

# Should Endodontists Place Implants? A Survey of U.S. Endodontists

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## Abstract

**Introduction:** The purpose of this national study was to assess endodontists' opinions regarding whether endodontists should place dental implants. **Methods:** A written survey was developed and mailed to 1505 randomly selected practicing endodontists within the United States. **Results:** The response rate was 46%. Univariate, bivariate, and logistic regression analyses were performed. Fifty-seven percent of respondents supported endodontists placing implants. Currently 5.7% of respondents place implants. Regression analyses identified the following variables as being positively associated with endodontists placing implants: graduation from an endodontic training program  $\geq 10$  years ago ( $p = .002$ ); interest in placing implants in the future ( $p = .0001$ ); the belief that implant placement should be incorporated into the endodontic residency curriculum ( $p < .0001$ ); the belief that general dentists would support endodontists placing implants ( $p < .0001$ ); and the desire to continue the rapport with a referred patient by placing an implant if the patient's tooth is nonrestorable ( $p < .0001$ ). **Conclusions:** The majority of responding endodontists believed that dental implant placement is within the scope of endodontic practice. Governing bodies of the specialty of endodontics might consider discussing whether formal implant training should be incorporated into future curricula. (*J Endod* 2009;35:966–970)

## Key Words

Dental implant placement, endodontics, referral rates, survey

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0099-2399/\$0 - see front matter

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During the past 3 decades, dental implant therapy has become an increasingly common treatment modality for tooth replacement. Dental implants have been perceived to increase patients' satisfaction with function, comfort, and esthetics (1). When dental implants were first introduced, they were mainly placed by oral surgeons. However, periodontists began to place implants during the mid-1980s. By the early 1990s, the American Academy of Periodontology determined that dental implant placement should be within the scope of periodontal practice (2). More recently, a broader range of dental care providers, including general dentists, prosthodontists, and endodontists, are learning the skills of implant placement.

Traditionally when a patient presented to a dental office with a nonvital or inflamed pulp, dentists believed that root canal treatment was the best treatment option. In fact, studies have shown that success rates for endodontically treated teeth are very high (3–5). Despite this, practitioners today consider extraction and tooth replacement with a dental implant as another option to endodontic treatment (6). As a result, many studies have been conducted to compare the long-term outcomes of endodontic treatment versus implant placement (5–16). For example, a recent study by Woodmansey (17) showed that endodontically treated teeth had a significantly higher maximum bite force, chewing efficiency, and total occlusal contact than single-tooth implant supported prostheses. In contrast, John et al (9) suggested that it might not be appropriate to compare root canal treatment with implant placement because of the varying outcome measures and prognostic indicators in the literature. Although there are differences in these studies, a recent review of the literature concluded that endodontic treatment is the best option in many cases; however, dental implants provide a good alternative in certain cases in which the prognosis of maintaining the tooth is questionable or poor (18). As a result, it has been suggested that various factors be considered, such as patient preference, restorability of the tooth, and esthetic concerns, before determining whether a tooth should receive endodontic treatment or whether an implant should be placed (18).

Despite the array of available literature supporting endodontic treatment as an appropriate restorative option for many teeth, some dentists now recommend implant therapy rather than root canal treatment or retreatment because of the perceived predictability of osseointegration and the long-term success (10). This shift is important because it has the potential of affecting the scope of endodontic practice. As a result of changing treatment ideologies, it has been suggested by some that endodontists should expand their scope of practice to include implant placement. In fact, a recent survey of endodontists within the United States found that 6.6% of respondents currently place implants (19). However, it is unclear whether most endodontists support implant placement by endodontists because there are currently no published articles in peer-reviewed journals that discuss this controversy. Although the American Association of Endodontists (AAE) stated that implant therapy is a suitable method to replace missing teeth, the AAE has not issued a position statement regarding whether implant placement should be within the scope of endodontic practice (20).

Currently there is a paucity of research describing how endodontic practice has been affected by dental implant placement. In addition, there is limited research describing what percentage of endodontists currently place implants or are interested in placing implants in the future. The purpose of this study was to assess endodontists' opinions about whether dental implant placement should be within the scope of endodontic practice and to identify the predictor variables associated with these opinions.

## Methods

A 17-item written survey was developed and distributed to a random sample of currently-practicing endodontists in the United States ( $N = 1505$ ). The names and addresses of potential subjects were provided from the AAE, which represents 95% of all endodontists nationally. Subjects were sent a cover letter that explained the purpose of the study and obtained informed consent. The survey, which was approved by the University of Iowa's Institutional Review Board, was first mailed in May 2008. A follow-up survey was mailed to nonresponders in June 2008. Respondents returned the surveys via a prepaid, addressed envelope.

