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## CASE REPORTS

# Implant failures associated with asymptomatic endodontically treated teeth

DAVID L. BRISMAN, D.M.D.; ADAM S. BRISMAN, D.M.D.; MARK S. MOSES, D.D.S.

**T**he high success rate of achieving osseointegration with root-form endosseous implants is well-documented.<sup>1-4</sup> Implant failures, however, do occur, and what causes them is not always clear. Baumgarten and Chiche<sup>5</sup> reviewed common factors of implant failures that occur

before the implants are uncovered.

These factors include infection, overheating the bone, habitual smoking, systemic disease, transmucosal overloading and excessive surgical trauma.

Esposito and colleagues<sup>6</sup> extensively reviewed the literature on etiologic factors causing implant failure and determined that infection, impaired healing and overload are the major etiologic causes for implant failure. While they did not attribute any implant failures to infected adjacent teeth, it has been reported that implant failure may occur when the implant is positioned adjacent to teeth that are clinically symptomatic of periapical pathology or have radiographic periapical pathology. Tehemar<sup>7</sup> recommends that these adjacent teeth

be treated endodontically or be extracted before the first stage of implant surgery.

In the following cases, implant failures occurred adjacent to asymptomatic endodontically treated teeth with

**Background.** Endosseous root-formed implants occasionally fail to osseointegrate. Causes of failure include infection, overheating of the bone, habitual smoking, systemic disease, transmucosal overloading, excessive surgical trauma and implant placement adjacent to teeth demonstrating periapical pathology.

**Case Description.** In this article, the authors present another possible cause of implant failure. The cases of four patients who received endosseous root-formed implants are discussed. Each patient demonstrated signs of infection after initial implant placement. The common factor in each failing implant was its placement adjacent to an asymptomatic endodontically treated tooth with no clinical or radiographic evidence of pathology.

**Clinical Implications.** These patients demonstrate the importance of evaluating and possibly retreating or extracting adjacent endodontically treated teeth before placing implants.

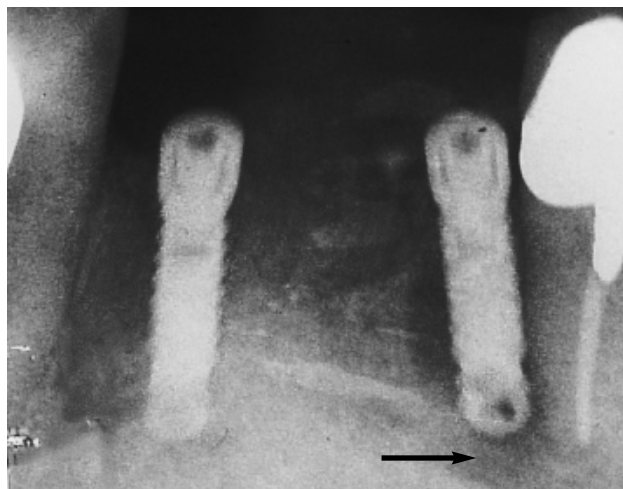
no clinical or radiographic evidence of pathology.

## CASE REPORTS

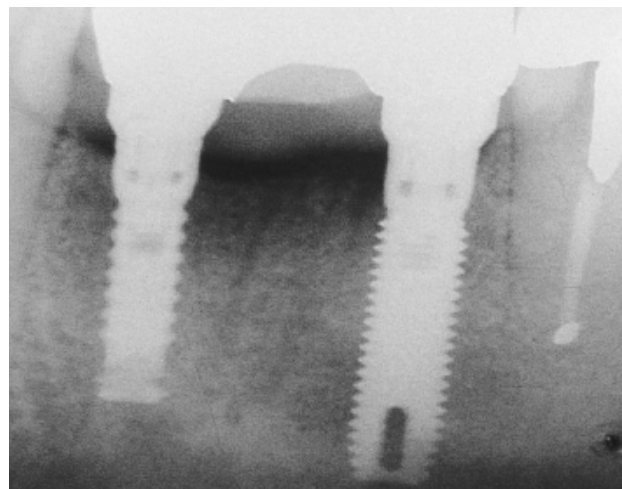
**Case 1.** A 64-year-old man with no significant medical history, except that he smoked, received endodontic treatment on his mandibular right canine in August 1990. A cast post-core and porcelain-fused-to-metal crown was placed shortly thereafter. The tooth was asymptomatic and received no further treatment.

