

**Table 3.1.10** Patient experiences of tooth loss and oral rehabilitation – qualitative analysis methods.

Author Year Reference Country	Material method Analysis method	Informants	Results	Summary	Study quality	Comments
De Palma 2005 [7] Sweden	Transcribed in-depth interview  Phenomenological-hermeneutic method	8 individuals (6 m, 2 fm)  $\bar{x}$ =54 years  Homeless men and women in Stockholm admitted for treatment at a public dental specialist clinic for homeless individuals with varying number of missing teeth	6 themes: – neglect of oral health – social functions social competence self-esteem self-confidence – oral function – the whole body – normal appearance – courteous reception/respect	Oral health is strongly associated with human dignity  During rehabilitative phases, dental professionals clearly have a positive impact on the overall recovery of homeless individuals	Moderate	The results could have been more clearly presented  The analysis according to Ricoeur could have been more thorough
De Souza e Silva 2009 [8] Brazil	Transcribed semi-structured in-depth interview 6 months after insertion of the dentures  During the interview the respondents were confronted with a frontal photo taken before start of treatment and a new one taken at the interview so that they could view the previous and current images on a computer screen  Content analysis	12 patients were selected to include both sexes with varying ages, those that had never used complete removable prostheses or those that already used CD but needed them replaced  Patients not further presented	Three thematic categories: – visual impact of the dentures – satisfaction with the prostheses – dissatisfaction with the dentures	In some responses dentures may well improve the quality of life of the edentulous person  It helps restore self-esteem and dignity and brings back the feeling of completeness and re-adaption to social integration	Moderate	The content analysis does not separate between manifest and latent contents in the transcribed texts  Analyse method not well described, reference to Cortes 1998  The Public Health system in Brazil has not been able to meet the demands for oral health and people lose their teeth prematurely  Implants are a Utopian goal for the system only willing are to invest in conventional complete dentures

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**Table 3.1.10** *continued*

<b>Author Year Reference Country</b>	<b>Material method Analysis method</b>	<b>Informants</b>	<b>Results</b>	<b>Summary</b>	<b>Study quality</b>	<b>Comments</b>
Fiske 1998 [9] UK	Transcribed in-depth interview  Qualitative approach	50 individuals  (14 m, 36 fm)  $\bar{x}$ =69.9 years  Toothless patients that seem well adapted to their dentures  Dentures in 3 months-57 years  $\bar{x}$ =18.4 years	10 main themes: – bereavement – self-confidence – appearance – self-image – taboo – secrecy – prosthodontic privacy – behaviour change – premature ageing – lack of preparation	Loss of teeth like loss of any body part leads to a process of reac- tions: – to grieve – to cope with the acquired dis- ability – to emotionally redefine the self	Moderate	The analysis is not fully described and could have been further devel- oped  This is an early qualitative study (1998) within this area and it may partly explain the methodological weaknesses
Graham 2006 [10] UK	Transcribed in-depth interview  Computer software packages for qualita- tive analysis Atlas.ti and N.Vivo	Patients wearing remov- able partial dentures n=17  (Dentists that treated these patients n=16)	2 themes with 6 codes/categories  Appearance to: – avoid social stigma – reflect social identity – perform social communication  Physical function of the mouth: – shape of the face – smiling – eating (taste, tac- tility of food)	Patient opinions  The mouth has a social function as a gap reflects a social identity  Patients' understanding of physi- cal function centred on the mouth rather than the teeth (as the dentists did) and thereby per- form essential social functions rather than ability to chew, load of remaining teeth, etc	Moderate	Method well described  Lack of overview, hard to follow the results

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**Table 3.1.10** *continued*

<b>Author Year Reference Country</b>	<b>Material method Analysis method</b>	<b>Informants</b>	<b>Results</b>	<b>Summary</b>	<b>Study quality</b>	<b>Comments</b>
Robinson 2005 [11] UK	Interviews in focus groups and semi- structured tran- scribed in-depth interviews  Content analysis	Recovering drug users  40 individuals  (26 m, 14 fm)  21–52 years  Drug users in 8–32 years	Themes and codes/categories  Avoid withdrawal: – fulltime job – low self-esteem  Drug use and health: – drugs break down your defense system  Drug use and oral health: – blame the drugs  Diet: – craving for sugar – no time for shop- ping, fast food – all money goes to drugs  Health seeking behaviour: – petrified of dentists – negative expe- riences – all you think of is scoring your drugs – unable to keep an appointment – self-medication – I want to keep fit now (non-addict identity)	The lifestyle of drug users may contribute to oral health prob- lems and low use of dental service because low priority of oral health relative to the need to obtain and use drugs, fear of dentists, self-medication and organisational problems in their lifestyles	Moderate	“All three authors reviewed the data”  Data analysis not clearly shown  Hard to follow the results

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**Table 3.1.10** *continued*

<b>Author Year Reference Country</b>	<b>Material method Analysis method</b>	<b>Informants</b>	<b>Results</b>	<b>Summary</b>	<b>Study quality</b>	<b>Comments</b>
Smith 2005 [12] UK	Transcribed semi-structured in-depth interviews  Qualitative interview analysis	23 individuals wearing partial dentures  (14 m, 9 fm)  35–70 years  Dentures since  3 months–35 years	Key theme headings  Initial fitting of partial dentures: – information – introduction  Advantages and difficulties of denture use: – appearance – self-assurance – self-confidence – loss of youth – embarrassing social situations – unexpected benefits (able to whistle)  Patterns of denture use: – balancing the benefits against the discomfort  Seeking help for problems with dentures: – dentist’s willingness to help – dentist’s patience – communication climate	Main benefit of partial dentures was improved appearance and confidence  The mouth is extremely important to a person’s concept of self  Information and supportive communication from the dentists are highly valued by the denture wearers and can promote effective use and appropriate help-seeking	Moderate	Strategic variation?  Topic guide not shown  Only one analyser=the interviewer  Lack of overview, hard to follow the results

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Table 3.1.10 continued

Author Year Reference Country	Material method Analysis method	Informants	Results	Summary	Study quality	Comments
Trulsson 2002 [6] Sweden	Transcribed in-depth interviews  Grounded theory	18 individuals (8 m, 10 fm)  58–86 years  $\bar{x}$ =71 years  Edentulous patients treated at Brånemark Clinic	3 categories with subcategories:  Becoming a deviating person: – lack of dental awareness earlier in life – feelings of shame and guilt – physical pain  Becoming an uncer- tain person: – physical suffering – feelings of shame – practical problems – decreased attrac- tion  Becoming the person I once was: – social security – regaining attrac- tion – good dental status – feelings of grati- tude	Description of changes in self- image starting with the subjects’ increasingly worsened dental status, followed by a period of them having to live and cope with a denture and, finally, living with a fixed prosthesis  The motive power for the decision to undergo treatment with a fixed prosthesis seems to be a desire to restore dental status and also to recapture attractiveness, self- esteem and positive self-image	High	Relevant strategic selection of respondents  The method is well described

