

/
 /
 I. 95% 5, 6).
 ,
 가
 . (emergence profile) ,
 20 2 - 3mm
 가 가 가 7).
 , 가 가 ,
 . 가
 가 ,
 . 8, 9)
 ,
 1). 가 10, 11). 10, 11)
 , 가
 . 12, 13).
 ,
 2). (32 Nm) ,
 3) 가
 , 5).
 , 가 8
 4).

가 , 27).
 14). 가 28, 29)
 , 가 30).
 가 , 가 ,
 가 가 , 가 가
 15). 가 가 가
 가
 16, 17)
 ,
 , 가 ,
 , 가 .
 18). 가 II. ()
 가 (1
 19). 20), - 1)
 21, 22)
 23)
 24) (SIM Clinic) 가
 1997 2 8
 25) , 6 ,
 , 가
 , 32 ,
 18 67 .
 26) 11 , 18 .
 34 , 6
 89 .

가 18 ,
 가 10 1 4 (, , ,) .

가 3
 (41) (23), 2.
 (14), 3 가 , 1 가
 1 . ;

, 6 가 0.5mm .
 (29 , 12 . ; (SDM, Krupp
) Corp., Essen, Germany)³³⁾
 가 2 3 가 ,

(De Trey Zinc
 cement, De Trey Div, Dentsply Ltd,
 England) 가 가
 0.5mm .

,
 ,
 31). 가 ;

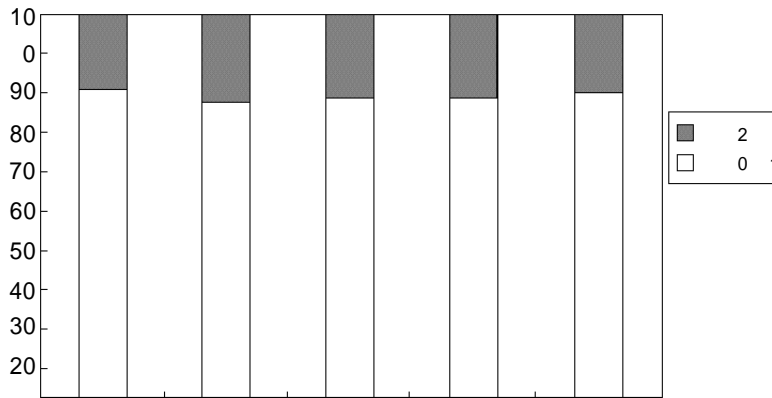
1. 0.5 mm 34),
 . ;
 / 가
 . ; Löe³²⁾ 0.5mm
 ; 0=
 가 , 1=
 , 2= 23);

. ;
 (0.35 N) (HuFriedy™, tip 가
 diameter 0.45 mm) 가 가 0.5mm
 15 . 0; 가 .
 1; 가 . 2;

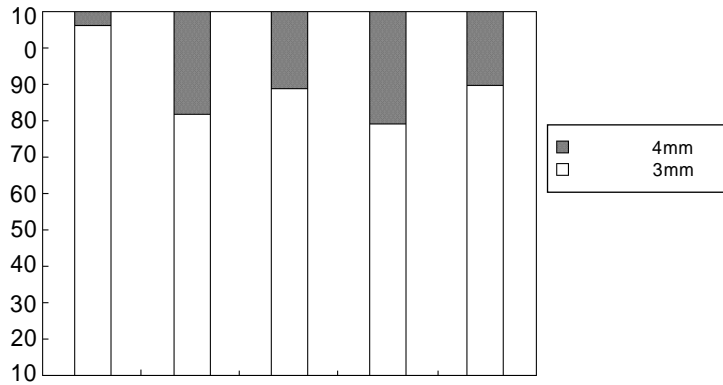
가
 . 3; “ ? ”
 4; 가 10cm
 . ; 0, 1, 2 , (VAS; Visual Analogue Scale³⁵)
 3 4 “ 100% ” ; “ ”
 3. 1) :
 , 2)
 ; : 75 % 100 %
 0.5mm , 3) : 75%
 19)
 0.5 mm (abutment) (1) (10)
 1
 ; 0.1 mm(0.21)
 100% 95%
 ; 0.1mm (2)

4. Mann - Whitney U test ,
 1 4 , (%) 32) (mm)
 ()

	(%)	(%)	(mm)
	10	56	0.6(0.8)
	22	58	0.7(0.8)
	44	56	0.5(0.8)
	29	63	0.5(0.8)
	27	59	0.6(0.5)
			3.1(0.5)



1



2

2 ((mm). (mm), , %).

