

2008 Survey of AAO Members on Miniscrew Usage

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This article reports on the current use of miniscrew implants (MSIs) in orthodontic practices throughout the world, based on an electronic survey of all members of the AAO taken earlier this year. The survey was originally sent to a total of 9,470 members in February, and a reminder was sent in March. It is anticipated that the poll will be repeated every two years.

A total of 564 AAO members responded to the survey, for a response rate of approximately 6%. Of these, 555 (98.5%) were practicing orthodontics, and nine were residents. About 35% of the respondents were from outside the United States. The number of years in practice ranged from 0 to more than 20, with the majority of respondents (58.4%) having practiced for more than 15 years.

Survey Results

Eighty percent of the respondents indicated that they had at least one current miniscrew case in their practices. Most had been using MSIs for one to three years; 7.5% had been using them for more than five years (Table 1). More than half of the respondents (57.4%) had placed 10 or fewer

MSIs; 16.6% had placed 11-20, 10.6% had placed 21-50, and 15.4% had placed more than 50. About 35% of the orthodontists had inserted their first miniscrews themselves, but most had referred out their first MSI placement to either an oral surgeon (49.4%) or a periodontist (15.8%). On the other hand, the majority of the respondents (54.5%) reported that they were now placing their own miniscrews. Those who didn't were mainly concerned about potential root damage (32.8%). The vast majority of orthodontists (91.6%) had received no training in MSI placement during their orthodontic residencies. Of those who did, most trained on either animal bone (35.4%) or plastic blocks (27.9%).

When placing miniscrews, most orthodontists used a combination of topical and local anesthesia (Table 2). Respondents preferred to use panoramic radiographs to determine MSI placement sites and either periapical (36.9%) or panoramic radiographs (38.5%) to assess MSI position after placement. Most orthodontists (58.3%) never drilled pilot holes, and an even greater percentage (78.3%) never measured the insertion torque. More

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**TABLE 1
MINISCREW IMPLANT (MSI)
EXPERIENCE AND TRAINING**

1. How long have you been using MSIs?	
Less than 1 year	26.7%
1-3 years	54.0
3-5 years	11.9
More than 5 years	7.5
2. How many MSIs have you placed?	
0	20.3
1-10	37.1
11-20	16.6
21-50	10.6
More than 50	15.4
3. Who placed your first MSI?	
Myself	34.8
Oral surgeon	49.4
Periodontist	15.8
4. Who is currently placing your MSIs?	
Myself	54.5
Oral surgeon	32.3
Periodontist	13.3
5. Why don't you place your own MSIs?	
Lack of training	13.6
Time	18.6
Too invasive	11.3
No kit	15.3
Pain	8.5
Root damage	32.8
6. Were you trained to place MSIs?	
Yes	8.4
No	91.6
7. If so, what method was used for training?	
Wood blocks	11.4
Plastic blocks	27.9
Human subject	8.1
Animal bone	35.4
Typodont	17.2

Note: Highest percentages appear in boldface type.

**TABLE 2
MINISCREW TECHNIQUES AND
TYPES OF CASES**

8. What type of anesthesia do you use?	
None	0.6%
Topical	23.9
Local infiltration	11.4
Topical and local	64.1
9. What radiograph do you use to identify the placement site?	
None	1.0
Periapical	18.5
Panoramic	69.7
Cephalometric	2.6
Cone-beam	8.2
10. What radiograph do you use to determine the MSI position?	
None	22.8
Periapical	36.9
Panoramic	38.5
Cephalometric	0.5
Cone-beam	1.3
11. Do you drill a pilot hole prior to placement?	
Never	58.3
Sometimes	31.2
Mostly	6.4
Always	4.1
12. Do you measure insertion torque?	
Never	78.3
Sometimes	12.0
Mostly	4.4
Always	5.3
13. When is the load applied to the MSIs?	
Immediately	76.8
After 2-3 weeks	18.0
After 4-5 weeks	3.8
After more than 5 weeks	1.4
14. Do you measure the forces applied?	
Yes	20.3
No	79.7
15. What method do you use to apply forces?	
Elastomeric chain	28.4
Elastomeric thread	8.6
Coil springs	63.0

16. How are forces applied?	
Directly	77.7
Indirectly	21.6
Unknown	0.7
17. For what type of cases have you used MSIs?	
Space closure	7.0
Intrusion	13.6
Occlusal plane leveling	5.9
Bodily movements	28.1
Molar uprighting	24.8
Extrusion	12.1
Orthopedics	8.6

Note: Highest percentages appear in boldface type.

