

## RECOMENDACIÓN T.6

### INFORME DE BÚSQUEDA Y SÍNTESIS DE EVIDENCIA DE EFECTOS DESEABLES E INDESEABLES Guía de Práctica Clínica Salud Oral Integral: Tratamiento y Rehabilitación Oral en Personas Adultas y Personas Mayores con Edentulismo Parcial o Total

#### A. PREGUNTA CLÍNICA

En personas con edentulismo total inferior ¿Se debe rehabilitar por medio de prótesis fija sobreimplante en comparación a rehabilitar por medio de sobredentadura implanto asistida (o implantosoportada)?

#### Análisis y definición de los componentes de la pregunta en formato PICO

**Población:** Personas con edentulismo total inferior.

**Intervención:** Rehabilitar por medio de prótesis fija sobre implante.

**Comparación:** Rehabilitar por medio de sobredentadura implanto asistida o implantosoportada

**Desenlace (outcome):** Calidad de vida relacionada con la salud oral, nivel de satisfacción del paciente, necesidad de rebasado de prótesis antagonista, complicaciones protésicas.

#### B. BÚSQUEDA DE EVIDENCIA

Se realizó una búsqueda general de revisiones sistemáticas asociadas al tema de “Edentulism”. Las bases de datos utilizadas fueron: Cochrane database of systematic reviews (CDSR); Database of Abstracts of Reviews of Effectiveness (DARE); HTA Database; PubMed; LILACS; CINAHL; PsycINFO; EMBASE; EPPI-Centre Evidence Library; 3ie Systematic Reviews and Policy Briefs Campbell Library; Clinical Evidence; SUPPORT Summaries; WHO institutional Repository for information Sharing; NICE public health guidelines and systematic reviews; ACP Journal Club; Evidencias en Pediatría; y The JBI Database of Systematic Reviews and implementation Reports. No se aplicaron restricciones en base al idioma o estado de publicación. Dos revisores de manera independiente realizaron la selección de los títulos y los resúmenes, la evaluación del texto completo y la extracción de datos. Un investigador experimentado resolvió cualquier discrepancia entre los distintos revisores. En caso de considerarse necesario, se integraron estudios primarios.

Seleccionadas las revisiones sistemáticas o estudios primarios asociadas a la temática, se clasificaron en función de las potenciales preguntas a las que daban respuesta. Al momento de definir la pregunta la evidencia ya se encontraba previamente clasificada según intervenciones comparadas. Los resultados se encuentran alojados en la plataforma Living Overview of the Evidence (L-OVE), sistema que permite la actualización periódica de la evidencia.

## C. SÍNTESIS DE EVIDENCIA

### Resumen de la evidencia identificada

Se identificaron 7 revisiones sistemáticas que incluyen 208 estudios primarios, de los cuales 29 corresponden a ensayos aleatorizados. Para más detalle ver “*Matriz de evidencia*”<sup>1</sup>, en el siguiente enlace: [Prótesis fija sobre implante versus sobredentadura implanto asistida o implanto soportada en desdentado total](#)

Tabla 1: Resumen de la evidencia seleccionada

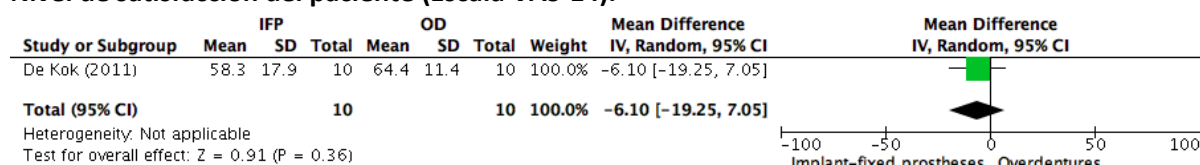
Revisión Sistemática	7 [1-7].
Estudios primarios	30 ensayos aleatorizados [8-37] y 179 observacionales [38-216].

### Estimador del efecto

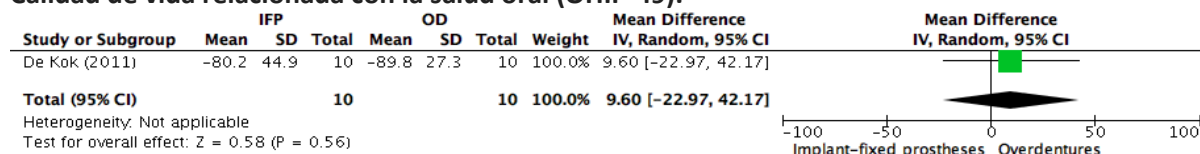
Se realizó un análisis de la matriz de evidencia, observando que dos revisiones [5,7] incluyeron los ensayos aleatorizados relevantes [9,27]. El resto de los ensayos fueron excluidos ya que realizaban comparaciones entre distintos sistemas de anclaje, el número y tipo de implantes que asisten la sobredentadura o prótesis fija [8,10-26,28-30]. Ninguna de las revisiones realizó un metanálisis ni reportó todos los resultados de los estudios, por lo que se extrajeron los datos directamente desde los estudios primarios. Los estudios observacionales tampoco fueron incorporados en el análisis, ya que su inclusión no mejoraba la certeza de la evidencia ni entregaba información adicional [38-216].

### Metanálisis

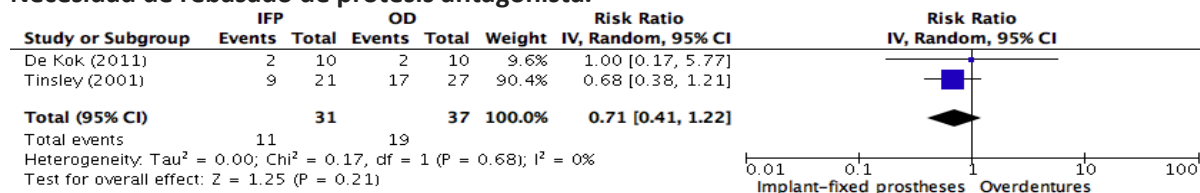
#### Nivel de satisfacción del paciente (Escala VAS-14).



#### Calidad de vida relacionada con la salud oral (OHIP-49).



#### Necesidad de rebasado de prótesis antagonista.



<sup>1</sup> **Matriz de Evidencia**, tabla dinámica que grafica el conjunto de evidencia existente para una pregunta (en este caso, la pregunta del presente informe). Las filas representan las revisiones sistemáticas y las columnas los estudios primarios que estas revisiones han identificado. Los recuadros en verde corresponden a los estudios incluidos en cada revisión. La matriz se actualiza periódicamente, incorporando nuevas revisiones sistemáticas pertinentes y los respectivos estudios primarios.

