Bijlage 6
Beschrijvende tabel en 'GRADE' tabellen 'chirurgische behandeling peri-implantitis'

Beschrijvende tabel studies 'chirurgische behandeling van peri-implantitis'						
Study reference	**Study characteristics**	**Patient characteristics**	**Intervention**	**Comparison/ Control**	**Follow up**	**Outcome measures and effect size**
Measures for surface decontamination: Implant surface decontamination with chlorhexidine (I) versus with placebo or else (C), combined with resective surgery and mechanical debridement						
De Waal, 2013 [cpi1]	Type of study: RCT, parallel, double-blind, placebo-controlled Setting: University Country: The Netherlands Source of funding: Test- and placebo-solutions provided for free by Dentaid SL (Cerdanyola, Spain).	Inclusion criteria: Patients with ≥ 1 endosseous dental implant with clinical and radiographical signs of peri-implantitis (peri-implantitis defined as bleeding and/or suppuration on probing, peri-implant probing pocket depth ≥ 5 mm and bone loss ≥ 2 mm), with implant function time ≥ 2 years. Exclusion criteria: Patients with medical and general contra-indications for the surgical procedures, with a history of radiotherapy to the head and neck region, being pregnant or lactating, with insuline-dependent diabetes; using antibiotics during the last 3 months, being incapable to perform basal oral hygiene measures due to physical or mental disorders, with active, uncontrolled periodontal infections of the natural dentition (PPD > 5mm), with implants with bone loss exceeding 2/3 of the length of	Intervention: Patients received resective surgical treatment consisting of apically re-positioned flap, bone recontouring, mechanical debridement of the implant surface with curettes and surgical gauzes soaked in saline and surface decontamination with 0.12% CHX + 0.05% CPC. (irrigation for 1 min). Procedure: Before the surgical procedure, all patients received extensive oral hygiene instructions and mechanical debridement of implants, suprastructures and remaining dentition. Suprastructures were removed if reasonably possible (in all but eight patients). Sutures were removed after 2 weeks. During follow-up examinations, patients were re-instructed in oral hygiene measures and implants and teeth were cleaned as necessary. Follow-up visits were scheduled after 3, 6 and 12 months.	Control intervention: Patients received resective surgical treatment consisting of apically re-positioned flap, bone recontouring mechanical debridement of the implant surface with curettes and surgical gauzes soaked in saline and surface decontamination with a placebo solution (without CHX/CPC) (irrigation for 1 min).	Length of follow up: 12 months Loss to follow up: I: N=0 C: N=3 (1 due to implant fracture and 2 due to persisting peri-implantitis)	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Bone loss (BL) Effect: *BOP (% of sites):* I: 80.4% (26.5) to 60.5% (30.1) C: 79.7% (28.1) to 57.2% (29.0) *n.s.* *PD:* I: 6.6 (1.6) to 4.3 (2.1) C:5.5 (1.4) to 3.7 (0.8) *n.s.* *BL:* I: 4.3 (2.1) to 5.0 (2.5) C: 3.6 (1.9) to 4.3 (2.2) *n.s.* Other measures in study: Suppuration on probing (SOP) Microbiological parameters

		the implant or implants with bone loss beyond any transverse openings in hollow implants, with implant mobility, with implants at which no position could be identified where proper probing measurements could be performed, with previous surgical treatment of the peri-implantitis lesions. N total at baseline: N=30				
De Waal, 2015 [cpi2]	Type of study: RCT, parallel, double-blind Setting: University Country: The Netherlands Source of funding: Test and control solutions were manufactured and provided by Dentaid SL (Cerdanyola, Spain).	Inclusion criteria: Patients with ≥ 1 endosseous dental implant with clinical and radiographical signs of peri-implantitis (peri-implantitis defined as bleeding and/or suppuration on probing, peri-implant probing pocket depth ≥5mm and bone loss ≥ 2mm); implant function time ≥ 2 years. Exclusion criteria: Patients with medical and general contra-indications for the surgical procedures; with a history of radiotherapy to the head and neck region, being pregnant or lactating, with insuline-dependent diabetes, using antibiotics during the last 3 months, being incapable to perform basal oral hygiene measures due to physical or mental disorders, with active, uncontrolled periodontal infections of the natural dentition (PPD >5 mm), with implants with bone loss exceeding 2/3 of the length of	Intervention: Patients received resective surgical treatment consisting of apically re-positioned flap, bone recontouring, mechanical debridement of the implant surface with curettes and surgical gauzes soaked in saline and surface decontamination with a 2% CHX solution (irrigation for 1 min). Procedure: Before the surgical procedure, all patients received extensive oral hygiene instructions and mechanical debridement of implants, suprastructures and remaining dentition. Suprastructures were removed if reasonably possible. Sutures were removed after 2 weeks. During follow-up examinations, patients were re-instructed in oral hygiene measures and implants and teeth were cleaned as necessary. Follow-up visits were scheduled after 3, 6 and 12 months.	Control intervention: Patients received resective surgical treatment consisting of apically re-positioned flap, bone recontouring, mechanical debridement of the implant surface with curettes and surgical gauzes soaked in saline and surface decontamination with a 0.12% CHX + 0.05% CPC solution (irrigation for 1 min).	Length of follow up: 12 months Loss to follow up: I: N=1 (due to implant fracture) C: N=3 (due to persisting peri-implantitis)	Outcome measures Bleeding on probing (BOP) Pocket depth (PD) Bone loss (BL) Effect: *BOP (% of sites):* I: 82.1% (23.9) to 42.7% (34.2) C: 74.2% (27.8) to 37.0% (35.3) *n.s.* *PD:* I: 4.7 (1.0) to 3.0 (0.7) C:5.0 (1.2) to 2.9 (0.7) *n.s.* *BL:* I: 4.0 (1.5) to 4.3 (1.7) C: 4.1 (1.6) to 4.1 (1.7) *n.s.* Other measures in study: Suppuration on probing (SOP) Microbiological parameters