The survey assessed endodontists' opinions regarding dental implants. The main dependent variable in this study was whether endodontists believed that implants should be included in an endodontist's scope of practice: "In your opinion, should endodontists place implants (Yes/No)?" The following predictor variables were also included: age, gender, institution and year of completed endodontic training, primary employment situation, geographic location, hours worked per week, retirement plans, and a series of questions regarding their attitudes about implant placement in the endodontic office (5-point Likert-type scale). Geographic location was divided into the 9 regions of the American Dental Association (21), and endodontic training institutions were categorized as private institution, public institution, military training, or hospital-based training.

Data were entered into an Excel (Microsoft Corp, Redmond, WA) spreadsheet. Data from the questionnaires were analyzed, and descriptive frequency tables were generated. Data obtained from the AAE were used to conduct nonresponse bias tests comparing respondents' and nonrespondents' practice location, age, and sex (22). These data were analyzed by using  $\chi^2$  test, Mantel-Haenszel  $\chi^2$  test, and Fisher exact test. Bivariate analyses with the  $\chi^2$  test or the Wilcoxon rank sum test were performed to test associations between the dependent variable (should endodontists place implants? Y/N) and each potential predictor variable. Variables that demonstrated statistically significant differences in the bivariate analysis ( $p < .05$ ) were used to develop a final model to identify factors associated with the dependent variable. Forward stepwise logistic regression analyses were conducted and verified by using backward elimination ( $p < .05$ ). All possible two-way interactions were examined. SAS version 9.1 was used for data analysis (SAS Institute Inc, Cary, NC).

## Results

Six hundred ninety-two (46%) useable surveys were returned. There were no statistically significant differences between respondents and nonrespondents on the basis of geographic region ( $p = .93$ ). Table 1 represents the demographic and practice characteristics of respondents. The age of respondents ranged from 29–74 years, with a mean age of 48.2 years, and 14.2% of respondents were female. No statistically significant differences in selected demographic factors were found between our data versus the AAE data in terms of age groups ( $p = .71$ ) and gender ( $p = .15$ ). This suggests that our sample was representative of endodontists practicing within the United States.

Respondents' opinions regarding implant placement by endodontists are shown in Table 2. Overall, 381 (57.0%) respondents believed that implant placement should be within the scope of endodontic practice. Furthermore, 5.7% of respondents stated that they currently place implants, and 25.4% were interested in placing implants in the future.

Regression analysis identified 5 predictor variables that were statistically significantly associated ( $p < .05$ ) with the view that endodontists should place implants (Table 3). Holding all other variables constant, the strongest predictor variable was the belief that implant placement

**TABLE 1.** Demographic and Practice Characteristics of Responding U.S. Endodontists ( $N = 692$ ;  $n = 682$ )

Dentist characteristics		Mean, 48.2 y
<b>Age</b>		
<b>Gender</b>		
Male		85.8%
Female		14.2%
<b>Years since graduation from residency</b>		
<10 y		38.6%
$\geq 10$ y		61.4%
<b>Endodontic training</b>		
Private university		34.8%
Public university		51.8%
Military		9.7%
Hospital-based program		3.7%
<b>Plan to retire in 5 years</b>		
Yes		22.1%
No		77.9%
Practice characteristics		Mean, 33.6 hours
<b>Region of practice</b>		
1. New England		6.1%
2. Middle Atlantic		12.9%
3. South Atlantic		20.2%
4. East South Central		4.1%
5. East North Central		16.3%
6. West North Central		8.3%
7. West South Central		10.0%
8. Mountain		7.6%
9. Pacific		14.5%
<b>Hours worked per week</b>		
<b>Taught endodontics within the past year</b>		
Yes		33.0%
No		67.0%

should be incorporated into the endodontic surgical curriculum. Endodontists who responded favorably to this question were 13.2 times more likely to support implant placement. Endodontists who graduated from a residency program 10 or more years ago were 2.4 times more likely to believe that endodontists should place implants as those who graduated less than 10 years ago. Respondents who were interested in placing implants in the future themselves were 8.0 times more likely to support endodontists placing implants as respondents who were not interested in placing implants. Respondents who believed that general dentists in the community would support implant placement were 4.5 times more likely to support implant placement by endodontists, whereas those who wanted to place the implant themselves if a referred patient had a nonrestorable tooth were 4.1 times more likely to support implant placement by endodontists. Table 3 also indicates which variables were and were not significant in the bivariate analyses. No interactions were found between predictor variables.