	(41)	(23)	(14)
(mm)	10.9(1.9)	11.4(1.4)	10.4(2.0)
(mm)	8.1(0.9)	8.7(0.6)	7.1(0.6)***
(%)	6 ; 15% 10 ; 24%	1 ; 4% 5 ; 22%	4 ; 29% 4 ; 29%
	47.8(15.4) 55.8(10.0)	47.6(16.0) 54.9(11.2)	51.3(15.7) 58.6(8.9)

***p<0.001 ;

3 (mm), (mm), (mm),
14.

	(41)	(23)	(14)
(mm)	3.7(1.8)	3.3(1.5)	4.4(1.9)
(mm)	1.8(0.7)	2.0(0.7)	1.8(0.6)
(mm)	3.4(1.0)	3.4(1.2)	3.2(0.6)
(mm)	3.5(0.9)	3.4(0.8)	3.5(0.9)
(mm)	7.4(1.5)	7.9(1.6)	6.8(1.5)***
(mm)	7.2(1.3)	7.0(0.9)	7.4(1.8)
(mm)	2.3(0.7)	2.3(0.7)	2.4(0.8)
(mm)	2.4(0.7)	2.3(0.8)	2.5(0.8)

***p<0.001 ;

4 ; (%), (%),
32) (mm).

	(41)	(25 , 21)	(16 , 20)
(%)	44	36	56
(%)	29	38	20
(%)	56	44	75
(%)	63	57	70
(mm)	0.5(0.8)	0.4(0.8)	0.7(0.9)
(mm)	0.5(0.8)	0.4(0.7)	0.6(0.9)
(mm)	3.1(0.7)	3.2(0.9)	3.0(0.3)

III.

Spearman rank test . p<0.05

1

가

StatView 4.51

(Abacus

가

가

Concepts, Inc., Berkeley, CA, 1995)

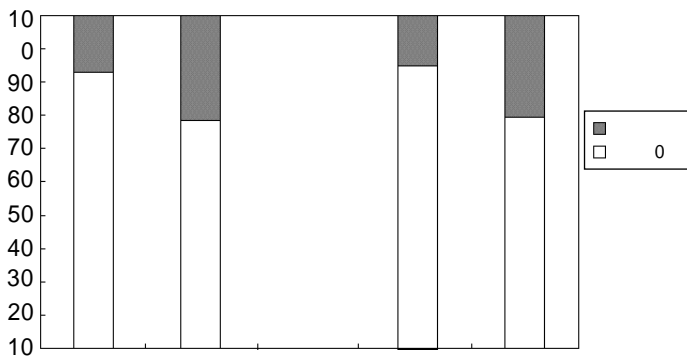
27%

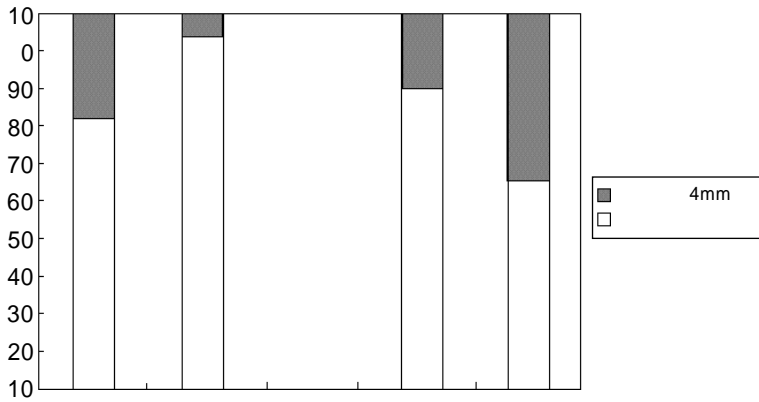
5 (%), (mm), ²⁴⁾ ;