		the implant or implants with bone loss beyond any transverse openings in hollow implants, with implant mobility, with implants at which no position could be identified where proper probing measurements could be performed, with previous surgical treatment of the peri-implantitis lesions. N total at baseline: N = 44				
Measures for surface decontamination: Implant surface decontamination with (I) versus without (C) diode laser, combined with access flap and mechanical debridement						
Papadopoulos, 2015 [cpi3]	Type of study: RCT, parallel Setting: University Country: Greece Source of funding: Not mentioned	Inclusion criteria: Patients with peri- implantitis, with PD ≥ 6mm in at least one implant and the simultaneous presence of bleeding or suppuration after probing, with no mobility of the implant, radiographic bone loss ≥ 2mm at least at one implant surface. Exclusion criteria: Patients with serious systematic disease by which a surgical procedure could not be performed (e.g., bleeding disorders, uncontrolled diabetes mellitus, etc.), with treatment of peri-implantitis within the previous 12 months, with antibiotic intake in the last 3 months before treatment, placement, and prosthetic loading of implants <12 months. N total at baseline: N=19	Intervention: Acces flap + mechanical debridement of the implant surface with sterilized cotton swabs soaked in saline + additional use of a diode laser. Procedure: Mechanical debridement using ultrasonics and hand instruments was performed on the whole dentition prior to surgery. Four weeks later, after patient re-examination, a surgical approach to the peri-implant defects was performed. The sutures were removed about 14 days after surgery, and postsurgical guidelines were given to all patients. These included a chlorhexidine 0.12 % mouth rinse twice a day for 2 weeks and a careful tooth brushing with a soft toothbrush so that the sutured area would be efficiently cleaned but not traumatized. Measurements were performed at three different time points, baseline (BSL), 3 months, and 6 months after treatment.	Control intervention: Acces flap + mechanical debridement of the implant surface with sterilized cotton swabs soaked in saline.	Length of follow up: 6 months Loss to follow up: N=3	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Effect: *BOP (difference):* I: 63% (94% to 31%) C: 67% (81% to 24%) *n.s.* *PD:* I: 5.92 to 4.44 C: 5.52 to 4.31 *n.s.* Other measures in study: Clinical attachment level (CAL) Plaque index (PI)

Measures for surface decontamination: Implant surface decontamination by access flap, mechanical debridement and decontamination with chlorhexidine, with (I) versus without (C) photodynamic therapy						
Bombeccari, 2013 [cpi4]	Type of study: RCT, parallel Setting: University and private practice Country: Italy Source of funding: Not mentioned	Inclusion criteria: Patients clinically and radiographically diagnosed as having peri-implantitis around at 1 or more dental implant (PPD ≥ 5mm with presence of BOP and/or inflammatory exudation and radiographic signs of progressive bone loss (bone loss > 3 threads) since at least 12 months. All patients had Nobel Biocare implants with a rough surface. Exclusion criteria: Patients with antibiotic administration during the previous 3 month before the sampling, heavy smokers (>10 cigarettes per day), heavy alcohol consumers, patients undergoing head and neck chemoradiotherapy, with degenerative bone diseases, with chronic inflammatory oral diseases on immunological basis, with immediate postextraction implant placement. N total at baseline: N=40	Intervention: Open flap surgery + implant surface debridement and decontamination with plastic scalers and 0.2% CHX solution (irrigation for 1 minute) + photodynamic therapy (PDT, application of toluidine blue O on the implant surface followed by irradiation with a diode laser). Procedure: After treatment, all patients were instructed to rinse with 0.2% CHX (10 mL for 1 minute at an interval of 8 hours for 2 weeks).	Control intervention: Open flap surgery + implant surface debridement and decontamination with plastic scalers and 0.2% CHX solution (irrigation for 1 minute).	Length of follow up: 6 months Loss to follow up: N = 0	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Effect: *BOP (% of sites):* I: 0.70 (0.48) to 0.10 (0.31) C: 0.80 (0.44) to 0.50 (0.52) *n.s.* *PD:* I: 5.9 (0.76) to 4.9 (0.47) C: 5.9 (0.78) to 5.5 (0.52) *p = 0.02* Other measures in study: Probing attachment level (PAL) Inflammatory exudation (IE)
Adjunctive resective therapy: resective surgery with (I) versus without (C) adjunctive implantoplasty						
Romeo, 2005 [cpi5] / Romeo, 2007 [cpi6]	Type of study: RCT, parallel Setting: University Country: Italy	Inclusion criteria: Patients with clinical signs of suppuration or sulcus bleeding; with probe penetration > 4mm into the peri-implant sulcus; with absence of implant mobility and with radiographic	Intervention: Patients were treated with resective surgery + implant surface topography adjustment (implantoplasty) Procedure: Before treatment patients received antibiotic therapy	Control intervention: Patients were treated with resective surgery only. No implantoplasty.	Length of follow up: 3 years (2 years for control group) Loss to follow up: N=0 For ethical reasons, after 2 years the	Outcome measures: Modified bleeding index (mBI) Pocket depth (PD) Bone level (BL) Implant failure Effect: *mBI:* 24months:

