Edentulous patients with a severely resorbed mandible often experience serious functional and psychosocial problems with their dentures. The most important wishes for improvement are a better retention and stability of the lower denture and a decrease of oral soreness. Recent clinical studies have shown that many of these patients can be treated to their satisfaction by an implant supported overdenture in the lower jaw and a new denture in the upper jaw. It is, however, until recently unclear whether 2 or 4 implants are needed to support an implant overdenture and also whether a one- or two-phase implant system is to be preferred.

The general aim of this study was to develop a simple, reliable and cost-effective treatment concept, based on overdentures supported by a small number of endosseous implants, for edentulous patients with a severely resorbed mandible (Cawood V-VI), suffering from problems of reduced retention and stability of their lower denture.

This presents a review of the literature about implants supporting mandibular overdentures. The mainly retrospective and only a few prospective studies on overdentures supported by 2, 3 or 4 implants indicate that the implant survival rates are comparable to those of implant supported bridges. In most studies the implant survival rate is at least 90%. Clinically no differences were found whether the mandibular overdentures were supported by 2, 3 or 4 (one- or two phase) implants in the interforaminal region. Controlled prospective studies on the number and type of implants which are most effective are limited. The majority of edentulous patients with an extreme resorbed mandible, complaining about lack of stability and retention of the lower denture, turned out to be satisfied with a mandibular overdenture supported by two implants. In the literature there is still a discussion going on whether it is favorable or not that the neck of the implant is surrounded by keratinized mucosa. As a rule there seems to be no definite need for the presence of keratinized peri-implant mucosa, but there is still a need for a controlled study of non-keratinized peri-implant mucosa versus keratinized mucosa to prove this hypothesis.

From this review of the literature it was concluded that long term comparative prospective controlled studies are necessary to come to a widely accepted experimentally supported treatment concept. In the results of a retrospective study of overdentures supported by two IMZ
implants in the lower jaw are described. The aim of this study was to evaluate the success rate and late peri-implant tissue reactions in patients treated in the period from 1987 to 1990 with 2 IMZ implants. Fifty edentulous patients were treated with overdentures supported by 2 endosseous IMZ implants in the lower jaw connected by a bar. The condition of the peri-implant tissue was evaluated for a loading period ranging from 12 to 57 months (24 months). The evaluation parameters included plaque-index, bleeding-index, “gingiva”-index, pocket-depth, dysesthesia of chin or lip, peri-implant bone loss and loss of implants. During the healing phase prior to the construction of an overdenture, 3 implants were lost (success rate 97.4%). After a healing period of six months, these implants were successfully replaced. During the follow up period a plaque index #1 was observed in 45 patients while an abundance of plaque and calculus was observed in 1 patient and a profuse bleeding during and after probing in 3 patients. Severe inflammation was observed in 3 patients. The mean pocket depth was 3.6 ± 1.7 mm. None of the patients experienced dysesthesia of lower lip and chin. Marginal bone loss was observed around 30 (26%) implants. From this study it is concluded that once proper osseointegration is obtained, 2 IMZ implants connected with a bar in the lower jaw supply a proper base for the support of an overdenture; the condition of the peri-implant tissues in general is steady and independent of the follow-up time.

presents the results of bone height measurements on panoramic radiographs. The aim of this study was to quantify the effect of mandibular angulation, position and shape of an edentulous mandible on the distortion of its image on panoramic radiographs. Five edentulous dry mandibles varying in size from small to wide and equipped with metal bars in and on top of the mandible, were used. The mandibles were radiographed at 9 different positions by tilting the mandible posteriorly around a transversal axis, using an orthopantomograph. The length of the images of the bars on top of the mandible increased significantly by tilting the mandibles from +20° to -20° (fig 4.6). The magnification factor of the images of the intrabony bars in the mandible was the largest at 0° and decreased significantly by both decreasing or increasing the inclination. The size of the mandible was not related to the magnification factor. From this study it is concluded that for both diagnostic and evaluative purposes of the edentulous mandible, the panoramic radiograph is not a reliable radiographic technique unless meticulous precautions are taken for reproducible positioning of the patient in the apparatus.