**Table 3.1.11 Patient experiences of tooth loss and oral rehabilitation – quantitative methods.**

Author Year Reference Country	Study design	Number Gender	Patient characteristics	Assessments	Treatment Follow-up	Results	Study quality Comments
Allen 2006 [17] UK	RCT	45/46 26 men 55 women	Implant group n=45 Mean age 64.5 years (SD 8.8)  Conventional group n=46 Mean age 68.5 years (SD 9.9)  At least 5 years experience of edentulousness  Referred for conventional (new) denture treatment	OHIP-49  Denture satisfac- tion with 5 grade Lickert scale	Implant supported man- dibular denture  Conventional mandibular denture  3 months	Large changes for both groups  There were no significant differences between the groups  Given the same treatment aspirations, implant-retained overdentures are not per- ceived to be a big improve- ment over conventional dentures for patients that are not especially dissatisfied with wearing conventional dentures	High  Simply offering a more expen- sive treatment option such as implant- retained overdentures to patients with little prior knowledge of the treatment may not yield significant psy- cho-social benefit for patients willing to accept conventional dentures
Grossmann 2007 [19] Germany	Prospective, longi- tudinal study, study groups randomised* for assessment of treatment to one of two different crown retention elements, GF-RPD (galvano- formed telescopic double crown remov- able partial dentures) and C-RPD (conical telescopic double crown removable partial dentures) respectively	54 patients 34 men 20 women	Mean age 64.6 years (SD 9)	OHIP-49G  Lickert scale	Patients requesting removable partial den- tures – at the prostho- dontic department at Heidelberg University  Special clinic where 50% in each group was treated by student  Randomised 30/30 for two different retention elements  6 months  12 months	There was a significant better OHRQoL after treatment in both groups at p<0.1 but no significant difference between groups at any time	Moderate  Short communication with few data given  Are patients consecutively included? During what time? No analysis of drop-outs  (12%) Some patients were given two partial dentures within the study  Criteria for participation are vague

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Table 3.1.11 continued

Author Year Reference Country	Study design	Number Gender	Patient characteristics	Assessments	Treatment Follow-up	Results	Study quality Comments
Heydecke 2003 [22] Canada	Prospective, longitudinal study, study groups from people interested in replacement of their dentures recruited through newspapers randomised to implant supported overdentures (IOD) or conventional complete dentures (CD) in the mandibula	55 patients 24 men 31 women	30 IOD 14 men 16 women mean age 68.9 years  25 CD 10 men 15 women mean age 69.4 years	OHIP-20  SF-36 (Short form of SIP)	Implant supported overdentures (IOD) or conventional complete dentures (CD) in the mandibula  All received new maxillary dentures  6 months	Comparison between groups showed significantly lower scores in four OHIP-domains in the IOD group  No significant differences were observed on psychological discomfort, social disability or handicap scales  SF-36 is not sensitive to changes in oral health	Moderate  Well conducted and described study  Drop-outs 8%, all in the CD group  6 months follow-up  All treated by one oral surgeon and one prosthodontist – specialist?
John 2004 [20] Australia	Prospective, longitudinal non-randomised clinical trial to compare changes in OHRQoL within three types of prosthodontic treatment	107 patients	42 FPD 52% women 43.8+12.5 years  31 RPD 61% women 60.5+9.4 years  34 CD 56% women 68.1+7.1 years	OHIP-49G	Fixed prosthodontics FPD  Removable partial dentures  RPD  Complete dentures  CD  6 months  (6–12 months)	The patients had a considerably impaired level of OHRQoL before treatment in comparison with the national study of persons with similar prosthodontic status  The improvements in all groups were of substantial magnitude and statistically significant  Up to 12 months after treatment the RPD and CD groups had poorer OHRQoL than the FDP group	Moderate  Convenience sample  Well described statistics  Good discussion regarding strengths and weaknesses in the study  Where were the patients treated and by whom? Multi-centre study?  The group FPD and RPD include subgroups with different treatment solutions but they are too small to analyse  Drop-outs 6/107 because of missing answers in the questionnaires  The statistical analysis comprises OHRQoL changes over time in clinically relevant patient groups, but does not include treatment efficacy

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**Table 3.1.11** continued

Author Year Reference Country	Study design	Number Gender	Patient characteristics	Assessments	Treatment Follow-up	Results	Study quality Comments
Szentpétery 2005 [21] Germany (Australia)	Prospective, longitudinal study to compare changes in OHRQoL between three groups with OHIP-G 49 (53)  (Same as [20])	107	42 FPD 52% women 43.8+12.5 years  31 RPD 61% women 60.5+9.4 years  34 CD 56% women 68.1+7.1 years	OHIP-G49	Fixed prosthodontics  FPD  Removable partial dentures  RPD  Complete dentures  CD  6 months  (6–12 months)	The 3 groups differed from each other in type of problems that decreased  Largest number of problems in RPD  Problems disappeared fastest and most completely in FPD  No major differences could be observed between different denture groups 6–12 months after treatment  After a sufficiently long period all 3 types of treatment had eliminated the majority of problems reported at baseline  The number of problems varied substantially between patients  Some problems not reported at baseline appeared at follow-up visits such as sore spots, sore jaw, painful gums (RPD and CD) therefore the total number of problems is a reflection both of decrease of baseline and of newly developed problems. Problems with eating and chewing dominate pre-treatment	Moderate  Convenience sample  Strengths and weaknesses in the study well discussed  Where were the patients treated and by whom? Multi-centre study?  Vague inclusion procedure, mixed treatment in the FPD and RPF groups  Too small treatment groups if the results were stratified to prosthodontic treatment received  In discussion:  The results could also have been influenced by the natural fluctuation of problems/symptoms and by chance

CD = Complete dentures; FPD = Fixed prosthodontics; IOD = Implant supported overdenture; RCT = Randomised controlled trial; RPD = Removable partial dentures; SD = Standard deviation



**Table 3.2.2** Implant-supported single tooth restorations in treatment of patients with single tooth loss.

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Henry 1996 [1] Australia	Prospective observational multicentre study (7 centres)  Consecutive allocation of patients  Inclusion period: 1 year (Jan 1987–May 1988)  Examination period: 1, 6, 12 months. Thereafter yearly up to 60 months  Selection criteria: One or two single tooth replacements with adjacent natural teeth. Natural tooth/partial denture antagonist. Healed implant site ( $\geq 9$ months).  Setting: specialist practice  5 years	107 implant-supported single crown restorations 88 max/19 mand  Two-stage surgical insertion of turned Brånemark implants  Standard single tooth abutments with titanium abutment screw  Patient description 92 patients 47 women 45 men Mean age: NA Range 14–70 years 6 patients <20 years  18%	CSR (single crowns)=88% (13 remade) CSR (implants)=98% 96.6% max 100% mand  Maintenance/ treatment complications  Biological complications – implants lost 3 (2.8%) Marg bone loss max: m 0.18 mm (SD 0.75) d 0,15 mm (SD 0.74) mean: 0.17 mm mand: m 0.24 mm (SD 0.57) d 0,31 (SD 0.60) mean: 0.28 mm – soft tissue fistulation: 9 patients (9.8%)  Technical complications – crown fracture: 4 (3.7%) – esthetic failure: 9 (8.4%) – crown/screw retightening: 28 occasions – titanium abutment screw replacement by gold screw: 13 (12%)	Moderate	See [30] and [31] for further description of sample  Survival not reported on patient/crown level  Mean age not reported. 6 patients below the age of 20  No reliability testing

