Scientific Review
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Soft Tissue Chamber —increased soft tissue volume and high esthetics

Esthetics is one of the most important outcome measurements in modern implant dentistry. The Soft Tissue Chamber—a three-dimensional chamber created between the horizontal offset of the implant and the outer design of the abutment—increases soft tissue contact zone and volume, leading to natural esthetic results.

The Soft Tissue Chamber has been a key design of the Astra Tech Implant System since 1985*. Thus, the data and results on the Soft Tissue Chamber are included in the available clinical documentation evaluating the peri-implant soft tissue.

Soft tissue stability

The Soft Tissue Chamber allows for an increased soft tissue contact zone and volume, sealing off and protecting the marginal bone[1–6].

This leads to:

- Long-lasting hard and soft tissue stability[7–14]
- Sustaining formation of connective tissue and collagen fibers[2, 7, 15–17]
- Maintained crestal bone levels**, which is a prerequisite for a natural interdental papilla[18]

High esthetic results and patient satisfaction

Numerous clinical studies show high esthetic results[19–33] with maintained, or even a gain, in papilla height and soft tissue dimensions. Esthetics are evaluated using:

- Pink Esthetic Score[10–14, 34–48]
- Gingival Zenith Score[8, 37, 38, 41, 42, 45, 49–55]
- Papilla index[7, 8, 16, 49–51, 56–67]

Furthermore, high patient satisfaction measured by OHIP[23, 47, 48, 60, 61, 68–96], Visual Analogue Scale[19, 23, 71, 79, 80, 85, 87, 97–103] and other methods[25, 56, 64, 99, 104–121] is reported.

Conclusion

The Soft Tissue Chamber maintains the soft tissue contour, leading to high esthetic results as well as high patient satisfaction.

*Formerly Connective Contour
**See Scientific review "Marginal bone maintenance with Astra Tech Implant System", www.dentsplysirona.com/science

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References

1. Abrahamsson I, Berglundh T. Tissue characteristics at microthreaded implants: An experimental study in dogs. Clin Implant Dent Relat Res 2006;8(3):107-13. Abstract

2. Moon IS, Berglundh T, Abrahamsson I, Linder E, Lindhe J. The barrier between the keratinized mucosa and the dental implant. An experimental study in the dog. J Clin Periodontol 1999;26(10):658-63. Abstract

3. Abrahamsson I, Berglundh T, Wennström J, Lindhe J. The peri-implant hard and soft tissues at different implant systems. A comparative study in the dog. Clin Oral Implants Res 1996;7(3):212-19. Abstract

4. Welander M, Abrahamsson I, Berglundh T. The mucosal barrier at implant abutments of different materials. Clin Oral Implants Res 2008;19(7):635-41. Abstract

5. Abrahamsson I, Berglundh T, Moon IS, Lindhe J. Peri-implant tissues at submerged and non-submerged titanium implants. J Clin Periodontol 1999;26(9):600-7. Abstract

6. Abrahamsson I, Berglundh T, Sekino S, Lindhe J. Tissue reactions to abutment shift: An experimental study in dogs. Clin Implant Dent Relat Res 2003;5(2):82-8. Abstract

7. Cecchinato D, Lops D, Salvi GE, Sanz M. A prospective, randomized, controlled study using OsseoSpeed implants placed in maxillary fresh extraction socket: soft tissues response. Clin Oral Implants Res 2015;26(1):20-7. Abstract

8. De Bruyn H, Raes F, Cooper LF, Reside G, Garriga JS, Tarrida LG, Wiltfang J, Kern M. Three-years clinical outcome of immediate provisionalization of single Osseospeed() implants in extraction sockets and healed ridges. Clin Oral Implants Res 2013;24(2):217-23. Abstract

9. Noelken R, Donati M, Fiorellini J, Gellrich NC, Parker W, Wada K, Berglundh T. Soft and hard tissue alterations around implants placed in an alveolar ridge with a sloped configuration. Clin Oral Implants Res 2014;25(1):3-9. Abstract

10. Noelken R, Moergel M, Kunkel M, Wagner W. Immediate and flapless implant insertion and provisionalization using autogenous bone grafts in the esthetic zone: 5-year results. Clin Oral Implants Res 2018;29(3):320-27. Abstract

11. Noelken R, Moergel M, Pausch T, Kunkel M, Wagner W. Clinical and esthetic outcome with immediate insertion and provisionalization with or without connective tissue grafting in presence of mucogingival recessions: A retrospective analysis with follow-up between 1 and 8 years. Clin Implant Dent Relat Res 2018;20(3):285-93. Abstract

12. Noelken R, Oberhansl F, Kunkel M, Wagner W. Immediately provisionalized OsseoSpeed® Profile implants inserted into extraction sockets: 3-year results. Clin Oral Implants Res 2016;27(6):744-9. Abstract

13. Noelken R, Pausch T, Al-Nawas B, Wagner W. Long-term results of immediately inserted and provisionalized OsseoSpeed Profile implants in the esthetic zone (P15602). Clin Oral Impl Res 2019;30(Supplement S19):408-08.