**Tabla de Resumen de Resultados (Summary of Findings)**

REHABILITAR POR MEDIO DE PRÓTESIS FIJA SOBRE IMPLANTE PARA EDENTULISMO TOTAL INFERIOR.						
Pacientes	Personas con edentulismo total inferior.					
Intervención	Rehabilitar por medio de prótesis fija sobre implante.					
Comparación	Rehabilitar por medio de sobredentadura implanto asistida o implanto soportada					
Desenlaces	Efecto relativo (IC 95%) -- Estudios/ pacientes	Efecto absoluto estimado*			Certeza de la evidencia (GRADE)	Mensajes clave en términos sencillos
		Sobredentadura implanto asistida	Prótesis fija sobre implantes	Diferencia (IC 95%)		
Calidad de vida relacionada con la salud oral**	-- 1 ensayo / 20 pacientes [9]	89,8 puntos menos	80,2 puntos menos	DM: 9,6 peor (22,97 mejor a 41,17 peor)	⊕○○○ <sup>1,2</sup> Muy baja	Rehabilitar con prótesis fija sobre implante podría empeorar la calidad de vida en comparación a rehabilitar con prótesis implantoasistida. Sin embargo, existe considerable incertidumbre dado que la certeza de la evidencia es muy baja.
Nivel de satisfacción del paciente***	-- 1 ensayo / 20 pacientes [9]	64,4 puntos	58,3 puntos	DM: 6,1 menos (19,25 menos a 7,05 más)	⊕○○○ <sup>1,2</sup> Muy baja	Rehabilitar con prótesis fija sobre implante podría disminuir el nivel de satisfacción en comparación a rehabilitar con prótesis implantoasistida. Sin embargo, existe considerable incertidumbre dado que la certeza de la evidencia es muy baja.
Necesidad de rebasado de prótesis antagonista	RR 0,71 (0,41 a 1,22) -- 2 ensayos / 68 pacientes [9,27].	514 por 1000	365 por 1000	Diferencia: 149 menos (303 menos a 113 más)	⊕○○○ <sup>1,2</sup> Muy baja	Rehabilitar con prótesis fija sobre implante podría disminuir la necesidad de rebasado de la prótesis antagonista en comparación a rehabilitar con prótesis implantoasistida. Sin embargo, existe considerable incertidumbre dado que la certeza de la evidencia es muy baja.
Complicaciones protésicas	-- 2 ensayos / 68 pacientes [9,27].	Un estudio [9] reportó 25 eventos de desajuste protésico en el grupo intervención versus 30 eventos en el grupo control a los 12 meses de seguimiento.  En otro estudio [27], en 5 y 17 casos tuvieron que rehacerse las prótesis en el grupo intervención y control respectivamente a los 4 años de seguimiento.			⊕○○○ <sup>1,2</sup> Muy baja	Rehabilitar con prótesis fija sobre implante podría tener poco impacto en la incidencia de complicaciones protésicas en comparación a rehabilitar con prótesis implantoasistida. Sin embargo, existe considerable incertidumbre dado que la certeza de la evidencia es muy baja.

GRADE: Grados de evidencia Grading of Recommendations Assessment, Development and Evaluation.

DM: diferencia de media// RR: Riesgo relativo // IC 95%: Intervalo de confianza del 95%

\*\*La calidad de vida relacionada con la salud oral fue medida el uso de la versión de 49 elementos del Perfil de impacto en la salud oral (OHIP-49). Este cuestionario consta de 49 ítems que cubren siete dominios: limitación funcional, dolor físico, malestar psicológico, discapacidad física, discapacidad psicológica, discapacidad social y discapacidad. Estos ítems son puntuados de 0 a 4, desde nunca (0) a muy a menudo (4).

\*\*\*Las opiniones de los pacientes sobre sus prótesis actuales en términos de satisfacción general, retención y estabilidad, masticación, higiene bucal, comodidad, habla y estética se evaluaron mediante una escala visual análoga (VAS-14). Cada escala usó una línea de 100 mm con "completa insatisfacción" en un extremo de la línea y "completa satisfacción" en el otro.

<sup>1</sup> Se disminuyó un nivel de certeza por riesgo de sesgo, ya que ambos ensayos presentan problemas en la asignación de la secuencia aleatoria y el ocultamiento de esta.

<sup>2</sup> Se disminuyó dos niveles de certeza de evidencia por imprecisión, ya que cada extremo del intervalo de confianza conlleva a decisiones opuestas, o en los casos en que no se cuenta con un intervalo, se trata de estudios con baja cantidad de pacientes.

**Fecha de elaboración de la tabla:** Enero, 2019.

## Referencias

1. Berglundh T, Persson L, Klinge B. A systematic review of the incidence of biological and technical complications in implant dentistry reported in prospective longitudinal studies of at least 5 years. *Journal of clinical periodontology*. 2002;29 Suppl 3:197-212; discussion 232-3.
2. Selim K, Ali S, Reda A. Implant Supported Fixed Restorations versus Implant Supported Removable Overdentures: A Systematic Review. *Open access Macedonian journal of medical sciences*. 2016;4(4):726-732.
3. Boven GC, Raghoebar GM, Vissink A, Meijer HJ. Improving masticatory performance, bite force, nutritional state and patient's satisfaction with implant overdentures: a systematic review of the literature. *Journal of oral rehabilitation*. 2015;42(3):220-33.
4. Yao CJ, Cao C, Bornstein MM, Mattheos N. Patient-reported outcome measures of edentulous patients restored with implant-supported removable and fixed prostheses: A systematic review. *Clinical oral implants research*. 2018;29 Suppl 16:241-254.
5. Ibrahim Ibrahim W, ElKhadem Hosny A, Alqutaibi Yaseen A, Kaddah Fathy A. Prosthodontic Maintenance of Fixed Implant Restorations vs. Implant Overdentures: A Systematic Review. *Indian Journal of Science and Technology*. 2016;9(45).
6. Kern JS, Kern T, Wolfart S, Heussen N. A systematic review and meta-analysis of removable and fixed implant-supported prostheses in edentulous jaws: post-loading implant loss. *Clinical oral implants research*. 2016;27(2):174-95.
7. Goodacre C, Goodacre B. Fixed vs removable complete arch implant prostheses: A literature review of prosthodontic outcomes. *European journal of oral implantology*. 2017;10 Suppl 1:13-34.
8. Walton JN, MacEntee MI, Glick N. One-year prosthetic outcomes with implant overdentures: a randomized clinical trial. *The International journal of oral & maxillofacial implants*. 2002;17(3):391-8.
9. De Kok IJ, Chang KH, Lu TS, Cooper LF. Comparison of three-implant-supported fixed dentures and two-implant-retained overdentures in the edentulous mandible: a pilot study of treatment efficacy and patient satisfaction. *The International journal of oral & maxillofacial implants*. 2011;26(2):415-26.
10. Raghoebar GM, Meijer HJ, van 't Hof M, Stegenga B, Vissink A. A randomized prospective clinical trial on the effectiveness of three treatment modalities for patients with lower denture problems. A 10 year follow-up study on patient satisfaction. *International journal of oral and maxillofacial surgery*. 2003;32(5):498-503.
11. Gjengedal H, Berg E, Gronningsaeter AG, Dahl L, Malde MK, Boe OE, Trovik TA. The influence of relining or implant retaining existing mandibular dentures on health-related quality of life: a 2-year randomized study of dissatisfied edentulous patients. *The International journal of prosthodontics*. 2013;26(1):68-78.
12. Cehreli M.C., Uysal S. & Akca K.. Marginal bone level changes and prosthetic maintenance of mandibular overdentures supported by 2 implants: a 5-year randomized clinical trial. *Clinical Implant Dentistry and Related Research*. 2010;12:114-121.
13. Naert I, Gizani S, Vuylsteke M, van Steenberghe D. A 5-year randomized clinical trial on the influence of splinted and unsplinted oral implants in the mandibular overdenture therapy. Part I: Peri-implant outcome. *Clinical oral implants research*. 1998;9(3):170-7.
14. Müller F, Duvernay E, Loup A, Vazquez L, Herrmann FR, Schimmel M. Implant-supported mandibular overdentures in very old adults: a randomized controlled trial. *Journal of dental research*. 2013;92(12 Suppl):154S-60S.
15. Krennmaier G, Seemann R, Fazekas A, Ewers R, Piehslinger E. Patient preference and satisfaction with implant-supported mandibular overdentures retained with ball or locator attachments: a crossover clinical trial. *The International journal of oral & maxillofacial implants*. 2012;27(6):1560-8.
16. Boerrigter EM, Geertman ME, Van Oort RP, Bouma J, Raghoebar GM, van Waas MA, van't Hof MA, Boering G, Kalk W. Patient satisfaction with implant-retained mandibular overdentures. A comparison with new complete dentures not retained by implants--a multicentre randomized clinical trial. *The British journal of oral & maxillofacial surgery*. 1995;33(5):282-8.