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**Table 3.2.2 continued**

<b>Author Year Reference Country</b>	<b>Study design Sample characteristics Inclusion period Follow-up</b>	<b>Intervention Sample Drop-outs</b>	<b>Results</b>	<b>Study quality</b>	<b>Comments</b>
Andersson 1998 [2] Sweden	Prospective observational study  Consecutive patients  1989–1991=3 years  Examination period: 2 weeks, 1, 3 and 6 months and thereafter 1, 2, 3 and 5 years  Selection criteria: Single tooth loss in non-molar sites with adjacent natural teeth  Setting specialist practice  5 years	65 implant supported single tooth Cera-One cemented restorations: – 62 max/3 mand – 62 all ceramic/3 metal ceramic  Two-stage surgical insertion of turned Brånemark implants  Patient description: 57 patients 24 women 33 men Mean age 31.9 years (SD 10.66)  9%	Survival rate CSR (Crowns)=93.7% CSR (Implants)=98.5%  Maintenance/ Treatment complications  Biological complications: – loss of implant 1 – crowns lost=4 – marginal bone loss: 0.1 mm (SD 0.5)  Technical complications: – 1 titanium abutment screw loose after 1 year	Moderate	See [32] and [33] for further description of sample  No reliability testing  Data reported on implant and crown level but not on patient level  1 patient <15 years

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**Table 3.2.2 continued**

<b>Author Year Reference Country</b>	<b>Study design Sample characteristics Inclusion period Follow-up</b>	<b>Intervention Sample Drop-outs</b>	<b>Results</b>	<b>Study quality</b>	<b>Comments</b>
Vigolo 2009 [3] Italy	Prospective observational study consecutive patients  2000–2002=2 years  Selection criteria: Single tooth edentulous sites in maxillary and mandibular molar regions  Setting private dental office  5 years	182 implant-supported single tooth molar cemented restora- tions:  – 42 max left molars with matching wide-diameter pros- thetic components. 50 max right molars with platform switched prosthetic compo- nents  – 43 mand right molars with matching wide-diameter pros- thetic components. 47 mand left molars with platform switched prosthetic compo- nents  2-stage surgical insertion of 5 mm-diameter wide turned implants 3i  144 patients Women/men: NR Mean age: 37 years (range 25–55)  0%	Survival rate CSR (Crowns)=100% CSR (Implants)=100%  Biological complications: – loss of implants n=0 – total number of crowns lost/ replaced=0  Marginal bone loss mean (mm): – wide diameter implant prosthetic components (n=85) – 1.1 mm SD 0.3 Platform switched prosthetic components (n=97) 0.6 mm SD 0.2  Technical complications: – none	Low	Confounding factors not reported (smoking reasons for tooth loss)  Statistics (marg bone loss) evaluated on implant level only and reported as mean values  No frequency distribution of bone loss during 5 years

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**Table 3.2.2** continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Bergenblock 2010 [4] Sweden	Retrospective observational study  Consecutive patients  1989–1991=3 years  Examination period: 2 weeks, 1, 3 and 6 months and thereafter 1, 2, 3 and 5 years.  Selection criteria: Single tooth loss in non-molar sites with adjacent natural teeth  Setting specialist practice  17–19 years (mean 18.4 years, SD 0.9 years)	65 implant-supported single tooth Cera-One cemented restora- tions: – 62 max/3 mand – 62 all ceramic/3 metal ceramic  Two-stage surgical insertion of turned Brånemark implants  Patient description: 57 patients 24 women 33 men Mean age 31.9 years (SD 10.66)  9%	Survival rate CSR (Crowns)=83.8% CSR (Implants)=96.8%  Maintenance/ Treatment complications  Biological complications: – loss of implant 2 – total number of crowns lost/ replaced=10 – crowns lost due to implant failure=2 – crowns lost/replaced due to fistulation=1 – marginal bone loss: 0.2 mm SD 0.82  Technical complications: – 1 titanium abutment screw loose after 1 year – crowns lost/replaced due to infraposition=3 – crowns lost/replaced due to porcelain fract=3 – crowns lost/replaced due to misfit=2	Moderate	See [32], [33] and [2] for further description of sample  Reliability testing  Radiographic evaluation of blinded observer  Data reported on implant and crown level  1 patient <15 years

CSR = Cumulative survival rate; NA = Not available; SD = Standard deviation; NR = Not relevant.

**Table 3.2.3** Partially edentulous patients treated with tooth-supported removable partial dentures (RPD) – in one or both jaws.

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Kapur 1989 [62] USA	RCT* 5 VA dental centres**  1977-10–1981-10  5 years	RPD: (n-122) – “Bar design;” 59 “circumferential design;” 59***  Patients: 118 Males: 100% Mean age: 52 years Age range: 25–77 years  18%	<ul style="list-style-type: none"> <li>– prosthesis survival of original RPD: 70%****</li> <li>– loss of abutment teeth: (n-5)</li> <li>– treatment complications (protheses/abutments):</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– caries: NA</li> <li>– periodontitis: 5 teeth lost</li> <li>– marginal bone loss: NA</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of abutments: 0</li> <li>– loss of retention: NA</li> <li>– veneer fractures: NA</li> <li>– fracture of frameworks or technical components: 9% (n-11)</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remake of prosthesis: 12% (n-15)</li> <li>– relining: 19% (n-23)</li> <li>– extra appointments: NA</li> <li>– recementation: NA</li> </ul>	Low*****	<p>*[65,66]; Here only 1 group is covered</p> <p>**Significant differences of success between centres</p> <p>***[63]</p> <p>****Including also 7 remade RPDs</p> <p>*****No patient level</p>

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Table 3.2.3 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Kapur 1994 [63] USA	RCT* 5 VA dental centres** up to 1981–10**  5 years	RPD: (n-59) “circumferential design”  Patients: 59 Males: 100% Mean age: 53 years Range: NA  10%	<ul style="list-style-type: none"> <li>– prosthesis survival of original RPD: 63%***</li> <li>– loss of abutment teeth: (n-4)</li> <li>– treatment complications (protheses/abutments):</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– caries: NA</li> <li>– periodontitis: 4 teeth lost</li> <li>– marginal bone loss: 0.0 mm</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of abutments: NA</li> <li>– loss of retention: NA</li> <li>– veneer fractures: NA</li> <li>– fracture of frameworks or technical components: 7% (n-4)</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remakes of prosthesis: 14% ( n-8)</li> <li>– relining: 25% (n-15)</li> <li>– extra appointments: NA</li> <li>– recementation: NA</li> </ul>	Low ****	<p>*Here only 1 group is covered (drop-outs in the bar group &gt;25%); complementary information in [67]</p> <p>**Significant differences in success rates between centres</p> <p>***Including also 5 remade RPDs</p> <p>****No patient level</p>

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Table 3.2.3 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Wagner 2000 [64] Germany	Retrospective cohort study  One university clinic  1987–1988  10 years	RPD: (n-194); including conical crown retained -113 (CCRPD) Clasp retained: 23 (CRPD) Combination of clasp and conical crown retention: 58 (ComRPD)  Patients: 147 Females: 44% Mean age: 55 years  49.7%	<ul style="list-style-type: none"> <li>– prosthesis survival of original RPD: 71%. Original state (success): 43%; modified (partially successful) 29%; failures (replaced with complete dentures): 29%</li> <li>– loss of abutment teeth: 26% (n-82)/(Total-21%)</li> <li>– treatment complications (protheses/abutments):</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– caries: 13% (Total: 6%)</li> <li>– periodontitis: NA</li> <li>– marginal bone loss: NA</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of abutments: NA</li> <li>– loss of retention: 18% (n-13)</li> <li>– veneer fractures: 39% (n-28)</li> <li>– fracture of frameworks or technical components: 11% (n-8)</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance</p> <ul style="list-style-type: none"> <li>– remakes of protheses: N/A</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– recementation: NA</li> </ul>	Low*	*No result presentation on patient level

CCRPD = Conical crown retained; ComRPD = Combination of clasp and conical crown retention; CRPD = Clasp retained; n = Number; NA = Not available; RCT = Randomised controlled trial; RPD = Removable partial dentures.