14. Noelken R, Schiegnitz E, Berglundh T, Wagner W. Functional hard and soft tissue regeneration around Profile implants placed in sloped alveolar ridges – 10-year results (P15600). Clin Oral Impl Res 2019;30(Supplement S19):19-19.

15. Cooper LF, Tarnow D, Froum S, Moriarty J, De Kok IJ. Comparison of marginal bone changes with internal conus and external hexagon design implant systems: A prospective, randomized study. Int J Periodontics Restorative Dent 2016;36(5):631-42. Abstract

16. Sanz M, Cecchinato D, Ferrus J, Salvi GE, Ramseier C, Lang NP, Lindhe J. Implants placed in fresh extraction sockets in the maxilla: clinical and radiographic outcomes from a 3-year follow-up examination. Clin Oral Implants Res 2014;25(3):321-7. Abstract

17. van Brakel R, Meijer GJ, Verhoeven JW, Jansen J, de Putter C, Cune MS. Soft tissue response to zirconia and titanium implant abutments: an in vivo within-subject comparison. J Clin Periodontol 2012;39(10):995-1001. Abstract

18. Norton MR, Astrom M. The Influence of Implant Surface on Maintenance of Marginal Bone Levels for Three Premium Implant Brands: A Systematic Review and Meta-analysis. Int J Oral Maxillofac Implants 2020;35(6):1099-111. Abstract

19. Chang M, Wennstrom JL. Soft tissue topography and dimensions lateral to single implant-supported restorations. a cross-sectional study. Clin Oral Implants Res 2013;24(5):556-62. Abstract

20. Donati M, La Scala V, Billi M, Di Dino B, Torrisi P, Berglundh T. Immediate functional loading of implants in single tooth replacement: a prospective clinical multicenter study. Clin Oral Implants Res 2008;19(8):740-48. Abstract

21. Donati M, La Scala V, Di Raimondo R, Speroni S, Testi M, Berglundh T. Marginal bone preservation in single-tooth replacement: a 5-year prospective clinical multicenter study. Clin Implant Dent Relat Res 2015;17(3):425-34. Abstract

22. Ebler S, Ioannidis A, Jung RE, Hammerle CH, Thoma DS. Prospective randomized controlled clinical study comparing two types of two-piece dental implants supporting fixed reconstructions - results at 1 year of loading. Clin Oral Implants Res 2016;27(9):1169-77. Abstract

23. Hosseini M, Gotfredsen K. A feasible, aesthetic quality evaluation of implant-supported single crowns: an analysis of validity and reliability. Clin Oral Implants Res 2012;23(4):453-8. Abstract

24. Khzam N, Mattheos N, Roberts D, Bruce WL, Ivanovski S. Immediate placement and restoration of dental implants in the esthetic region: clinical case series. J Esthet Restor Dent 2014;26(5):332-44. Abstract

25. Kim A, Campbell SD, Viana MA, Knoernschild KL. Abutment material effect on peri-implant soft tissue color and perceived esthetics. J Prosthodont 2016;25(8):634-40. Abstract

26. Kraus RD, Epprecht A, Hammerle CHF, Sailer I, Thoma DS. Cemented vs screw-retained zirconia-based single implant reconstructions: A 3-year prospective randomized controlled clinical trial. Clin Implant Dent Relat Res 2019;21(4):578-85. Abstract

27. Lops D, Chiapasco M, Rossi A, Bressan E, Romeo E. Incidence of inter-proximal papilla between a tooth and an adjacent immediate implant placed into a fresh extraction socket: 1-year prospective study. Clin Oral Implants Res 2008;19(11):1135-40. Abstract

28. Lops D, Parpaiola A, Paniz G, Sbricoli L, Magaz VR, Venezze AC, Bressan E, Stellini E. Interproximal papilla stability around CAD/CAM and stock abutments in anterior regions: A 2-year prospective multicenter cohort study. Int J Periodontics Restorative Dent 2017;37(5):657-65. Abstract

