

mal cardiac function that requires treatment by digoxin.

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Discussion

Electrocardiographic Changes in Cardiac Patients Undergoing Dental Extractions Under Local Anesthesia

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In their article, Blinder et al considered the effect of exodontia and local anesthesia on cardiac function, as monitored by electrocardiogram, on 40 patients with preexisting cardiovascular disorders. It appears, from their description, that the patients represented American Society of Anesthesiologists (ASA) II, III and IV risks for dental care. Pain control was initiated in all patients with mepivacaine 3% [no vasopressor]. However, the authors do not indicate if this was completely successful in all patients during the extractions, a fact that could have considerable bearing on the development of the acute rhythm changes noted during the procedure. In the absence of adequate anesthesia, significant amounts of catecholamines would be released into the cardiovascular system in response to sudden, unexpected pain, increasing the likelihood of acute electrocardiogram (ECG) changes.

Assuming the presence of clinically adequate pain control in all patients, it was observed that 35% (n = 14) demonstrated ECG indications of new dysrhythmia, tachycardia or ST-segment depression during the 2 hours immediately following local anesthetic administration and the surgical procedure. The abnormal rhythms observed were premature ventricular contractions (n = 8 patients), atrial fibrillation (n = 7), premature atrial contractions (n = 1) and ventricular tachycardia (n = 1). No patient developed signs or symptoms of clinically significant cardiac dysfunction in association with these rhythm abnormalities, and in all cases the ECG abnormality resolved to the resting status by the end of the two hour "acute" observation period. Of perhaps greater significance was the finding that of the 14 patients demonstrating ECG changes, 12 [86%] were receiving digitalis as a part of the management of their cardiovascular problems [congestive heart failure, atrial fibrillation].

Are rhythm disturbances more common during surgery in cardiovascularly compromised patients than in more physically fit individuals? and what, if any, are their implications? Driscoll et al extracted either impacted teeth or multiple

nonimpacted teeth in 77 ASA I and II patients.¹ Patients received local anesthesia (lidocaine [with epinephrine]) alone or local anesthesia plus intravenous diazepam sedation. Of 38 patients (average age 22.7 years) undergoing removal of impactions, 21.05% demonstrated cardiac dysrhythmias during their surgery. Of 48 patients undergoing multiple extractions or alveolectomies (average age 42.4 years), 37.5% experienced dysrhythmias. Of patients receiving local anesthesia alone (no sedation) 45.83% of the multiple extraction group demonstrated dysrhythmias. In all, 27.4% of the 124 surgical procedures carried out in this study were associated with at least some dysrhythmia. The abnormal rhythms observed, in order of prevalence, were premature nodal (9.6% of patients), nonspecific T wave changes (6.4%), premature atrial contraction (4.8%) wandering pacemaker (3.2%) premature ventricular contraction (3.2%), and aberrant ventricular conduction [1.7%]. As the authors observed, however, "the many arrhythmias discovered were not considered to be significant."

The results of this study seems to confirm the suspicion that the physiologic and psychologic stresses associated with the administration of intraoral local anesthesia and the surgical procedure are capable of provoking acute rhythm disturbances in a significant percentage of patients regardless of whether the patient is physically fit or cardiovascularly compromised.¹ In both trials the observed rhythm disturbances were not clinically significant, in that they did not adversely affect cardiac function, therefore, representing a clinical finding not requiring management.

The 86% incidence of rhythm disturbances among patients receiving digoxin in this study is a potentially more disturbing finding. Digoxin is commonly used in the management of congestive heart failure, atrial fibrillation, and other rhythm disturbances. A potential drug-drug interaction between digoxin and local anesthetics leading to an increased dysrhythmogenic potential is hinted at by this finding. A review of the literature back to 1973 found only a few articles suggesting adverse drug interactions between local anesthetics and digoxin. In all cases the local anesthetic was bupivacaine, a drug with a known risk of increased cardiotoxicity compared with other local anesthetics.² The bupivacaine dose capable

of producing dysrhythmias in rats is 12 mg/kg, versus a dose of 2.9 mg/kg in rats that were pretreated with digoxin.³ A clinical report purporting to support this finding suggests caution in using bupivacaine for patients on cardiac glycoside therapy.⁴ Indeed, bupivacaine-induced ventricular dysrhythmias occur at a lower local anesthetic dose (4.2 mg/kg) than does seizure activity (7.1 mg/kg) a finding that makes bupivacaine unique among all local anesthetics (where seizures develop before CVS toxicity).⁵ No reports were found of increased incidence of dysrhythmias in patients on digoxin or other cardiac glycosides with any local anesthetics other than bupivacaine.

The authors of this article conclude by suggesting that "patients treated with digoxin may present a higher risk of complications during dental extractions under a local anesthetic and that the use of a cardiac monitor is recommended." I concur with both parts of the statement, adding that a cardiac monitor would be recommended during surgical management of any patient with significant cardiovascular disease.

A similar study using a vasopressor-containing local anesthetic is needed, as most surgical procedures warrant the addition of epinephrine or levonordefrin to short or medium-

duration local anesthetics to slow the rate of absorption, lower the systemic blood level, delay cresting of the peak blood level, prolong the duration of anesthesia, intensify the "depth" of anesthesia, and reduce the incidence of systemic reactions.⁶

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