**Table 3.2.4** Partially-edentulous patients treated with tooth-supported fixed partial dentures (TFPP) in one or both jaws.

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Result	Study quality	Comments
Karlsson 1989 [68] Sweden	Retrospective cohort study (register)  Unknown number of private practices  1974–1975  13–14 years and 20 years*	TFPP (n-164) >4 units with (26%) and without extensions (74%)  Patients: 97 (72*) Females: 53 (55%) Mean age: 64 years Range: 54–75 years  ** Recalled: 41% (57*) Eligible: 85 (89%*)	<ul style="list-style-type: none"> <li>– prosthesis survival of original TFPP: 80%* (14 years CSR), 65%* (20 years CSR)</li> <li>– loss of abutment teeth: NA</li> <li>– treatment complications (prostheses/abutments):</li> </ul> <p>Biological (causing prostheses failure):</p> <ul style="list-style-type: none"> <li>– caries: 9%</li> <li>– periodontitis: 2%</li> <li>– endodontic: 1%</li> <li>– marginal bone loss: NA</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of abutments: N/A</li> <li>– loss of retention: 9% (caries)</li> <li>– veneer fractures: NA</li> <li>– fractures of framework or technical component: 1%</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remake of prostheses: NA</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– recementation: NA</li> </ul>	Low***	High numbers of lost patients in relation to eligible numbers of patients (n-642)  *Complementary information - [71]  **Register study, no drop-outs  ***Register study, no baseline data

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Table 3.2.4 continued

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Result	Study quality	Comments
Palmqvist 1993 [69] Sweden	Retrospective cohort study  1 specialist centre  1968–1972  18–23 years	TFPP: 103, >4 unit “gold-resin” (67%) or “metal-ceramic” (31%) prostheses in upper or lower jaws. All together 487 abutments, of which 365 were vital (75%)  Patients: 122 Females: 67 (55%) Mean age: N/A (29 (24%) and 43 (35%) patients were younger than 30 or older than 49 years, respectively)  46%	<ul style="list-style-type: none"> <li>– prosthesis survival of original TFPP: 77%; original/ unchanged 53%, repaired 10%, partly remaining 12%, failed 23% (3% metal-ceramic/ 33% gold-resin; P&lt;0.01)</li> <li>– loss of abutment teeth: 14% (n-67), vital/non-vital: 10%/24% (P&lt;0.001), terminal/intermediate: 13%/6% (P&lt;0.01)</li> <li>– treatment complications (prostheses/abutments):</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– caries: 2% (n-10 about teeth, leading to extraction)</li> <li>– periodontitis: 6% (n-28 about teeth, leading to extraction)</li> <li>– endodontic: 15% (n-49 lost vitality)</li> <li>– marginal bone loss: NA</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of abutments: 2% (n-9 about teeth leading to extraction)</li> <li>– loss of retention: 6% (n-6)</li> <li>– veneer fractures: NA</li> <li>– fracture of frameworks or technical components: 3% (n-3)</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remakes of prostheses: NA</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– recementation: NA</li> </ul>	Low*	Cluster patterns for abutment loss were noted  Complementary information see [72]  *Unclear inclusion, some single crown patients?

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Table 3.2.4 continued

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Result	Study quality	Comments
Valderhaug 1991 [70] Norway	Retrospective cohort study  1 university clinic  1967-09–1968-06  15 years	TFPP*: (n-108) 89/19 max/mand: 343 abutment teeth  Patients: 102 Females: 73 (72%) Mean age: 48 years Range: 25–69 years  46% (30% after 10 years)	<ul style="list-style-type: none"> <li>– prosthesis survival of original TFPP: 76%</li> <li>– after 10 years 90%; failure rate during 0-5/5-10/10-15 years; 4%/7%/14%</li> <li>– loss of abutment teeth: NA</li> <li>– treatment complications (prostheses/abutments)</li> </ul> <p>Biological (leading to prosthesis failure):</p> <ul style="list-style-type: none"> <li>– caries: 5% (n-5 prostheses)</li> <li>– periodontitis: 2% (n-2 prostheses)</li> <li>– endodontic: NA</li> <li>– marginal bone loss: NA</li> </ul> <p>Technical (leading to prosthesis failure):</p> <ul style="list-style-type: none"> <li>– fractures of abutments: 3% (n-3 prostheses)</li> <li>– loss of retention: 7% (n-7 prostheses)</li> <li>– veneer fractures</li> <li>– fracture of frameworks or technical components: 1% (n-1 prosthesis)</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remakes of prostheses: NA</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– recementation: NA</li> </ul>	Low**	<p>*Only gold-acrylic fixed prostheses</p> <p>**No data on patient level</p> <p>For complementary information see [73–75]</p>

CSR = Cumulative survival rate; n = Number; NA = Not available; TFPP = Tooth-supported fixed partial dentures.

**Table 3.2.5** Partially edentulous patients treated with implant-supported fixed partial dentures (IFPP) in one or both jaws.

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Gotfredsen 2001 [76] Denmark	Prospective cohort study*  Multicentre (n-6)  1990-11–1993-09  5 years	Freestanding IFPP (n-52) (17 max/35 mand)  AstraTech implants (n-133) TiO2: 64/Turned: 64 (5 impl. not accounted for reg. surface texture); Two-stage surgery  Patients: 50 Females: 25 (50%) Mean age: 53 years Range: N/A  Max/mand: 17/35  10%	<ul style="list-style-type: none"> <li>– prosthesis survival of original IFPP: 96.1% (2/52)</li> <li>– loss of implant abutment: 2.3% (3/133); TiOB.=0/64; Turned=3/64</li> <li>– treatment complications (prostheses/abutments)</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– peri-implantitis: 6% given for both implant groups</li> <li>– marginal bone loss*** (TiOB.): 0.5 mm (Turned): 0.2 mm, &gt;2.4 mm (TiOB): 3.1% (n-2) (Turned ): 0%</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of impl: 0</li> <li>– fractures of retention components: 2</li> <li>– veneer fractures: 2</li> <li>– fracture of framework: 0</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: 2.9% (1/35 mand)</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remakes of prostheses: 3.9% (n-2)</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– loss of retention: 17</li> </ul>	Low**	<p>*RCT regard- ing implants, not regarding primary end-point</p> <p>**Prosthesis survival is not the primary endpoint; results not reported on patient level</p> <p>***Marginal bone loss measured first from bridge attach- ment</p>

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Table 3.2.5 continued

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Lekholm 1994 [77] Sweden	Prospective cohort study  Multicentre (n-9)  1985-07–1987-04  5 years	Freestanding IFPP (n-197); gold-acrylic  Brånemark turned implants (n: 558); Two-stage surgery  Patients: 159 Females: 92 (58%) Range: 18–70 years* Mean age: N/A  Max/mand: 68/91  17%	<ul style="list-style-type: none"> <li>– prosthesis survival of original IFPP: 94.3% (CSR)</li> <li>– (max/mand 94.4/94.1%)</li> <li>– loss of impl abutment: 6.7% (CSR max/mand: 92.0%/94.1%)</li> <li>– treatment complications (prostheses/abutments)</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– peri-implantitis: 0.1/0.1** (mean)</li> <li>– marginal bone loss: 0.5 mm (mand) 0.8 mm (max)</li> </ul> <p>Technical:***</p> <ul style="list-style-type: none"> <li>– fractures of impl: 0.4% (n-2)</li> <li>– fractures of retention components: 0.9% (n-5)</li> <li>– veneer fractures: 22 occasions</li> <li>– fractures of framework: 0</li> </ul> <p>Risks:***</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: 2.2% (2 mands at 5 years)</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:***</p> <ul style="list-style-type: none"> <li>– remakes of prostheses: NA</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– loss of retention: 7 occasions</li> </ul>	Low****	<p>*[135] and [79]</p> <p>**[136]</p> <p>***Reported for the 4th and 5th years only</p> <p>****Results presented on prosthesis/implant levels and not on patient level</p> <p>Radiographic baseline at second-stage surgery</p>