29. Pieri F, Siroli L, Forlivesi C, Corinaldesi G. Clinical, esthetic, and radiographic evaluation of small-diameter (3.0-mm) implants supporting single crowns in the anterior region: a 3-year prospective study. Int J Periodontics Restorative Dent 2014;34(6):825-32. Abstract

30. Raes F, Cosyn J, Crommelinck E, Coessens P, De Bruyn H. Immediate and conventional single implant treatment in the anterior maxilla: 1-year results of a case series on hard and soft tissue response and aesthetics. J Clin Periodontol 2011;38(4):385-94. Abstract

31. Raes S, Rocci A, Raes F, Cooper L, De Bruyn H, Cosyn J. A prospective cohort study on the impact of smoking on soft tissue alterations around single implants. Clin Oral Implants Res 2015;26(9):1086-90. Abstract

32. Ricciardi MT, Pizzi P. High-risk esthetically driven restoration: begin with the end in mind. Compend Contin Educ Dent 2013;34(3):206-10. Abstract

33. Thoma DS, Brandenberg F, Fehmer V, Knechtle N, Hammerle CH, Sailer I. The esthetic effect of veneered zirconia abutments for single-tooth implant reconstructions: A randomized controlled clinical trial. Clin Implant Dent Relat Res 2016;18(6):1210-17. Abstract

34. Arora H, Ivanovski S. Correlation between pre-operative buccal bone thickness and soft tissue changes around immediately placed and restored implants in the maxillary anterior region: A 2-year prospective study. Clin Oral Implants Res 2017;28(10):1188-94. Abstract

35. Arora H, Ivanovski S. Clinical and aesthetic outcomes of immediately placed single-tooth implants with immediate vs. delayed restoration in the anterior maxilla: A retrospective cohort study. Clin Oral Implants Res 2018;29:346-52. Abstract

36. Arora H, Khzam N, Roberts D, Bruce WL, Ivanovski S. Immediate implant placement and restoration in the anterior maxilla: Tissue dimensional changes after 2-5 year follow up. Clin Implant Dent Relat Res 2017;19(4):694-702. Abstract

37. Barwacz CA, Stanford CM, Diehl UA, Cooper LF, Feine J, McGuire M, Scheyer ET. Pink esthetic score outcomes around three implant-abutment configurations: 3-year results. Int J Oral Maxillofac Implants 2018;33(5):1126-35. Abstract

38. Barwacz CA, Stanford CM, Diehl UA, Qian F, Cooper LF, Feine J, McGuire M. Electronic assessment of peri-implant mucosal esthetics around three implant-abutment configurations: a randomized clinical trial. Clin Oral Implants Res 2016;27(6):707-15. Abstract

39. Borges T, Lima T, Carvalho A, Dourado C, Carvalho V. The influence of customized abutments and custom metal abutments on the presence of the interproximal papilla at implants inserted in single-unit gaps: a 1-year prospective clinical study. Clin Oral Implants Res 2014;25(11):1222-7. Abstract

40. Borges T, Lima T, Carvalho AC, Carvalho V. Clinical outcome of inter-proximal papilla between a tooth and a single implant treated with CAD/CAM abutments: a cross-sectional study. J Oral Maxillofac Res 2012;3(3). Abstract

41. Cooper LF, Reside G, Stanford C, Barwacz C, Feine J, Abi Nader S, Scheyer ET, McGuire M. A multicenter randomized comparative trial of implants with different abutment interfaces to replace anterior maxillary single teeth. Int J Oral Maxillofac Implants 2015;30(3):622-32. Abstract

42. Cooper LF, Reside G, Stanford C, Barwacz C, Feine J, Nader SA, Scheyer T, McGuire M. Three-year prospective randomized comparative assessment of anterior maxillary single implants with different abutment interfaces. Int J Oral Maxillofac Implants 2019;34(1):150-58. Abstract

43. Jacobs BP, Zadeh HH, De Kok I, Cooper L. A Randomized Controlled Trial Evaluating Grafting the Facial Gap at Immediately Placed Implants. Int J Periodontics Restorative Dent 2020;40(3):383-92. Abstract

44. Marcelis K, Vercruyssen M, Naert I, Teughels W, Quirynen M. Model-based guided implant insertion for solitary tooth replacement: a pilot study. Clin Oral Implants Res 2012;23(8):999-1003. Abstract

