

What Affects Postoperative Sinusitis and Implant Failure after Dental Implant:

A Meta-analysis



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Background

The dental implant is an innovative instrument that enables the edentulous patient to chew. Many factors have a bearing on the success of dental implantation. There are also many complications after dental implantation. In this meta-analysis, we investigated which factors increase the risk of postoperative sinusitis and implant failure after dental implant for the first time.

Key Results

Twenty-seven studies were included in our final metaanalysis. The proportion of postoperative sinusitis, perforation of the sinus membrane, and implant failure was 0.05 (95% confidence interval [CI], 0.04-0.07), 0.17 (95% CI, 0.13- 0.22), and 0.05 (95% CI, 0.04-0.07), respectively, using the single proportion test. The only factors that affected postoperative sinusitis were preoperative sinusitis and intraoperative perforation of the Schneiderian membrane (P <.01 and P <.01, respectively). The only factors that affected dental implant failure were smoking and residual bone height of the maxilla (P<.05 and P<.01, respectively).

Methods

Data Source

Included data were searched through the PubMed, EMBASE, and Cochrane library databases. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and 2 authors (J.S.K., S.H.K.) independently extracted data by multiple observers.

Review Methods

We used a random-effects model considering the variation between and within the included studies.

	preop sinusitis		no sinusitis			Odds Ratio		Odds Ratio		
Study or Subgroup	Events	Total	Events	Total	Weight	IV, Random, 95% CI	Year	IV, Rand	lom, 95% Cl	
Fidwell 1992	3	6	2	42	15.9%	20.00 [2.35, 169.91]	1992			
Timmenga 1997	2	5	0	40	7.8%	57.86 [2.30, 1457.86]	1997			
Raghoebar 1999	2	7	0	68	8.1%	62.27 [2.65, 1465.12]	1999			
Timmenga 2003	0	1	1	16	6.3%	3.44 [0.09, 127.69]	2003	20	•	
Mardinger 2007	1	2	0	6	6.2%	13.00 [0.33, 505.22]	2007			
Manor 2010	5	7	1	130	11.8%	322.50 [24.90, 4177.23]	2010			
Moreno Vazquez 2014	2	8	4	164	19.5%	13.33 [2.03, 87.63]	2014			
Chen 2017	0	9	2	75	8.3%	1.55 [0.07, 34.72]	2017		•	
Kozuma 2017	2	4	6	117	16.1%	18.50 [2.21, 154.92]	2017			
Total (95% CI)		49		658	100.0%	21.21 [8.25, 54.52]			-	
Total events	17		16							
Heterogeneity: Tau ² = 0.	27; Chi ² = 9	.17, df =	8 (P = 0.3)	33); I ² =	13%		L			4.00
Test for overall effect: Z =	= 6.34 (P < 0	0.00001)					0.0	Favours (no sinusitis	Favours [preop si	100 nusitis]
	1021 1028		10 2015			ACTIVITY INCO 1995		14124 11100 12221 2020		

Conclusion

Two factors affect postoperative sinusitis after implant surgery: preoperative sinusitis and Schneiderian membrane rupture. It should also be noted that the factors affecting implant failure are residual bone height and smoking. These findings will have a significant impact on the counseling and treatment policy of patients who receive dental implants.

Α		perforation		no perforation		Odds Ratio			Odds Ratio			
~	Study or Subgroup	Events	Total	Events	Total	Weight	IV, Random, 95% CI	Year	IV, Random, 95% CI			
	Becker 2008	1	41	13	160	14.0%	0.28 [0.04, 2.23]	2008				
	Kim YK 2013	7	30	6	44	28.1%	1.93 [0.58, 6.45]	2013				
	Nolan 2014	17	150	7	209	36.3%	3.69 [1.49, 9.14]	2014				
	Kim YK 2014	3	17	6	48	21.7%	1.50 [0.33, 6.80]	2014				
	Total (95% CI)		238		461	100.0%	1.76 [0.73, 4.28]					
	Total events	28		32								
	Heterogeneity: Tau ² = 1	leterogeneity: Tau² = 0.35; Chi² = 5.32, df = 3 (P = 0.15); l² = 44%										
	Test for overall effect: 2	Z = 1.25 (F	9 = 0.21)					Favours [no perforation] Favours [perforation]			
В		smoking		no smoking		Odds Ratio			Odds Ratio			
D.	Study or Subgroup	Events	s Tota	Events	Total	Weight	IV, Random, 95% CI	Year	IV, Random, 95% Cl			
	Mardinger 2007	1	2 8	3 4	47	19.9%	3.58 [0.54, 23.96]	2007				
	Soardi 2013	4	4 58	5	198	39.5%	2.86 [0.74, 11.02]	2013				
	Moreno Vazquez 2014	6	5 154	4	210	40.6%	1.73 [0.46, 6.54]	2014				





Figure 1. Forest plots showing the relationship between postoperative sinusitis and each of the following primary outcomes: (A) preoperative sinusitis, (B) perforation of the Schneiderian membrane, (C) smoker, (D) diabetes mellitus, (E) sex, (F) 1-stage dental implant surgery, and (G) recurrence of sinusitis according to surgery vs medical treatment only.

Figure 2. Forest plots showing the relationship between dental implant and each of the following primary outcomes: (A) perforation of the Schneiderian membrane, (B) smoker, (C) sex, (D) 1-stage dental implant surgery, (E) surgical approach for dental implantation, (F) age, (G) residual bone height of maxilla, and (H) relationship between age and perforation of Schneiderian membrane.

Disclosure of Conflict of Interest

Name(s) of the author(s): Jong Seung Kim, Sam Hyun Kwon The authors declare no potential conflicts of interest.

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