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Table 3.2.5 continued

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Wennström 2004 [78] Sweden	Prospective cohort study*  One specialist centre  3 years  5 years	Freestanding IFPP (n-56) (porcelain in occl surf)  Astra Tech implants (n-149) TiO-blasted: 75/Turned: 73 Two-stage surgery  Patients: 51 Females: 31 (61%) Mean age: 60 years Range: 36–80 years Max/mand: N/A  7.8%	<ul style="list-style-type: none"> <li>– prosthesis survival of original IFPP: 94.7%</li> <li>– IFPP failed: 3/56=5.3%</li> <li>– on subj. level: 5.9%</li> <li>– loss of impl abutment: 2.7% (4/149)</li> <li>– treatment complications (prostheses/abutments)</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– BoP: 5% of the surface</li> <li>– marginal bone loss: 0.4 mm (mean) (TioB): 0.5 mm** (Turned): 0.3 mm** &gt;2.0 mm: 10% (n-15)</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of impl: 2% (n-3)</li> <li>– fractures of retention components: NA</li> <li>– veneer fractures: 2% (n-3)</li> <li>– fractures of framework: 0</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: NA</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remakes of prostheses: NA</li> <li>– relining: NA</li> <li>– extra appointments: NA</li> <li>– loss of retention: 2% (n-3)</li> </ul>	Moderate	<p>*RCT regard- ing implants, not regarding primary end-point</p> <p>**Sign diff (p&gt;0.05) Tur/Tio</p> <p>No information on paraesthesia</p> <p>Radiographic base- line at prosthesis placement</p>

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Table 3.2.5 continued

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Lekholm 1999 [79] Sweden	Retrospective cohort study  Multicentre (n-6)  1985-07–1987-04  10 years	Freestanding IFPP (n-163); gold-acrylic; (max/mand: 65/98)  Brånemark turned implants (n-461); Two-stage surgery  Patients: 127 Females: 73 (57%) Mean age: 50 years Range: 18–70 years  Max/mand: 56/71  30%	<ul style="list-style-type: none"> <li>– prosthesis survival of original IFPP: 86.5% (CSR)</li> <li>– IFPP replaced: 7.4%</li> <li>– continuous prosthesis function: 94.3%</li> <li>– loss of impl abutment: 7.4% (max/mand: 9.8%/6.3%)</li> <li>– treatment complications*</li> </ul> <p>Biological:</p> <ul style="list-style-type: none"> <li>– BoP: 9% of implant sites</li> <li>– marginal bone loss: 0.7 mm for both jaws &gt;2.0 mm: 7%</li> </ul> <p>Technical:</p> <ul style="list-style-type: none"> <li>– fractures of implants: 2.7% (3 patients)</li> <li>– fractures of retention components: 2.7% (3 patients)</li> <li>– veneer fractures: 5.5% (7 patients)</li> <li>– fractures of framework: 0</li> </ul> <p>Risks:</p> <ul style="list-style-type: none"> <li>– permanent paraesthesia: 2.8% (2/71 mandibles)</li> <li>– allergic reactions: NA</li> <li>– severe infections: NA</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>– remake of prostheses: 7.4%</li> <li>– relining: NA</li> <li>– extra appointments: 14.2% (18 patients)</li> <li>– loss of retention: 3.9% (5 patients)</li> </ul>	Low***	<p>No report on reliability or deviation in radiographic readings</p> <p>*Reported during the last 5 years only</p> <p>**Reported 1999</p> <p>***Results reported on prosthesis and implant level but not on patient level</p>

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Table 3.2.5 continued

Author Year Reference Country	Study design Clinical setting Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Örtorp 2008 [80] Sweden	Retrospective cohort study  One specialist centre  1990-11–1993-09  10 years	Freestanding impl. supp. mand. FDP (T+C; n-120)  1) 60 FDP-laser welded titanium framework (Ti fw) – 49 veneered with low fusing porcelain – 11 veneered with acrylic resin teeth/composite resin  2) 60 FDP- cast gold alloy framework (Au fw) – 8 veneered with resin teeth – 52 veneered with porcelain teeth  Brånemark turned impl (n-351; 174 Ti fw/177 Au fw); Two-stage surgery  Sample <sup>1</sup> : Patients: 104 (52 Ti fw/52 Au fw) Females: 63 (30 Ti fw/33 Au fw) Men: 41 ( 22 Ti fw/19 Au fw) Mean age: Ti fw=58 years (range 28–77); Au fw=59 years (range 27–78)  Max/mand: 0/104  33.7 %	– prosthesis survival of original IFPP: 93.7% (CSR) – CSR (Ti fw.): 88.4% – CSR (Au fw.): 100% – loss of impl abutment: 7.0% CSR (Ti fw): 8.5%* CSR (Ti fw): 5.3%* – treatment complications (prostheses/abutments)  Biological: – peri-implantitis: Ti fw=8 occasions Au fw=11 occasions – marginal bone loss:** (Ti fw): 0.5 mm (Au fw): 0.7 mm >2.4 mm: 2%  Technical: – fractures of impl: 0 – fractures of retention components: Ti fw/au fw: ¾ occ. – veneer fractures: (Ti fw) 26 occ.*** (Au fw) 4 occ.*** – fractures of framework: 0  Risks: – permanent paraesthesia: NA – allergic reactions: NA – severe infections: NA  Maintenance: – no event prosthesis: 50%/32% (au fw/Ti fw) – remake of prostheses: NA – relining: NA – extra appointments: NA – loss of retention: Ti fw/Au fw: 6/7 occ.	Moderate	<sup>1</sup> [137] for further description of sample  *Sign. more implants lost after loading in test group (implant and patient level)  **Sign. more marginal bone loss during 10 years in control group (patient level)  ***Sign. more frequently reported chipping of veneer in Ti fw group

CSR = Cumulative survival rate; IFPP = Implant-supported fixed partial dentures;  
n = Number; NA = Not available; RCT = Randomised controlled trial.