**TABLE 3
MINISCREW FAILURES**

18. Do you replace failed MSIs?	
Yes	82.6%
No	17.4
19. What is your percentage of MSI failures?	
None	17.7
Less than 10%	32.0
10-25%	35.3
26-50%	10.4
51-99%	4.2
100%	0.4
20. In which jaw have you experienced the most failures?	
Maxilla	43.8
Mandible	29.8
Same in both jaws	26.4
21. What do you do with slightly mobile MSIs?	
Nothing	40.7
Tighten	30.6
Replace	22.3
Remove	6.4

Note: Highest percentages appear in boldface type.

**TABLE 4
PATIENT RESPONSE, TREATMENT EFFECTS, AND ORTHODONTIST SATISFACTION**

22. Pain at MSI placement?	
Yes	12.8
No	73.2
Don't know	14.1
23. Pain after 48-72 hours?	
Yes	19.9
No	64.3
Don't know	15.8
24. Pre-placement patient anxiety?	
Very	3.9
Moderately	26.9
Slightly	54.9
Not anxious	14.4
25. Have MSIs made treatment faster?	
Yes	42.8
No	29.8
Don't know	27.4
26. Have MSIs made treatment better?	
Yes	78.7
No	6.4
Don't know	14.9
27. How much more time do MSIs require?	
Substantially less	2.9
Less	8.4
No difference	57.1
More	28.9
Substantially more	2.7
28. Are you satisfied with the success of MSIs?	
Very dissatisfied	5.1
Dissatisfied	3.3
Neutral	16.4
Satisfied	50.1
Very satisfied	25.1

Note: Highest percentages appear in boldface type.

TABLE 5
SIGNIFICANT ASSOCIATIONS BETWEEN MINISCREW FAILURE RATES
AND SURVEY ITEMS

Survey Item	Those Who Reported Fewer Failures Also Reported That:	p*
1	They had been using MSIs longer.	<.001
2	They had placed more MSIs.	<.001
4	They placed their MSIs themselves.	<.001
9	They used periapical or cone-beam radiographs.	.042
12	They measured insertion torque.	.043
14	They measured the forces applied to the MSI.	<.001
18	They replaced failed MSIs.	.046
22	Their patients reported no pain at MSI placement.	<.001
23	Their patients reported no pain after 48-72 hours.	<.001
24	Their patients reported less anxiety.	.004
25	MSIs had made their treatment faster.	<.001
26	MSIs had made their treatment better.	<.001
27	MSIs required less time than traditional treatment.	<.001
28	They were satisfied or very satisfied with the success of MSIs.	<.001

*Chi-square test.

than three-quarters of the respondents said they loaded the miniscrews immediately; 79.7% did not measure the forces applied. Orthodontic forces were typically applied directly (77.7%) rather than indirectly, using coil springs (63.0%) or chains (28.4%). Most orthodontists used miniscrew anchorage for bodily tooth movements (28.1%) or molar uprighting (24.8%).

The percentage of MSI failures ranged from 0% to 100%, but the vast majority of respondents (85.0%) reported failure rates of 25% or less (Table 3). Failures were more common in the maxilla (43.8%) than the mandible (29.8%). In cases of failure, most of the respondents (82.6%) said they replaced the miniscrews. When MSIs became slightly mobile, the orthodontists generally either did nothing (40.7%) or merely tightened them (30.6%).

About 73% of the orthodontists reported that their patients did not experience pain or discomfort at the time of MSI placement; 64.3% reported no pain or discomfort 48-72 hours after placement (Table 4). Most respondents indicated that their

patients were either slightly (54.9%) or moderately (26.9%) anxious before miniscrew placement. Although fewer than half of the orthodontists (42.8%) reported that MSIs had made their treatment faster, 78.7% indicated that MSIs had made their treatment better. In terms of chairtime, most orthodontists reported that MSIs made no difference (57.1%), but 31.6% indicated that miniscrews required more or substantially more time than traditional treatment methods. Generally, the orthodontists were satisfied (50.1%) or very satisfied (25.1%) with the success of the MSIs used in their offices.

Of the few orthodontists who did not have at least one miniscrew case in their practices at the time of the survey, most (56.5%) had attended a course, but had not yet put the information to practical use. Another 16.3% felt they could achieve the same results with other systems, 13.0% said they had not been adequately trained, and 4.3% believed the procedure was too invasive. Regardless, 91% of these orthodontists did plan to use MSIs in the future.

