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The Role of Dental Health in Cardiovascular Surgery Postoperative Complications and Functional Recovery

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Abstract :

Many people following cardiovascular surgery have poor dental health, which might worsen their overall health. Patients undergoing cardiovascular surgery may have different postoperative outcomes depending on their dental health. So, we looked into how cardiovascular surgery patients' dental health before the procedure affected their risk of problems and how well they recovered functionally. Patients admitted to a single hospital for elective heart surgery were the subjects of this retrospective cohort study. A patient's periodontal health, number of remaining teeth, denture use, occlusal support, and overall oral health were evaluated. We measured the length of hospital stay, the reacquisition of walking capacity, and activities of daily living to study postoperative problems associated to surgery and postoperative functional recovery. Postoperative respiratory problems were linked to preoperative oral health condition, and functional recovery was connected with this status independently. Functional recovery following cardiac surgery may be enhanced by preoperative oral intervention.

Introduction :

Over the past 20 years, more and more evidence has emerged linking dental health to overall wellness. By recognizing this connection and tackling the problem of dental disease, we might potentially lessen the financial burden of health care while also reducing the likelihood of illness and incapacity. Preventing postoperative infective consequences (POICs), such as postoperative pneumonia and surgical site infection, may be possible with dental care provided prior to major surgical procedures aided by general anesthesia, according to multiple studies. Both elective cardiac and non-cardiac surgical patients may benefit from using chlorhexidine mouthwashes before to surgery to reduce the risk of postoperative pneumonia, according to recent research. There is evidence that dental hygienists, oral health therapists, and dentists can significantly improve postoperative outcomes by providing preoperative dental care, which in turn reduces the incidence or risk of postoperative infection complications (POICs) (Sanchez et al.,2019).

The goal of extraction, a common treatment in oral surgery, is to remove diseased teeth that pose a threat to oral health; the most common teeth to be extracted are the third molars.

The factors that influence its removal will determine how straightforward or hard the treatment is. When it comes to lower teeth, factors such as the relative thickness of the mandibular cortex and maxilla, as well as their proximity to the inferior alveolar nerve, the tooth's status (whether it's included, erupted, or semi-erupted), the degree of impaction, the patient's age, the surgeon's experience, the time of surgery, and the tooth's anatomical considerations all play a role.

Alveolitis, bleeding, wound dehiscence, bone cortices fracture, and other problems are all possible following a tooth extraction. Complication rates among patients range from 1% to 30.9%, despite the procedure's regularity. Alveolitis is the most common consequence of dental extractions, occurring anywhere from zero to thirty-five percent of the time. Infections, discomfort, and paresthesia of the

mandibular nerve are among the most often reported consequences (Rassameehiran et al.,2015).

The healthcare system incurs higher expenses as a result of patients spending longer than expected in the recovery room after major surgeries due to infectious problems, which are a leading cause of postoperative morbidity and mortality. As a result, improving patient care and preventing infectious complications necessitates accurate prediction of postoperative problems. Clinical guidelines and other research have identified a number of systemic or surgical risk factors for postoperative complications, including the Global Guidelines for the Prevention of Surgical Site Infection. Despite numerous studies showing a positive effect of pre-operative oral care on postoperative results, there is a lack of information regarding the ways in which oral and dental disease factors, such as the burden of dental illness, negatively affect postoperative outcomes. The risk of postoperative pneumonia and infection at the surgical site may be increased if there is an active infection or inflammation in the mouth, according to multiple studies. The lack of comprehensive evaluation of associations between oral/dental health and POICs is likely due to the fact that these studies only looked at one factor or surgical outcome related to oral/dental disease, and the majority of the subjects in these studies had already received oral/dental care before the surgery. Hence, this study set out to determine whether there was a correlation between the prevalence of oral diseases and POICs in patients undergoing major surgeries while under general anesthesia (Chen et al.,2018).

Methods:

A single urban-area university hospital was the setting for this retrospective cohort investigation. We included consecutive inpatients who had elective heart surgery and could walk freely before the procedure, with or without assistance. Exclusion criteria included a lack of preoperative evaluation of oral function, a history of neurologic or severe orthopedic disease, and an inability to complete postoperative therapy. The study was authorized by the Institutional Review Board of Kobe University (permission number: 190064) and followed the guidelines laid out in the Declaration of Helsinki for

research involving human beings. Our use of the opt-out approach to gain consent was necessary due to the retrospective study design.

Discussion:

Optimal protocols and guidelines for preoperative dental assessment and care have not been established, and recommendations for such care continue to be contentious, despite prior research showing that it can reduce the risk of postoperative infection complications (POICs). The level of dental intervention that may have occurred prior to surgery is also unclear. Reason being, there hasn't been a complete understanding of the connection between good dental hygiene and successful recovery after surgery. Two independent predictors for POICs were the presence of visible tongue plaque and the number of decaying teeth equal to or greater than four, according to this prospective cohort analysis. This research implies that dental evaluation prior to surgery could help determine which patients are more likely to experience postoperative problems, which could lead to better patient outcomes through perioperative care measures. In clinical practice, health practitioners can easily assess risk for POICs using the simple risk score developed in this study (Minakuchi et al.,2018).

