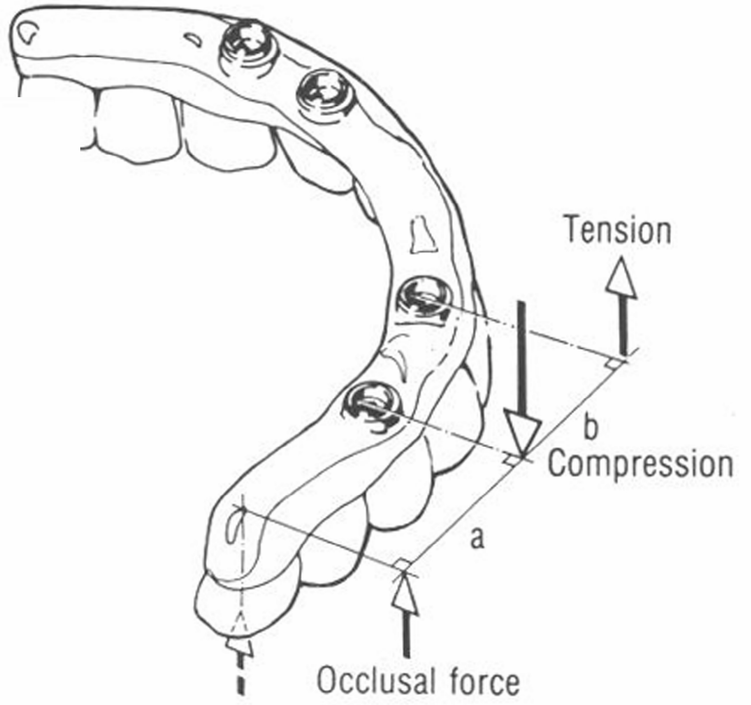
Bone remodeling within 1mm of placement level

High Satisfaction - 94% would recommend treatment to a friend

Liddelow G, Carmichael G. Retrospective evaluation of immediate placement and loading of four implants to support a complete mandibular fixed prosthesis with at least 7 years of follow-up. Int J Pros 2017 (In Press)

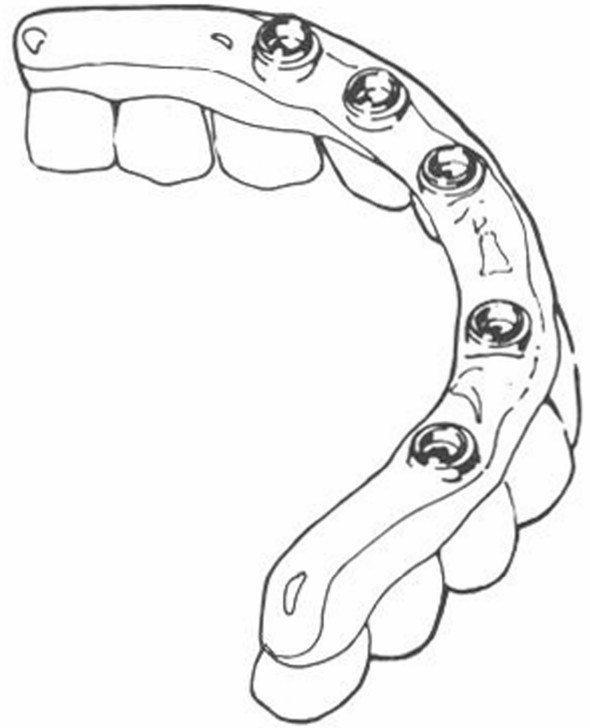
How many implants?





Rangert B, Jemt T, Jörneus L. Forces and Moments on Bränemark Implants. Int J Oral Maxillofac Implants 1989;4:241-247.
Henry PJ, Rosenberg I. Single stage surgery for rehabilitation of the edentulous mandible: Preliminary results. Pract Periodont Aesthet Dent 1994;6:15-24.
Duyck J et al. Magnitude and distribution of occlusal forces on oral implants supporting fixed prostheses: An in vivo study. Clin Implant Dent Relat Res 2000;11:465-475.

How many implants?



5th implant

Carlsson et al

- > bone loss on midline implants with poor plaque control and bruxism

Less space between implants

- desirable to have 3mm between implants

Carlsson GE, Lindquist LW, Jemt T. Long-term marginal periimplant bone loss in edentulous patients. Int J Prosthodont. 2000 Jul-Aug;13(4):295-302.

