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Risk of Infective Endocarditis after ImplantSurgery in Cardiac Patients

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ABSTRACT
Implant treatment has become a common modality among the people for tooth replacement. The dental surgical procedures too require evaluation for systemic conditions for patients having cardiac or any health conditions. Cardiac conditions may be life threatening for the patients undergoing implant surgeries. Infective endocarditis is a serious infection occurring on the endothelial surfaces of the heart, especially at the valves. This article sums up a detail about the risk of infective endocarditis, the protocols to follow and the medicament that can be taken for cardiac patients undergoing implant surgery.

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I. INTRODUCTION

Infective endocarditis (IE) is an uncommon but life-threatening infection. Despite advances in diagnosis, antimicrobial therapy, surgical techniques and management of complications, patients with Infective endocarditis still have high morbidity and mortality rates[1,2,5,10]. Infective endocarditis(IE) is defined as an inflammation of the inner tissue of the heart(endocardium), which may include one or more heart valves, the mural endocardium or a septal defect, caused by infectious agents.[2]Initiated by bacteraemia, bacterial endocarditis is a rare infection of the heart that usually results in serious sequelae. Most cases of Infective endocarditis are bacterial, but any microorganism can cause Infective endocarditis, even fungi, Chlamydia, rickettsia, etc[3-4.] Infective endocarditis is more likely to result from bacteraemia's associated with daily activities and so the maintenance of good oral health and hygiene is more important than peri-procedural antibiotics.[5] The bloodstream is sterile under normal conditions. Transient bacteraemia occurs when bacteria enters the bloodstream, which is unavoidable.[6]

DENTAL IMPLANTS AND INFECTIVE ENDOCARDITIS

Infective endocarditis can be induced by bacteraemia attributable to dental procedures. Oral bacteria invading the blood stream after dental work can attach and multiply at target sites such as platelets and fibrinogen formed in the endothelium, resulting in vegetations and inducing Infective endocarditis. Bacteraemia occurring after dental procedures is termed "transient bacteremia".[7] Dental implant placement is a routine surgery to replace a lost tooth. Despite the fact that dental implants routinely have a high rate of success, failures do occur. The oral cavity is known to be a source of pathogens that may affect the heart valves and other heart anomalies. It has been suggested that bacteraemia occurs during dental treatment, as well as during everyday activities such as tooth brushing and mastication.[9]The spread of infection from dental implants may occur at various stage with the earliest stage at the time of implant insertion. A later stage relates to mucositis- the implant equivalent to gingivitis, this infection is evident in the peri-implant mucosa following the healing phase. During implant exposure and placement of the prosthesis, bacteraemia may originate from extensively inflamed and infected tissue around the implant with loss of alveolar bone. (peri-implantitis).[9] Bacterial contamination of implant site may be one of the causes of postoperative infection and early implant failure.[12] The dental procedure which are at risk for Infective endocarditis:

- Extraction
- Periodontal procedure including surgery, sub gingival scaling and root planning.
- Replanting an avulsed tooth
- Implant placement
- Apicoectomy.[5,13]

RISK FACTORS

The British Society for Antimicrobial Chemotherapy (BSAC) listed two groups of cardiac patients: patient not at risk and special risk patients. High risk conditions commonly include prosthetic heart valves, cyanotic congenital heart surgeries, surgically constructed systemic or pulmonary shunt or conduit and a history of endocarditis. The negligible risk category includes patients with a cardiac pacemaker, coronary artery bypass grafting. Valvular damage following rheumatic fever, previous endocarditis, a ventricular septal defect, prosthetic heart valves, or valvular stenosis can lead to changes in blood flow or damage in the cardiac endothelium. Changes in blood flow or damaged endothelium surfaces lead to precipitation of platelets and fibrin. If the bacteria enter the blood circulation, they can be colonized in the platelet and fibrin network. The network of platelet, fibrin, inflammatory cells and enclosed organisms is called infective vegetations. These vegetations can result in local myocardial abscesses, which inhibit the valvular function and eventually may lead to congestive heart failure.[6,11]

ORAL PROPHYLAXIS AS A PREVENTION OF ENDOCARDITIS

The revised guidelines of AHA suggested that consideration must be given to improvement and maintenance of oral health and hygiene and improved access to dental care for patients with predisposing cardiac conditions.[8] Good oral health and hygiene have been thought to be the best preventives for Infective endocarditis because healthy (nonbleeding) gums serve as a barrier to bacteraemia. It is mandatory that clinical examination, focused on the periodontal inflammation and caries, has been conducted in high risk patients, as well as the full series of intraoral radiographs. There are four measures for entire dental disease prevention: good oral hygiene for bacterial plaque removal, dietary measures (elimination of sugars and carbohydrates), the routine follow up, a daily use of toothpaste with high fluoride concentration. A careful dental evaluation is recommended so that required dental treatment may be completed whenever possible before the cardiac valve surgery or replacement or repair of congenital heart defects. Both the intermediate and the high-risk patients should be aware of the importance of strict dental and cutaneous hygiene. Regular brushing, flossing, making sure that the dentures fit properly and seeking professional dental care every six months, prevents the tooth and gum infections that could leadto endocarditis.[2]