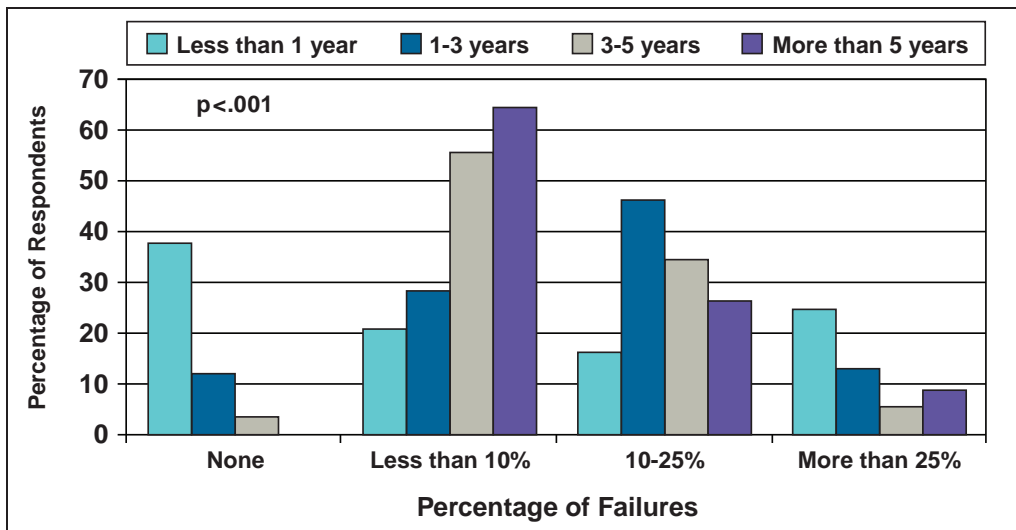


Fig. 1 Miniscrew failure rate according to years of use.

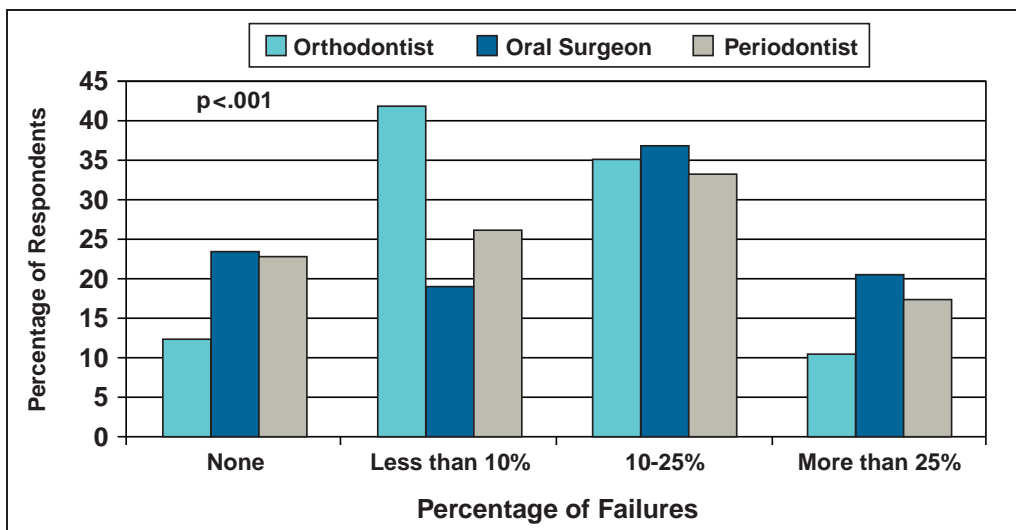


Fig. 2 Miniscrew failure rate according to who places screws.

Relationships Among Responses

Although a statistical relationship does not prove a causal relationship, the percentage of MSI failures was significantly related to a number of factors, including the orthodontists' experience, as measured by either the number of miniscrews they had placed or the number of years they had been using them (Table 5, Fig. 1). The percentage of failures reported was significantly lower for orthodontists who inserted their own MSIs than for those who referred the placement to oral surgeons or periodontists (Fig. 2). In addition, orthodontists who placed miniscrews themselves had been using them significantly longer than those who did not

($p < .001$). Respondents who placed MSIs themselves were also significantly more likely to replace the ones that failed ($p < .001$). Although training was not related to most of the other survey items, the orthodontists who had been trained in miniscrew placement had been using them significantly longer than those who had not been trained ($p < .001$).