45. McGuire MK, Scheyer T, Ho DK, Stanford CM, Feine JS, Cooper LF. Esthetic outcomes in relation to implant-abutment interface design following a standardized treatment protocol in a multicenter randomized controlled trial- A cohort of 12 cases at 1-year follow-up. Int J Periodontics Restorative Dent 2015;35(2):149-59. Abstract

46. Noelken R, Neffe BA, Kunkel M, Wagner W. Maintenance of marginal bone support and soft tissue esthetics at immediately provisionalized OsseoSpeed implants placed into extraction sites: 2-year results. Clin Oral Implants Res 2014;25(2):214-20. Abstract

47. Raes F, Cosyn J, De Bruyn H. Clinical, aesthetic, and patient-related outcome of immediately loaded single implants in the anterior maxilla: A prospective study in extraction sockets, healed ridges, and grafted sites. Clin Implant Dent Relat Res 2013;15(6):819-35. Abstract

48. Raes S, Eghbali A, Chappuis V, Raes F, De Bruyn H, Cosyn J. A long-term prospective cohort study on immediately restored single tooth implants inserted in extraction sockets and healed ridges: CBCT analyses, soft tissue alterations, aesthetic ratings, and patient-reported outcomes. Clin Implant Dent Relat Res 2018;20(4):522-30. Abstract

49. Cooper LF, Raes F, Reside GJ, Garriga JS, Tarrida LG, Wiltfang J, Kern M, de Bruyn H. Comparison of radiographic and clinical outcomes following immediate provisionalization of single-tooth dental implants placed in healed alveolar ridges and extraction sockets. Int J Oral Maxillofac Implants 2010;25(6):1222-32. Abstract

50. Cooper LF, Reside G, Raes F, Garriga JS, Tarrida LG, Wiltfang J, Kern M, De Bruyn H. Immediate provisionalization of dental implants in grafted alveolar ridges in the esthetic zone: a 5-year evaluation. Int J Periodontics Restorative Dent 2014;34(4):477-86. Abstract

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51. Cooper LF, Reside GJ, Raes F, Garriga JS, Tarrida LG, Wiltfang J, Kern M, De Bruyn H. Immediate provisionalization of dental implants placed in healed alveolar ridges and extraction sockets: A 5-year prospective evaluation. Int J Oral Maxillofac Implants 2014;29(3):709-17. Abstract

52. Galindo-Moreno P, Nilsson P, King P, Becktor J, Speroni S, Schramm A, Maiorana C. Clinical and radiographic evaluation of early loaded narrow diameter implants - 1-year follow-up. Clin Oral Implants Res 2012;23(5):609-16. Abstract

53. Galindo-Moreno P, Nilsson P, King P, Worsaae N, Schramm A, Padial-Molina M, Maiorana C. Clinical and radiographic evaluation of early loaded narrow-diameter implants: 5-year follow-up of a multicenter prospective clinical study. Clin Oral Implants Res 2017;28(12):1584-91. Abstract

54. King P, Maiorana C, Luthardt RG, Sondell K, Oland J, Galindo-Moreno P, Nilsson P. Clinical and radiographic evaluation of a small-diameter dental implant used for the restoration of patients with permanent tooth agenesis (hypodontia) in the maxillary lateral incisor and mandibular incisor regions: a 36-month follow-up. Int J Prosthodont 2016;29(2):147-53. Abstract

55. Maiorana C, King P, Quaas S, Sondell K, Worsaae N, Galindo-Moreno P. Clinical and radiographic evaluation of early loaded narrow-diameter implants: 3 years follow-up. Clin Oral Implants Res 2015;26(1):77-82. Abstract

56. Bashutski JD, Wang HL, Rudek I, Moreno I, Koticha T, Oh TJ. Effect of flapless surgery on single-tooth implants in the esthetic zone: a randomized clinical trial. J Periodontol 2013;84(12):1747-54. Abstract

57. Büchi DL, Sailer I, Fehmer V, Hammerle CH, Thoma DS. All-ceramic single-tooth implant reconstructions using modified zirconia abutments: a prospective randomized controlled clinical trial of the effect of pink veneering ceramic on the esthetic outcomes. Int J Periodontics Restorative Dent 2014;34(1):29-37. Abstract

58. Eisner B, Naenni N, Husler J, Hammerle C, Thoma D, Sailer I. Three-year results of a randomized controlled clinical trial using submucosally veneered and unveneered zirconia abutments supporting all-ceramic single-implant crowns. Int J Periodontics Restorative Dent 2018;38(5):645-52. Abstract