## Discussion

Implant placement by endodontists is currently a controversial topic, but few studies have examined endodontists' opinions regarding implant placement within their own specialty. This study found that the majority of respondents (57.0%) believed that endodontists should place dental implants. This is significant because currently there are only a few endodontic residency programs in the country that include implant training. If endodontists are going to place implants, then the governing bodies who determine the endodontic training curriculum should consider reviewing and possibly altering the surgical curriculum to include implant placement to help ensure that a minimum standard of care is achieved.

The belief that implant placement should be incorporated into the endodontic training curriculum relates directly to one's belief in

**TABLE 2.** Endodontists' Practice and Opinions Regarding Implant Placement (n = 668)

<b>Believe endodontists should place implants</b>	
Yes	57.0%
No	43.0%
<b>Currently place implants</b>	
Yes	5.7%
No	94.3%
<b>Interested in placing implants in the future</b>	
Yes	25.4%
No	74.6%
<b>Willing to pursue additional training to learn implant placement</b>	
Agree/strongly agree	33.8%
Neutral	24.6%
Disagree/strongly disagree	41.6%
<b>Believe implants should be part of the endodontic curriculum</b>	
Yes	63.0%
No	37.0%
<b>Believe that general dentists in the community would support endodontists placing implants</b>	
Agree/strongly agree	47.6%
Neutral	33.6%
Disagree/strongly disagree	18.8%
<b>Would like to continue the rapport they built with a referred patient by placing an implant themselves if they determined that a referred tooth is nonrestorable</b>	
Agree/strongly agree	28.4%
Neutral	24.0%
Disagree/strongly disagree	47.6%
<b>Perception of endodontic referral change during the past 10 years</b>	
Referrals have increased	30.5%
Referrals have decreased	38.5%
No change in referrals	31.0%
<b>Believe that placing implants would increase the profitability of their office</b>	
Agree/strongly agree	47.9%
Neutral	24.6%
Disagree/strongly disagree	27.5%

changing endodontic practice patterns. Respondents recognized that proper education has to be provided if a procedure is going to be performed at the standard of care of a dental specialist. This will also drive accreditation requirements and the availability of continuing education (CE) courses on implant placement specifically for endodontists.

Endodontists who had been practicing longer were more likely to support endodontists placing implants than recent graduates, a finding that did not support our original hypothesis. Perhaps more experienced practitioners are more interested in, or more comfortable, learning a new skill. In contrast, recent graduates might feel overwhelmed from their recent schooling and cannot imagine going through additional training to place dental implants. Alternatively, recent graduates might have pursued the endodontic specialty to perform "traditional" endodontic procedures as opposed to the surgical procedures found in periodontics or oral surgery specialties. Because of their desire to perform traditional endodontic procedures, recent graduates might be less likely to support expanding the scope of endodontic practice to include implant placement.

Respondents who were personally interested in placing implants in the future were more likely to support implant placement by endodontists. Similarly, respondents who believed that general dentists in the community would support endodontists placing implants were more likely to support implant placement by endodontists. Perhaps these practitioners believed that providing this new service would not jeopardize relationships with referring dentists but would build on them instead. The desire to maintain the rapport with a referred patient by placing an implant for a nonrestorable tooth instead of referring the patient to yet another specialist could help justify implant placement by endodontists.

Although geographic region of practice was a statistically significant variable with implant placement at the bivariate level, it was not significant in the final regression model. Because geographic location

was significant at the bivariate level, it appears that practice philosophies and economic circumstances might influence respondents' opinions regarding implant placement, but other variables are more strongly associated. Although alternative models for dividing the country might have changed the significance of geographic location in the final model, the methods for categorizing geographic location are endless; thus it is worth evaluating geographic differences in attitude in future studies.

Although 249 (38.5%) respondents perceived that referrals have decreased during the past 10 years, this variable was not significant in the final model. This suggests that although this variable might play a role, other variables beyond referrals and economics are also contributing to this philosophical shift.

A majority of the respondents who currently place implants reported that they received training in implant placement at CE courses (97%) and by implant company representatives (80%). There is a great deal of variability between these training modalities: number of hours involved, number of cases treated, and quality of education. Although CE courses provide added benefit to a strong educational base, it is difficult to ensure that all programs can provide enough training for dentists to perform implant placement at the highest standard of care. Only 15% of respondents who currently place implants stated that they received implant placement training in their residency program. The survey did not specify whether implant training occurred in an endodontic residency or general practice residency, so it is impossible to determine from this study exactly how many endodontic residency programs include implant placement as part of their curricula.