17. Meijer HJ, Raghoobar GM, Van't Hof MA, Visser A. A controlled clinical trial of implant-retained mandibular overdentures: 10 years' results of clinical aspects and aftercare of IMZ implants and Brånemark implants. *Clinical oral implants research*. 2004;15(4):421-7.
18. Stoker G, van Waas R, Wismeijer D. Long-term outcomes of three types of implant-supported mandibular overdentures in smokers. *Clinical oral implants research*. 2012;23(8):925-9.
19. Gjengedal H, Dahl L, Lavik A, Trovik TA, Berg E, Boe OE, Malde MK. Randomized clinical trial comparing dietary intake in patients with implant-retained overdentures and conventionally relined denture. *The International journal of prosthodontics*. 2012;25(4):340-7.
20. van der Bilt A, van Kampen FM, Cune MS. Masticatory function with mandibular implant-supported overdentures fitted with different attachment types. *European journal of oral sciences*. 2006;114(3):191-6.
21. Olsson M, Gunne J, Astrand P, Borg K. Bridges supported by free-standing implants versus bridges supported by tooth and implant. A five-year prospective study. *Clinical oral implants research*. 1995;6(2):114-21.
22. Pan S, Awad M, Thomason JM, Dufresne E, Kobayashi T, Kimoto S, Wollin SD, Feine JS. Sex differences in denture satisfaction. *Journal of dentistry*. 2008;36(5):301-8.
23. Heijdenrijk K, Raghoobar GM, Meijer HJ, Stegenga B, van der Reijden WA. Feasibility and influence of the microgap of two implants placed in a non-submerged procedure: a five-year follow-up clinical trial. *Journal of periodontology*. 2006;77(6):1051-60.
24. Jabbour Z, Emami E, Grandmont P, Rompré PH, Feine JS. Is oral health-related quality of life stable following rehabilitation with mandibular two-implant overdentures. 2012;23:1205-09.
25. Meijer HJ, Raghoobar GM, Batenburg RH, Vissink A. Mandibular overdentures supported by two Brånemark, IMZ or ITI implants: a ten-year prospective randomized study. *Journal of clinical periodontology*. 2009;36(9):799-806.
26. Palmqvist S, Owall B, Schou S. A prospective randomized clinical study comparing implant-supported fixed prostheses and overdentures in the edentulous mandible: prosthodontic production time and costs. *The International journal of prosthodontics*. 2004;17(2):231-5.
27. Tinsley D, Watson CJ, Russell JL. A comparison of hydroxylapatite coated implant retained fixed and removable mandibular prostheses over 4 to 6 years. *Clinical oral implants research*. 2001;12(2):159-66.
28. Naert I, Gizani S, Vuylsteke M, Van Steenberghe D. A 5-year prospective randomized clinical trial on the influence of splinted and unsplinted oral implants retaining a mandibular overdenture: prosthetic aspects and patient satisfaction. *Journal of oral rehabilitation*. 1999;26(3):195-202.
29. Walton JN, Glick N, Macentee MI. A randomized clinical trial comparing patient satisfaction and prosthetic outcomes with mandibular overdentures retained by one or two implants. *The International journal of prosthodontics*. 2009;22(4):331-9.
30. Awad MA, Morais JA, Wollin S, Khalil A, Gray-Donald K, Feine JS. Implant overdentures and nutrition: a randomized controlled trial. *Journal of dental research*. 2012;91(1):39-46.
31. Kronstrom M, Davis B, Loney R, Gerrow J, Hollender L. A prospective randomized study on the immediate loading of mandibular overdentures supported by one or two implants; a 3 year follow-up report. 2014;16:323-29.
32. Elsyad M.A., Al-Mahdy Y.F. & Fouad M.M.. Marginal bone loss adjacent to conventional and immediate loaded two implants supporting a ball-retained mandibular overdenture: a 3-year randomized clinical trial. *Clinical Oral Implants Research*. 2012;23:496-503.
33. Wismeijer D, Van Waas MA, Vermeeren JI, Mulder J, Kalk W. Patient satisfaction with implant-supported mandibular overdentures. A comparison of three treatment strategies with ITI-dental implants. *International journal of oral and maxillofacial surgery*. 1997;26(4):263-7.
34. Heydecke G, Penrod JR, Takanashi Y, Lund JP, Feine JS, Thomason JM. Cost-effectiveness of mandibular two-implant overdentures and conventional dentures in the edentulous elderly. *Journal of dental research*. 2005;84(9):794-9.

35. Awad MA, Locker D, Korner-Bitensky N, Feine JS. Measuring the effect of intra-oral implant rehabilitation on health-related quality of life in a randomized controlled clinical trial. *Journal of dental research*. 2000;79(9):1659-63.
36. Kapur KK, Garrett NR, Hamada MO, Roumanas ED, Freymiller E, Han T, Diener RM, Levin S, Wong WK. Randomized clinical trial comparing the efficacy of mandibular implant-supported overdentures and conventional dentures in diabetic patients. Part III: comparisons of patient satisfaction. *The Journal of prosthetic dentistry*. 1999;82(4):416-27.
37. Meijer HJ, Raghoobar GM, Van 't Hof MA, Visser A, Geertman ME, Van Oort RP. A controlled clinical trial of implant-retained mandibular overdentures; five-years' results of clinical aspects and aftercare of IMZ implants and Brånemark implants. *Clinical oral implants research*. 2000;11(5):441-7.
38. Mertens C., Steveling H.G., Stucke K., Pretzl B. & Meyer-Bäumer A. Fixed implant-retained rehabilitation of the edentulous maxilla: 11-year results of a prospective study. *Clinical Implant Dentistry and Related Research*. 2012;14:464-472.
39. Chiapasco M, Gatti C. Implant-retained mandibular overdentures with immediate loading: a 3- to 8-year prospective study on 328 implants. *Clinical implant dentistry and related research*. 2003;5(1):29-38.
40. Andersson B, Odman P, Lindvall AM, Brånemark PI. Cemented single crowns on osseointegrated implants after 5 years: results from a prospective study on CeraOne. *The International journal of prosthodontics*. 1998;11(3):212-8.
41. Haraldson T, Jemt T, Stålblad PA, Lekholm U. Oral function in subjects with overdentures supported by osseointegrated implants. *Scandinavian journal of dental research*. 1988;96(3):235-42.
42. Walton JN, MacEntee MI. A prospective study on the maintenance of implant prostheses in private practice. *The International journal of prosthodontics*. 1997;10(5):453-8.
43. Eliasson A., Narby B., Ekstrand K., Hirsch J., Johansson A. & Wennerberg A.. A 5-year prospective clinical study of submerged and nonsubmerged Paragon system implants in the edentulous mandible. *The International Journal of Prosthodontics*. 2010;23:231-238.
44. Stellingsma K, Bouma J, Stegenga B, Meijer HJ, Raghoobar GM. Satisfaction and psychosocial aspects of patients with an extremely resorbed mandible treated with implant-retained overdentures. A prospective, comparative study. *Clinical oral implants research*. 2003;14(2):166-72.
45. Allen PF, McMillan AS, Walshaw D. A patient-based assessment of implant-stabilized and conventional complete dentures. *The Journal of prosthetic dentistry*. 2001;85(2):141-7.
46. Nyström E, Nilson H, Gunne J, Lundgren S. Reconstruction of the atrophic maxilla with interpositional bone grafting/Le Fort I osteotomy and endosteal implants: a 11-16 year follow-up. *International journal of oral and maxillofacial surgery*. 2009;38(1):1-6.
47. Zarb GA, Schmitt A. The longitudinal clinical effectiveness of osseointegrated dental implants: the Toronto study. Part I: Surgical results. *The Journal of prosthetic dentistry*. 1990;63(4):451-7.
48. van der Bilt A, Burgers M, van Kampen FM, Cune MS. Mandibular implant-supported overdentures and oral function. *Clinical oral implants research*. 2010;21(11):1209-13.
49. Walton JN, MacEntee MI. A retrospective study on the maintenance and repair of implant-supported prostheses. *The International journal of prosthodontics*. 1993;6(5):451-5.
50. Örtorp A, Jemt T. CNC-milled titanium frameworks supported by implants in the edentulous jaw: a 10-year comparative clinical study. *Clinical implant dentistry and related research*. 2012;14(1):88-99.
51. De Santis D, Trevisiol L, D'Agostino A, Cucchi A, De Gemmis A, Nocini PF. Guided bone regeneration with autogenous block grafts applied to Le Fort I osteotomy for treatment of severely resorbed maxillae: a 4- to 6-year prospective study. *Clinical oral implants research*. 2012;23(1):60-9.
52. Steflik DE, Koth DL, Robinson FG, McKinney RV, Davis BC, Morris CF, Davis QB. Prospective investigation of the single-crystal sapphire endosteal dental implant in humans: ten-year results. *The Journal of oral implantology*. 1995;21(1):8-18.