ANTIBIOTIC REGIMEN

Because antibiotic therapy has been a standard and effective treatment for bacterial endocarditis, it has been thought that antibiotics administered before dental or medical procedures may be an effective treatment for subsequent bacterial endocarditis. The American heart association AHA issued its first statement on the prevention of bacterial endocarditis in 1955, recommending antibiotic prophylaxis.[3] An antibiotic for the prophylaxis should be administered in a single dose before the procedure. If the dosage of the antibiotic has not been administered before the procedure, the dosage may be administered up to two hours after the procedure. Amoxicillin is the preferred choice for the oral therapy because it is well absorbed in the Gastrointestinal tract and provides high and sustained serum concentrations. For patients who are allergic to penicillin or amoxicillin, the use of clindamycin, azithromycin or clarithromycin is recommended.[3,13] Because of the possible cross reactions, a cephalosporin should not be administered to patients with a history of anaphylaxis, angioedema or urticaria after the treatment with any form of penicillin, including ampicillin or amoxicillin. Patients who are unable to tolerate an oral antibiotic may be treated with ampicillin, ceftriaxone or cefazolin administered intramuscularly or intravenously. If a patient is already receiving a chronic antibiotic, it is prudent to select an antibiotic from a different class rather than to increase the dosage of the current antibiotic. If possible, it would be preferable to delay a dental treatment until at least 10 days after completion of the previous antibiotic therapy. Patients receiving parenteral antibiotic therapy for the Infective endocarditis may require dental procedure during the antimicrobial therapy, particularly if the subsequent valve replacement surgery is anticipated. In these cases, the parenteral antibiotic therapy for the Infective endocarditis should be continued and the timing of the dosage to be adjusted to 30 to 60 minutes before the dental treatment. Intramuscular injections for Infective endocarditis prophylaxis should be avoided in patients who are receiving anticoagulant therapy.[2]

ANTIBIOTICS PROHYLAXIS EFFECT

Hall et. al. found that antibiotic prophylaxis had no effect on the incidence, level, or type of bacteraemia. Therefore, it has been hypothesized that if antibiotic prophylaxis prevents endocarditis, it does so not by eliminating or reducing bacteraemia, but rather by reducing "stickiness" of the bacteria to the heart valves or reducing the multiplication of bacteria already on the heart valve.[3]

DENTAL SURGERIES

The implantologist must be familiar with the antibiotic regimens for heart conditions requiring prophylaxis. There may be future updates but currently, the 2017 AHA and ACC guidelines for endocarditis prophylaxis should be used. In patients who are classified in the high-risk category for development of endocarditis, elective implant therapy may be contraindicated. Edentulous patients restored with implants must contend with transient bacteraemia from chewing, brushing, or peri-implant disease. Endosteal implant with adequate width of attached gingiva, are the implant of choice for such group of patients who need implant supported prosthesis. Implants may be contraindicated for patients with a limited oral hygiene potential and for those with a history of multiple endocarditis events. There is very scarce evidence which shows cardiovascular diseases to be an absolute contraindication. Dental implants can be placed in patients with cardiovascular diseases provided precautions aretaken in conditions which are detrimental. A few precautions include,

- Avoid placement of dental implants in patients with recent MI/CVA, up to six months after preliminarycare.
- Avoid placement of dental implants with prosthetic valve up to six months after replacement to avoid endocarditis and other complications. Also, placement of dental implants should be done only after antibiotic prophylaxis.
- Proper evaluation of INR, platelet count and haematocrit to avoid haemorrhagic complications.
- Implantologist must be aware about the medications taken by patient with any cardiovascular diseases and the precautions to be taken for each medication.[15]

II. CONCLUSION

Common dental procedures, even non-surgical dental procedure, often cause bacteraemia that can result in infective endocarditis in people who have a predisposing risk for this disease, such as valvular heart diseases, cyanotic congenital heart surgeries, surgically constructed systemic or pulmonary shunt or conduit and a history of endocarditis. Common dental procedures often cause bacteraemia and periodontally diseased patients may even suffer from bacteraemia after tooth brushing. Antibiotics have to be used adequately in order to prevent such infections during dental procedures. Proper oral hygiene should also be maintained and no active infection should be present during the implant surgical procedures.

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