		(41)	(25 ,
21)	(16 , 20)		
(%)			
	59.2(22.2)	61.4(23.5)	55.8(20.5)
	57.3(25.1)	65.9(29.1)	48.2(16.3)*
(mm)			
	3.4(1.0)	3.3(1.2)	3.5(0.8)
	3.5(0.9)	3.4(0.9)	3.7(0.8)
(mm)			
	7.4(1.5)	7.7(1.5)	7.1(1.7)
	7.2(1.3)	7.5(1.4)	7.0(1.1)
	2.3(0.7)	1.8(0.4)	3.1(0.3)***

* p<0.05, **p<0.001 ;

59 % . 2 .
 0.5 0.7(0.6), 23
 가 (2.7mm), 가 ,
 (3.5mm), 3.1mm . 1 5(22%) 가
 ,
 2 가 3mm
 가





4

(3 4).
가

($p < 0.001$). 6 (2 , 4
) 가

3

가

($p < 0.05$)

1.1mm

3 (3)

($p < 0.001$).

가

(4)

(5) ,

($r = 0.346, p = 0.03$)

($r = 0.349, p = 0.03$),

($r = 0.355, p = 0.03$)

(; 44 75%, 57 70 %, ($r = 0.383, p = 0.02$)

; 0.4 0.7, 0.4

0.6). (2)가

95.9,

, 98, 84 100 .9

(31%)가 , 16 (55%) (2.7mm)
 , 4 (14%) 가 38,
 가 . 40)
 .(p=0.61, p=0.45)
 IV. 가 가
 44)
 가 45)
 39, 40), 46)
 ,
 (6/10),
 가 가 47)
 . 27% 1mm 가
 13%³⁶⁾, 20%³⁷⁾
 ,
 39 - 43)
 25 - 70% 6 - 7mm
 . 4.9mm
 (longitudinal
 prospective study)³⁸⁾ 5mm
 (cross - sectional retrospective study)³⁹⁾ 7mm, 6mm 가
 1mm¹²⁾
 () 1.65mm⁴⁸⁾ 0.65mm
 . 가 .
 41 - 43) (emergence profile)
 .
 (2) 20 % 23 가
 (Ekfeldt ³⁶⁾ 1 , 4
 26 %, Haas ¹³⁾ 14%)
 3.1mm Cordoli ³⁶⁾ 3.4mm
 Haas ¹³⁾ .

50).

가

가

가

가

가

41, 43).

33, 34)

1.1 -

1.4mm 가

41)

5mm

가

100%

33)

가

21)

(1.3mm 2.0mm,

가

1.1mm 1.8 mm)

4.3mm

22)

3.75mm

1mm

49),

가

가가

24)

가

()

가

가

가

(black triangle)

()

15)

(2)

가

VI.