**Table 3.2.11** Treatment of patients with edentulous maxillae.

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Jemt 2002 [109] Sweden	Prospective multicentre (6 centres) RCT  10 consecutive patients per centre  Fixed implants or natural dentition with or without removable partial dentures in mandible  1 year (April 1994–June 1995)*  5 years	Fixed full-arch prosthe- ses with a laser-welded titanium framework supported by at least 5 Brånemark implants (two-stage surgery)  28 patients mean age: 59 years (range 40–73) 12 women 16 men  Drop-outs: <14%	Fixed full-arch pros- theses with conven- tional cast-gold alloy framework sup- ported by at least 5 Brånemark implants (two-stage surgery)  30 patients mean age: 61 years (range 38–74) 13 women 17 men  Drop-outs: <14%	CSR prostheses 96% CSR implants 91%  Complications  Biological: – 1 patient lost all implants and the construction – bone loss >2 mm: 13 sites (0.05%) – soft tissue problems n=1  Technical: – fracture material or mobile/unstable prostheses: n=21 in 12 patients	CSR prostheses 93% CSR implants 94%  Complications  Biological: – 1 patient lost all implants and the construction – bone loss >2 mm: 17 sites (0.06%) – soft tissue prob- lems n=6 patients  Technical: – 1 patient had a new prosthesis due to veneering material problems – fracture mate- rial or mobile/ unstable prosthe- ses: n=24 in 12 patients	Similar cumu- lative survival and success rate	Moderate	RCT of mate- rial of con- struction, not of treatment methods  *[120]

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Table 3.2.11 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Örtorp 2004 [110] Sweden	RCT  Consecutive patients treated at specialist clinic  1.5 years  5 years	Milled Ti-framework supported by 6–8 Brånemark implants (two-stage surgery)  23 patients mean age 66.9 years (SD 8.9) 10 women mean age 70.6 years (SD 6.9) 13 men mean age 64.1 years (SD 9.4)  Lost follow-up: 19%	Conventional cast gold alloy framework supported by 4-8 Brånemark implants (two-stage surgery)  31 patients mean age 67.0 years (SD 10.8) 19 women mean age 67.2 (SD 12.1) 12 men mean age 66.7 (SD 8.8)  Lost follow-up: 25%	CSR prostheses 95% (1 failure) CSR implants 90%  Complications  Biological: – soft tissue problems n=3 in 3 patients – bone loss mean 0.5 mm (SD 0.41) – implant loss n=13 in 6 patients after insertion and after connection  Technical: – material prob- lems resin veneer fractures n=10 in 8 patients	CSR prostheses 97% (1 failure) CSR implants 97%  Complications  Biological: – soft tissue problems n=5 in 5 patients – bone loss mean 0.4 mm (SD 0.45) – implant loss n=5 in 5 patients after insertion and after connection  Technical: – material problems resin veneer fractures n=23 in 10 patients	More loaded implants were lost in intervention group than in control group  Difference not significant on patient level	Moderate	RCT of material of construction, not of treatment methods

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Table 3.2.11 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Örtorp 2009 [111] Sweden	RCT  Consecutive patients treated at specialist clinic  1.5 years  10 years	Milled Ti-framework supported by 6–8 Brånemark implants (two-stage surgery)  23 patients mean age 66.9 years (SD 8.9) 10 women mean age 70.6 years (SD 6.9) 13 men mean age 64.1 years (SD 9.4)  Lost follow-up: 45%	Conventional cast gold alloy framework supported by 4–8 Brånemark implants (two-stage surgery)  31 patients mean age 67.0 years (SD 10.8) 19 women mean age 67.2 years (SD 12.1) 12 men mean age 66.7 years (SD 8.8)  Lost follow-up: 38%	CSR prosthesis 95% CSR implants 90%  Complications  Biological: – soft tissue problems n=3 in 3 patients – bone loss mean 0.7 mm (SD 0.61) – >2.5 mm: 20% of implants – implant loss n=13 in 6 patients after insertion and after connection  Technical: – material problems resin veneer frac- tures – severe* n=26 in 11 patients – uncomplicated** n=7 in 6 patients	CSR prosthesis 97% CSR implants 97%  Complications  Biological: – soft tissue prob- lems n=5 in 5 patients – bone loss mean 0.5 mm (SD 0.63) >2.5 mm: 8% of implants – implant loss n=4 in 4 patients after insertion and after connection  Technical: – material problems – resin veneer fractures – severe* n=37 in 13 patients – uncomplicated** n=9 in 6 patients		Moderate	RCT of material of construction, not of treatment methods  Same sample as [110]  *Fracture needed adjustment at the laboratory  **Fracture adjusted chairside

CSR = Cumulative prosthesis or implant survival rates; RCT = Randomised controlled trial;  
SD = Standard deviation.

**Table 3.2.12** Treatment of patients with edentulous maxillae.

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Results	Study quality	Comments
Jemt 1994 [112] Sweden	Prospective observational  Consecutive patients treated in edentulous maxilla with fixed prostheses, supported by implants in a specialist clinic  2 years (1986–1987)  5 years	Fixed implant-supported 10- to 12-unit prostheses on standard Brånemark implants (two-stage surgery (mean number 5.9 implants, cast type III alloy framework with resin teeth)  Status of mandible*: fixed implant-supported prostheses: 18 patients  Complete dentures: 1 patient 1–9 remaining teeth: 24 patients 10–12 remaining teeth: 29 patients  Mean age: 60.1 years (SD 11.6; range 32–75) 28 women 48 men  Drop-outs: 16%	CSR prostheses 96% (3 failures) CSR implant 92%  Complications  Biological: – bone loss mean 1.2 mm (SD 0.58) – lost implants n=34 (8.9%) – soft tissue problems n=44 occasions – phonetic problems 30 occasions – paresthesia n=0  Technical: – material problems – resin veneers n=73 occasions – fracture framework n=1 occasions – prosthesis redesign n=20 – loose gold/abutment screw, new prostheses and resoldered prostheses n=7 occasions	Moderate	*[121]

CSR = Cumulative prosthesis or implant survival rates; SD = Standard deviation.

**Table 3.2.13** Treatment of patients with edentulous mandibles.

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Visser 2006 [113] The Netherlands	RCT – 5 groups – one group not included here (see comments)  Patients referred to uni- versity clinic  2 years (between 1990–1992)  10 years	Implant-retained over- dentures (two-stage surgery of 2 implants of IMZ or Brånemark) and new denture trial in maxilla. Overdentures on round-shaped bar with Ackermann clip retention system  Group 1 Bone height 8–15 mm 30 patients mean age: 56 years (46–83)  Drop-outs: 30%  Group 3 Bone height 16–25 mm 32 patients mean age: 59 years (41–90)  Drop-outs: 6%	Complete dentures  Group 2 Bone height 8–15 mm 30 patients mean age: 60 years (53–82)  Drop-out: 16%  Group 5 Bone height 16–25 mm 29 patients mean age: 55 years (44–88)  Drop-outs: 17%	CSR implant 92%  Complications  Biological: – Implant loss n=17  Technical: – Ackermann clip frequently broke, was replaced by Dolder bars	21 patients (43%) of patients with complete dentures switched to implant- retained overden- tures  (10 from group 2 and 11 from group 5)	More failures of treatment in complete denture group than in implant- retained over- denture group  Patients with implant-retained overdenture compared with patients with complete den- tures needed  More pros- thetic care than (P<.05)  More often rou- tine inspections (P<.05)	Moderate	A 5th group was treated with prepros- thetic surgery and complete dentures. Not included here  CSR of pros- thetic con- struction not presented by authors  NB. Patients changing from com- plete denture treatment group to overden- ture group should be considered as failures