53. Quirynen M, Alsaadi G, Pauwels M, Haffajee A, van Steenberghe D, Naert I. Microbiological and clinical outcomes and patient satisfaction for two treatment options in the edentulous lower jaw after 10 years of function. *Clinical oral implants research*. 2005;16(3):277-87.
54. Polizzi G, Grunder U, Goené R, Hatano N, Henry P, Jackson WJ, Kawamura K, Renouard F, Rosenberg R, Triplett G, Werbit M, Lithner B. Immediate and delayed implant placement into extraction sockets: a 5-year report. *Clinical implant dentistry and related research*. 2000;2(2):93-9.
55. Testori T, Del Fabbro M, Galli F, Francetti L, Taschieri S, Weinstein R. Immediate occlusal loading the same day or the after implant placement: comparison of 2 different time frames in total edentulous lower jaws. *The Journal of oral implantology*. 2004;30(5):307-13.
56. Attard NJ, Diacono M. Early loading of fixture original implants with mandibular overdentures--a preliminary report on a prospective study. *The International journal of prosthodontics*. 2010;23(6):507-12.
57. Castillo-Oyagüe R, Suárez-García MJ, Perea C, Río JD, Lynch CD, Gonzalo E, Torres-Lagares D, Preciado A. Validation of a new, specific, complete, and short OHRQoL scale (QoLFAST-10) for wearers of implant overdentures and fixed-detachable hybrid prostheses. *Journal of dentistry*. 2016;49:22-32.
58. Cannizzaro G, Leone M, Esposito M. Immediate functional loading of implants placed with flapless surgery in the edentulous maxilla: 1-year follow-up of a single cohort study. *The International journal of oral & maxillofacial implants*. 2007;22(1):87-95.
59. Krennmair G., Suto D., Seemann R. & Piehslinger E.. Removable four implant-supported mandibular overdentures rigidly retained with telescopic crowns or milled bars: a 3-year prospective study. *Clinical Oral Implants Research*. 2012;23:481-488.
60. Palmer RM, Palmer PJ, Smith BJ. A 5-year prospective study of Astra single tooth implants. *Clinical oral implants research*. 2000;11(2):179-82.
61. Cibirka RM, Razzoog M, Lang BR. Critical evaluation of patient responses to dental implant therapy. *The Journal of prosthetic dentistry*. 1997;78(6):574-81.
62. Van de Velde T, Collaert B, De Bruyn H. Immediate loading in the completely edentulous mandible: technical procedure and clinical results up to 3 years of functional loading. *Clinical oral implants research*. 2007;18(3):295-303.
63. de Jong MH, Wright PS, Meijer HJ, Tymstra N. Posterior mandibular residual ridge resorption in patients with overdentures supported by two or four endosseous implants in a 10-year prospective comparative study. *The International journal of oral & maxillofacial implants*. 2010;25(6):1168-74.
64. Arvidson K, Esselin O, Felle-Persson E, Jonsson G, Smedberg JI, Soderstrom U. Early loading of mandibular full-arch bridges screw retained after 1 week to four to five Monotype implants: 3-year results from a prospective multicentre study. *Clinical oral implants research*. 2008;19(7):693-703.
65. Walton JN, MacEntee MI. Problems with prostheses on implants: a retrospective study. *The Journal of prosthetic dentistry*. 1994;71(3):283-8.
66. Fischer K, Stenberg T. Prospective 10-year cohort study based on a randomized controlled trial (RCT) on implant-supported full-arch maxillary prostheses. Part 1: sandblasted and acid-etched implants and mucosal tissue. *Clinical implant dentistry and related research*. 2012;14(6):808-15.
67. Timmerman R, Stoker GT, Wismeijer D, Oosterveld P, Vermeeren JI, van Waas MA. An eight-year follow-up to a randomized clinical trial of participant satisfaction with three types of mandibular implant-retained overdentures. *Journal of dental research*. 2004;83(8):630-3.
68. Geertman ME, Boerrigter EM, Van't Hof MA, Van Waas MA, van Oort RP, Boering G, Kalk W. Two-center clinical trial of implant-retained mandibular overdentures versus complete dentures--chewing ability. *Community dentistry and oral epidemiology*. 1996;24(1):79-84.
69. Buser D, Mericske-Stern R, Bernard JP, Behneke A, Behneke N, Hirt HP, Belser UC, Lang NP. Long-term evaluation of non-submerged ITI implants. Part 1: 8-year life table analysis of a prospective multi-center study with 2359 implants. *Clinical oral implants research*. 1997;8(3):161-72.

70. Zitzmann NU, Marinello CP. [Patient satisfaction with removable implant-supported prostheses in the edentulous mandible]. *Schweizer Monatsschrift fur Zahnmedizin = Revue mensuelle suisse d'odontostomatologie = Rivista mensile svizzera di odontologia e stomatologia*. 2006;116(3):237-44.
71. Katsoulis J, Brunner A, Mericske-Stern R. Maintenance of implant-supported maxillary prostheses: a 2-year controlled clinical trial. *The International journal of oral & maxillofacial implants*. 2011;26(3):648-56.
72. Mengel R, Schröder T, Flores-de-Jacoby L. Osseointegrated implants in patients treated for generalized chronic periodontitis and generalized aggressive periodontitis: 3- and 5-year results of a prospective long-term study. *Journal of periodontology*. 2001;72(8):977-89.
73. Jemt T, Lindquist L, Hedegard B. Changes in chewing patterns of patients with complete dentures after placement of osseointegrated implants in the mandible. *The Journal of prosthetic dentistry*. 1985;53(4):578-83.
74. Covani U., Orlando B., D'Ambrosio A., Sabattini V.B. & Barone A. Immediate rehabilitation of completely edentulous jaws with fixed prostheses supported by implants placed into fresh extraction sockets and in healed sites: a 4-year clinical evaluation. *Implant Dentistry*. 2012;21:272-279.
75. Jemt T, Stålblad PA. The effect of chewing movements on changing mandibular complete dentures to osseointegrated overdentures. *The Journal of prosthetic dentistry*. 1986;55(3):357-61.
76. Liddelow GJ, Henry PJ. A prospective study of immediately loaded single implant-retained mandibular overdentures: preliminary one-year results. *The Journal of prosthetic dentistry*. 2007;97(6 Suppl):S126-37.
77. Schwarz S, Gabbert O, Hassel AJ, Schmitter M, Séché C, Rammelsberg P. Early loading of implants with fixed dental prostheses in edentulous mandibles: 4.5-year clinical results from a prospective study. *Clinical oral implants research*. 2010;21(3):284-9.
78. Lundqvist S. Speech and other oral functions. Clinical and experimental studies with special reference to maxillary rehabilitation on osseointegrated implants. *Swedish dental journal. Supplement*. 1993;91:1-39.
79. Burns DR, Unger JW, Coffey JP, Waldrop TC, Elswick RK. Randomized, prospective, clinical evaluation of prosthodontic modalities for mandibular implant overdenture treatment. *The Journal of prosthetic dentistry*. 2011;106(1):12-22.
80. Zitzmann NU, Marinello CP. Treatment outcomes of fixed or removable implant-supported prostheses in the edentulous maxilla. Part I: patients' assessments. *The Journal of prosthetic dentistry*. 2000;83(4):424-33.
81. Raghoobar GM, Friberg B, Grunert I, Hobkirk JA, Tepper G, Wendelhag I. 3-year prospective multicenter study on one-stage implant surgery and early loading in the edentulous mandible. *Clinical implant dentistry and related research*. 2003;5(1):39-46.
82. Alfadda SA, Attard NJ, David LA. Five-year clinical results of immediately loaded dental implants using mandibular overdentures. *The International journal of prosthodontics*. 2009;22(4):368-73.
83. Cooper L.F., Moriarty J.D., Guckes A.D., Klee L.B., Smith R.G., Almgren C. & Felton D.A.. Five-year prospective evaluation of mandibular overdentures retained by two microthreaded, TiOblast nonsplinted implants and retentive ball anchors. *The International Journal of Oral and Maxillofacial Implants*. 2008;23:696-704.
84. Carlsson GE, Lindquist LW, Jemt T. Long-term marginal periimplant bone loss in edentulous patients. *The International journal of prosthodontics*. 2000;13(4):295-302.
85. Lekholm, U. J., Van Steenberghe, D., Herrman, I., Bolender, C., Folmer, T., Gunne, J., Henry, P., Higuchi, K., Laney, W. & Linden, U.. Osseointegrated implants in the treatment of partially edentulous jaws: a prospective 5-year multicenter study. 1995;
86. Watson RM, Davis DM. Follow up and maintenance of implant supported prostheses: a comparison of 20 complete mandibular overdentures and 20 complete mandibular fixed cantilever prostheses. *British dental journal*. 1996;181(9):321-7.
87. Jofre J, Castiglioni X, Lobos CA. Influence of minimally invasive implant-retained overdenture on patients' quality of life: a randomized clinical trial. *Clinical oral implants research*. 2013;24(10):1173-7.