In January 1998, we diagnosed the mandibular incisors as unrestorable as a result of severe bone loss due to periodontitis and periapical pathology. We extracted the incisors on Jan. 20, 1998, and inserted a removable partial denture. The patient ceased smoking for three months before the implants were placed. On Sept. 9, 1998, we placed two 3.25- × 13-millimeter endosseous

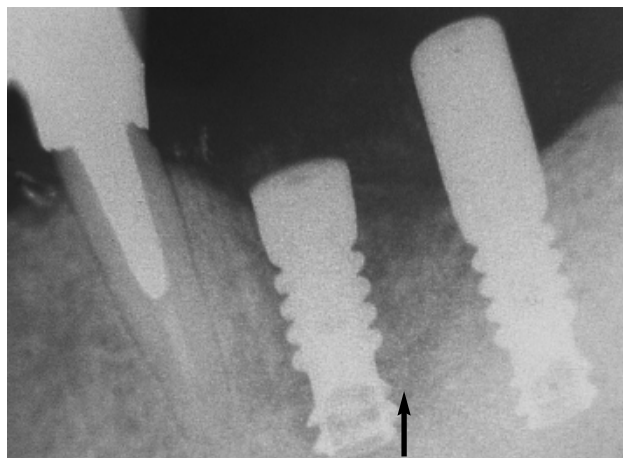
**The inability to consistently identify endodontically treated teeth that have potential microbial contamination has resulted in a new dilemma surrounding implant cases.**



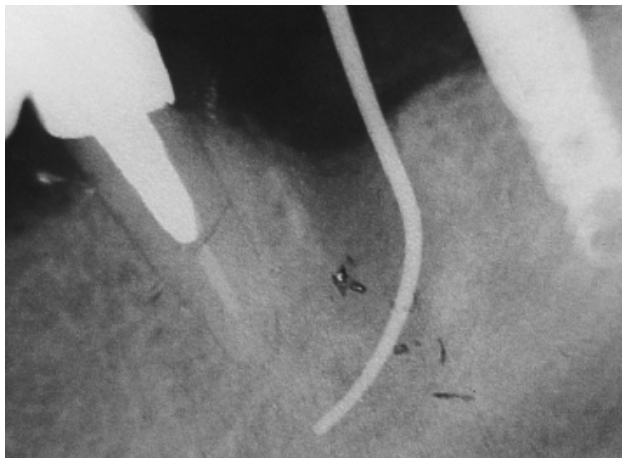
**Figure 1.** Radiograph taken six weeks after implant placement revealed a radiolucent area around the implant adjacent to the mandibular right canine (arrow).



**Figure 2.** Radiograph showing that the infection was resolved and the implants were restored.



**Figure 3.** Four weeks after placement of implants, a radiolucent area developed around the implant in the site of the first molar (arrow).



**Figure 4.** A gutta-percha cone was used to trace the sinus tract to the apex of mandibular second premolar.

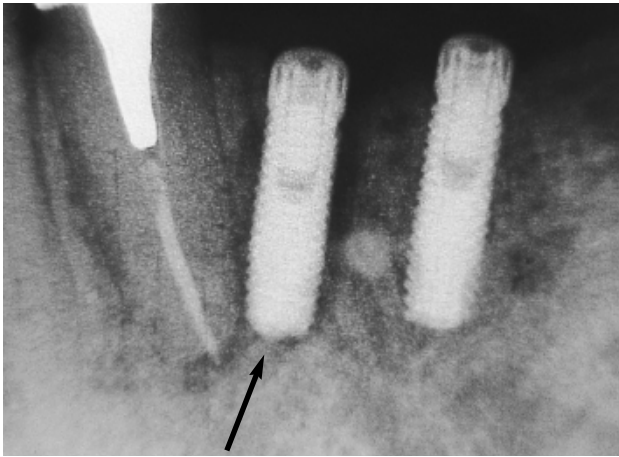
root-formed implants in the areas of the mandibular right and left lateral incisors.

The patient's postoperative instructions included taking 500 milligrams of amoxicillin three times daily and refraining from using the mandibular appliance. We removed the sutures one week after the surgery and there were no significant findings. Six weeks after the implants were placed, we examined the patient and noted a fistula around the mandibular right implant (Figure 1). A radiograph revealed a radiolucent area around the implant. We removed the implant and placed a gutta-percha cone in the extraction site and traced the sinus tract to the apex of the mandibular left canine.<sup>8</sup> We then referred the patient to an oral surgeon who performed an apicoectomy. After five months, we placed another

implant into the original site. Four months later, we uncovered both implants and found that they had been restored successfully (Figure 2).