	Source of funding: Not mentioned	evidence of horizontal peri-implant radiolucence. Exclusion criteria: See inclusion criteria above. N total at baseline: N=17 (I: 10, C: 7)	(Amoxicillin 50 mg/kg/die for 8 days per os). A full-mouth disinfection was operated. Calculus and soft deposits of plaque were removed from all accessible sites of implants with a plastic scaler. Patients receive apically repositioned flap, granulation tissue removal and bone recontouring if needed. After treatment all patients were instructed to rinse with 0.2%CHX for 2 weeks.		follow-up of the control group was interrupted because of persisting active inflammation. After 24 months 2 hollow-screw implants of control group were removed because of mobility.	I: 2.83 (0.47) to 0.5 (0.69) C: 2.86 (0.35) to 2.33 (0.74) *p<0.01* *PD:* 24months: I: 5.79 (1.69) to 3.58 (1.06) C: 6.52 (1.62) to 5.5 (1.47) *p<0.001* *BL (loss):* 24 months: Mesial: I:3.82 (1.52) to 3.81 (1.59) C: 3.45 (1.93) to 4.39 (2.3) Distal: I: 3.94 (1.64) to 3.96 (1.67) C: 3.49 (1.8) to 4.53 (2.18) *p < 0.05* *Implant failure:* 24 months: I: 0% of implants C: 12.5% of implants *p not mentioned* Other measures in study: Suppuration Modified plaque index (mPI) Presence of pseudopockets (DIM) Mucosa recession (REC) Probing attachment level (PAL)
Adjunctive augmentative therapy: Access flap combined with implantoplasty and augmentative therapy and debridement with Er:YAG laser (I) versus mechanical debridement (C)						
Schwarz, 2011 [cpi7] / Schwarz, 2012[cpi8] / Schwarz, 2013 [cpi9]	Type of study: RCT, parallel Setting: University Country: Germany Source of funding:	Inclusion criteria: Patients having at least 1 implant affected by peri-implantitis with an infrabony component > 3mm as detected on radiographs and PD > 6mm. Exclusion criteria: Implant mobility; restorations with overhangings or margins;	Intervention: Patients received flap surgery, and implantoplasty at buccally and supracrestally exposed implant parts. Surface debridement and decontamination using an Er:YAG laser (ERL). Augmentative procedure with natural bone mineral (BioOss)	Control intervention: Patients received flap surgery, and implantoplasty at buccally and supracrestally exposed implant parts. Surface debridement and decontamination using plastic curettes plus cotton pellets plus sterile saline (CPS). Augmentative procedure with natural bone mineral (BioOss) and bioresorbable collegen membrane (BioGuide).	Length of follow up: 4 years Loss to follow up: I: N =7 C: N=4 *After 2-3 months (refused to continue follow-up)* I: N=1	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Effect: *BOP difference from baseline:* 6 months I: 47.8% ± 35.5 (93%-46%) C: 55.5% ± 31.1 (100%-45%) *n.s.*

	The study was in part funded by Geistlich Biomaterials, Wolhusen, Switzerland. The study materials were provided by Elexxion AG, Radolfzell, Germany and Geistlich Biomaterials.	implants with evidence of overload; absence of peri-implant keratinised mucosa; patients with acute periodontitis; insufficient level of oral hygiene (PI≥1); patients with any systemic diseases that could influence the outcome of the therapy; heavy smokers (>10 cigarettes per day); hollow cylinder implants. N total at baseline: N=32	and bioresorbable collegen membrane (BioGuide). Procedure: Before the start of the experimental part of the study and in order to reduce the signs of inflammation (i.e. suppuration and pus formation), the study implants received a single course of non-surgical instrumentation using plastic curettes combined with an anti-septic pocket irrigation using 0.2% CHX solution and subgingival application of CHX gel 0.2%. At 2 weeks after initial therapy, the surgical treatment was performed. Clinical and radiographic parameters were recorded at baseline and after 6 months of non-submerged healing. Post-operative care consisted of rinsing with 0.2% CHX solution twice a day for 2 weeks. The sutures were removed 10 days after the surgery. Recall appointments were scheduled every second week during the first 2 months after surgery and monthly during the short-term observation period of 6 months. During the rest of the observation period of 48 months, the patients were recalled every 6 months. A supragingival professional implant/tooth cleaning and rein- forcement of oral hygiene were performed at 1, 3, 6, 12, 18, 24, 36 and 48 months after treatment.		C: N=1 *between 6 and 24months (due to pus formation and progressive bone loss):* I: N=5 C: N=1 *between 24 and 36 months (due to pus formation and progressive bone loss)* I: N=1 C: N=2	24 months I: 75.0% ± 32.6 (97%-22%) C: 54.9% ± 30.3 (100%-45%) *n.s.* 48 months I: 71.6% ± 24.9 (95%-24%) C: 85.2% ± 16.4 (100%-15%) *p not mentioned* *PD difference from baseline:* 6 months: I: 1.7 ± 1.4 (5.1 to 3.4) C: 2.4 ± 1.5 (5.5 to 3.1) *n.s.* 24 months: I: 1.1 ± 2.2 (4.9 to 3.8) C: 1.5 ± 2.0 (5.2 to 3.7) *n.s.* 48 months: I: 1.3 ± 1.8 (5.1 to 3.8) C: 1.2 ± 1.9 (5.5 to 4.3) *p not mentioned* Other measures in study: Plaque index (PI) Mucosal recession (REC) Clinical attachment level (CAL)
Adjunctive augmentative therapy: Augmentation with a nanocrystalline hydroxyapatite (I) versus a bovine derived xenocraft in combination with a collagen membrane (C)						
Schwarz,	Type of study:	Inclusion criteria:	Intervention:	Control intervention:	Length of follow up:	Outcome measures:

2006 [cpi10] / Schwarz, 2008 [cpi11] / Schwarz, 2009 [cpi12]	RCT, parallel Setting: University Country: Germany Source of funding: Study materials provided by Geistlich Biomaterials, Wolhusen, Switzer-land and Heraeus, Hanau, Germany	Patients having at least 1 implant affected by peri-implantitis with an infrabony component > 3mm as detected on radiographs and PD > 6mm (in case of multiple implants, the most advanced defect was selected as the primary target site). Exclusion criteria: Implant mobility; restorations with overhangings or margins; implants with evidence of overload; absence of peri-implant keratinised mucosa; patients with acute periodontitis; insufficient level of oral hygiene (PI≥1); patients with any systemic diseases that could influence the outcome of the therapy; heavy smokers (>10 cigarettes per day); hollow cylinder implants. N total at baseline: 22	Patients received flap surgery, surface debridement (plastic curettes) and an augmentative procedure consisting of application of nanocrystalline hydroxyapatite (NHA, Ostim, Heraeus, Hanau, Germany) in the intrabony defect component (ready-to-use paste in a syringe, containing about 65% water and nanoscopic apatite particles (35%) in an aqueous dispersion. NHA is intended for use without the additional application of a barrier membrane). Procedure: Before the surgical intervention, all patients received non-surgical instrumentation of implants using plastic curettes combined with pocket irrigation with 0.2% CHX solution and subgingival application of CHX gel 0.2%. Post-operative care consisted of rinsing with 0.2% CHX solution twice a day for 2 weeks. The sutures were removed 10 days after the surgery. Recall appointments were scheduled every second week during the first 2 months after surgery and monthly during the short-term observation period of 6 months. During the rest of the observation period of 48 months, the patients were recalled every 6 months. A supragingival professional implant/tooth cleaning and reinforcement of oral hygiene were performed at 1, 3, 6, 12, 18, 24, 30, 36, 42, and 48 months after treatment.	Patients received flap surgery, surface debridement (plastic curettes) and an augmentative procedure consisting of application of natural bone mineral (NBM, Bio-Oss, Geistlich, Wolhusen, Switzerland, particle size 0.25 to 1 mm, bovine-derived) in the intrabony defect component in combination with a native collagen membrane (CM) Bio-Gide, Geistlich) of porcine origin.	4 years Loss to follow up: I: N=2 C: N=0 After 12 months, two patients from the I-group (n=2 implants) had to be discontinued from the study due to severe pus formation	Bleeding on probing (BOP) Pocket depth (PD) Effect: *BOP difference from baseline:* 6 months I: 52% (82%-30%) C: 50% (78%-28%) *p not mentioned* 24 months: I: 36% (80%-44%) C: 44% (78%-34%) *p not mentioned* 48 months: I: 32% (80%-48%) C: 51% (79%-28%) *p not mentioned* *PD difference from baseline:* 6 months: I: 2.1 ± 0.5 (7.0 to 4.9) C: 2.6 ± 0.4 (7.1 to 4.5) *p not mentioned* 24 months: I: 1.5 ± 0.6 (6.9 to 5.4) C: 2.4 ± 0.8 (7.1 to 4.7) *p not mentioned* 48 months: I: 1.1 ± 0.3 (6.9 to 5.8) C: 2.5 ± 0.9 (7.1 to 4.6) *p not mentioned* Other measures in study: Plaque index (PI) Gingival recession (REC) Clinical attachment level (CAL)