59. Hosseini M, Worsaae N, Gotfredsen K. Tissue changes at implant sites in the anterior maxilla with and without connective tissue grafting: A five-year prospective study. Clin Oral Implants Res 2020;31(1):18-28. Abstract

60. Hosseini M, Worsaae N, Schiodt M, Gotfredsen K. A 1-year randomised controlled trial comparing zirconia versus metal-ceramic implant supported single-tooth restorations. Eur J Oral Implantol 2011;4(4):347-61. Abstract

61. Hosseini M, Worsaae N, Schiodt M, Gotfredsen K. A 3-year prospective study of implant-supported, single-tooth restorations of all-ceramic and metal-ceramic materials in patients with tooth agenesis. Clin Oral Implants Res 2013;24(10):1078-87. Abstract

62. Laass A, Sailer I, Husler J, Hammerle CH, Thoma DS. Randomized controlled clinical trial of all-ceramic single-tooth implant reconstructions using modified zirconia abutments: Results at 5 years after loading. Int J Periodontics Restorative Dent 2019;39(1):17-27. Abstract

63. Lops D, Mosca D, Muller A, Rossi A, Rozza R, Romeo E. Management of peri-implant soft tissues between tooth and adjacent immediate implant placed into fresh extraction single socket: a one-year prospective study on two different types of implant-abutment connection design. Minerva Stomatol 2011;60(9):403-15. Abstract

64. Mertens C, Steveling HG. Early and immediate loading of titanium implants with fluoride-modified surfaces: results of 5-year prospective study. Clin Oral Implants Res 2011;22(12):1354-60. Abstract

65. Stanford CM, Wagner W, Rodriguez YBR, Norton M, McGlumphy E, Schmidt J. Evaluation of the effectiveness of dental implant therapy in a practice-based network (FOCUS). Int J Oral Maxillofac Implants 2010;25(2):367-73. Abstract

66. Thoma DS, Brandenberg F, Fehmer V, Büchi DL, Hammerle CH, Sailer I. Randomized controlled clinical trial of all-ceramic single tooth implant reconstructions using modified zirconia abutments: Radiographic and prosthetic results at 1 year of loading. Clin Implant Dent Relat Res 2016;18(3):462-72. Abstract

67. Tsuda H, Rungcharassaeng K, Kan JY, Roe P, Lozada JL, Zimmerman G. Peri-implant tissue response following connective tissue and bone grafting in conjunction with immediate single-tooth replacement in the esthetic zone: A case series. Int J Oral Maxillofac Implants 2011;26(2):427-36. Abstract

68. Bernard L, Vercruyssen M, Duyck J, Jacobs R, Teughels W, Quirynen M. A randomized controlled clinical trial comparing guided with nonguided implant placement: A 3-year follow-up of implant-centered outcomes. J Prosthet Dent 2019;121(6):904-10. Abstract

69. Bilhan H, Geckili O, Sulun T, Bilgin T. A quality-of-life comparison between self-aligning and ball attachment systems for 2-implant-retained mandibular overdentures. J Oral Implantol 2011;37 Spec No(sp1):167-73. Abstract

70. Cakir O, Kazancioglu HO, Celik G, Deger S, Ak G. Evaluation of the efficacy of mandibular conventional and implant prostheses in a group of Turkish patients: a quality of life study. J Prosthodont 2014;23(5):390-6. Abstract

71. De Kok I, Chang K-H, Li T-S, 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. Int J Oral Maxillofac Implants 2011;26(2):415-26. Abstract

72. Doornewaard R, Bruyn H, Matthys C, Bronkhorst E, Vandeweghe S, Vervaeke S. The Long-Term Effect of Adapting the Vertical Position of Implants on Peri-Implant Health: A 5-Year Intra-Subject Comparison in the Edentulous Mandible Including Oral Health-Related Quality of Life. J Clin Med 2020;9(10). Abstract

73. Doornewaard R, Glibert M, Matthys C, Vervaeke S, Bronkhorst E, de Bruyn H. Improvement of Quality of Life with Implant-Supported Mandibular Overdentures and the Effect of Implant Type and Surgical Procedure on Bone and Soft Tissue Stability: A Three-Year Prospective Split-Mouth Trial. J Clin Med 2019;8(6). Abstract