**Case 2.** A 76-year-old man with no significant medical history received endodontic treatment on June 5, 1980; a post-core and porcelain-fused-to-metal crown was placed on the mandibular right second premolar. The second premolar served as the distal abutment for a three-unit fixed retainer. The mandibular right first molar had received endodontic treatment on Dec. 13, 1977, and the distal root was hemisectioned on Aug. 28, 1989. The first molar was extracted in June 1997. The mandibular second molar had been extracted in 1973.

Three months later in the areas of the mandibular right first and second molars, we placed two



**Figure 5.** Radiograph at the time of the surgical uncovering showing a radiolucency that developed around the apex of the implant at the site of the first molar (arrow).



**Figure 6.** A gutta-percha cone was used to trace the sinus tract to the apex of the mandibular right second premolar.

4.25- × 10-mm endosseous root-formed implants. The patient was instructed to take 500 mg of amoxicillin three times daily for one week. After one week, we removed the sutures and noted that the healing appeared to be within normal limits. After four months, we uncovered the implants and noted that the implant in the site of the second molar had integrated successfully, but the implant in the site of the first molar was mobile. We removed the implant in the first molar site and performed a bone graft consisting of radiated bone and tetracycline. We determined that the asymptomatic endodontically treated mandibular right second premolar was the cause of the implant failure. The patient was advised not to have another implant placed without re-treating or extracting the second premolar. The patient, however, chose to have another implant placed by another dentist, without re-treating the second premolar.

Within four weeks of placement, a fistula developed around the implant (Figure 3). We used a gutta-percha cone to trace a sinus tract to the apex of the second premolar (Figure 4). We recommended that the patient have the premolar extracted and have two additional implants placed. No further treatment has been reported.

**Case 3.** A 60-year-old man received endodontic retreatment of his mandibular right second premolar that then received a cast post-core and porcelain-fused-to-metal crown in October 1997.

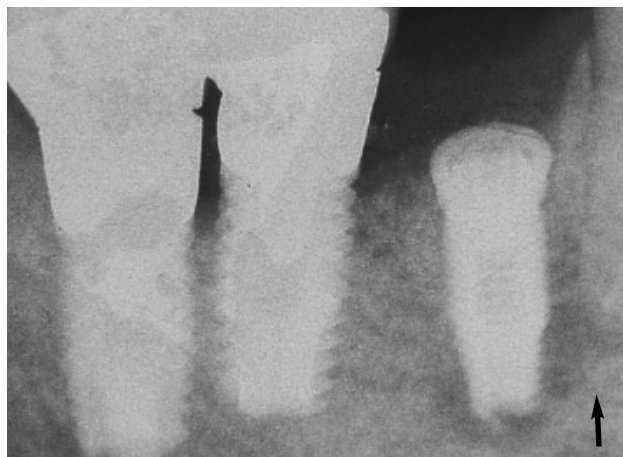
**The patient was advised not to have another implant placed without re-treating or extracting the second premolar. The patient, however, chose to have another implant placed by another dentist, without re-treating the second premolar.**

We placed two 3.3- × 10-mm endosseous root-formed implants in the areas of the mandibular right first and second molars in March 1999. At the time of placement, the proximity of the implant in the first molar to the second premolar was noted, but we determined that the implant had not infringed on the periodontal ligament. The patient

was instructed to take 500 mg of amoxicillin three times daily for one week. After one week, we removed the patient's sutures. Four months after the procedure, we uncovered the implants. We took a periapical radiograph and noted that a radioluculent area had developed around the implant in the site of the first molar adjacent to the second premolar (Figure 5). We removed the implant. In the site of the failed implant, we used a gutta-percha cone to trace a sinus tract to the apex of the second premolar (Figure 6).

**Case 4.** A 64-year-old woman with no significant medical history had two 5.0- × 10.0-mm endosseous root-formed implants placed in the areas of the mandibular right first and second molars in January 1998. These implants healed without incident, and we uncovered them in June 1998. The implants then were restored prosthetically. In October 1998, we surgically extracted the mandibular right second premolar because of periodontal disease and dental caries and placed an alloplastic bone graft. In May 1999, we inserted a 3.75- × 10-mm endosseous root-formed implant into the grafted