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Table 3.2.13 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Stoker 2007 [116] The Netherlands	RCT (3 groups)  Patients with persistent problems with complete dentures referred to specialist and teaching hospital  3 years (1991–1993)  8 years	Implant-retained over- dentures on one-stage 2 ITI-implants new complete dentures in upper jaw  Group A Ball attachments and Dalla Bona matrices 30 patients  Drop-outs: 13%*  Group B Single egg-shaped Dolder bar 33 patients  Drop-outs: 3%*	Group C Implant-retained overdentures on one-stage 4 ITI- implants with Dolder triple bar and new complete dentures in upper jaw  33 patients  Drop-outs: 6%*	Group A Complications  Biological: – lost implants n=3 in 2 patients  Technical: – overdenture frac- ture n=2 – remake lower denture n=1 – rebasing lower denture n=15 occasions – fractured/worn retentions ele- ment n=10  Group B Complications  Biological: – lost implants n=0  Technical: – overdenture frac- ture n=3 – remake lower denture n=3 – rebasing lower denture n=10 – fractured/worn retentions ele- ment n=10	Group C Complications  Biological: – lost implants n=0  Technical: – overdenture frac- ture n=0 – remake lower denture n=2 – rebasing lower denture n=7 – fractured/worn retentions ele- ment n=5	No differences in total number of check-ups and mean total treat- ment time  Group with ball attachment needed a higher number of after- care contacts for simple readjust- ment of reten- tive system such as reactivating matrices	Moderate	RCT of number of implants and retention elements, not of treatment methods  Remake of lower overdentures calculated to 6% of total patient popu- lation  *[115]

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**Table 3.2.13** continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Meijer 2009 [114] The Netherlands	RCT (3 groups)  Patients suffered from insufficient retention of their lower dentures; referred to specialist and teaching hospital  3.5 years (1992–1995)*  10 years	Implant-retained overdentures (two- stage surgery of 2 ITI implants) and new den- tures in maxilla. Over- dentures on round bar and clip attachments  30 patients  Mean age 52.8 (38–74) 18 women 12 men  Drop-outs: 10%	Implant-retained overdentures (two- stage surgery of 2 Brånemark implants) and new dentures in maxilla. Overden- tures on round bar and clip attachments  30 patients  Mean age 56.6 (35–79) 24 women 6 men  Drop-outs: 10%	4-graded scale (0=no complaints and 3=severe com- plaints)  Patients were satis- fied with the treat- ment  Mean evaluation score in six domains ranged between 0.2–0.3	4-graded scale (0=no complaints and 3=severe com- plaints)  Patients were satisfied with the treatment  Mean evaluation score in six domains ranged between 0.1–0.7	No differences between implant system regarding patients' opinion of denture func- tion or aesthetics	Moderate	RCT of implant system not of treatment method  A third group was treated with IMZ implants – no longer available in Sweden  *[122]

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Table 3.2.13 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Timmerman 2004 [115] The Netherlands	RCT (3 groups)  Patients with persistent problems with their com- plete dentures referred to specialist and teaching hospital  3 years (1991–1993)  8 years	Implant-retained over- dentures on one-stage 2 ITI-implants with complete dentures in upper jaw  Group A Ball attachments and Dalla Bona matrices  36 patients Mean age 50 (33–80) 22 women 14 men  Drop-outs: 11%  Group B Single egg-shaped Dolder bar  37 patients Mean age 51.3 (35–76) 29 women 8 men  Drop-outs: 3%	Group C Implant-retained overdenture on one- stage 4 ITI-implants with triple bar and complete denture in upper jaw  37 patients Mean age 53.1 (35–81) 25 women 12 men  Drop-outs: 5%	Score 1–5*  Group A – function general 1.95 ± 0.61 – lower denture function 1.88 ± 0.78 – speech 3.70 ± 0.93 – social functioning 1.34 ± 0.65 – chewing soft food 1.03 ± 0.12 – chewing hard food 1.37 ± 0.38  Group B – function general 1.81 ± 0.61 Lower denture function 1.91 ± 0.78 – speech 4.02 ± 0.93 – social functioning 1.36 ± 0.65 – chewing soft food 1.00 ± 0.12 – chewing hard food 1.31 ± 0.38	Score 1–5*  Group C – function general 1.99 ± 0.61 – lower denture function 2.22 ± 0.78 – speech 3.82 ± 0.93 – social functioning 1.47 ± 0.65 – chewing soft food 1.36 ± 0.12 – chewing hard food 1.36 ± 0.38	No difference between the groups for 9 sat- isfaction factor scores	Moderate	RCT of number of implants and retention elements, not of treatment methods  Participants were less satisfied after 8 years than at 19 months follow-up  Same sample as [116]  * [123]

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Table 3.2.13 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Örtorp 2004 [110] Sweden	RCT  Consecutive patients treated at specialist clinic  1.5 years  5 years	Milled Ti-framework supported by 4–5 Brånemark implants (two-stage surgery in 37 and one-stage sur- gery in 7 patients)  44 patients mean age 66.8 years (SD 11.1) 22 women mean age 70.4 years (SD 11.6) 22 men mean age 63.1 years (SD 9.6)  Lost to follow-up: 19%	Conventional cast gold alloy framework supported by 5–6 Brånemark implants (two-stage surgery)  31 patients mean age 66.0 years (SD 11.1) 18 women mean age 66.8 years (SD 9.7) 13 men mean age 65.5 years (SD 12.3)  Lost to follow-up: 25%	CSR prostheses 100% CSR implants 99.5%  Complications  Biological: – soft tissue prob- lems n=3 in 2 patients – bone loss mean 0.4 mm (SD 0.5) – implant failures before insertion n=1  Technical: – material problems resin veneer frac- tures n=2 in 2 patients	CSR prostheses 100% CSR implants 100%  Complications  Biological: – soft tissue prob- lems n=2 in 2 patients – bone loss mean 0.7 mm (SD 0.54) – implant failures n=0  Technical: – material problems resin veneer frac- tures n=3 in 3 patients	Difference not significant on patient level	Moderate	RCT of mate- rial of con- struction, not of treatment methods

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Table 3.2.13 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Örtorp 2006 [117] Sweden	Retrospective RCT  Patients consecutively provided with fixed, laser-welded titanium framework  Setting: specialist clinic  4 years (1987–1991)  10 years	Fixed full-arch prostheses (10–12 teeth) with a laser-welded titanium framework on 4–6 Brånemark implants (two-stage surgery)  155 patients 77 women 78 men mean age 64 years (SD 10.4 range 35–87)  Drop-outs: 46% resulting in 84 patients at 10-year follow-up	Fixed full-arch prostheses (10–12 teeth) with cast gold alloy framework on 4–6 Brånemark fixtures (two-stage surgery)  53 patients 27 women 26 men mean age 67 years (SD 9.7 range 39–86)  Drop-outs: 47% resulting in 28 patients at 10-year follow-up	CSR prosthesis 92.8% New prosthesis: 9 in 9 patients  CSR implant 99.5%  Number of clinical appointments at 10 years: 100 (98 during year 1)  Mean per patient and year: 1.4  Complications Biological: – lost implants n=4 in 3 patients – soft tissue problems n=39 in 29 patients – marginal bone loss mean 0.56 (SD 0.45) Technical: – framework fracture n=30 in 20 patients – resin veneer fracture n=43 in 22 patients	CSR prosthesis 100% CSR implant 99.6%  Number of clinical appointments at 10-years: 100 (98 during year 1)  Mean per patient and year: 1.4  Complications Biological: – lost implants n=1 – soft tissue problems n=12 in 8 patients – marginal bone loss mean=0.77 mm (SD 0.36) Technical: – framework fracture n=2 in 2 patients – resin veneer fracture n=10 in 7 patients – screw retightened n=1	Fractures of metal frames and remade prostheses more common for laser-welded titanium framework  First generation titanium frameworks worked poorly compared to gold alloys frameworks (p<0.05)	Moderate	RCT of material of construction, not of treatment methods  Two different fabrication modes of titanium frameworks combined as one test group in this Table