Adjunctive augmentative therapy: Augmentation with porous titanium granules (I) versus no augmentation (C)						
Wohlfahrt, 2012 [cpi13]	Type of study: RCT, parallel Setting: University Country: Norway Source of funding: Tigran AB Norwegian Research Council	Inclusion criteria: Patients age at least 18 years, with eligibility for treatment in an outpatient dental clinic, with the possibility of removing prosthetic supraconstructions for submersion of the implants during 6 months, with full mouth plaque scores <20%, with implants functionally loaded for at least 12 months prior to baseline. Eligible patients had peri-implantitis at at least one site with a PD ≥ 5 mm, BOP and an infrabony component of the peri-implant osseous defect as judged on radiographs. Only implants with infrabony defects with a depth ≥ 4 mm, as verified during surgery, were included. Exclusion criteria: Patients with allergy to penicillin, with medications that induced hyperplasia, with uncontrolled diabetes (glycosylated hemoglobin > 6.5), with systematic antibiotics < 6 months prior to surgery, being pregnant or lactating, with known psychologic illness, with mobile implants. One implant per patient was included. N total at baseline: N=33	Intervention: Open flap debridement combined with an augmentative procedure with porous titanium granules (PTG), followed by submerged healing (6 months). Procedure: Before baseline measurements patients went through a hygiene phase and received any necessary periodontal treatment. Patients were prescribed amoxicillin (500 mg three times daily) and metronidazole (400 mg two times daily) starting 3 days prior to surgery and for 7 days after surgery. After the supraconstruction was removed the interior screw hole was cleaned with 3% hydrogen peroxide, a cover screw was seated, and local anesthetic was injected. Then a full-thickness mucoperiosteal flap was raised. The implant was curetted with area-specific titanium curettes. The implant surfaces were conditioned using 24% EDTA gel for 2 minutes and then rinsed with sterile saline. If necessary to achieve satisfactory blood supply to the defect, the cortical bony wall was perforated with a sharp instrument. The patients were instructed not to brush in the surgical area the first 4 weeks after surgery. Instead, they were to rinse twice daily with CHX 0.2% for 4 weeks, starting 24 hours after surgery. Remnants of sutures were removed 3 weeks after surgery.	Control intervention: Open flap debridement followed by submerged healing (6 months). Without augmentative procedure.	Length of follow up: 12 months Loss to follow up: I: N=0 C: N=1	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Bone level (BL) Effect: *BOP (reduction):* I: 0.38 (2.1) C: 0.56 (2.9) *n.s.* *PPD:* I: 6.5 (1.9) to 4.9 (1.8) C: 6.5 (2.3) to 4.4 (1.7) *n.s.* *BL (reduction in defect height)* I: 2.0 (1.7) C: 0.1 (1.9) *p<0.001* Other measures in study: Suppuration Buccal keratinized mucosa Infrabony defect fill

			Oral hygiene was checked at each postsurgical visit and at 3, 6, and 9 months, and individually-based supragingival debridement and hygiene instructions were given as needed. Stage-two surgeries were performed 6 months after the initial surgery, and the supraconstructions were re-seated accordingly but with a lag time of 2 to 6 weeks, depending on the state of the wound around the healing abutment.			
Jepsen, 2016 [cpi14]	Type of study: RCT, parallel, multi-center Setting: University Country: Germany Source of funding: Tigran Technologies AB German research Foundation Geistlich Pharma Straumann Biomet 3i	Inclusion criteria: Patients aged > 18 y with a diagnosis of peri-implantitis (PD ≥ 5mm, BOP, and or pus), implants in function for > 12 months. Based on intra-operative exploration: patients with intraosseous defect component ≥3 mm at the deepest point, three to four walls, with defect with at least 270° (circumferential), and a defect angle ≤35° (from the axis of the implant). Exclusion criteria: Patients with diabetes mellitus (hemoglobin A1c ≥6.5), using corticosteroids or other anti-inflammatory prescription drugs, using medications known to induce gingival hyperplasia, with a history of taking systemic antibiotics in the preceding month, being pregnant or nursing, with implants placed in grafted bone or previously augmented with bone/bone substitute, with implants previously surgically treated	Intervention: Open flap debridement plus augmentative procedure with porous titanium granules (PTG) Procedure: Pre-surgical interventions included providing oral hygiene instructions according to the patients' individual needs, nonsurgical periodontal/peri-implantation, and surgical periodontal therapy. A non-submerged surgical technique was used for both the test and control sites. Granulation tissue was removed using titanium curettes and the exposed implant sur faces were cleaned mechanically by using a rotary titanium brush and decontaminated chemically with 3% H2O2 for 1 min, followed by rinsing with saline for 60 s (2 × 20 ml). The sutures were removed after 7 to 14 d and patients were instructed on the use of soft toothbrushes and soft interdental brushes in the surgical area. Patients were	Control intervention: Open flap debridement without augmentative procedure.	Length of follow up: 12 months Loss to follow up: I: N=0 C: N=4 (refused to attend 12 months appointment)	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Bone level (BL) Effect: *BOP:* I: 89.4% (20.7) to 33.3% (31.7) C: 85.8% (23.9) to 40.4% (37.1) *n.s.* *PD:* I: 6.3 (1.3) to 3.5 (1.5) C:6.3 (1.6) to 3.5 (1.1) *n.s.* *BL:* Mesial: I: 5.55 (2.30) to 1.98 (1.99) C: 4.63 (2.68) to 3.63 (2.34) $p<0.001$ Distal: I: 5.41 (2.72) to 1.96 (1.95) C: 4.45(2.23) to 3.63 (2.32) $p<0.001$ Other measures in study: Plaque index (PI) Suppuration on probing (SOP) Radiographic defect fill