Failure rates were also related to the techniques used for miniscrew insertion. The respondents who used periapical or cone-beam radiographs to determine placement sites reported lower failure rates than those who used panoramic radiographs, cephalograms, or nothing. Those who measured the insertion torque of implants and the

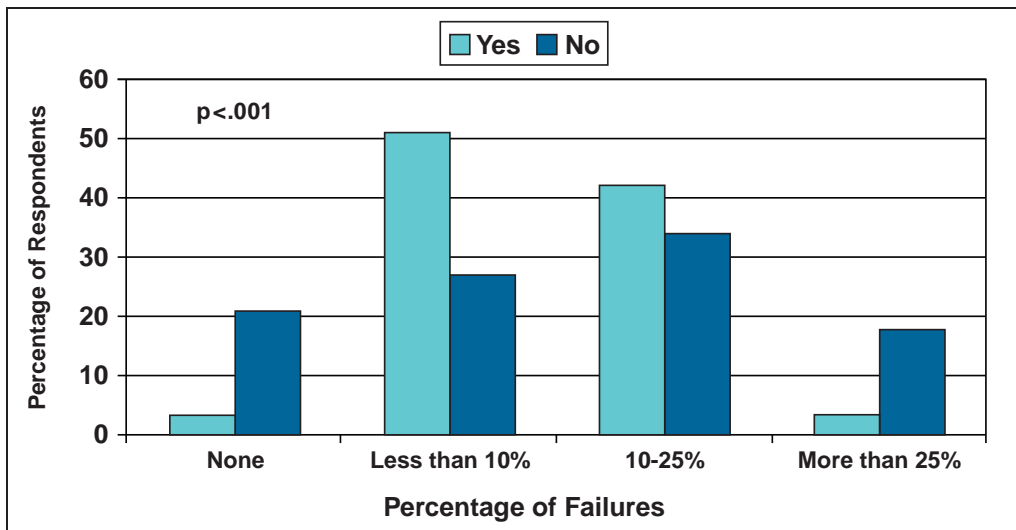


Fig. 3 Miniscrew failure rate according to whether insertion torque was measured.

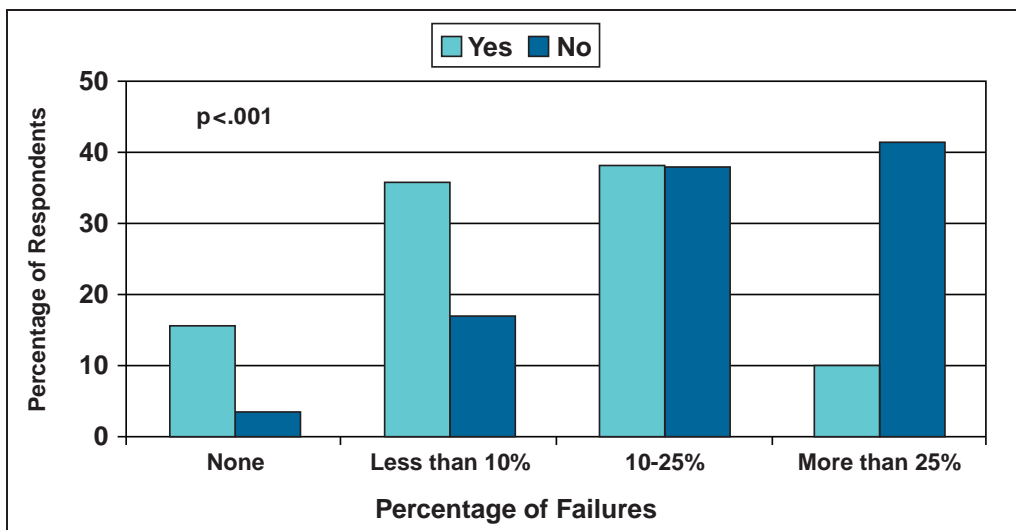


Fig. 4 Miniscrew failure rate according to orthodontist satisfaction with miniscrew use.

forces applied to the implants also reported significantly fewer MSI failures than those who did not (Fig. 3).

Interestingly, orthodontists who reported higher rates of MSI failure also had patients who experienced more pain, both at the time of placement and 48-72 hours later. Similarly, greater numbers of implant failures were associated with increased anxiety among patients. As might be expected, the orthodontists who had fewer failures were more satisfied with MSIs, perhaps because they also believed that miniscrews had made their treatment faster and better (Fig. 4). Those who were satisfied or very satisfied with MSIs had been using them significantly longer than those who

were not satisfied ($p < .001$).

The orthodontists who practiced outside the United States had placed significantly more MSIs than those who practiced within the United States ($p < .001$). They were also significantly more likely to note that their miniscrew treatments required less time than conventional approaches ($p < .001$); in contrast, most orthodontists practicing within the United States indicated that MSIs required at least the same amount of time as conventional treatments.

Overall, the survey results show that the use of miniscrew anchorage in clinical orthodontic treatment has become the norm rather than the exception. □