Rangert B, Jemt T, Jörneus L. Forces and Moments on Brånemark Implants. Int J Oral Maxillofac Implants 1989;4:241-247.

Henry PJ, Rosenberg I. Single stage surgery for rehabiltation of the edentulous mandible: Preliminary results. Pract Periodont Aesthet Dent 1994;6:15-24.

Henry P, Liddelow G. Immediate loading of dental implants. Aust Dent J 2008;53:S69-S81

Brånemark P-I, Svensson B, van Steenberghe D. Ten-year survival rates of fixed prosthesis on four or six implants ad modum Brånemark in full edentulism. Clin Oral Impl Res 1995;6:227-231.

Mandibular deformation

Corporal approximation 11-53μm (up to 780μm)

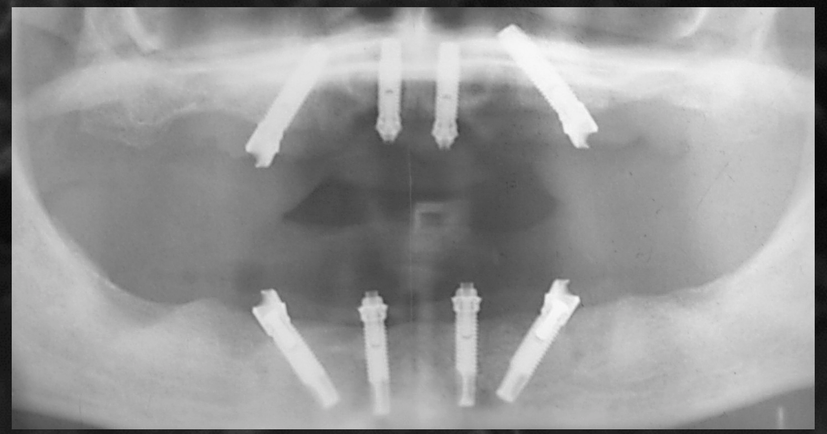
No relation with height but significant in cross section

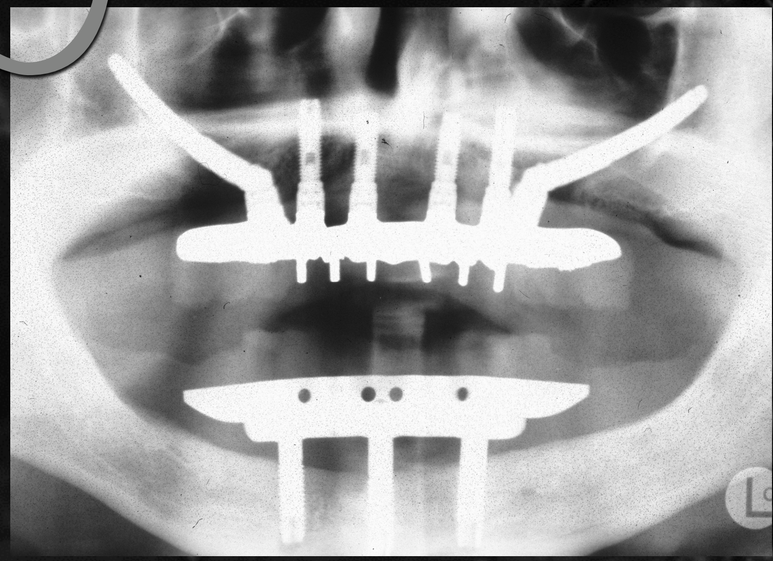
Pain , screw fracture, loosening, fracture of metal substructure

Al-Sukhun J, Helenius M,Lindqvist C, Kelleway J. Biomechanics of the Mandible Part I: Measurement of Mandibular Functional Deformation Using Custom-Fabricated Displacement Transducers. J Oral Maxillofac Surg 2006;64:1015-1022.
De Marco P, Paine S. Mandibular dimensional change J Prosthet Dent 1974;31:482.

Implant tilting







Krekmanov L, Kahn M, Rangert B, Lindström H. Tilting of posterior mandibular and maxillary implants for improved prosthesis support.
Int J Oral Maxillofac Implants 2000;15:405-414.

