

# *Dentist Role in Congestive Heart Failure Patient (Serial Cases)*

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**Abstract**—Congestive Heart Failure (CHF) is a condition where the heart is unable to pump adequate blood to organs and tissues, due to one-part failure so that there is blood pooling in the heart. CHF patient needs more attention by dentist, because oral focus infection can affect patient's heart condition. Furthermore, CHF patient condition can cause various complications, so that dental treatment modification is needed. The objective of this paper is to describe the dentist's role as the medical team in CHF patient management. Two female patients, 25 and 59 years old, were hospitalized at RSCM Jakarta with CHF diagnosis, referred to the Oral Medicine clinic for oral cavity focus infection evaluation and management. Both patients were prepared for heart valve surgery. Clinical examination revealed the presence of oral cavity focus infection and cheilosis. In order to eliminate oral cavity focus infection, scaling and tooth extraction are needed, with patient's systemic condition consideration. Dentist has an important role in patient CHF management. A multidisciplinary approach is required to treat CHF patients to prevent complications and to improve treatment results.

**Keywords**—dentist, Dental Management, Congestive Heart Failure (CHF)

## I. INTRODUCTION

Congestive heart failure (CHF) is a complex clinical syndrome caused by structural or functional heart abnormalities resulting in impaired ability of one or both ventricles to fill or release the blood. It causes lack of systemic circulation perfusion which rich in oxygen, so that the metabolic needs of vital organs and peripheral tissues inadequate [1-3]. Congestive Heart Failure patients keeps increasing every year, WHO data shows 1.5% to 2% of adults in the United States suffer from it. The disease is common in elderly, but recently there has been an increase in heart failure patients under the age of 45 years [3]. Cardiovascular disease patient requires more attention in daily dental practice. Epidemiologic data suggested that the oral infection may be a trigger factor leads to infection in important

organs, which are located far from sources of oral infection, including the heart [4]. The focus infection can affect patient with cardiovascular disease [5]. There are three biological mechanisms that explain the associated between oral inflammation such as (periodontal disease) and cardiovascular disease that are: (1) Bacteria from the periodontal inflammation enter the blood and invade heart and blood vessel tissue, causing harmful effects. (2) The body responds to the periodontal inflammation with the production of inflammatory mediators that travel through the blood and cause harmful effects on the heart and blood vessels. (3) Bacterial products such as lipopolysaccharides enter the blood and cause harmful effects on the heart and blood vessels [4].

The objective of this case report is to describe the dentist role as the medical team in CHF patient management. Dentist knowledge is essential in preventing complications before and during valve heart surgery, improving and maintaining the results of the surgery therapy.

## II. CASE REPORT

### A. Case I

A 25 years old woman in CHF diagnosis was referred to the oral medicine department of Cipto Mangunkusumo Hospital for evaluating and managing of focus infection, the patient was in preparation for heart valve surgery. Anamnesis revealed that the patient has no complaint in her oral cavity, with a history of two teeth extraction in hospital about 3 months ago due to dental caries. She brushed her teeth twice a day, in the morning and before sleep at the night. The patient has a limitation for daily water intake, as much as one small bottle of mineral water (330 ml) per day. Blood examination result showed the decrease of hemoglobin value at 10.6 g/dL, hematocrit 30.9%, erythrocytes  $3.62 \times 10^6/\mu\text{L}$ , and an increase in prothrombin time (PT) of 44.5 seconds and leukocyte  $11 \times 10^3/\mu\text{L}$ . The patient consumed medications which contained potassium

chloride, spironolactone, digoxin, carvedilol, and ramipril.

Intra oral examination showed moderate oral hygiene with supra and sub gingival calculus, inflammation of the gingival margin, enamel caries at 18, 17, 16, 26, 27, 46, 47 and missing teeth 36, 37. The intra oral diagnosis are chronic gingivitis, pulp irritation at 18, 17, 16, 26, 27, 46, 47 and edentulous area of 36, 37. The dental management plan for the patient was scaling as the elimination of focus infection.