88. Benzing U, Weber H, Simonis A, Engel E. Changes in chewing patterns after implantation in the edentulous mandible. *The International journal of oral & maxillofacial implants*. 1994;9(2):207-13.
89. Heschl A, Payer M, Clar V, Stopper M, Wegscheider W, Lorenzoni M. Overdentures in the edentulous mandible supported by implants and retained by a Dolder bar: a 5-year prospective study. *Clinical implant dentistry and related research*. 2013;15(4):589-99.
90. MacEntee MI, Walton JN. The economics of complete dentures and implant-related services: a framework for analysis and preliminary outcomes. *The Journal of prosthetic dentistry*. 1998;79(1):24-30.
91. Rodriguez AM, Orenstein IH, Morris HF, Ochi S. Survival of various implant-supported prosthesis designs following 36 months of clinical function. *Annals of periodontology / the American Academy of Periodontology*. 2000;5(1):101-8.
92. Van Lierde KM, Browaeys H, Corthals P, Matthys C, Mussche P, Van Kerckhove E, De Bruyn H. Impact of fixed implant prosthetics using the 'all-on-four' treatment concept on speech intelligibility, articulation and oromyofunctional behaviour. *International journal of oral and maxillofacial surgery*. 2012;41(12):1550-7.
93. Feine JS, Maskawi K, de Grandmont P, Donohue WB, Tanguay R, Lund JP. Within-subject comparisons of implant-supported mandibular prostheses: evaluation of masticatory function. *Journal of dental research*. 1994;73(10):1646-56.
94. Jemt T, Lekholm U. Oral implant treatment in posterior partially edentulous jaws: a 5-year follow-up report. *The International journal of oral & maxillofacial implants*. 1993;8(6):635-40.
95. Naert I, Gizani S. & van Steenberghe D.. Rigidly splinted implants in the resorbed maxilla to retain a hinging overdenture: a series of clinical reports for up to 4 years. *Journal of Prosthetic Dentistry*. 1998;79:156-164.
96. Blomberg S, Lindquist LW. Psychological reactions to edentulousness and treatment with jawbone-anchored bridges. *Acta psychiatrica Scandinavica*. 1983;68(4):251-62.
97. Brägger U, Aeschlimann S, Bürgin W, Hämmerle CH, Lang NP. Biological and technical complications and failures with fixed partial dentures (FPD) on implants and teeth after four to five years of function. *Clinical oral implants research*. 2001;12(1):26-34.
98. Deporter D, Watson P, Pharoah M, Levy D, Todescan R. Five- to six-year results of a prospective clinical trial using the ENDOPORE dental implant and a mandibular overdenture. *Clinical oral implants research*. 1999;10(2):95-102.
99. Vroom MG, Sipos P, de Lange GL, Gründemann LJ, Timmerman MF, Loos BG, van der Velden U. Effect of surface topography of screw-shaped titanium implants in humans on clinical and radiographic parameters: a 12-year prospective study. *Clinical oral implants research*. 2009;20(11):1231-9.
100. Cordioli G, Majzoub Z, Castagna S. Mandibular overdentures anchored to single implants: a five-year prospective study. *The Journal of prosthetic dentistry*. 1997;78(2):159-65.
101. De Bruyn H., Van de Velde T. & Collaert B.. Immediate functional loading of TiOblast dental implants in full-arch edentulous mandibles: a 3-year prospective study. *Clinical Oral Implants Research*. 2008;19:717-723.
102. Lethaus B., Kälber J., Patrin G., Brandstätter A. & Weingart D.. Early loading of sandblasted and acid-etched titanium implants in the edentulous mandible: a prospective 5-year study. *The International Journal of Oral and Maxillofacial Implants*. 2011;26:887-892.
103. Pera P, Bucca C, Borro P, Bernocco C, De LA, Carossa S. Influence of mastication on gastric emptying. *Journal of dental research*. 2002;81(3):179-81.
104. Collaert B. & De Bruyn H.. Immediate functional loading of TiOblast dental implants in full-arch edentulous maxillae: a 3-year prospective study. *Clinical Oral Implants Research*. 2008;19:1254-1260.
105. Slot W, Raghoobar GM, Cune MS, Vissink A, Meijer HJ. Maxillary overdentures supported by four or six implants in the anterior region: 5-year results from a randomized controlled trial. *Journal of clinical periodontology*. 2016;43(12):1180-1187.
106. Fartash, Bahman, Arvidson, Kristina. Long-term evaluation of single crystal sapphire implants as abutments in fixed prosthodontics. *Clinical Oral Implants Research*. 1997;8(1):58-67.
107. Smedberg JI, Nilner K, Frykholm A. A six-year follow-up study of maxillary overdentures on osseointegrated implants. *The European journal of prosthodontics and restorative dentistry*. 1999;7(2):51-6.

108. Krennmair G., Krainhofner M. & Piehslinger E.. The influence of bar design (round versus milled bar) on prosthodontic maintenance of mandibular overdentures supported by 4 implants: a 5-year prospective study. *The International Journal of Prosthodontics*. 2008;21:514-520.
109. Guljé F, Raghoebar GM, Ter Meulen JW, Vissink A, Meijer HJ. Mandibular overdentures supported by 6-mm dental implants: a 1-year prospective cohort study. *Clinical implant dentistry and related research*. 2012;14 Suppl 1:e59-66.
110. Lindquist LW, Carlsson GE, Jemt T. A prospective 15-year follow-up study of mandibular fixed prostheses supported by osseointegrated implants. Clinical results and marginal bone loss. *Clinical oral implants research*. 1996;7(4):329-36.
111. Muller K, Morais J, Feine J. Nutritional and anthropometric analysis of edentulous patients wearing implant overdentures or conventional dentures. *Brazilian dental journal*. 2008;19(2):145-50.
112. Zitzmann NU, Marinello CP. Treatment outcomes of fixed or removable implant-supported prostheses in the edentulous maxilla. Part II: clinical findings. *The Journal of prosthetic dentistry*. 2000;83(4):434-42.
113. Arvidson K, Bystedt H, Frykholm A, von Konow L, Lothigius E. Five-year prospective follow-up report of the Astra Tech Dental Implant System in the treatment of edentulous mandibles. *Clinical oral implants research*. 1998;9(4):225-34.
114. Zani SR, Rivaldo EG, Frasca LC, Caye LF. Oral health impact profile and prosthetic condition in edentulous patients rehabilitated with implant-supported overdentures and fixed prostheses. *Journal of oral science*. 2009;51(4):535-43.
115. Davis DM, Packer ME. Mandibular overdentures stabilized by Astra Tech implants with either ball attachments or magnets: 5-year results. *The International journal of prosthodontics*. 2000;12(3):222-9.
116. da Silva RJ, Issa JP, Semprini M, da Silva CH, de Vasconcelos PB, Celino CA, Siéssere S, Regalo SC. Clinical feasibility of mandibular implant overdenture retainers submitted to immediate load. *Gerodontology*. 2011;28(3):227-32.
117. Pera P, Bassi F, Schierano G, Appendino P, Preti G. Implant anchored complete mandibular denture: evaluation of masticatory efficiency, oral function and degree of satisfaction. *Journal of oral rehabilitation*. 1998;25(6):462-7.
118. Akoglu B, Ucankale M, Ozkan Y, Kulak-Ozkan Y. Five-year treatment outcomes with three brands of implants supporting mandibular overdentures. *The International journal of oral & maxillofacial implants*. 2011;26(1):188-94.
119. Wyatt CC, Zarb GA. Treatment outcomes of patients with implant-supported fixed partial prostheses. *The International journal of oral & maxillofacial implants*. 1998;13(2):204-11.
120. Fartash B, Tangerud T, Silness J, Arvidson K. Rehabilitation of mandibular edentulism by single crystal sapphire implants and overdentures: 3-12 year results in 86 patients. A dual center international study. *Clinical oral implants research*. 1996;7(3):220-9.
121. Harle TJ, Anderson JD. Patient satisfaction with implant-supported prostheses. *The International journal of prosthodontics*. 1993;6(2):153-62.
122. Murphy WM, Absi EG, Gregory MC, Williams KR. A prospective 5-year study of two cast framework alloys for fixed implant-supported mandibular prostheses. *The International journal of prosthodontics*. 2002;15(2):133-8.
123. Engquist B., Astrand P., Anzén B., Dahlgren S., Engquist E., Feldmann H., Karlsson U., Nord P.G., Sahlholm S. & Svärdröm P.. Simplified methods of implant treatment in the edentulous lower jaw: a 3-year follow-up report of a controlled prospective study of one-stage versus two-stage surgery and early loading. *Clinical Implant Dentistry and Related Research*. 2005;7:95-104.
124. de Souza FI, de Souza Costa A, Dos Santos Pereira R, Dos Santos PH, de Brito RB, Rocha EP. Assessment of Satisfaction Level of Edentulous Patients Rehabilitated with Implant-Supported Prostheses. *The International journal of oral & maxillofacial implants*. 2016;31(4):884-90.
125. Watson R.M., Jemt T., Chai J., Harnett J., Heath M.R., Hutton J.E., Johns R.B., Lithner B., McKenna S., McNamara D.C., Naert I. & Taylor R. Prosthodontic treatment, patient response, and the need for