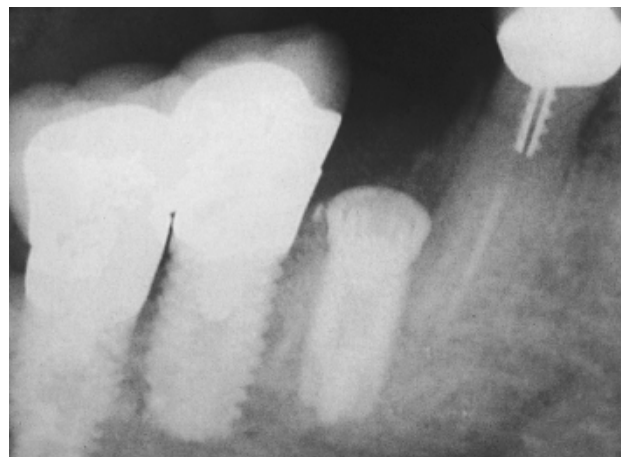
**Figure 7. A radiograph taken two weeks postoperatively revealed a radiolucent lesion around the mandibular right first premolar (arrow).**

extraction site of the second premolar. Two weeks later, the patient had mild pain at palpation, erythema and swelling in the mucobuccal fold of the second premolar region. We incised the site and drained it, and the patient was instructed to take 300 mg of clindamycin four times daily for two days, then 150 mg four times daily for seven days.

Radiographs revealed a radiolucent area around the first premolar, an asymptomatic tooth that had been endodontically treated 12 years before, as well as a direct communication from the first premolar to the recently placed implants in the second premolar site (Figure 7). Three days later, the patient complained of severe pain and discomfort. We performed exploratory surgery and débridement, reflected a flap and observed that the implants showed no evidence of mobility or buccal dehiscence. We closed the flap with 4-0 silk sutures, and the patient continued taking the antibiotic. When we saw the patient two weeks later, she had no complaints and the infection appeared to be resolved both clinically and radiographically (Figure 8).

## DISCUSSION

Endodontic treatment is a successful and accepted procedure. An asymptomatic tooth that appears normal on a periapical radiograph usually indicates that endodontic treatment has been successful.<sup>9</sup> It has been shown, however, that even if a periapical area seems to have been resolved on a radiograph, microorganisms may persist indefinitely. In 1967 Brynolf<sup>10</sup> reported that 93 percent



**Figure 8. Radiograph showing resolution after treatment.**

of endodontically treated teeth in cadavers exhibited histologic signs of inflammation. Many of these teeth appeared radiographically normal. Although cadaver studies may be suspect owing to the difficulty of proper fixation of tissues, other studies have supported their observations. More recently, Green and colleagues<sup>11</sup> demonstrated

that histologic findings could be associated with endodontically treated teeth that appear radiographically normal. Twenty-six percent of the specimens they examined had histologic signs of inflammation despite normal radiographic findings. Seltzer<sup>12</sup> removed a small block section containing the root tip and surrounding tissues from 14 teeth six to 30 months after endodontic treatment was performed in children. He found histo-

logic evidence of periapical chronic inflammatory lesions in at least one-half of the specimens. Rowe and Binnie<sup>13</sup> performed endodontic treatment on 180 teeth in beagles. Of the 129 teeth that displayed no radiographic abnormality, 47 percent demonstrated a histologic apical inflammatory response. Lin and colleagues<sup>14</sup> also stated that periapical lesions often are not detectable radiographically and can be asymptomatic. They credited most endodontic treatment failures to persisting bacterial infections, which are a result of inadequate obturation or an incomplete seal. Since radiographs are only two-dimensional views of the root, they may lead the practitioner to leave part of the canal space untouched and, therefore, not treated properly.

Since radiographs are only two-dimensional views of the root, they may lead the practitioner to leave part of the canal space untouched and, therefore, not treated properly.

Although the literature on failure caused by adjacent endodontically treated teeth is limited, Shaffer<sup>9</sup> also reported incidences in which teeth with radiographic pathology caused the failure of the adjacent implant. Similar findings occurred in the cases we reported in this article. All four patients in this study had at least two implants placed. In each case, the implant adjacent to the endodontically treated tooth failed. Dentists are unable to test the sterility of a tooth's apex. Therefore, an asymptomatic endodontically treated tooth may be harboring a chronic infection, which may be the cause of implant failure.

## CONCLUSION

The inability to consistently identify endodontically treated teeth that have potential microbial contamination has resulted in a new dilemma surrounding implant cases. Dentists should be aware that if implant failure occurs in a tooth adjacent to one that has received endodontic therapy, further treatment or possible extraction of the treated tooth might be necessary before repeating implant surgery. ■

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