1. Creugers, N.H.J., van t Hof, M. A. : " An analysis of clinical studies on resin - bonded bridges "; J. Dent. Res., 70 : 146 - 149, 1991.
2. Andersson, B. : " Implants for single - tooth replacement. A clinical and experimental study on the Brånemark CeraOne System "; Swedish Dental Journal, supplement 108, 1995
3. Adell, R., Lekholm, U., Rockler, B., Brånemark, P - I. : " A 15 - year study of osseointegrated fixtures in the partially edentulous jaw "; Int. J. Oral Sur., 10 : 387 - 416, 1981.
4. Jemt, T., : " Modified single and short - span restorations supported by osseointegrated fixtures in the partially edentulous jaw "; J. Prosthet. Dent., 55 : 243 - 247, 1986.
5. Avivi - Arber, L., Zarb, G. A. : " Clinical effectiveness of implant - supported single - tooth replacement; Toronto study "; Int. J. Oral. Maxillofac. Implants, 11 : 311 - 321, 1996.
6. Esposito, M., Hirsh, J - M., Lekholm, U., Thomsen, P. : " Biological factors contributing to failures of osseointegrated oral implants(1). Success criteria and epidemiology "; Eur. J. Oral Sci., 106 : 527 - 551, 1998.
7. Palacci, P., Ericsson, I., Engstrand, P. : " Implant placement "; In: Palacci, P., Ericsson, I., Engstrand, P., Rangert, B.(eds.). Optimal Implant Positioning & Soft Tissue Management for the Brånemark System, Chicago, Quintessence, 35 - 39, 1995.
8. Silness, J. : " Periodontal conditions in patients treated with dental bridges; III. The relationship between the location of the crown margin and the periodontal condition "; J. Periodont. Res., 5 : 225 - 229, 1970.
9. Valderhaug, J., Ellingsen, J. E., Jokstad, A. : " Oral hygiene, periodontal conditions and carious lesions in patients treated with dental bridges : A 15 - year clinical and radiographic follow - up study "; J. Clin. Periodontol., 20 : 482 - 489, 1993.
10. Jemt, T., Lekholm, U., Gröndahl, K. : " A 3 - year followup study of early single implant restorations ad modum Brånemark "; Int. J. Periodont. Restor. Dent., 10 : 341 - 349, 1990.
11. Jemt, T., Pettersson, P. : " A 3 - year follow - up study on single implant treatment "; J. Dent., 21 : 203 - 208, 1993.
12. Andersson, B., Öman, P., Lindvall, A - M., Lithner, B. : " Single tooth restorations supported by osseointegrated implants; Results and experiences from a prospective study after 2 to 3 years "; Int. J. Oral Maxillofac. Implants, 10 : 701 - 711, 1995.
13. Haas, R., Mensdorff - Pouilly, N., Mailath, G., Watzek, G. : " Brånemark

- single tooth implants; A preliminary report of 76 implants”, *J. Prosthet. Dent.*, 73 : 274 - 279, 1995.
14. Agar, J. R., Cameron, S. M., Highbanks, J. C., Parker, M. H. : “ Cement removal from restorations luted to titanium abutments with simulated subgingival margins ”, *J. Prosthet. Dent.*, 78 : 43 - 47, 1997.
 15. Lindhe, J., Berglundh, T. : “ The peri-implant mucosa ”, In: Lindhe, J., Karring, T., Lang, N.(eds.). *Clinical Periodontology and Implant Dentistry*, Munksgaard, Copenhagen, 3rd ed., pp. 862 - 872, 1997.
 16. Smith, D. E., Zarb, G. A. : “ Criteria for success of osseointegrated endosseous implants ”, *J. Prosthet. Dent.*, 62 : 567 - 572, 1989.
 17. Mombelli, A. : “ Criteria for success. Monitoring ” In: Lang, N. P., Karring, T.(eds.). *Proceedings of the 1st European Workshop on Periodontology*, Berlin, Quintessence, pp: 317 - 325, 1993.
 18. Philips, K., Kois, J. C. : “ Aesthetic peri - implant site development: The restorative connection ”, *Dent. Clin. North Am.*, 42 : 57 - 70, 1998.
 19. Tjan, A. H. L., Miller, G. D., The, J. G. P. : “ Some esthetic factors in a smile ”, *J. Prosthet. Dent.*, 51 : 24 - 28, 1984.
 20. Takei, H., Yamada, H., Han, T. : “ Maxillary anterior esthetics. Preservation of the interdental papilla ”, *Dent. Clin. North Am.*, 33 : 263 - 273.
 21. Tarnow, D. P., Magner, A. W., Fletcher, P. : “ The effect of the distance from the contact point to the crest of the presence or absence of the interproximal papilla ”, *J. Periodontol.*, 63 : 995 - 996, 1992.
 22. van der Velden, U. : “ Regeneration of the interdental soft tissues following denudation procedures ”, *J. Clin. Periodontol.*, 9 : 455 - 459, 1982.
 23. Wennström, J. L. : “ Mucogingival considerations in orthodontic treatment ”, *Seminars in Orthodontics*, 2 : 46 - 54, 1996.
 24. Jemt, T. : “ Regeneration of gingival papillae after single - implant treatment ”, *Int. J. Periodont. Restor. Dent.*, 17 : 327 - 333, 1997.
 25. Gargiulo, A. W., Wentz, F. M., Orban, B. : “ Dimensions and relations of the dentogingival junction in humans ”, *J. Periodontol.*, 32 : 261 - 267, 1961.
 26. Dunn, W. J., Murchison, D. F., Broome, J. C. : “ Patients ’ perceptions of dental attractiveness ”, *J. Prosthodont.*, 5 : 166 - 171, 1996.
 27. Wagner, I - V., Carlsson, G. E., Ekstrand, K., Ödman, P., Schneider, N. : “ A comparative study of assessment of dental appearance by dentists, dental technicians and laymen using computer - aided image manipulation ”, *Int. J. Prosthodont.*, in press, 1998.
 28. Brisman, A. S. : “ Esthetics: a comparison of dentists ’ and patients ’