- maintenance of complete implant-supported overdentures: an appraisal of 5 years of prospective study. *The International Journal of Prosthodontics*. 1997;10:345-354.
126. Landa LS, Cho SC, Froum SJ, Elian N, Tarnow DP. A prospective 2-year clinical evaluation of overdentures attached to nonsplinted implants utilizing ERA attachments. *Practical procedures & aesthetic dentistry : PPAD*. 2001;13(2):151-6; quiz 158.
  127. Martín-Ares M, Barona-Dorado C, Guisado-Moya B, Martínez-Rodríguez N, Cortés-Bretón-Brinkmann J, Martínez-González JM. Prosthetic hygiene and functional efficacy in completely edentulous patients: satisfaction and quality of life during a 5-year follow-up. *Clinical oral implants research*. 2016;27(12):1500-1505.
  128. Koth DL, McKinney RV, Steflik DE, Davis QB. Clinical and statistical analyses of human clinical trials with the single crystal aluminum oxide endosteal dental implant: five-year results. *The Journal of prosthetic dentistry*. 1988;60(2):226-34.
  129. Jacobs R, Manders E, Van Looy C, Lembrechts D, Naert I, van Steenberghe D. Evaluation of speech in patients rehabilitated with various oral implant-supported prostheses. *Clinical oral implants research*. 2001;12(2):167-73.
  130. Meijer HJ, Raghoobar GM, Van 't Hof MA. Comparison of implant-retained mandibular overdentures and conventional complete dentures: a 10-year prospective study of clinical aspects and patient satisfaction. *The International journal of oral & maxillofacial implants*. 2003;18(6):879-85.
  131. Attard NJ, Laporte A, Locker D, Zarb GA. A prospective study on immediate loading of implants with mandibular overdentures: patient-mediated and economic outcomes. *The International journal of prosthodontics*. 2006;19(1):67-73.
  132. Henry PJ, Laney WR, Jemt T, Harris D, Krogh PH, Polizzi G, Zarb GA, Herrmann I. Osseointegrated implants for single-tooth replacement: a prospective 5-year multicenter study. *The International journal of oral & maxillofacial implants*. 1996;11(4):450-5.
  133. Slot W, Raghoobar GM, Vissink A, Meijer HJ. Maxillary overdentures supported by four or six implants in the anterior region; 1-year results from a randomized controlled trial. *Journal of clinical periodontology*. 2013;40(3):303-10.
  134. Jemt T. Fixed implant-supported prostheses in the edentulous maxilla. A five-year follow-up report. *Clinical oral implants research*. 1994;5(3):142-7.
  135. Behneke A, Behneke N, d'Hoedt B. The longitudinal clinical effectiveness of ITI solid-screw implants in partially edentulous patients: a 5-year follow-up report. *The International journal of oral & maxillofacial implants*. 2000;15(5):633-45.
  136. Bouma J, Boerrigter LM, Van Oort RP, van Sonderen E, Boering G. Psychosocial effects of implant-retained overdentures. *The International journal of oral & maxillofacial implants*. 1997;12(4):515-22.
  137. Mericske-Stern R, Grütter L, Rösch R, Mericske E. Clinical evaluation and prosthetic complications of single tooth replacements by non-submerged implants. *Clinical oral implants research*. 2001;12(4):309-18.
  138. Gotfredsen K, Holm B. Implant-supported mandibular overdentures retained with ball or bar attachments: a randomized prospective 5-year study. *The International journal of prosthodontics*. 2001;13(2):125-30.
  139. Carlsson GE, Lindquist LW. Ten-year longitudinal study of masticatory function in edentulous patients treated with fixed complete dentures on osseointegrated implants. *The International journal of prosthodontics*. 1994;7(5):448-53.
  140. Lorenzoni M., Stopper M., Vogl S. & Wegscheider W.A.. Sofort und konventionell versorgte Implantate im zahnlosen Unterkiefer. *Zeitschrift für Zahnärztliche Implantologie*. 2013;29:130-138.
  141. Sjöström M, Sennerby L, Nilson H, Lundgren S. Reconstruction of the atrophic edentulous maxilla with free iliac crest grafts and implants: a 3-year report of a prospective clinical study. *Clinical implant dentistry and related research*. 2007;9(1):46-59.
  142. Feine JS, de Grandmont P, Boudrias P, Brien N, LaMarche C, Taché R, Lund JP. Within-subject comparisons of implant-supported mandibular prostheses: choice of prosthesis. *Journal of dental research*. 1994;73(5):1105-11.

