



NEW ZEALAND DENTAL ASSOCIATION

Code of Practice

ANTIBIOTIC PROPHYLAXIS FOR PATIENTS WITH PROSTHETIC JOINT REPLACEMENTS UNDERGOING DENTAL TREATMENT

August 2013

The New Zealand Dental Association has developed this Code of Practice, Antibiotic prophylaxis for patients with prosthetic joint replacements undergoing dental treatment, based on available evidence and expert advice. This Code of Practice provides guidance to members regarding the provision of antibiotic prophylaxis for dental patients who have prosthetic joint replacements. The Code of Practice for Antibiotic prophylaxis for patients with prosthetic joint replacements undergoing dental treatment is also intended as a practical resource for members of the New Zealand Dental Association.

This Code of Practice supersedes the NZDA Code of Practice Antibiotic prophylaxis for dental treatment of patients with prosthetic joint replacements (2003)

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Introduction

Prosthetic replacement of large joints such as the hip, knee, elbow and shoulder is a common and highly successful orthopaedic surgical procedure. Mechanical failure (loosening or fracture) is the most common complication affecting prosthetic joints followed by joint infection.¹ Joint infection can occur early (< 3 months after surgery), delayed (3 to 24 months after surgery) or late (more than 24 months after surgery).¹⁻² The total rate of joint infection is in the range 0.3% to 1.9%³ with around 30% (0.09% – 0.57% overall) being late infections.⁴ It is thought that most early and delayed infections are acquired in the operating theatre with late infections often being attributed to haematogenous seeding.¹⁻²

Infection of a prosthetic joint replacement is a devastating complication that can lead to loss of the prosthetic joint and serious morbidity for the patient.⁵ Late prosthetic joint infection with streptococci can be more amenable to treatment with debridement and antibiotics compared with staphylococcal infection.⁶ There is a theoretical risk of oral organisms from a dental procedure induced bacteraemia, infecting a prosthetic joint.⁷⁻¹³ Historically, as with bacterial endocarditis prophylaxis, prophylactic antibiotics before invasive dental care have been recommended to reduce the risk of a prosthetic joint infection occurring.

Over the last decade or so, there has been considerable debate around the need for, and effectiveness of, the routine use of antibiotic prophylaxis for individuals who have a prosthetic joint. Orthopaedic groups and associations generally supporting the routine use of prophylactic antibiotics (in a variety of circumstances) and other groups of physicians, infectious disease specialists and dentists suggesting that routine antibiotic prophylaxis in such patients is, based on current evidence, unjustified.

Bacteraemia from oral sources

Bacteraemia with oral bacteria occurs following normal daily activities such as eating and tooth-brushing as well as during certain dental interventions.¹⁴⁻²¹ The intensity of the bacteraemia caused by normal daily activities is similar to that caused by a dental intervention (eg. tooth extraction).^{20, 22} It has been reported that the overall exposure to oral induced bacteraemia from daily activities (due to the repetitive nature of the bacteraemia) is significantly greater (by several magnitudes) than the exposure from dental procedures.^{14, 23, 24} The bacteraemia following a dental procedure is usually of short duration with no detectable bacteraemia in 80% of patients after 60 minutes.^{1, 14, 20, 23-26} It is notable that gingival bleeding is a poor predictor of bacteraemia which can occur in the absence of bleeding. Any 'invasive' oral procedure, whether it causes bleeding or not, has the potential to induce a bacteraemia.^{18, 23, 26}

Berbari *et al* (2010) reported that the low grade bacteraemia caused by dental procedures and by physiologic activities (<1 x 10⁴ colony-forming units per millilitre (CFU)/ml) was substantially lower than the high-density bacteraemia needed to get haematogenous seeding of prosthetic joints in animal models (3-5 x 10⁸ CFU/ml).²⁷

Effectiveness of prophylactic antibiotics

The efficacy of pre-treatment antibiotic prophylaxis in preventing a subsequent transient bacteraemia is equivocal with evidence suggesting that bacteraemia cannot be avoided in all cases, although with prophylaxis any bacteraemia is likely to contain fewer bacterial species.^{16, 21, 22, 24, 25, 28-35} Uçkay *et al* (2008) completed a systematic review analysing 144 studies (including 23 prospective studies but no randomised controlled trials) with respect to the effectiveness of antibacterial prophylaxis in preventing prosthetic joint infection and concluded that the evidence supporting the efficacy of antibacterial prophylaxis is at best very weak.¹

Berbari *et al* (2010) reported in a case control study that antibiotic prophylaxis in high-risk or low-risk dental procedures did not decrease the risk of subsequent total hip or knee infection (adjusted OR, 0.9 [95% CI, 0.5–1.6] and 1.2 [95% CI, 0.7–2.2], respectively) and concluded that pre-procedural antibacterial prophylaxis in patients receiving dental procedures did not alter the risk of subsequent joint infection.²⁷

A number of groups continue to advocate the routine use of prophylactic antibiotics prior to dental care for patients with prosthetic joints.³⁶ Comprehensive reviews of the literature have failed to demonstrate substantive credible evidence of haematogenous infection of prosthetic joints by oral organisms following dental procedures^{1, 5, 8, 10, 24, 27, 37, 39-45} Antibiotic prophylaxis prior to dental procedures may reduce the risk and intensity of any bacteraemia. However there is no evidence that antibiotic prophylaxis reduces or eliminates the risk of late prosthetic joint infection.^{1, 27, 45}