74. Emami E, Cerutti-Kopplin D, Menassa M, Audy N, Kodama N, Durand R, Rompre P, de Grandmont P. Does immediate loading affect clinical and patient-centered outcomes of mandibular 2-unsplinted-implant overdenture? A 2-year within-case analysis. J Dent 2016;50:30-6. Abstract

75. Erkapers M, Ekstrand K, Baer RA, Toljanic JA, Thor A. Patient satisfaction following dental implant treatment with immediate loading in the edentulous atrophic maxilla. Int J Oral Maxillofac Implants 2011;26(2):356-64. Abstract

76. Ettl T, Weindler J, Gosau M, Muller S, Hautmann M, Zeman F, Koller M, Papavasileiou D, Burgers R, Driemel O, Schneider I, Klingelhoffer C, Meier J, Wahlmann U, Reichert TE. Impact of radiotherapy on implant-based prosthetic rehabilitation in patients with head and neck cancer: A prospective observational study on implant survival and quality of life-preliminary results. J Craniomaxillofac Surg 2016;44(9):1453-62. Abstract

77. Gates WD, 3rd, Cooper LF, Sanders AE, Reside GJ, De Kok IJ. The effect of implant-supported removable partial dentures on oral health quality of life. Clin Oral Implants Res 2014;25(2):207-13. Abstract

78. Geckili O, Bilhan H, Bilgin T. Impact of mandibular two-implant retained overdentures on life quality in a group of elderly Turkish edentulous patients. Arch Gerontol Geriatr 2011;53(2):233-6. Abstract

79. Geckili O, Bilhan H, Mumcu E. Clinical and radiographic evaluation of three-implant-retained mandibular overdentures: a 3-year retrospective study. Quintessence Int 2011;42(9):721-8. Abstract

80. Geckili O, Bilhan H, Mumcu E, Dayan C, Yabul A, Tuncer N. Comparison of patient satisfaction, quality of life, and bite force between elderly edentulous patients wearing mandibular two implant-supported overdentures and conventional complete dentures after 4 years. Spec Care Dentist 2012;32(4):136-41. Abstract

81. Limmer B, Sanders AE, Reside G, Cooper LF. Complications and patient-centered outcomes with an implant-supported monolithic zirconia fixed dental prosthesis: 1 year results. J Prosthodont 2014;23(4):267-75. Abstract

82. Martin-Ares M, Barona-Dorado C, Guisado-Moya B, Martinez-Rodriguez N, Cortes-Breton-Brinkmann J, Martinez-Gonzalez JM. Prosthetic hygiene and functional efficacy in completely edentulous patients: satisfaction and quality of life during a 5-year follow-up. Clin Oral Implants Res 2016;27(12):1500-05. Abstract

83. Matthys C, De Vijlder W, Besseler J, Glibert M, De Bruyn H. Cost-effectiveness analysis of two attachment systems for mandibular overdenture. Clin Oral Implants Res 2020;E-pub Mar 27 doi:10.1111/CLR.13599. Abstract

84. Matthys C, Vervaeke S, Besseler J, De Bruyn H. Five-year study of mandibular overdentures on stud abutments: Clinical outcome, patient satisfaction and prosthetic maintenance-Influence of bone resorption and implant position. Clin Oral Implants Res 2019;30(9):940-51. Abstract

85. Menassa M, de Grandmont P, Audy N, Durand R, Rompre P, Emami E. Patients' expectations, satisfaction, and quality of life with immediate loading protocol. Clin Oral Implants Res 2016;27(1):83-9. Abstract

86. Mertens C, de San Jose Gonzalez J, Freudlsperger C, Bodem J, Krisam J, Hoffmann J, Engel M. Implant-prosthetic rehabilitation of hemimaxillectomy defects with CAD/CAM suprastructures. J Craniomaxillofac Surg 2016;44(11):1812-18. Abstract

87. Mumcu E, Bilhan H, Geckili O. The effect of attachment type and implant number on satisfaction and quality of life of mandibular implant-retained overdenture wearers. Gerodontology 2012;29(2):e618-23. Abstract

88. Ponsi J, Lahti S, Rissanen H, Oikarinen K. Change in subjective oral health after single dental implant treatment. Int J Oral Maxillofac Implants 2011;26(3):571-7. Abstract

89. Raes F, Cooper LF, Tarrida LG, Vandromme H, De Bruyn H. A case-control study assessing oral-health-related quality of life after immediately loaded single implants in healed alveolar ridges or extraction sockets. Clin Oral Implants Res 2012;23(5):602-8. Abstract