		for peri-implantitis, or a mobile implant. N total at baseline: N=70 (N=63 after application of intra-operative inclusion/exclusion criteria)	recalled at 6 wk and 3, 6, 9, and 12 mo after surgery for professional oral hygiene procedures with supragingival debridement and hygiene instructions provided as needed.			Defect resolution
Adjunctive augmentative therapy: Augmentation with autogenous bone and a collagen membrane (I) versus bovine-derived xenocraft and a collagen membrane (C)						
Aghazadeh, 2012 [cpi15]	Type of study: RCT, parallel, single-blind Setting: University Country: Sweden Source of funding: The study was funded by Biomet 3i	Inclusion criteria: Patients with a minimum of one osseointegrated implant with loss of bone 2mm defined by comparing digital intra-oral radiographs at the time of screening for this study with bone loss from radiographs taken following placement of the implant supra-structure, combined with a PD ≥ 5mm, with BOP/ suppuration, and an angular peri-implant bone defects (≥ 3mm in depth as determined from intra-oral digital radiographs). Exclusion criteria: Patients with uncontrolled diabetes mellitus (HbA1c > 7), requiring antibiotic prophylaxis, taking prednisone or other anti-inflammatory medications, using antibiotics in the preceding 3 months, taking medications known to affect gingival overgrowth. N total at baseline: N=50	Intervention: Acces flap + debridement and decontamination of the implant surface with curettes and hydrogen peroxide (3%) for 1 min + a augmentative procedure with autogenous bone and a resorbable collagen membrane (Osseoguard, Biomet 3I) + post-surgical antibiotics (Azitromycin, 2 x 250mg day 1 and 1 x 250mg days 2-4). Procedure: Before entering into the study any periodontal disease around existing teeth had to be treated so that no pockets > 5 mm were present around any existing tooth. All patients also underwent a preparatory routine treatment phase including mechanical debridement of teeth and implants using hand instruments or ultrasonic devices as designed either for teeth or implants. Subjects were also instructed in oral hygiene measures prior to treatment and thereafter as deemed necessary. No surgical intervention for study purpose was performed before the re-assurance of good patient motivation and compliance was identified. During the first 6	Control intervention: Acces flap + debridement and decontamination of the implant surface with curettes and hydrogen peroxide (3%) for 1 min + a augmentative procedure with a bovine-derived xenograft (Bio-Oss, Geistlich Pharma) and a resorbable collagen membrane (Osseoguard, Biomet 3I) + post-surgical antibiotics (Azitromycin, 2 x 250mg day 1 and 1 x 250mg days 2-4).	Length of follow up: 12 months Loss to follow up: N=0	Outcome measures: Bleeding on probing (BOP) Pocket depth (PD) Bone level (BL) Effect: *BOP (reduction):* I: 44.8% (6.3) C: 50.4% (5.3) *n.s.* *PD (decrease):* I: 2.0 mm (0.2) C: 3.1 mm (0.2) *p < 0.01* *BL:* I: 0.2 (0.3) C: 1.1 (0.3) *p < 0.05* Other measures in study: Plaque index (PI) Mucosal recession (REC) Suppuration on probing (SOP)

			weeks after surgery, all subjects rinsed with 0.1% CHX. Six weeks after surgery the first supportive therapy was given, and the subjects were enrolled in a maintenance programme with visits every third month.			

Overzicht 'Risk of bias' studies 'chirurgische behandeling van peri-implantitis'

		random sequence generation (selection bias)	allocation concealment (selection bias)	blinding (performance bias and detection bias)	incomplete outcome data (attrition bias)	selective reporting (reporting bias)	other bias
cpi1	De Waal, 2013	Low risk	Low risk	Low risk	Low risk	High risk	Low risk
cpi2	De Waal, 2015	Low risk	Low risk	Low risk	Low risk	High risk	Low risk
cpi3	Papadopoulos, 2015	Low risk	Unclear risk	Low risk	Low risk	Unclear risk	Low risk
cpi4	Bombeccari, 2013	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
cpi5/cpi6	Romeo, 2005 / Romeo, 2007	High risk	High risk	High risk	High risk	High risk	High risk
cpi7/cpi8 / cpi9	Schwarz, 2011 / Schwarz, 2012/ Schwarz, 2013	Low risk	Unclear risk	Low risk	Unclear risk	High risk	Low risk
cpi10/ cpi11/ cpi12	Schwarz, 2006 / Schwarz, 2008 / Schwarz, 2009	Low risk	Unclear risk	Low risk	High risk	High risk	Low risk
cpi13	Wohlfahrt, 2012	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
cpi14	Jepsen, 2015	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
cpi15	Aghazadeh, 2012	Low risk	Low risk	Low risk	Low risk	High risk	Low risk

Dit overzicht is gebaseerd op de analyse van 'risk of bias' in:

- Esposito M, Grusovin MG, Worthington HV. (2012) Interventions for replacing missing teeth: treatment of peri-implantitis (Review). Cochrane Database of Systematic reviews; issue 1, art no CD004970.
- Ghanem A, Pasumarthy S, Ranna V, Varela Kellesarian S, Abduljabbar T, Vohra F, Malstrom H. (2012) Is mechanical curettage with adjunct photodynamic therapy more effective in the treatment of peri-implantitis than mechanical curettage alone? Review. Photodiagnosis and Photodynamic Therapy 15: 191-196.
- Daugela P, Cicciù M, Saulacic N. (2016) Surgical regenerative treatments for peri-implantitis: meta-analysis of recent findings in a systematic literature review. J Oral Maxillofac Res: 7 (3): e15.
- Ramenauskite A, Daugela P, Juodzbalys G. (2016) Treatment of peri-implantitis: meta-analysis of findings in a systematic literature review and novel protocol proposal. Quint int 47 (5): 379-393.