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Table 3.2.13 continued

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Örtorp 2009 [111] Sweden	RCT  Consecutive patients treated at specialist clinic  1.5 years  10 years	Milled Ti-framework supported by 6-8 Brånemark implants (two-stage surgery)  44 patients mean age 66.8 years (SD 11.1 ) 22 women mean age 70.4 years (SD 11.6) 22 men mean age 63.1 years (SD 9.6)  Lost to follow-up: 45%	Conventional cast gold alloy framework supported by 4-8 Brånemark implants (two-stage surgery)  31 patients mean age 66.0 years (SD 11.1) 13 women mean age 66.0 years (SD 11.1) 18 men mean age 65.5 years (SD 12.3)  Lost to follow-up: 38%	CSR prosthesis 96% CSR implants 100%  Complications  Biological: – soft tissue problems n=7 in 6 patients – bone loss mean 0.7 mm (SD 0.85) – implant loss n=0  Technical: – material problems resin veneer frac- tures severe* n=1 uncomplicated** n=1	CSR prosthesis 100% CSR implants 100%  Complications  Biological: – soft tissue prob- lems n=4 in 4 patients – bone loss mean 0.6 mm (SD 0.52) – implant loss n=0  Technical: – material prob- lems resin veneer fractures – severe* n=1 – uncomplicated** n=2 in 2 patients		Moderate	RCT of mate- rial of con- struction, not of treatment methods  Same sample as [110]  *fracture in need of laboratory adjustment  **fracture adjusted chairside

CSR = Cumulative success rate of prosthesis or cumulative survival rate of implants;  
n = Number; RCT = Randomised controlled trial; SD = Standard deviation.

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CSR = Cumulative success rate of prosthesis or cumulative survival rate of implants;  
n = Number; RCT = Randomised controlled trial; SD = Standard deviation.

**Table 3.2.14** Treatment of patients with edentulous mandibles.

Author Year Reference Country	Study design Sample characteristics Inclusion period Follow-up	Intervention Sample Drop-outs	Outcome	Study quality	Comments
Arvidson 1998 [119] Sweden	Prospective observational Patients at specialist clinic Group I 3 years (1985–1987) Group II 4 years (1988–1991) 5 years	4–6 fixtures (two-stage surgery) (Astra Tech) with fixed detachable bridges – framework in Type III gold and acrylic resin artificial teeth  107 patients 64 women age range <40–>81 43 men age range <41–>81  15%	Criteria for failed prosthetic treatment: When bridges could not function after loss of implants. There was no such com- plication giving a cumulative prosthetic success rate of 100%  98.7% of implants in function	Low	No description on patient recruitment  2 patient groups
Behneke 2002 [118] Germany	Prospective observational Patients at specialist clinic 4 years (1988-11-01–1992-12-31) 5 years	Implant-retained overdentures on 2–5 ITI-implants (one-stage surgery) with straight bar and complete den- tures in upper jaw  100 patients Mean age 62.2 years 57 women 43 men	Overdenture fracture ranged between 1–15.8% per year  Cumulative implant survival rate 98.8% Cumulative implant success rate 95.7%  Complications  Biological: – bone loss median 1 mm – lost implants n=0 after loading – implant failures before loading n=4 – soft tissue problems (mucositis, peri- implantitis or mucosal enlargement) n=93 during the 5 years  Technical: – bar fracture n=36	Moderate	Calculated percentage fractured overdentures in relation to restorations at risk 7%

n = number

**Table 3.3.1.** Treatment with immediately loaded dental implants and mandibular overdentures in edentulous patients.

Author Year Reference Country	Study design Sample characteristics Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Alfadda 2009 [7] Canada	Controlled trial with control sample treated previously  Patients treated at university specialist clinic  5 years	Patients treated with 2 immediately loaded implants and an ovoid bar fitted to an overdenture with a clip system. Patients received new complete conventional dentures, and had to wear them for at least 2 months prior to implant surgery  35 patients edentulous for a mean 17.75 ±17.37 years  70 implants  4 patients	Patients treated with at least 2 implants, loaded after conventional two-stage treatment, and an ovoid bar fitted to an overdenture with a clip system  42 patients edentulous for a mean of 13.74 ±9.77 years  111 implants  0	Implant survival: 96.8%	Implant survival: 98.2%	Similar cumulative survival rate	Low	Control sample previously treated  Unclear inclusion period  No randomisation  No blind evaluation  Unclear if the outcome is survival or success rates  Drop-outs in intervention sample at the 5-year recall visit: 2 patients had died and it was not possible to locate the other 2 subjects

**Table 3.3.2.** Treatment with fixed partial bridges on immediately loaded dental implants.

Author Year Reference Country	Study design Sample characteristics Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Degidi 2009 [6] Italy	RCT Patients treated in private practice 5 years	Patients treated with dental implants that were immediately loaded with fixed partial bridges without occlusal contact  41 partially edentulous patients  119 implants  No drop-outs	Patients treated with one-stage or two- stage implant surgery and fixed partial bridges after tradi- tional healing periods  31 partially edentulous patients  109 implants  No drop-outs	Implant survival: 97.3%  Bridge survival: 100%	Implant survival: 100%  Bridge survival: 100%	Similar cumulative survival rate	Low	Unclear inclusion period  No blind evaluation  No success outcome

RCT = Randomised controlled trial

**Table 3.3.3.** Treatment with single crowns on immediately loaded dental implants.

Author Year Reference Country	Study design Sample characteristics Follow-up	Intervention Sample Drop-outs	Control Sample Drop-outs	Intervention outcome	Control outcome	Comparison	Study quality	Comments
Degidi 2009 [6] Italy	RCT Patients treated in private practice 5 years	Patients treated with dental implants that were immediately loaded with single crowns without occlusal contact  22 patients missing a single tooth  22 implants  No drop-outs	Patients treated with one-stage or two- stage implant surgery and single crowns after traditional heal- ing periods  23 patients missing a single tooth  23 implants  No drop-outs	Implant success: 100%	Implant success: 100%	Similar cumulative success rate	Moderate	Unclear inclusion period  No blind evaluation

RCT = Randomised controlled trial



**Table 5.6** Economic aspects.

Author Year Reference Country	Study design Reliability test	Intervention Patient characteristics	Control Patient characteristics	Drop-outs	Results	Comparison, e.g. level of significance	Study quality Comments
Attard 2003 [1] Canada	CCT follow-up over 9 years Cost minimization analysis  NA	Fixed protheses selected cases n=25	Overdenture selected cases n=25	I: NA  C: NA	I: Fixed protheses 10,748 Can\$ More severe hardware damage  C: Overdenture 3,665 Can\$	p=.01 for costs	Low
Attard 2005 [2] Canada	CCT follow-up Cost analysis  NA	Fixed mandibular protheses n=45 Different time period of follow-up	Mandibular over- dentures n=45	I: NA  C: NA	I: Fixed protheses 20.7 years of follow-up, on average 11,492 Can\$  C: Overdentures 15.6 years of follow-up at an average 9,660 Can\$	p<.05 for costs	Low
Stoker 2007 [3] The Netherlands	Follow-up 8 years of RCT  In initial study	a) 2 implants ball attachments n=36 b) 2 implants single bar n=36 c) 4 implants triple bar n=37	NA	I: a) n=4 b) n=0 c) n=3 of which all deceased  C: NA	I: Cost of follow-up during 8 years a) 997 Euro b) 961 Euro c) 984 Euro  C: NA	NS as regards costs	Moderate

CCT = Clinical controlled trial; NA = Not available; RCT = Randomised controlled trial