90. Raes S, Raes F, Cooper L, Giner Tarrida L, Vervaeke S, Cosyn J, De Bruyn H. Oral health-related quality of life changes after placement of immediately loaded single implants in healed alveolar ridges or extraction sockets: a 5-year prospective follow-up study. Clin Oral Implants Res 2017;28(6):662-67. Abstract

91. Thoma DS, Haas R, Sporniak-Tutak K, Garcia A, Taylor TD, Hammerle CHF. Randomized controlled multicentre study comparing short dental implants (6 mm) versus longer dental implants (11-15 mm) in combination with sinus floor elevation procedures: 5-Year data. J Clin Periodontol 2018;45(12):1465-74. Abstract

92. Thoma DS, Haas R, Tutak M, Garcia A, Schincaglia GP, Hammerle CH. Randomized controlled multicentre study comparing short dental implants (6 mm) versus longer dental implants (11-15 mm) in combination with sinus floor elevation procedures. Part 1: demographics and patient-reported outcomes at 1 year of loading. J Clin Periodontol 2015;42(1):72-80. Abstract

93. Toia M, Wennerberg A, Torrisi P, Farina V, Corra E, Cecchinato D. Patient satisfaction and clinical outcomes in implant-supported overdentures retained by milled bars: Two-year follow-up. J Oral Rehabil 2019;46(7):624-33. Abstract

94. Van Lierde K, Browaeys H, Corthals P, Mussche P, Van Kerkhoven E, De Bruyn H. Comparison of speech intelligibility, articulation and oromyofunctional behaviour in subjects with single-tooth implants, fixed implant prosthetics or conventional removable prostheses. J Oral Rehabil 2012;39(4):285-93. Abstract

95. Van Lierde KM, Corthals P, Browaeys H, Mussche P, Van Kerckhove E, De Bruyn H. Impact of anterior single-tooth implants on quality of life, articulation and oromyofunctional behaviour: a pilot study. J Oral Rehabil 2011;38(3):170-5. Abstract

96. Vercruyssen M, van de Wiele G, Teughels W, Naert I, Jacobs R, Quirynen M. Implant- and patient-centred outcomes of guided surgery, a 1-year follow-up: An RCT comparing guided surgery with conventional implant placement. J Clin Periodontol 2014;41(12):1154-60. Abstract

97. Barbier L, Pottel L, De Ceulaer J, Lamoral P, Duyck J, Jacobs R, Abeloos J. Evaluation of quality of life after mandibular reconstruction using a novel fixed implant-supported dental prosthesis concept: A pilot study. Int J Prosthodont 2019;32(2):162-73. Abstract

98. Dierens M, Collaert B, Deschepper E, Browaeys H, Klinge B, De Bruyn H. Patient-centered outcome of immediately loaded implants in the rehabilitation of fully edentulous jaws. Clin Oral Implants Res 2009;20(10):1070-77. Abstract

99. Emami E, Alesawy A, de Grandmont P, Cerutti-Kopplin D, Kodama N, Menassa M, Rompre P, Durand R. A within-subject clinical trial on the conversion of mandibular two-implant to three-implant overdenture: Patient-centered outcomes and willingness to pay. Clin Oral Implants Res 2019;30(3):218-28. Abstract

100. Gotfredsen K. A 5-year prospective study of single-tooth replacements supported by the Astra Tech implant: a pilot study. Clin Implant Dent Relat Res 2004;6(1):1-8. Abstract

101. Gotfredsen K. A 10-year prospective study of single tooth implants placed in the anterior maxilla. Clin Implant Dent Relat Res 2009;14(1):80-7. Abstract

102. Hallman M, Mordenfeld A, Strandkvist T. A retrospective 5-year follow-up study of two different titanium implant surfaces used after interpositional bone grafting for reconstruction of the atrophic edentulous maxilla. Clin Implant Dent Relat Res 2005;7(3):121-6. Abstract

103. Toia M, Galli S, Cecchinato D, Wennerberg A, Jimbo R. Clinical Evidence of OsseoSpeed EV Implants: A Retrospective Study and Characterization of the Newly Introduced System. Int J Periodontics Restorative Dent 2019;39(6):863-74. Abstract

104. Boven GC, Slot JWA, Raghoebar GM, Vissink A, Meijer HJA. Maxillary implant-supported overdentures opposed by (partial) natural dentitions: a 5-year prospective case series study. J Oral Rehabil 2017;44(12):988-95. Abstract