#### B. Case II

A 59 years old woman in CHF diagnosis was referred to the Oral Medicine Department of Cipto Mangunkusumo for focus infection evaluation and management, in preparation of heart valve surgery. Patient anamnesis revealed toothache on lower left posterior area. Before hospitalized, she felt difficult to brush the teeth because it led to stertorous. However, after hospitalized, she could brush the teeth twice a day, in the morning and evening. Patient's water intake was limited to 2-3 glasses per day. Blood examination result showed the decrease of the erythrocyte value at  $3.74 \times 10^6/\mu\text{L}$ , leukocyte  $4.87 \times 10^3/\mu\text{L}$ , lymphocyte 17.9% and the increase of eosinophil value at 6.6%, monocyte 11.5%, blood urea 69 mg/dL. She consumed the medicines which contain acetylcysteine, spironolactone, furosemide, bisoprolol hemi fumarate, cefixime, lansoprazole. In addition, she was given topical Vaseline for her scratch waist skin.

In extra oral examination at the upper and lower lips looked dry, desquamation, while in intraoral examination, the oral hygiene was moderate, calculus at subgingival and supragingival with generalized inflammation at the margin gingiva, radix of 38, enamel caries 25, 11 and missing teeth at 18, 17, 16, 27, 28, 37, 46. Based on clinical examination, the diagnosis were cheilosis at the upper and lower lips, chronic gingivitis, gangrene radix of 38, pulp irritation at 25, 11, and edentulous area at 18, 17, 16, 27, 28, 37, 46. The plan management of this case were scaling and radix extraction of 38 for elimination of focus infection.

### III. CASE MANAGEMENT

The first patient's focus infection that led to generalized inflammation at the gingival margin will be scaled (as her treatment plan). The second patient's focus infection that caused generalized inflammation at gingival margin and gangrene radix of 38 will be scaled and extracted respectively. In both cases, the plan of dental procedures management is invasive procedure. Prior the invasive dental procedure, the dentist has medical considerations to avoid the risk of bleeding and infection that may threaten the patient's safety.

Both patients are given information and education about the condition of the oral cavity, the findings on hard and soft tissue oral cavity associated with systemic conditions as well as dental and oral treatment plans. The instructions are maintaining the oral hygiene during hospitalization and after surgery.

### IV. DISCUSSION

Congestive heart failure patients have several treatments that aim to identify and correct both of the underlying disorder and the precipitating factors. The treatment includes pharmacological therapy, lifestyle modification, surgical therapy, implant installation, or heart transplantation [6]. The pharmacological therapy of CHF patients are using vascular vasodilation, prophylaxis of venous thrombosis or administration of antiembolic, control of body fluids such as diuretics, cardiac glycosides, vasodilators, angiotensin-converting enzyme inhibitors, phosphodiesterase inhibitors, and sympathomimetic amines. For more severe cases of CHF conditions, surgical therapy is recommended [1,6]. In this case, both CHF patients were referred to Oral Medicine clinic, before the heart valve surgery. The patients were recommended to perform preoperative procedures for eliminating oral focus infections, which potentially may cause bacteremia and endocarditis during heart valve surgery therapy. The CHF patient condition can be worsened by endocarditis [7]. Therefore, both patients who will have heart valve surgery are referred to the oral medicine department to eliminate oral focus infection.

Li Xiaojing et al. suggested that there is a correlation between oral cavity infection and systemic disease, related to the presence of periodontal disease. Periodontal disease is a condition that causes inflammation and damage in dental attachment apparatus (such as damage at the gingiva, periodontal ligament, cementum and alveolar bone) [8]. Focus infection in the oral cavity includes periodontitis, non-vital teeth, incomplete endodontic treatment, dental devitalization inadequate root canal therapy, cellulites, radicular cyst, apical periodontitis, apical granuloma and alveolar abscess [9]. Both patients have chronic gingivitis and gangrene radix as focus infection. Gingivitis as inflammation is a mediating factor in the development of cardiovascular disease [7]. Gingivitis suggest as a focus infection because it defined as the result of an unspecified inflammatory reaction in response to the growth of gram-positive or gram-positive bacteria in the gingival sulcus. Gingival sulcus is believed to be a reservoir of bacteria. The excessive growth of gram-negative bacteria in the gingival sulcus is the beginning of periodontitis [7,8].

In addition, gangrene radix in the second case also play a role as focus infection, because chronic root residual conditions can cause the periapical tissue susceptible to infection, the non-vital pulp tissue is a good medium for the growth of microorganisms. Through the dental apical foramen, infectious microorganisms in the pulp tissue may spread to the periodontal tissues around the apex of the tooth, it can cause inflammation or infection of the tissues [10].