Maló P, Rangert B, Nobre M. "All-on-4" immediate function concept with Brånemark System® implants for completely edentulous mandibles: A retrospective clinical study. Clin Implant Dent Relat Res 2003;5(suppl 1):2-9.

IMMEDIATE LOADING

Edentulous Jaws

1991 - Single stage surgery and immediate loading - T-033C

1994 - Routine lower jaw on 4 implants, immediate loading

1998 - Branemark Novum - T-086

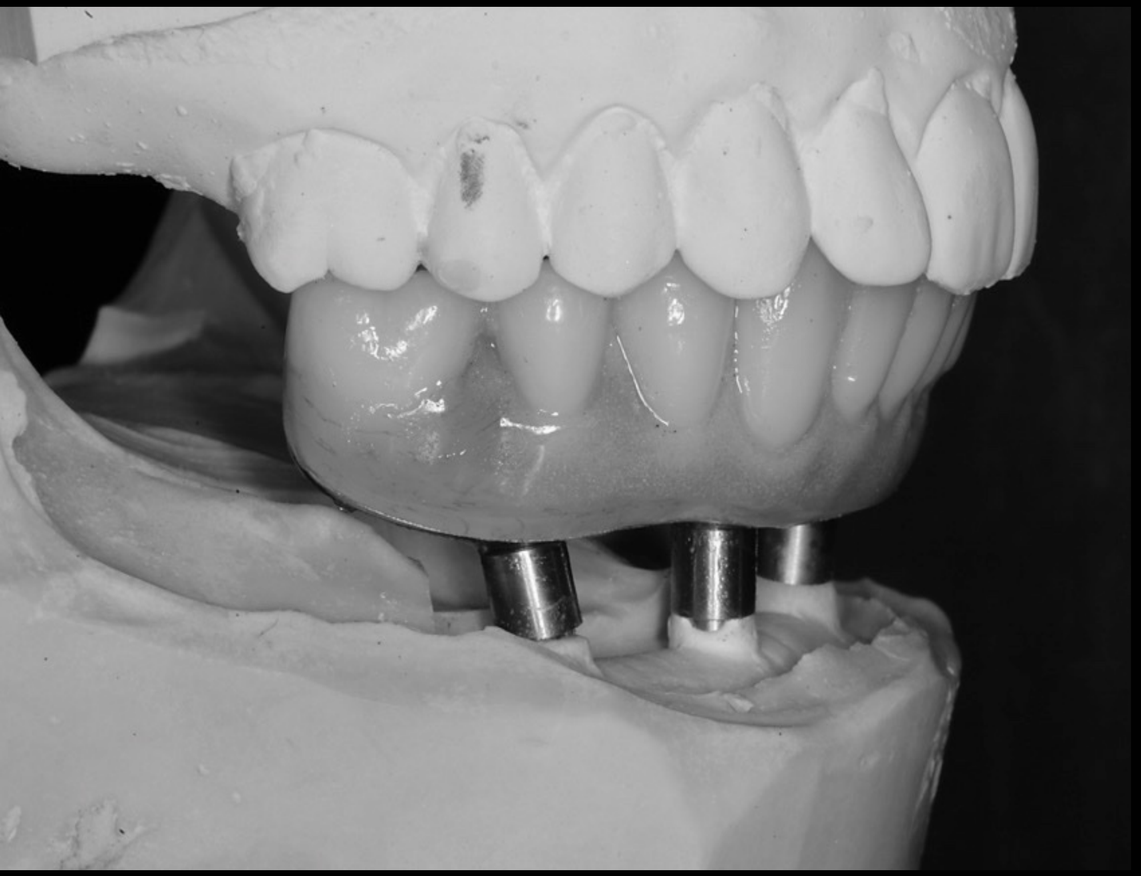
2000 - Immediate loading maxilla

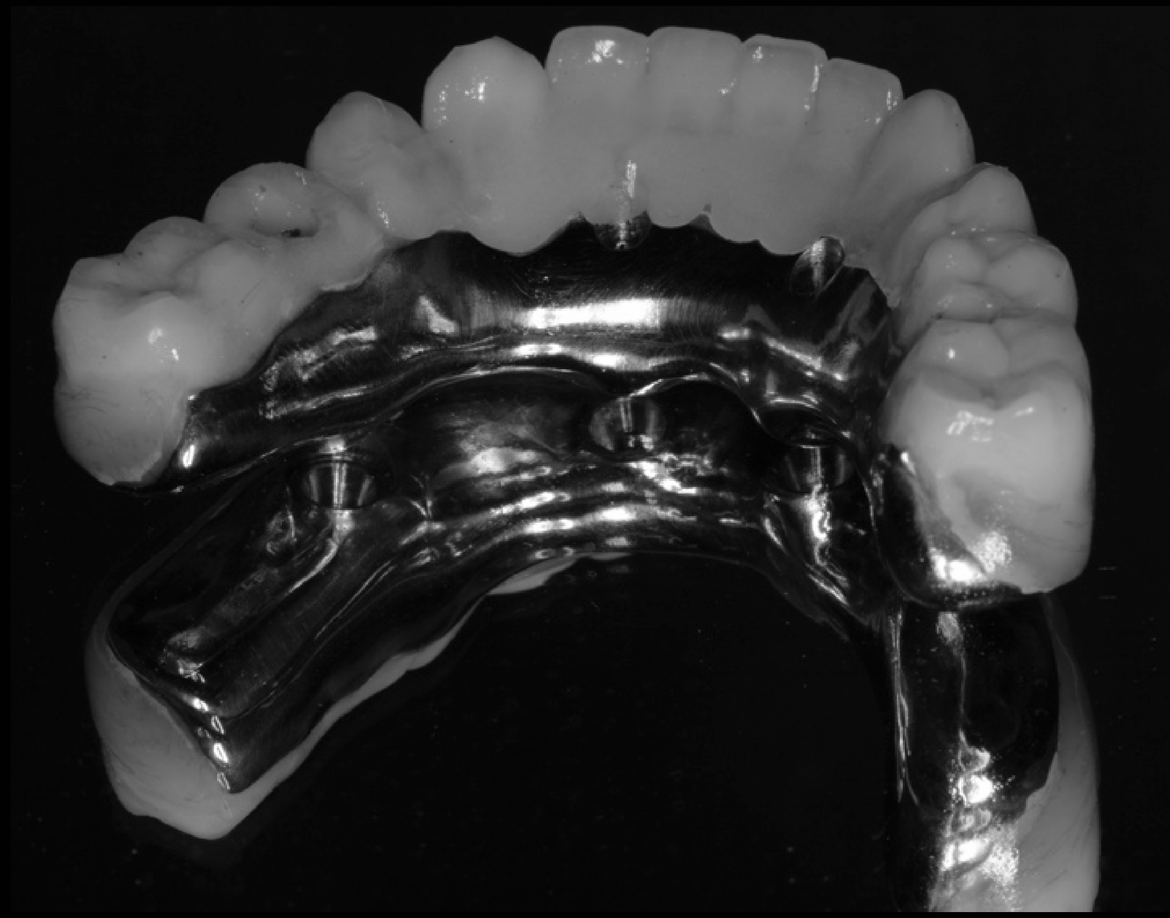
2003 - Teeth in an hour (NobelGuide)

2008 - Immediate loading of Zygoma implants

ASSOCIATED BRÅNEMARK OSSEOINTEGRATION CENTER ... PERTH

Definitive phase - 1yr after implant placement
Procera Titanium/acrylic





Riedy SJ, Lang BR, Lang BE. Fit of implant frameworks fabricated by different techniques. J Prosthet Dent 1997;78:596-604.

Ortorp A, Jemt T. Clinical experiences of computer numeric control-milled titanium frameworks supported by implants in the edentulous jaw: A 5-year prospective study. Clin Impl Dent Relat Res 2004;6:199-209.

Home Care

Patient Aids







Maintenance

Complete denture opposing FDP less potential for wear/breakages

Minimised cantilevers and occlusal table

Retrievability with screw retained prosthesis

Complete denture superior aesthetics and lip support

4 implants well spaced easier plaque control - interproximal brushes

Passive fit of CAD/CAM framework - ↓component stress

Recall visits tailored to need - at least 6 monthly

ASSOCIATED BRÅNEMARK OSSEOINTEGRATION CENTER ... PERTH

THE UNIVERSITY OF WESTERN AUSTRALIA

Thank you!

glenliddelow@gmail.com
www.branemarkcentre.com.au

BRÅNEMARK CENTRE PERTH