143. Garrett NR, Kapur KK, Hamada MO, Roumanas ED, Freymiller E, Han T, Diener RM, Levin S, Chen T. A randomized clinical trial comparing the efficacy of mandibular implant-supported overdentures and conventional dentures in diabetic patients. Part II. Comparisons of masticatory performance. *The Journal of prosthetic dentistry*. 1998;79(6):632-40.
144. Beikler T, Flemmig TF. EAO consensus conference: economic evaluation of implant-supported prostheses. *Clinical oral implants research*. 2015;26 Suppl 11:57-63.
145. Geertman ME, Slagter AP, van Waas MA, Kalk W. Comminution of food with mandibular implant-retained overdentures. *Journal of dental research*. 1994;73(12):1858-64.
146. Hoogstraten J, Lamers LM. Patient satisfaction after insertion of an osseointegrated implant bridge. *Journal of oral rehabilitation*. 1987;14(5):481-7.
147. Slot W, Raghoobar GM, Vissink A, Meijer HJ. A comparison between 4 and 6 implants in the maxillary posterior region to support an overdenture; 1-year results from a randomized controlled trial. *Clinical oral implants research*. 2014;25(5):560-6.
148. Krennmaier G., Seemann R., Weinlander M. & Piehslinger E.. Comparison of ball and telescopic crown attachments in implant-retained mandibular overdentures: a 5-year prospective study. *The International Journal of Oral and Maxillofacial Implants*. 2011;26:598-606.
149. Kordatzis K, Wright PS, Meijer HJ. Posterior mandibular residual ridge resorption in patients with conventional dentures and implant overdentures. *The International journal of oral & maxillofacial implants*. 2003;18(3):447-52.
150. Heydecke G, Boudrias P, Awad MA, De Albuquerque RF, Lund JP, Feine JS. Within-subject comparisons of maxillary fixed and removable implant prostheses: Patient satisfaction and choice of prosthesis. *Clinical oral implants research*. 2003;14(1):125-30.
151. Jacobs R, Schotte A, van Steenberghe D, Quirynen M, Naert I. Posterior jaw bone resorption in osseointegrated implant-supported overdentures. *Clinical oral implants research*. 1992;3(2):63-70.
152. Bergendal T, Engquist B. Implant-supported overdentures: a longitudinal prospective study. *The International journal of oral & maxillofacial implants*. 1998;13(2):253-62.
153. Scheller H, Urgell JP, Kultje C, Klineberg I, Goldberg PV, Stevenson-Moore P, Alonso JM, Schaller M, Corria RM, Engquist B, Toreskog S, Kastenbaum F, Smith CR. A 5-year multicenter study on implant-supported single crown restorations. *The International journal of oral & maxillofacial implants*. 1998;13(2):212-8.
154. Hemmings KW, Schmitt A, Zarb GA. Complications and maintenance requirements for fixed prostheses and overdentures in the edentulous mandible: a 5-year report. *The International journal of oral & maxillofacial implants*. 1994;9(2):191-6.
155. Zarb GA, Schmitt A. The longitudinal clinical effectiveness of osseointegrated dental implants in posterior partially edentulous patients. *The International journal of prosthodontics*. 1993;6(2):189-96.
156. Fontijn-Tekamp FA, Slagter AP, Van Der Bilt A, Van 'T Hof MA, Witter DJ, Kalk W, Jansen JA. Biting and chewing in overdentures, full dentures, and natural dentitions. *Journal of dental research*. 2000;79(7):1519-24.
157. De Leonardi D, Garg AK, Pecora GE. Osseointegration of rough acid-etched titanium implants: 5-year follow-up of 100 minimatic implants. *The International journal of oral & maxillofacial implants*. 1999;14(3):384-91.
158. Agliardi E.L., Pozzi A., Stappert C.F., Benzi R., Romeo D. & Gherlone E.. Immediate fixed rehabilitation of the edentulous maxilla: a prospective clinical and radiological study after 3 years of loading. *Clinical Implant Dentistry and Related Research*. 2012;16:292-302.
159. Richter E.J. & Knapp W.. Auf zwei Eckzahnimplantaten abgestützte Oberkiefer-Coverdentureprothesen - Ergebnisse einer klinischen Studie. *Implantologie*. 2010;18:165-174.
160. Lindquist LW, Carlsson GE. Long-term effects on chewing with mandibular fixed prostheses on osseointegrated implants. *Acta odontologica Scandinavica*. 1985;43(1):39-45.

161. Hellem S, Karlsson U, Almfeldt I, Brunell G, Hamp SE, Astrand P. Nonsubmerged implants in the treatment of the edentulous lower jaw: a 5-year prospective longitudinal study of ITI hollow screws. *Clinical implant dentistry and related research*. 2001;3(1):20-9.
162. Gotfredsen K, Karlsson U. A prospective 5-year study of fixed partial prostheses supported by implants with machined and TiO<sub>2</sub>-blasted surface. *Journal of prosthodontics : official journal of the American College of Prosthodontists*. 2001;10(1):2-7.
163. Mericske-Stern R, Steinlin Schaffner T, Marti P, Geering AH. Peri-implant mucosal aspects of ITI implants supporting overdentures. A five-year longitudinal study. *Clinical oral implants research*. 1994;5(1):9-18.
164. Eliasson A, Palmqvist S, Svenson B, Sondell K. Five-year results with fixed complete-arch mandibular prostheses supported by 4 implants. *The International journal of oral & maxillofacial implants*. 2000;15(4):505-10.
165. Buser D, Dula K, Lang NP, Nyman S. Long-term stability of osseointegrated implants in bone regenerated with the membrane technique. 5-year results of a prospective study with 12 implants. *Clinical oral implants research*. 1996;7(2):175-83.
166. Romeo E, Lops D, Margutti E, Ghisolfi M, Chiapasco M, Vogel G. Long-term survival and success of oral implants in the treatment of full and partial arches: a 7-year prospective study with the ITI dental implant system. *The International journal of oral & maxillofacial implants*. 2004;19(2):247-59.
167. Burns DR, Unger JW, Elswick RK, Giglio JA. Prospective clinical evaluation of mandibular implant overdentures: Part II--Patient satisfaction and preference. *The Journal of prosthetic dentistry*. 1995;73(4):364-9.
168. Stoker GT, Wismeijer D, van Waas MA. An eight-year follow-up to a randomized clinical trial of aftercare and cost-analysis with three types of mandibular implant-retained overdentures. *Journal of dental research*. 2007;86(3):276-80.
169. Crespi R, Vinci R, Capparé P, Romanos GE, Gherlone E. A clinical study of edentulous patients rehabilitated according to the "all on four" immediate function protocol. *The International journal of oral & maxillofacial implants*. 2012;27(2):428-34.
170. Ekelund JA, Lindquist LW, Carlsson GE, Jemt T. Implant treatment in the edentulous mandible: a prospective study on Brånemark system implants over more than 20 years. *The International journal of prosthodontics*. 2004;16(6):602-8.
171. De Bruyn H, Collaert B, Lindén U, Johansson C, Albrektsson T. Clinical outcome of Screw Vent implants. A 7-year prospective follow-up study. *Clinical oral implants research*. 1999;10(2):139-48.
172. Allen F, McMillan A. Food selection and perceptions of chewing ability following provision of implant and conventional prostheses in complete denture wearers. *Clinical oral implants research*. 2002;13(3):320-6.
173. Preciado A, Del Río J, Lynch CD, Castillo-Oyagüe R. A new, short, specific questionnaire (QoLIP-10) for evaluating the oral health-related quality of life of implant-retained overdenture and hybrid prosthesis wearers. *Journal of dentistry*. 2013;41(9):753-63.
174. Friberg B, Nilson H, Olsson M, Palmquist C. Mk II: the self-tapping Brånemark implant: 5-year results of a prospective 3-center study. *Clinical oral implants research*. 1997;8(4):279-85.
175. Andersson B, Odman P, Lindvall AM, Brånemark PI. Five-year prospective study of prosthodontic and surgical single-tooth implant treatment in general practices and at a specialist clinic. *The International journal of prosthodontics*. 1998;11(4):351-5.
176. Grogono AL, Lancaster DM, Finger IM. Dental implants: a survey of patients' attitudes. *The Journal of prosthetic dentistry*. 1989;62(5):573-6.
177. Ericsson I, Randow K, Nilner K, Peterson A. Early functional loading of Brånemark dental implants: 5-year clinical follow-up study. *Clinical implant dentistry and related research*. 2000;2(2):70-7.
178. Kimoto K, Garrett NR. Effect of mandibular ridge height on masticatory performance with mandibular conventional and implant-assisted overdentures. *The International journal of oral & maxillofacial implants*. 2003;18(4):523-30.