Oral microbes can directly affect to cardiovascular such as hypercoagulability and atherosclerosis [11]. Indirect trigger for dissemination of inflammatory mediators in the bloodstream will cause bacterial transients. The virulence factor of bacterial

(lipopolysaccharide/LPS) is released into the circulation and increases the expression of endothelial cell adhesion molecules and interleukin-1 secretion (IL-1), tumor necrosis factor alpha (TNF- $\alpha$ ), and thromboxane which leads to adhesion and platelet aggregation that form the foam cell, cholesterol deposits and cholesterol esters may plug the blood vessels [8,11]. The cardiac muscle later on will be damaged when the decrease of blood intake happened because of the plug. If it disturbs the heart's ability to pump the blood, heart failure will happen [7,8].

Preoperative procedure is a dental treatment before the heart valve surgery, which aims to eliminate focus infection and prevent the complication of infective endocarditis. In this case the dentist communicate about invasive preoperative procedure with the cardiologist. On the other hand, preoperative procedure has a risk of endocarditis, when the dentist doing the invasive procedure treatment without prophylactic antibiotics. Antibiotics are given to the patients who have the risk of bacteremia during the invasive preoperative procedure [12,13]. Antibiotic prophylaxis is often administered to dental patients for prevention of harmful consequences of the bacteremia, which may be caused by invasion of the oral microorganisms into an injured gingival during scaling and dental extraction treatment. The administration of antibiotics for prophylaxis is given 1 hour before the invasive preoperative procedure. In conditions that the antibiotics are not given before the invasive operative procedure, it can be given up to 2 hours after the invasive preoperative procedure [13]. In addition, the dentist can give the antiseptic mouthwash to inhibit oral bacterial growth. Antiseptic mouthwash has bactericidal and bacteriostatic properties to oral bacterial [14].

Cardiovascular disease patient requires more attention to daily dental treatment because the patients with CHF have medical risks of bleeding and emergency [15]. The dentists should have the awareness that patients with CHF have been prescribed with anticoagulant. The management of CHF patients in anticoagulant therapy will be necessary to discuss and evaluate with cardiologist before the invasive dental treatment. It is because for some patients the cessation of anticoagulant can lead to thrombosis or thromboemboli [5,16].

For both patients in this case, before doing the invasive dental treatment such as scaling and tooth extraction, the dentist had ask to the cardiologist to give written permission for doing the treatment and tolerance of treatment. The dentist and cardiologists can assess the risk of bleeding that may occur after a preoperative procedure. The high risk of bleeding in preoperative procedure can be assessed from history of bleeding and from the complete blood examination profile include scores of prothrombin time (PT), partial thromboplastin time (PTT) and international normalized ratio (INR). The dental literature recommendation the blood test results of the PT/INR test should be under two times normal for patients taking anticoagulant, and the value

of INR  $<4$ . Nevertheless, a common recommendation to stop anticoagulant 2–3 days prior to an invasive preoperative procedure to decrease the INR value to less than 2.0-2.5 [5,13,17].

Furthermore, the dental preoperative procedure can also increase the stress and anxiety of the patient. The body responds to the stress and anxiety by increasing the release of catecholamine from the adrenal medulla into the cardiovascular system which increases the workload on the heart, when this happened, it will lead to emergency situations. In CHF patients, it is recommended to perform the dental treatment in a short time (about 30 minutes), in the morning, and semi-supine position on the dental chair to avoid orthostatic hypotension [12]. For dental extraction treatment, administration of epinephrine as a vasoconstrictor in compensated CHF patients should be limited, not to exceed 0.04 mg. Epinephrine cannot be used in patients with severe heart failure because it will cause dysrhythmias [3].

Dentist's involvement in the medical team of CHF management is an important part of the success in CHF therapy. Dentists can help the preparation of heart valve surgery by eliminating the oral focus infection that contributes to the success of the heart valve surgery. The best preoperative treatment can only be achieved in a long-term period when oral hygiene is performed adequately postoperative, improve the coordination and communication between cardiologist and dentist is also important. After the heart valve surgery both patients are expected to maintain the oral hygiene.

Dentists, as an important medical team member, have an important role in CHF patient's management. Dentists play a role in pre-operative procedure before heart valve surgery. The preoperative procedures determine the success of surgical therapy and prevent the complications of endocarditis and bacteremia during heart valve surgery procedures.

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