There are a few limitations to this study. One limitation is a 46% response rate. Nonrespondents might have different opinions than respondents. To minimize nonrespondent bias, the survey was submitted to a random sample of endodontists nationally. Furthermore, nonresponse testing demonstrated that there were not statistically significant differences between respondents and nonrespondents by

**TABLE 3.** Final Logistic Model Associated with the Belief that Endodontists Should Place Dental Implants (n = 586)

Predictor variable	Adjusted odds ratio	95% Confidence interval	P value
Graduation from residency program ≥10 y ago vs <10 y ago*	2.39	1.37–4.18	.002
Interest in personally placing implants in the future Yes vs no*	8.01	3.12–21.00	.0001
The belief that implant placement should be incorporated into the endodontic curriculum Yes vs no*	13.15	7.68–22.50	<.0001
The belief that general dentists in the community would support endodontists placing implants Strongly agree/agree vs strongly disagree/disagree*	4.47	2.17–9.19	<.0001
Neutral vs strongly disagree/disagree*	1.55	0.74–3.20	<.0001
The desire to continue the rapport with a referred patient by personally placing an implant if the patient's tooth is deemed nonrestorable with endodontic treatment Strongly agree/agree vs strongly disagree/disagree*	4.12	1.86–9.14	<.0001
Neutral vs strongly disagree/disagree*	2.01	1.13–3.74	<.0001

\*Reference group.

Variables that were considered but were not significant in the final model:

Significant at bivariate level only ( $p < .05$ ): geographic region; endodontists in community place implants; respondent places implants; respondent interested in placing implants and is willing to pursue additional training to learn implant placement; respondent did not feel busy during the past 12 months; belief that: placing implants would increase the profitability of the office; other dental specialists would support endodontists placing implants; implants have an equal or better long-term success rate than traditional endodontic procedures, staff would not be resistant to placing implants; placing implants would increase referrals to the office; and learning implant placement would fulfill the respondent's desire to learn something new. Respondents who disagreed with the following statements were more likely to support implant placement: "I prefer to limit my practice to nonsurgical endodontic therapy;" "The increased cost of liability insurance with placing implants is more than I want to spend;" and "It would not be financially advantageous to place implants in my practice due to a large increase in overhead."

Insignificant at the bivariate level ( $p > .05$ ): gender; location of residency training; primary practice situation; average working hours per week; teaching endodontics in an academic environment during the past year; planning to retire in the next 5 years; if generalists and/or specialists currently place implants in the community; and perceived change in referrals during the past 10 years.

geographic region of practice, age, and sex. This suggests that the results from the study might be generalizable to most endodontists. Although the sample population only included members of the AAE, the AAE represents 95% of endodontists within the United States; thus a majority of endodontists were represented. Likewise, there were no differences found between our demographics and the demographics of the AAE. Despite these attempts to make the study generalizable, it is possible that endodontists who were apathetic about implant placement were the ones who did not return the survey. Therefore, this response rate might represent an inherent bias in the results of the survey.

Although the study quantifies what percentage of respondents are in favor of endodontists placing implants, the survey did not ascertain why respondents were in favor of implant placement. At this point in time, it is merely speculation as to the motivation behind endodontists placing implants. Almost half of respondents stated that they believed that placing implants would increase the profitability of their office. Although this variable was not statistically significant, it shows that money might be one of the motivating factors behind this philosophical shift. Future studies should be conducted to better understand the driving factors behind endodontists' support of implant placement.

This study provides an excellent starting point for exploring the opinion of whether endodontists should place implants. However, future studies should evaluate other aspects of this topic. For example, would general dentists be willing to refer their patients to endodontists for implant placement? What role would the endodontist have in planning the restorative treatment for an implant? Why are endodontists who graduated more than 10 years ago more in favor of implant placement than recent graduates? Studies should also be conducted to assess the potential ramifications of including implant placement training into endodontic residency curricula. These studies should consider the following questions: Is the demand for dental implants large enough to provide adequate experiences for each endodontic resident? Would there be strife among the various specialty departments within dental schools as more residents compete for implant surgery experience?

Would the current endodontic curriculum need to be lengthened to include time for teaching implant placement so that other techniques are not sacrificed? Should some of this extra training be aimed at teaching endodontic residents how to interpret cone beam volumetric tomography images or graft bone? Would residents take part in prosthodontic treatment planning sessions to become more involved in the restorative treatment planning process? What impact would a longer residency program have on the overall number of endodontists in the workforce, and how would a different curriculum impact the treatment options provided by endodontists? Before changing the endodontic residency curriculum, the answers to these questions should be addressed. Once evidence-based studies have been completed, the governing bodies of the specialty of endodontics, endodontic training programs, and the Commission on Dental Accreditation can consider discussing whether formal implant training should be incorporated into future residency curricula.

### Acknowledgments

*This study was funded through a grant from Delta Dental of Iowa.*

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