

Clients with Cardiac Pacemakers

Cardiac pacemakers are increasingly common in the aging population. With an estimated 3.25 million functioning cardiac pacemakers worldwide, dental hygienists are encountering clients with cardiac pacemakers and implantable cardioverter defibrillators (ICD) more frequently than in the past. In planning individualized dental hygiene services, dental hygienists assess the current medical status of all clients to determine those who are at high risk for emergency situations and to determine whether special precautions are necessary.

Background

Implanted cardiac devices (ICD) and implanted pacemakers are used to treat cardiac arrhythmias associated with damaged heart muscle. A pacemaker and ICD consist of a battery generator contained in a small metal box (approx. 5 x 5 cm) usually implanted subcutaneously, in the chest wall below the clavicle. Attached to the generator are one or two thin wires (leads) that pass into the venous circulation into the heart. The leads both monitor the heart rate and deliver the pacing impulse as required. An ICD has the capacity to deliver a cardioversion / defibrillation current.

Most clients who have implanted cardiac devices have been provided with a device identification card by their cardiologist. This card identifies the model number, manufacturer and medical contacts. This information will assist the dental hygienist in identifying any contraindications for proceeding with dental hygiene treatment.

Risk Factors

If a client reports having a pacemaker, or any other implanted device, a medical consultation may be required prior to initiating dental hygiene care. The usual health history should be supplemented with information contained in the identification card along with the underlying disease condition.



Endocarditis

There is a theoretical risk of bacterial endocarditis due to the presence of the pacemaker as a foreign material in the circulatory system. However, the American Heart Association has classified the pacemaker and ICD as a negligible risk factor for endocarditis and does not recommend prophylactic antibiotic coverage for dental hygiene treatment. A medical consultation would be prudent if the client reports any other heart or medical conditions that may be indicators of additional risk or if the implant has been inserted within the last 6 months.

Electromagnetic Interference

Pacemakers and ICDs are sensitive to strong electromagnetic signals that may temporarily interfere with function. Most devices are now designed with safeguards that include electronic filters or shields that insulate in the presence of electromagnetic interference (EMI). Most dental hygiene / dental procedures do not involve strong electromagnetic signals and are unlikely to interfere with a shielded pacemaker or ICD. Those considered safe are: dental radiographs; dental hand pieces; composite curing lights; sonic scalars and piezoelectric scalars. There is some evidence that, older



ferromagnetic ultrasonic scalers, magnetostrictive (Cavitron) scalers, Transcutaneous Electrical Nerve Stimulators (TENS), ultrasonic cleaning baths and electrosurgical units caused marked interference with cardiac implant devices when tested in an in-vitro setting and placed at close proximity. Manufacturers of the Dentsply/Cavitron ultrasonic scaler advise users not to operate the unit if the operator or client has an implanted cardiac device. Exposure to magnetostrictive scalers may

contribute to a temporary increase in pace rate but this is not considered clinically significant as the pacemaker is not easily damaged and usually resumes normal operation immediately when external interference ends. To date, there have been no actual reported incidences of interference with the operation of a cardiac pacemaker from dental equipment.

Power Toothbrushes

There are no known or reported interactions from electric and most battery powered toothbrushes. A precaution has been issued by one leading cardiac implant manufacturer for the use of sonic toothbrushes with a battery charger. They caution clients to maintain a distance of at least 6 inches between the battery charger unit and the implanted device and to have a distance greater than 1 inch between the toothbrush and the implanted device.

Local Anaesthetic

Epinephrine or other vasoconstrictors are contraindicated in all intractable arrhythmias and should be used with caution (reduced dose with careful monitoring) in clients with pacemakers and implanted defibrillators.



Symptoms of Pacemaker Malfunction

Clients may report unusual activity or discomfort from their implanted device. Observable symptoms of a malfunction include, difficulty breathing, dizziness, light-headedness, changes in pulse rate, swelling in chest, ankles, arms, wrists, chest pain, prolonged hiccoughing, and muscular twitching. In the event of a suspected malfunction, turn off all suspected sources of interference and activate your medical emergency

protocol. In most instances, the implanted cardiac unit will return to normal function when interference has been discontinued. An interference incident should be reported to the client's cardiologist to determine the need for a medical follow-up.

Implications for Dental Hygiene Treatment

- **The presence** of a pacemaker or an ICD indicates a medically compromised heart condition. The usual health history should be supplemented with information about the underlying condition and the specifics of the implanted device.
- **Consultation** with the client's cardiologist or the cardiologist unit responsible for follow up of the client's pacemaker or ICD is recommended when planning therapeutic services.
- **Antibiotic** prophylaxis is NOT recommended unless indicated by the cardiologist.
- **Magnetostrictive** (Cavitron) instruments may affect unshielded cardiac implanted devices. If the use of a magnetostrictive ultrasonic is contraindicated, a sonic or piezoelectric instrument may be used.
- **Covering** unshielded pacemakers with a lead apron may offer protection from electrical interference. Care should be taken not to place electrical cords over the client's chest or operate the magnetostrictive hand piece within 6 inches of the implanted cardiac device.
- **Caution** should be taken in the selection of local anaesthetic.
- **In the event** of a suspected implanted device malfunction, follow your medical emergency protocol. Dental hygiene records should be accurate and all-inclusive with a detailed record of the incident. A report of the incident should be forwarded to the CDHO and your liability insurer.

References

- American Academy of Periodontology** (2000). Position Paper: Sonic and Ultrasonic Scalers in Periodontics, *J Periodontol* 2000:71 (11) p.p.1792-1801
- American Academy of Periodontology** (2002). Periodontal Management of Patients with Cardiovascular Diseases, *J Periodontol* 2002:73 (8) p.p. 954-968.
- College of Dental hygienists of British Columbia**, Tab 7: Interpretation Guidelines, p.p. 34-36
- Densply International Inc.** (1983) Important Notice to Owners and Users of Densply/Cavitron Ultrasonic Unit.
- Guidant**, Sources of Electromagnetic Interference (EMI) For pacemakers, Implantable Cardioverter Defibrillators (ICDs), and Heart Failure Devices. March 2004. p.p 1-8.
- Kahri, J., Rapola, J.** (2005) Cardiovascular Disorders in Dental Practice. *Tandl/egebladet* 109 NR. 2, p.p. 132-140.
- Medtronic**, Dental Equipment and Pacemakers or ICDS, Rev: 10.01
- Wilkins, E.** (1999) Clinical Practice of the Dental Hygienist 8th Ed. Lippincott Williams & Wilkins: PA.