Samenvattende tabel van kwaliteitstoetsing studies 'chirurgische behandeling peri-implantitis'							
Aantal studies	**Design**	**Beperkingen[1]**	**Inconsistentie[2]**	**Indirect bewijs[3]**	**Imprecisie[4]**	**Andere overwegingen**	**Kwaliteit[5]**
BOP in chirurgische behandeling van peri-implantitis							
8	RCT	Serieus[d,e]	Niet serieus	Niet serieus	Zeer serieus	Nee	Zeer laag
(P)PD in chirurgische behandeling van peri-implantitis							
9	RCT	Zeer serieus[a,b,c,d,e]	Niet serieus	Niet serieus	Zeer serieus	Nee	Zeer laag
IF in chirurgische behandeling van peri-implantitis							
1	RCT	Zeer serieus[a,b,c,d,e]	Niet serieus	Niet serieus	Zeer serieus	Nee	Zeer laag
BL in chirurgische behandeling van peri-implantitis							
5	RCT	Zeer serieus[a,b,c,d,e]	Niet serieus	Niet serieus	Zeer serieus	Nee	Zeer laag
mBI in chirurgische behandeling van peri-implantitis							
1	RCT	Zeer serieus[a,b,c,d,e]	Niet serieus	Niet serieus	Zeer serieus	Nee	Zeer laag

1 Beperkingen: meer of minder beperkingen in opzet en uitvoering van onderzoek. Mogelijke bronnen van vertekening zijn:
- a selectieve toewijzing van de onderzoekdeelnemers (selectiebias)
- b vertekening door het ontbreken van blindering (performance bias)
- c vertekening van uitkomstmetingen door gebrek aan blindering van de effectbeoordelaar (informatiebias)
- d selectieve uitval van onderzoekdeelnemers (attrition bias)
- e selectieve publicatie van uitkomsten binnen hetzelfde onderzoek (reporting bias)
- f andere mogelijke bronnen van vertekening

2 Inconsistentie: grote verschillen in behandeleffecten tussen studies die niet verklaard kunnen worden door bijvoorbeeld verschillen in populatie, interventies, uitkomsten en studiekwaliteit

3 Indirect bewijs: afwijking van de vraag van het onderzoek ten opzichte van de uitgangsvraag

4 Imprecisie: Onzekerheid over de grootte van het effect door bijvoorbeeld een kleine steekproef of weinig voorkomende events

5 Op basis van de beoordeling van genoemde criteria wordt de volgende gradering van kwaliteit gebruikt:
- Hoog: Het werkelijke effect ligt dicht in de buurt van de schatting van het effect
- Matig: Het werkelijke effect ligt waarschijnlijk dicht bij de schatting van het effect maar er is een mogelijkheid dat het hier substantieel afwijkt
- Laag: Het werkelijke effect kan substantieel verschillend zijn van de schatting van het effect
- Zeer laag: Het werkelijke effect wijkt waarschijnlijk substantieel af van de schatting van het effect

Bron: Everdingen, JJE van et al. Evidence-based richtlijnontwikkeling. Een leidraad voor de praktijk. Houten, 2014.

GRADE tabel: kwaliteitstoetsing studies 'chirurgische behandeling peri-implantitis'

Aantal studies	Design	Beperkingen	Inconsistentie	Indirect bewijs	Imprecisie	Andere overwegingen	Aantal patiënten	Effect	Kwaliteit	Belang
Measures for surface decontamination: BOP in implant surface decontamination with chlorhexidine (I) versus with placebo or else (C), combined with resective surgery and mechanical debridement, after 12 months										
1 [cpi1, cpi2]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	44	I: van 82% tot 43% C: van 74% tot 37% NS	Zeer laag	Cruciaal
Measures for surface decontamination: PD in implant surface decontamination with chlorhexidine (I) versus with placebo or else (C), combined with resective surgery and mechanical debridement, after 12 months										
1 [cpi1, cpi2]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	44	I: van 4.7 tot 3.0 C: van 5.0 tot 2.9 NS [cpi2]	Zeer laag	Cruciaal
Measures for surface decontamination: BL in implant surface decontamination with chlorhexidine (I) versus with placebo or else (C), combined with resective surgery and mechanical debridement, after 12 months										
1 [cpi1, cpi2]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	44	I: van 4.0 tot 4.3 C: van 4.1 tot 4.1 NS [cpi2]	Zeer laag	Cruciaal
Measures for surface decontamination: BOP in implant surface decontamination with (I) versus without (C) diode laser, combined with access flap and mechanical debridement, after 6 months										
1 [cpi3]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	19	I: 63% (van 94% tot 31%) C: 67% (van 81% tot 24%) NS	Zeer laag	Cruciaal
Measures for surface decontamination: PD in implant surface decontamination with (I) versus without (C) diode laser, combined with access flap and mechanical debridement, after 6 months										
1 [cpi3]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	19	I: van 5.9 tot 4.4 C: van 5.5 tot 4.3 NS	Zeer laag	Cruciaal
Measures for surface decontamination: BOP in implant surface decontamination by access flap, mechanical debridement and decontamination with chlorhexidine, with (I) versus without (C) photodynamic therapy, after 6 months										
1 [cpi4]	RCT	Niet serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	40	I: van 70% tot 10% C: van 80% tot 50% NS	Laag	Cruciaal

