to feel pain are before treatment, when the tooth or restoration is first cut into, when the dentin is entered, on reaching the pulp chamber, and during the time the dentist is negotiating and instrumenting the root canals. A number of strategies can be employed to treat molars with acute irreversible pulpitis and primary acute apical periodontitis (Table 1).

POSTOPERATIVE INTERVENTIONS

Patients who are in moderate to severe pain preoperatively are 5 times more likely to experience moderate to severe pain both during and after their endodontic treatment. After providing good pain management before and during surgery, clinicians need to advise their patients about postoperative pain management techniques. A flexible analgesic strategy is generally needed, which nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen can achieve. Paracetamol can be added to the drug regimen if moderate pain is anticipated, with codeine introduced if the pain is expected to be severe. Usually the systemic NSAID and analgesic agents can be discontinued within 2 to 3 days at most. If the patient cannot use NSAIDs, just paracetamol and codeine can be used. Pain relief medication should begin immediately after treatment is completed to significantly diminish the chance postoperative pain will develop.

For patients with chronic irreversible pulpitis or other conditions that are asymptomatic or produce only mild, occasional symptoms, NSAIDs and/or analgesics are not required. Patients should use these agents only as needed.

Long-acting local anesthetics may improve postoperative comfort for patients, especially if they experienced severe preoperative pain. Bupivacaine has proved especially helpful in this regard.

Clinical Significance

Dentists must make patients as comfortable as possible when they undergo endodontic treatment. This applies to pain control before, during, and after treatment. A combination of strategies may be required, and the dentist should be flexible to manage the individual needs of patients.

Abbott PV, Parirokh M: Strategies for managing pain during endodontic treatment. *Austral Endod J* 44:99-113, 2018

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Full pulpotomy rather than root canal treatment

BACKGROUND

Vital pulp therapy (VPT) is considered more minimally invasive for managing teeth with inflamed pulps than traditional root canal treatment (RCT). Because of the healing potential of the pulp-dentin complex once the irritant is removed, VPT procedures can achieve a high success rate. However, the nonsalvageable portion of the dental pulp must be removed to permit recovery ad healing of the less inflamed remaining pulp tissue. Bioactive endodontic cements such as mineral trioxide aggregate (MTA) have been used to achieve good results. Biodentine is a calcium silicate cement designed to be comparable to MTA in terms of biocompatibility and the induction of a calcific barrier but it offers better properties with respect to mixing, handling, initial setting times, and coronal discoloration. The outcome of Biodentine full pulpotomy in adult permanent teeth with carious exposure and clinical signs and symptoms of irreversible pulpitis was evaluated.

METHODS

The 64 permanent molars (52 patients) had symptomatic vital pulps (Table 1). After preparing the tooth with anesthetic, isolation, and disinfection, carious surfaces were removed. The pulp was amputated to the level of the canal orifices, and hemostasis was achieved. A 3-mm layer of Biodentine was placed, followed by resin-modified glass-ionomer liner and a resin composite (21 teeth) or amalgam restoration (43 teeth). Postoperative periapical radiographs were obtained. Clinical and radiographic evaluations were carried out 6 months and 1 year postoperatively, with comparisons of pain levels both preoperatively and 2 days after treatment.

RESULTS

At baseline 41% of the patients had reported severe spontaneous pain of 10 on a 0 to 10 scale and the others had a history of severe lingering pain when drinking cold drinks that measured 9 to 10 and was reproduced on cold testing. During removal of the inflamed pulp, hemostasis was achieved within 4 minutes in 78% of patients.

Ninety-three percent of the patients reported complete relief of pain 2 days after pulpotomy. The remainder of the patients reported mild discomfort only, scoring 1 to 2 on the 0 to 10 scale.

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria
The patient should be ≥ 18 years old
Noncontributory medical history
Molar tooth with deep caries extending ≥ two of three of dentine
The tooth should give positive response to cold testing
Clinical diagnosis of irreversible pulpitis with/without periapical rarefaction
The tooth is restorable, probing pocket depth and mobility are within normal limits
No signs of pulpal necrosis including sinus tract or swelling
Exclusion criteria
Teeth with immature roots
Nonrestorable teeth
Negative response to cold testing, the presence of sinus tract or swelling
No pulp exposure after caries excavation
Bleeding could not be controlled after full pulpotomy in 6 minutes
Insufficient bleeding after pulp exposure, the pulp is judged necrotic or partially necrotic

(Courtesy of Taha NA, Abdelkhader SZ: Outcome of full pulpotomy using Biodentine in adult patients with symptoms indicative of irreversible pulpitis. *Int Endod J* 51:819-828, 2018.)

The clinical and radiographic success rate was 98% after 1 year (Figure 4).

When considering only cases with preoperative periapical rarefaction, 7 of 9 had complete healing. There was no evidence of internal resorption, canal narrowing, or crown discoloration in any cases. At 1 year, repair was performed in 2 amalgam restorations after partial fracture of the margin and tooth structure.

DISCUSSION

These mature permanent molars with cariously exposed pulps had good results after full pulpotomy using Biodentine. At 1 year, the success rate was 98%.

Clinical Significance

Teeth with clinical signs and symptoms indicative of partial irreversible pulpitis are not necessarily destined in all cases to root canal treatment. Performing full pulpotomy as an alternative treatment approach may allow a minimally invasive approach. Biodentine provided high success rates as a therapeutic material in full pulpotomy in adult teeth with carious exposures. This approach should be considered in selected patients as indicated.

Taha NA, Abdelkhader SZ: Outcome of full pulpotomy using Biodentine in adult patients with symptoms indicative of irreversible pulpitis. *Int Endod J* 51:819-828, 2018

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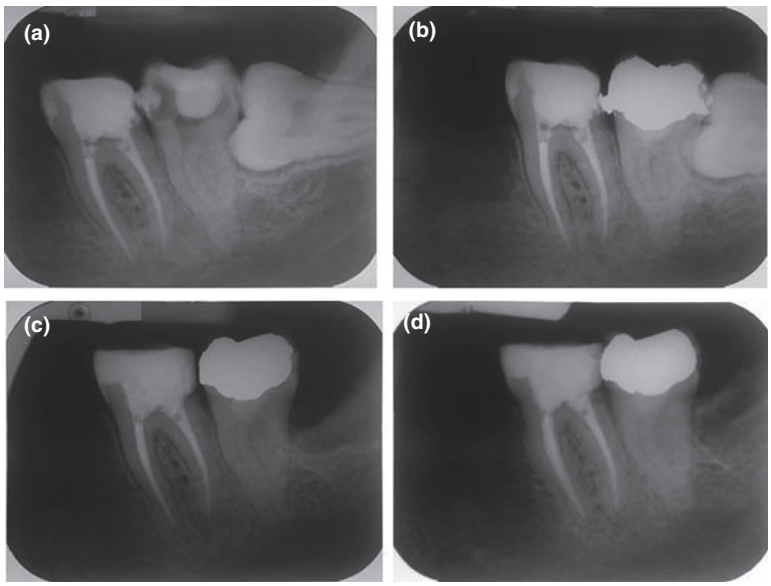

Figure 4. Radiographs of mandibular left second molar with recurrent caries exposing the pulp in a 23-year-old woman diagnosed with irreversible pulpitis. **A,** Preoperative; **B,** postoperative after Biodentine full pulpotomy; **C,** 6 months of follow-up; **D,** 12 months of follow-up. (Courtesy of Taha NA, Abdelkhader SZ: Outcome of full pulpotomy using Biodentine in adult patients with symptoms indicative of irreversible pulpitis. *Int Endod J* 51:819-828, 2018.)