105. Bressan E, Tomasi C, Stellini E, Sivolella S, Favero G, Berglundh T. Implant-supported mandibular overdentures: a cross-sectional study. Clin Oral Implants Res 2012;23(7):814-9. Abstract

106. Gulje F, Raghoebar GM, Ter Meulen JW, Vissink A, Meijer HJ. Mandibular overdentures supported by 6-mm dental implants: a 1-year prospective cohort study. Clin Implant Dent Relat Res 2012;14 Suppl 1(Supplement 1):e59-66. Abstract

107. Guljé FL, Raghoebar GM, Vissink A, Meijer HJ. Single crowns in the resorbed posterior maxilla supported by either 6-mm implants or by 11-mm implants combined with sinus floor elevation surgery: A 1-year randomised controlled trial. Eur J Oral Implantol 2014;7(3):247-55. Abstract

108. Guljé FL, Raghoebar GM, Vissink A, Meijer HJ. Single restorations in the resorbed posterior mandible supported by 6-mm implants: a 1-year prospective case series study. Clin Implant Dent Relat Res 2015;17 Suppl 2:e465-71. Abstract

109. Gulje FL, Raghoebar GM, Vissink A, Meijer HJA. Single crown restorations supported by 6-mm implants in the resorbed posterior mandible: A five-year prospective case series. Clin Implant Dent Relat Res 2019;21(5):1017-22. Abstract

110. Gulje FL, Raghoebar GM, Vissink A, Meijer HJA. Single crowns in the resorbed posterior maxilla supported by either 11-mm implants combined with sinus floor elevation or 6-mm implants:A 5-year randomised controlled trial. Int J Oral Implantol (Berl) 2019;12(3):315-26. Abstract

111. Kriz P, Seydlova M, Dostalova T, Valenta Z, Chleborad K, Zvarova J, Feberova J, Hippmann R. Oral health-related quality of life and dental implants – preliminary study. Cent Eur J Med 2012;7(2):209-15. Abstract

112. Kriz P, Seydlova M, Dostalova T, Zdenek V, Chleborad K, Zavarova J, Feberova J, Hippmann R. Dental implants and improvement of oral health-related quality of life. Community Dent Oral Epidemiol 2012;40(Suppl 1):65-70. Abstract

113. Mertens C, Steveling HG, Seeberger R, Hoffmann J, Freier K. Reconstruction of severely atrophied alveolar ridges with calvarial onlay bone grafts and dental implants. Clin Implant Dent Relat Res 2013;15(5):673-83. Abstract

114. Packer M, Nikitin V, Coward T, Davis DM, Fiske J. The potential benefits of dental implants on the oral health quality of life of people with Parkinson's disease. Gerodontology 2009;26(1):11-8. Abstract

115. Palmer RM, Howe LC, Palmer PJ, Wilson R. A prospective clinical trial of single Astra Tech 4.0 or 5.0 diameter implants used to support two-unit cantilever bridges: results after 3 years. Clin Oral Implants Res 2012;23(1):35-40. Abstract

116. Parpaiola A, Toia M, Norton M, Cecchinato D, Bressan E, Lops D. CAD/CAM Implant Abutments: Peri-implant Hard and Soft Tissue Response with Up to 4 Years of Follow-up- A Retrospective Cohort Study Evaluation. Int J Periodontics Restorative Dent 2020;40(2):193-201. Abstract

117. Pieri F, Aldini NN, Fini M, Marchetti C, Corinaldesi G. Preliminary 2-year report on treatment outcomes for 6-mm-long implants in posterior atrophic mandibles. Int J Prosthodont 2012;25(3):279-89. Abstract

118. Rismanchian M, Fazel A, Rakhshan V, Eblaghian G. One-year clinical and radiographic assessment of fluoride-enhanced implants on immediate non-functional loading in posterior maxilla and mandible: a pilot prospective clinical series study. Clin Oral Implants Res 2011;22(12):1440-5. Abstract

119. Schepke U, Meijer HJ, Kerdijk W, Cune MS. Digital versus analog complete-arch impressions for single-unit premolar implant crowns: Operating time and patient preference. J Prosthet Dent 2015;114(3):403-6 e1. Abstract

120. Slot W, Raghoebar 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. J Clin Periodontol 2016;43(12):1180-87. Abstract

121. Slot W, Raghoebar 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. J Clin Periodontol 2013;40(3):303-10. Abstract

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