Measures for surface decontamination: PD in implant surface decontamination by access flap, mechanical debridement and decontamination with chlorhexidine, with (I) versus without (C) photodynamic therapy, after 6 months										
1 [cpi4]	RCT	Niet serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	40	I: van 5.9 tot 4.9 C: van 5.9 tot 5.5 p = 0.02	Laag	Cruciaal
Adjunctive resective therapy: mBI in resective surgery with (I) versus without (C) adjunctive implantoplasty, after 24 months										
1 [cpi5/cpi6]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	17	I: van 2.8 tot 0.5 C: van 2.9 tot 2.3 p < 0.01	Zeer laag	Cruciaal
Adjunctive resective therapy: PD in resective surgery with (I) versus without (C) adjunctive implantoplasty, after 24 months										
1 [cpi5/cpi6]	RCT	Zeer serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	17	I: van 5.8 tot 3.6 C: van 6.5 tot 5.5 p < 0.001	Zeer laag	Cruciaal
Adjunctive resective therapy: BL in resective surgery with (I) versus without (C) adjunctive implantoplasty, after 24 months										
1 [cpi5/cpi6]	RCT	Zeer serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	17	Mesiaal: I: van 3.8 tot 3.8 C: van 3.5 tot 4.4 Distaal: I: van 3.9 tot 4.0 C: van 3.5 tot 4.5 p < 0.05	Zeer laag	Cruciaal
Adjunctive resective therapy: IF in resective surgery with (I) versus without (C) adjunctive implantoplasty, after 24 months										
1 [cpi5/cpi6]	RCT	Zeer serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	17	I: 0% van de implantaten C: 12.5% van de implantaten p niet vermeld	Zeer laag	Cruciaal
Adjunctive augmentative therapy: BOP in access flap combined with implantoplasty and augmentative therapy and debridement with Er:YAG laser (I) versus mechanical debridement (C), after 48 months										
1 [cpi7/cpi8/cpi9]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	32	I: 72% (van 95 tot 24%) C: 85% (van 100 tot 15%) p niet vermeld	Zeer laag	Cruciaal
Adjunctive augmentative therapy: PD in access flap combined with implantoplasty and augmentative therapy and debridement with Er:YAG laser (I) versus mechanical debridement (C), after 48 months										
1 [cpi7/cpi8/cpi9]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	32	I: 1.3 (van 5.1 tot 3.8) C: 1.2 (van 5.5 tot 4.3) p niet vermeld	Zeer laag	Cruciaal

Adjunctive augmentative therapy: BOP in augmentation with a nanocrystalline hydroxyapatite (I) versus a bovine derived xenocraft in combination with a collagen membrane (C), after 48 months										
1 [cpi10/cpi11/cpi12]	RCT	Zeer serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	22	I: 32% (van 80% tot 48%) C: 51% (van 79% tot 28%) p niet vermeld	Zeer laag	Cruciaal
Adjunctive augmentative therapy: PD in augmentation with a nanocrystalline hydroxyapatite (I) versus a bovine derived xenocraft in combination with a collagen membrane (C), after 48 months										
1 [cpi10/cpi11/cpi12]	RCT	Zeer serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	22	I: 1.1 (van 6.9 tot 5.8) C: 2.5 (van 7.1 tot 4.6) p niet vermeld	Zeer laag	Cruciaal
Adjunctive augmentative therapy: BOP in augmentation with porous titanium granules (I) versus no augmentation (C), after 12 months										
2 [cpi13, cpi14]	RCT	Niet Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	33/ 63	Reductie [cpi13] I: 0.38 C: 0.56 NS I: van 89% tot 33% C: van 86% tot 40% NS [cpi14]	Laag	Cruciaal
Adjunctive augmentative therapy: (P)PD in augmentation with porous titanium granules (I) versus no augmentation (C), after 12 months										
2 [cpi13, cpi14]	RCT	Niet Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	33/ 63	I: van 6.5 tot 4.9 C: van 6.5 tot 4.4 NS [cpi13] I: van 6.3 tot 3.5 C: van 6.3 tot 3.5 NS [cpi14]	Laag	Cruciaal
Adjunctive augmentative therapy: BL in augmentation with porous titanium granules (I) versus no augmentation (C), after 12 months										
2 [cpi13, cpi14]	RCT	Niet Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	33/ 63	I: 2.0 (1.7) C: 0.1 (1.9) $p < 0.001$ [cpi13] Mesiaal: [cpi14] I: van 5.55 tot 1.98 C: van 4.63 tot 3.63 $p < 0.001$ Distaal:	Laag	Cruciaal

								I: van 5.41 tot 1.96 C: van 4.45 tot 3.63 p < 0.001		
Adjunctive augmentative therapy: BOP in augmentation with autogenous bone and a collagen membrane (I) versus bovine-derived xenocraft and a collagen membrane (C), after 12 months										
1 [cpi15]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	50	Afname: I: 44.8% C: 50.4% NS	Zeer laag	Cruciaal
Adjunctive augmentative therapy: PD in augmentation with autogenous bone and a collagen membrane (I) versus bovine-derived xenocraft and a collagen membrane (C), after 12 months										
1 [cpi15]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	50	Afname: I: 2.0 mm C: 3.1 mm p < 0.01	Zeer laag	Cruciaal
Adjunctive augmentative therapy: BL in augmentation with autogenous bone and a collagen membrane (I) versus bovine-derived xenocraft and a collagen membrane (C), after12 months										
1 [cpi15]	RCT	Serieus	Niet serieus	Niet serieus	Zeer serieus	Nee	50	I: 0.2 C: 1.1 p < 0.05	Zeer laag	Cruciaal

I interventiegroep
C controlegroep
BOP bleeding on probing
mBI mean bleeding index
(P)PD (probing)pocket depth
BL bone level
IF Implant failure