- concepts ”, J. Am. Dent. Assoc., 100 : 345 - 352, 1980.
29. Kalk, W., Baat, C. de, Kaandrop, A. J. G. : “ Comparison of patients ’ views and dentists ’ evaluations 5 year after complete denture treatment ” , Community Dent. Oral Epidemiol., 19 : 213 - 216, 1991.
30. Meijering, A. C., Roeters, F. J. M., Mulder, J., Creugers, N. H. J. : “ Recognition of veneer restorations by dentists and beautician students ”, J. Oral Rehabil., 24: 506 - 511, 1997.
31. Andersson, B., Öman, P., Carlsson, L., Br nemark, P - I. : “ A new Br nemark single tooth abutment: Handling and early clinical experiences ”, Int. J. Oral Maxillofac. Implants, 7 : 105 - 111, 1992.
32. Löe, H. : “ The gingival index, the plaque index and the retention index systems ”, J. Periodontol., 38 : 610 - 616, 1967.
33. Eger, T., Möler, H. P., Heinecke, A. : “ Ultrasonic determination of gingival thickness; Subjective variation and influence of tooth type and clinical features ”, J. Clin. Periodontol., 23 : 839 - 845, 1996.
34. Olsson, M., Lindhe, J., Marinello, C. P. : “ On the relationship between crown form and clinical features of the gingiva in adolescents ”, J. Clin. Periodontol., 20 : 570 - 577, 1993.
35. Tamaro, S., Berggren, U., Bergenholtz, G. : “ Representation of verbal pain descriptors on a visual analogue scale by dental patients and dental students ”, Eur. J. Oral Sci., 105 : 207 - 212, 1997.

36. Ekefeldt, A., Carlsson, G. E., Börjesson, G. : " Clinical evaluation of single - tooth restorations supported by osseointegrated implants: A retrospective study ", *Int. J. Oral Maxillofac. Implants*, 9 : 179 - 183, 1994.
37. Cordioli, G., Castagna, S., Consolati, E. : " Single - tooth implant rehabilitation : A retrospective study of 67 implants ", *Int. J. Prosthodont.*, 7 : 525 - 531, 1994.
38. Adell, R., Lekholm, U., Rockler, B., Brå - nemark, P - I., Lindhe, J., Eriksson, B., Sbordone, L. : " Marginal tissue reactions at osseointegrated titanium fixtures; (I). A 3 - year longitudinal prospective study ", *Int. J. Oral Maxillofac. Surg.*, 15 : 39 - 52, 1986.
39. Lekholm, U., Adell, R., Lindhe, J., Brå - nemark, P - I., Eriksson, B., Rockler, B., Lindvall, A. M., Yoneyama, T. : " Marginal tissue reactions at osseointegrated titanium fixtures; (II) A cross - sectional retrospective study ", *Int. J. Oral Maxillofac. Surg.*, 15 : 53 - 61, 1986.
40. Apse, P., Zarb, G. A., Schmitt, A., Lewis, D. W. : " The longitudinal effectiveness of osseointegrated dental implants. The Toronto Study: Peri - implant mucosal response ", *Int. J. Periodont. Restor. Dent.*, 11 : 95 - 111, 1991.
41. Wennström, J. L., Bengazi, F., Lekholm, U. : " The influence of the masticatory mucosa on the peri - implant soft tissue condition ", *Clin. Oral Impl. Res.*, 5 : 1 - 8, 1994.
42. Papaioannou, W., Quirynen, M., Nys, M., van Steenberghe, D. : " The effect of periodontal parameters on the subgingival microbiota around implants ", *Clin. Oral Impl. Res.*, 6 : 197 - 204, 1995.
43. Bengazi, F., Wennström, J. L., Lekholm, U. : " Recessión of the soft tissue margin at oral implants " *Clin. Oral Impl. Res.*, 7 : 303 - 310, 1996.
44. van Steenberghe, D., Klinge, B., Linden, U., Quirynen, M., Herrmann, I., Garpland, C. : " Periodontal indices around natural and titanium abutments: A longitudinal multicenter study " *J. Periodontol.*, 64 : 538 - 541, 1993.
45. Quirynen, M., van Steenberghe, D., Jacobs, R., Schotte, A., Darius, P. : " The reliability of pocket probing around screwed implants ", *Clin. Oral Impl. Res.*, 2 : 186 - 192, 1991.
46. Chaytor, D. V., Zarb, G. A., Schmitt, A. W., Lewis, D. : " The longitudinal effectiveness of osseointegrated dental implants. The Toronto Study: bone level changes ", *Int. J. Periodont. Restor. Dent.*, 11 : 112 - 125, 1991.
47. Wheeler, R. C. : " Wheeler 's Atlas of Tooth Form ", 4 th ed., Wheeler, R. C., Ash, M.(eds.), Philadelphia, Saunders, 1984.
48. Esposito, M., Ekstubbé, A., Gröndahl, K. : " Radiological evaluation of marginal bone loss at tooth surfaces facing single Br nemark implants ", *Clin. Oral Impl. Res.*, 4 : 151 - 157, 1993.
-
49. Anderegg, C. R., Metzler, D. G., Nicoll, B. K. : " Gingiva thickness in guided tissue regeneration and associated recession at facial furcation defects ", *J. Periodontol.*, 66 :