Other considerations regarding prophylactic antibiotic use

The provision of antibiotic prophylaxis carries risks. The relative risk of complications, such as allergy from antibiotics, suggests that these complications outweigh the risk of haematogenous prosthetic joint infection by oral organisms associated with dental procedures. For example, the incidence of acute anaphylaxis to penicillin group antibiotics is reported as between 1 in 2500 and 1 in 10,000 and is fatal in around 10% of those affected.^{46,47} The increasingly problematic issue of bacterial resistance to antibiotics with the associated increase in morbidity and mortality requires practitioners to exercise prescribing restraint and only administer antibiotics where the evidence supports their use.

Potential risk groups

Notwithstanding the evidence available, there is some support for the use of prophylactic antibiotics in a group of patients who, because of other comorbidities, may be at an increased risk of haematogenously spread infection of a prosthetic joint when receiving ‘invasive’ dental procedures (Table 1).^{5, 10, 12, 13, 24, 37, 38} It should be noted that some reports suggest the risk to patients may be overstated.^{27, 33, 48}

Table 1 Invasive Dental Procedures

<p>All dental procedures that involve manipulation of the gingival tissues or the periapical region of the teeth or perforation of the oral mucosa*</p>
<p>* The following procedures and events are not considered invasive</p> <ul style="list-style-type: none"> • Routine anaesthetic injections through non-infected tissues • Taking dental radiographs • Placement and adjustment of removable prosthodontic or orthodontic brackets/appliances • Bleeding from trauma to the lips or oral mucosa
<p><small>Adapted from: The National Heart Foundation of New Zealand Advisory Group Guidelines for the prevention of infective endocarditis associated with dental and other medical interventions. December 2008</small></p>

If antibiotic prophylaxis is administered, it is important that the prophylaxis is active against *viridans streptococci* in particular, as they are the oral organisms that would be expected to be associated with a dental procedure-induced haematogenous prosthetic joint infection. Table 2 details suitable antibiotic regimens.^{24, 36, 49, 50}

Table 2 Antibacterial recommendations to reduce the risk of dentally-induced bacteraemia

Standard	Amoxicillin (oral) 2.0g one hour before the procedure. No follow-up dose Or Cephalexin (oral) 2.0g one hour before the procedure. No follow-up dose
Penicillin allergy	Clindamycin (oral) 600mg one hour before the procedure. No follow-up dose Or Clarithromycin (oral) 500mg one hour before the procedure. No follow-up dose

Antibiotic prophylaxis is not indicated for dental procedures in patients with osseous pins, plates and screws.³⁸

If a patient with a prosthetic joint replacement provides recommendations about antibacterial prophylaxis which differ from those in this guideline the dental practitioner should contact the patient's medical practitioner to discuss this. If the recommendation of the doctor differs from those in this guideline and the doctor insists on antibacterial prophylaxis then the doctor should be asked to make the prescription for this or if this is too inconvenient for the patient then the dentist may choose to make the prescription documenting in the patient record that it was requested by the doctor. It should be noted however, the dentist is ultimately responsible for making the treatment recommendation.

Reducing bacteraemia risk

Whilst the data regarding the implications of poor oral health on bacteraemia risk is contradictory the weight of evidence suggests that the incidence and magnitude of bacteraemia of oral origin appears to be related to the degree of oral and gingival inflammation, the concentration of microorganisms²¹ in the area, and the degree of tissue trauma.^{14, 22, 23, 27, 51, 53-55} To reduce this bacteraemic risk, patients should have a healthy mouth prior to joint replacement and maintain good oral health through regular and effective home care procedures and regular dental examination (and treatment as required).^{50, 56, 57}

Patients with prosthetic joint replacements who present with acute oral infections should receive prompt treatment to remove the source of infection and therapeutic antibiotics should be administered when indicated.³⁸

Concluding comments

The low risk of late haematogenous prosthetic joint infection from oral organisms secondary to a dental procedure, the absence of compelling data for an association between dental procedures and prosthetic joint infection, and the risk of antibiotic associated complications all argue strongly against the routine use of antibiotics before dental procedures.⁵³ Because of comorbidities, some individuals may be at greater risk of a joint infection and in these individuals antibiotic prophylaxis may be justified.

Recommendations

There is no scientific evidence that supports the routine use of antibiotic prophylaxis in healthy individuals undergoing dental procedures who have received a prosthetic joint replacement and therefore such prophylaxis is not justified.

On balance clinicians may consider (in consultation with the patients doctor) prophylaxis for patients who have a theoretical increased risk of joint infection because of severely compromised immune function or previously infected prosthetic joints, noting that prophylaxis is not indicated for otherwise healthy individuals.

It is prudent that all patients scheduled for prosthetic joint replacement have a dental examination, and treatment as required, to reduce and remove oral sources of bacteraemia.

Patients with a prosthetic joint replacement should minimise their risk of bacteraemia arising from oral sources by maintaining good oral health through, regular and effective home care procedures and regular dental examination (and treatment as required).

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