179. Nyström E, Nilson H, Gunne J, Lundgren S. A 9-14 year follow-up of onlay bone grafting in the atrophic maxilla. *International journal of oral and maxillofacial surgery*. 2009;38(2):111-6.
180. Weinländer M, Piehslinger E, Krennmair G. Removable implant-prosthetic rehabilitation of the edentulous mandible: five-year results of different prosthetic anchorage concepts. *The International journal of oral & maxillofacial implants*. 2010;25(3):589-97.
181. Ferrigno N, Laureti M, Fanali S, Grippaudo G. A long-term follow-up study of non-submerged ITI implants in the treatment of totally edentulous jaws. Part I: Ten-year life table analysis of a prospective multicenter study with 1286 implants. *Clinical oral implants research*. 2002;13(3):260-73.
182. Becker W, Dahlin C, Lekholm U, Bergstrom C, van Steenberghe D, Higuchi K, Becker BE. Five-year evaluation of implants placed at extraction and with dehiscences and fenestration defects augmented with ePTFE membranes: results from a prospective multicenter study. *Clinical implant dentistry and related research*. 1999;1(1):27-32.
183. Listl S, Fischer L, Giannakopoulos NN. An economic evaluation of maxillary implant overdentures based on six vs. four implants. *BMC oral health*. 2014;14:105.
184. Degidi M., Nardi D. & Piattelli A.. Immediate loading of the edentulous maxilla with a definitive restoration supported by an intraorally welded titanium bar and tilted implants. *The International Journal of Oral and Maxillofacial Implants*. 2010;25:1175-1182.
185. Malmstrom H, Xiao J, Romanos G, Ren YF. Two-Year Success Rate of Implant-Retained Mandibular Overdentures by Novice General Dentistry Residents. *The Journal of oral implantology*. 2015;41(3):268-75.
186. Akca K., Cehreli M.C. & Uysal S.. Marginal bone loss and prosthetic maintenance of bar-retained implant-supported overdentures: a prospective study. *The International Journal of Oral and Maxillofacial Implants*. 2010;25:137-145.
187. Behneke A, Behneke N, d'Hoedt B. A 5-year longitudinal study of the clinical effectiveness of ITI solid-screw implants in the treatment of mandibular edentulism. *The International journal of oral & maxillofacial implants*. 2002;17(6):799-810.
188. Martínez-González JM, Martín-Ares M, Cortés-Bretón Brinkmann J, Calvo-Guirado JL, Barona-Dorado C. Impact of prosthetic rehabilitation type on satisfaction of completely edentulous patients. A 5-year prospective study. *Acta odontologica Scandinavica*. 2013;71(5):1303-8.
189. Jemt T, Chai J, Harnett J, Heath MR, Hutton JE, Johns RB, McKenna S, McNamara DC, van Steenberghe D, Taylor R, Watson RM, Herrmann I. A 5-year prospective multicenter follow-up report on overdentures supported by osseointegrated implants. *The International journal of oral & maxillofacial implants*. 1996;11(3):291-8.
190. Haraldson T, Carlsson GE. Bite force and oral function in patients with osseointegrated oral implants. *Scandinavian journal of dental research*. 1977;85(3):200-8.
191. van Kampen FM, van der Bilt A, Cune MS, Fontijn-Tekamp FA, Bosman F. Masticatory function with implant-supported overdentures. *Journal of dental research*. 2004;83(9):708-11.
192. Khoo HD, Chai J, Chow TW. Prosthetic outcome, patient complaints, and nutritional effects on elderly patients with magnet-retained, implant-supported overdentures--a 1-year report. *The International journal of oral & maxillofacial implants*. 2013;28(5):1278-85.
193. Boerrigter EM, Stegenga B, Raghoobar GM, Boering G. Patient satisfaction and chewing ability with implant-retained mandibular overdentures: a comparison with new complete dentures with or without preprosthetic surgery. *Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons*. 1995;53(10):1167-73.
194. Cune MS, de Putter C, Hoogstraten J. Treatment outcome with implant-retained overdentures: Part II-- Patient satisfaction and predictability of subjective treatment outcome. *The Journal of prosthetic dentistry*. 1994;72(2):152-8.
195. Brennan M, Houston F, O'Sullivan M, O'Connell B. Patient satisfaction and oral health-related quality of life outcomes of implant overdentures and fixed complete dentures. *The International journal of oral & maxillofacial implants*. 2010;25(4):791-800.

196. Mendonca DB, Prado MM, Mendes FA, Borges Tde F, Mendonça G, do Prado CJ, Neves FD. Comparison of masticatory function between subjects with three types of dentition. *The International journal of prosthodontics*. 2009;22(4):399-404.
197. Bakke M, Holm B, Gotfredsen K. Masticatory function and patient satisfaction with implant-supported mandibular overdentures: a prospective 5-year study. *The International journal of prosthodontics*. 2002;15(6):575-81.
198. Jacobs R, van Steenberghe D, Nys M, Naert I. Maxillary bone resorption in patients with mandibular implant-supported overdentures or fixed prostheses. *The Journal of prosthetic dentistry*. 1993;70(2):135-40.
199. Büttel AE, Gratwohl DA, Sendi P, Marinello CP. Immediate loading of two unsplinted mandibular implants in edentulous patients with an implant-retained overdenture: an observational study over two years. *Schweizer Monatsschrift für Zahnmedizin = Revue mensuelle suisse d'odonto-stomatologie = Rivista mensile svizzera di odontologia e stomatologia*. 2012;122(5):392-7.
200. Al-Zubeidi MI, Alsabeeha NH, Thomson WM, Payne AG. Patient satisfaction and dissatisfaction with mandibular two-implant overdentures using different attachment systems: 5-year outcomes. *Clinical implant dentistry and related research*. 2012;14(5):696-707.
201. MacEntee MI, Walton JN, Glick N. A clinical trial of patient satisfaction and prosthodontic needs with ball and bar attachments for implant-retained complete overdentures: three-year results. *The Journal of prosthetic dentistry*. 2005;93(1):28-37.
202. Liddel G, Henry P. The immediately loaded single implant-retained mandibular overdenture: a 36-month prospective study. *The International journal of prosthodontics*. 2010;23(1):13-21.
203. Makkonen TA, Holmberg S, Niemi L, Olsson C, Tammisalo T, Peltola J. A 5-year prospective clinical study of Astra Tech dental implants supporting fixed bridges or overdentures in the edentulous mandible. *Clinical oral implants research*. 1997;8(6):469-75.
204. Rasmusson L, Roos J, Bystedt H. A 10-year follow-up study of titanium dioxide-blasted implants. *Clinical implant dentistry and related research*. 2005;7(1):36-42.
205. Harder S, Wolfart S, Egert C, Kern M. Three-year clinical outcome of single implant-retained mandibular overdentures--results of preliminary prospective study. *Journal of dentistry*. 2011;39(10):656-61.
206. Meijer HJ, Raghoobar GM, Batenburg RH, Visser A, Vissink A. Mandibular overdentures supported by two or four endosseous implants: a 10-year clinical trial. *Clinical oral implants research*. 2009;20(7):722-8.
207. Lekholm U, Gunne J, Henry P, Higuchi K, Lindén U, Bergström C, van Steenberghe D. Survival of the Brånemark implant in partially edentulous jaws: a 10-year prospective multicenter study. *The International journal of oral & maxillofacial implants*. 1999;14(5):639-45.
208. Oh SH, Kim Y, Park JY, Jung YJ, Kim SK, Park SY. Comparison of fixed implant-supported prostheses, removable implant-supported prostheses, and complete dentures: patient satisfaction and oral health-related quality of life. *Clinical oral implants research*. 2016;27(2):e31-7.
209. Wright PS, Glantz PO, Randow K, Watson RM. The effects of fixed and removable implant-stabilised prostheses on posterior mandibular residual ridge resorption. *Clinical oral implants research*. 2002;13(2):169-74.
210. Zitzmann NU, Marinello CP, Sendi P. A cost-effectiveness analysis of implant overdentures. *Journal of dental research*. 2006;85(8):717-21.
211. Attard NJ, Zarb GA, Laporte A. Long-term treatment costs associated with implant-supported mandibular prostheses in edentulous patients. *The International journal of prosthodontics*. 2005;18(2):117-23.
212. Heydecke G, McFarland DH, Feine JS, Lund JP. Speech with maxillary implant prostheses: ratings of articulation. *Journal of dental research*. 2004;83(3):236-40.
213. de Grandmont P, Feine JS, Taché R, Boudrias P, Donohue WB, Tanguay R, Lund JP. Within-subject comparisons of implant-supported mandibular prostheses: psychometric evaluation. *Journal of dental research*. 1994;73(5):1096-104.

214. Raghoobar, Gerry M., Meijer, Henny J. A., Stegenga, Boudewijn, Van't Hof, Martin A., Van Oort, Rob P., Vissink, Arjan. Effectiveness of three treatment modalities for the edentulous mandible. *Clinical Oral Implants Research*. 2000;11(3):195-201.
215. Ericsson I, Randow K, Nilner K, Petersson A. Some clinical and radiographical features of submerged and non-submerged titanium implants. A 5-year follow-up study. *Clinical oral implants research*. 1997;8(5):422-6.
216. Weber HP, Crohin CC, Fiorellini JP. A 5-year prospective clinical and radiographic study of non-submerged dental implants. *Clinical oral implants research*. 2000;11(2):144-53.