397 - 402, 1995.

50. Pontoriero, R., Tonelli, M. P., Carnevale, G., Mombelli, A., Nyman, S. R., Lang, N. P. : " Experimentally induced peri - implant mucositis: A clinical study in humans ", Clin. Oral Impl. Res., 5 : 254 - 259, 1994.
51. Wise, M. D. : " Failure in the restored dentition : Management and treatment " , 1st ed., London, Quintessence, pp. 93 - 95, 1995.
52. Johnson, P. F. : " Racial norms: Esthetic and prosthodontic implications ", J. Prosthet. Dent., 67 : 502 - 508, 1992.

- Abstract -

Soft tissue reactions around implant-supported single-tooth replacements in the maxillary anterior region

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The aims of this study were firstly to investigate soft tissue reactions around single implant - supported crowns and secondly to compare soft tissue dimensions and conditions of the crowns in relation to interdental papillae, and lastly to investigate patients ' esthetic satisfaction with their single implant - supported crowns according to the interdental papillae presence/absence.

Twenty - nine patients(41 implants) whose single missing tooth in the maxillary anterior region had been replaced by single implant - supported crown participated for the study and various variables of soft tissue conditions, dimensions and crown dimensions were measured around the single implant - supported crowns at clinical examination and from study models and

slides.

The results showed that the soft tissue conditions around the single implant - supported crowns were similar to those around implants used for partially or totally edentulous patients. Except for the high frequency of bleeding on probing, all other parameters revealed healthy conditions. The buccal sites of the crown had a shallow pocket comparing with other sites. At all sites of the crown, similar status of little inflammation was found. Mesial sites and central - incisor positioned implant - supported crowns had lower contact point position than distal sites and lateral - incisor positioned crowns, respectively. Mucositis index, probing depth and contact point position were significantly correlated with papillae index ($p < 0.05$). More inflammation and lower contact point position were found at the implant - supported crown with no interdental space than that with interdental space. Patients showed high esthetic satisfaction regardless of interdental space presence.

The result indicated that, despite of their submucosal crown margins, single implant - supported crowns have soft tissue conditions as good as other implants used for the treatment of the different types of edentulism and a clinician can manipulate interdental papilla height by modifying crown shapes within the limits of not violating total esthetics.

Keywords; single implants - soft tissue conditions - soft tissue dimensions - crown dimensions - esthetic satisfaction