ln the accuracy of a new method for quantification of radiographic changes of the marginal bone around implants is evaluated. Three groups of 7 patients, treated with an
overdenture supported by two endosseous implants (Bränemark, IMZ, ITI Bonefit) were selected. Six weeks after loading the implants, radiographs were made using the long cone technique and an aiming device (fig 5.2). The radiographs were scanned and digitized. Subsequently 2 observers measured twice the height and the area of the peri-implant bone defects. Independently from each other the observers carried out the measurements with a 7 day interval between the first and second measurement of the same radiograph. Calculation of the inter-observer error resulted in small differences for the Bränemark implant system (p<0.05), but no significant differences for the IMZ and ITI Bonefit implant systems. The intra-observer error resulted in no significant differences in any of the 3 implant systems (p>0.05). It is concluded that the newly developed analysis technique can overcome the majority of drawbacks of existing techniques for quantification of peri-implant bone loss in the mandible.

In the results are described of the one- and up to five-years results of a prospective comparative study on mandibular overdentures supported by 2 Bränemark, IMZ or ITI Bonefit implants with regard to the condition of the peri-implant tissues. Ninety edentulous patients (Cawood class V-VI) participated in this study. After randomization, 30 patients were treated with 2 Bränemark implants, 30 patients with 2 IMZ implants and 30 patients with 2 ITI Bonefit implants. After 3 months overdentures were fabricated, supported by a round bar and clip attachment. A standardized clinical and radiographic evaluation was performed 0, 6 and every 12 months after insertion of the denture. Two implants were lost (1 Bränemark, 1 IMZ) during the healing period. None of the patients showed any sensory change in lip or chin region. There were no significant differences between the 3 groups with regard to plaque-, calculus-, “gingiva”-, and bleeding scores throughout the observation period. In the first 12 months the pocket depth in the Bränemark group decreased significantly whereas the recession increased significantly in both the Bränemark as well as in the IMZ group. Subsequently the average pocket probing depth as well as the recession did not change significantly. In the first 12 months, there was significantly less bone loss in the ITI Bonefit group. In the up to 5-years follow-up period, small but no significant differences of peri-implant bone loss had occurred. With regard to the prosthetic aftercare the most frequent treatment during the evaluation period was replacement of a clip attachment, followed by adjustment of the occlusal height of the prosthesis. From this study it is concluded that 2 (Bränemark, IMZ or ITI Bonefit) implants placed in the interforaminal region connected with a bar supply a proper base for the support of a mandibular overdenture in the (Cawood V-VI) edentulous
patient. The ITI Bonefit implant appears to be the implant of choice for mandibular overdenture therapy, because only one operation is required for a comparable result.

A description of the one- and up to five-years results of a prospective comparative study on mandibular overdentures supported by 2 or 4 endosseous implants. Sixty edentulous patients (Cawood class V-VI) participated in this study. After randomization, 30 patients were treated with an overdenture supported by 2 IMZ implants (group A) and 30 patients were treated with an overdenture on 4 IMZ implants (group B). The implants were inserted in the anterior region of the mandible. After 3 months overdentures were fabricated, supported by a round bar and clip attachments. A standardized clinical and radiographic evaluation was performed 0, 6 and every 12 months after insertion of the denture. One implant was lost (group A) during the healing period. There were no significant differences with regard to any of the studied clinical or radiographic parameters of the peri-implant tissues between group A and B and also no significant differences between the lateral and central implants in group B. None of the patients reported a sensory change in lip or chin region. The most frequent prosthetic treatment during the evaluation period was loss of a clip attachment. There was no significant difference in prosthetic aftercare between group A and group B. From this study it is concluded that in general there is no need for the insertion of more than two endosseous implants to support an overdenture in an edentulous patient (Cawood V-VI).

In a treatment concept for the edentulous patient with a severely resorbed mandible is proposed, based on the available literature and based on the results of our study. Our conclusion is that in an edentulous patient with a severely resorbed mandible the insertion of 2 endosseous implants, placed in the interforaminal region supporting an overdenture on a bar construction, generally gives a very reliable result. The placement of 4 implants can be restricted to patients with a (partial) dentulous upper jaw, mandibular soreness and pain, a narrow mandibular arch and finally patients with an extreme resorption of the mandible (Cawood VII). A one-phase implant system is preferable for mandibular overdenture therapy since only one operation is required for a comparable result. Application of palatal mucosa grafts to obtain a zone of keratinized attached mucosa as a standard procedure in implant surgery is an overtreatment and can be restricted to patients suffering from a severe peri-implant hyperplasia, tissue overgrowth and/or peri-implant muscle pull.