Bergan and colleagues discovered significant associations between postoperative pneumonia and tongue plaque and poor denture hygiene, while Mirzashahi and colleagues demonstrated significant associations between surgical site infection and caries, gingivitis/periodontitis, and the presence of active dental abscesses.

A higher risk of postoperative infections may be connected with several factors, one of which is the presence of several decaying teeth and an obvious coating on the tongue. First, there is growing proof that bacteria in the mouth can cause postoperative infections (POICs), including pneumonia and infections at the surgical site. According to recent studies, aspiration of oral and pharyngeal secretions during endotracheal tube insertion and removal prior to and after surgery is a major risk factor for postoperative pneumonia. When patients had pneumonia after an esophagectomy,

Akutsu and colleagues found the same harmful bacteria in their postoperative sputum as they had in their preoperative tooth plaque. Patients suffering from peritonitis following a gastric bypass surgery and the periodontal pockets of those patients were found to contain same bacterial strains, according to research by Nishikawa and colleagues. In addition, one possible explanation for the pathogenesis of surgical site infections is the "Trojan horse mechanism." This theory proposes that immune cells, such as macrophages or neutrophils, can take up pathogens from distant locations, like the mouth, gums, or gastrointestinal tract. Then, these "first responders" can bring the bacteria they ingested to the site of the wound, where they cause infection (Lin et al.,2016).

Another explanation could be because unsightly dental decayand/or visible plaque on the tongue are indicators of lower socioeconomic level or general poor health. Inadequate dental care is associated with a host of serious health issues, including but not limited to: diabetes, cancer, heart disease, premature birth, pneumonia, and diabetes mellitus. Low and middle-income countries bear a disproportionate share of the burden of poor oral health, as do those from poorer socioeconomic backgrounds, and this inequality exists both within and between nations. Individuals with lower health literacy levels, both in relation to overall and oral health, as well as those who are unable to independently maintain good dental hygiene owing to age or disability, are additional risk factors for poor oral health (Arai et al.,2017).

Several risk factors for oral illnesses are similar to those for chronic noncommunicable diseases, including smoking, excessive alcohol use, a diet high in free sugars, and inadequate personal hygiene. Cavities in teeth and a coating on the tongue could be a sign of several different demographic risk factors for POICs. One independent predictor that the multiple regression model found, alongside the amount of decaying teeth and visible tongue plaque, was the length of the planned postoperative hospital stay. This might be because a number of patient and surgical factors could be considered thoroughly in order to ascertain the anticipated length of hospital stay following surgery (Yuguchi et al.,2019).

No specialized equipment, not even radiographs, is needed to evaluate this score's plaque on the tongue

and decayed teeth. A strikingly large proportion of patients in this research group who had a score of 5 also had POICs. Patients at high risk for complications after surgery should undergo a dental evaluation before the procedure, as a score of 5 can only be achieved in cases where cavities and/or visible plaque on the tongue are present. This easy-to-understand metric for evaluating POIC risk would be helpful because the demand for surgical services has skyrocketed (Ogawa et al.,2017).

Patients experiencing extensive tooth loss had a much greater risk of postoperative respiratory problems. After removing potential confounding factors, there was still a correlation between functional recovery and the number of residual teeth.

If a person has a full complement of teeth, it's a sign that their oral cavity is healthy. Reportedly, various oral function parameters, such as oral mucosal moisture, occlusal force, lip motor function, masticatory function, and swallowing performance, were maintained throughout the aging process in healthy elderly persons with more than 20 teeth. As a result, we zeroed down on tooth count as a straightforward, easily-comprehensible, and clinically relevant indicator of dental health. To begin, chronic dental disease (CVD) is associated with tooth loss, which is a sign of chronic oral inflammation. Periodontal disease, which can start in the mouth and spread throughout the body, is triggered by an increase in inflammatory mediators such cytokines. This condition is associated with the development and worsening of cardiometabolic diseases. The loss of teeth can be attributed to periodontal disease. Second, poor oral health and an increased risk of cardiovascular disease are brought about by smoking, which is very common. The smoking rates in this trial were significant despite the fact that all patients were told to quit smoking before cardiovascular surgery. Third, decreased chewing power, which may result from more tooth loss, may cause patients to eat less healthy food. An increased risk of cardiovascular disease (CVD) is linked to poor nutrition, which in turn is caused by oral dysfunction.Also, a big risk factor for cardiovascular disease is diabetes, which brings us to our fourth point. In addition, Demmer et al. demonstrated a two-way causal relationship between periodontitis and diabetes, with a correlation between the severity of periodontitis and the likelihood of developing diabetes. It is reasonable to assume that cardiovascular surgery patients have worse overall oral health, and we provided the first evidence of this association in a sizable sample (Akashi et al.,2019).

Predicting how far along the road to recovery you were after surgery required physical function as well. In this case, people with twenty or more teeth performed physically better than those with less than twenty teeth. A large cohort study found that having a low number of natural teeth was connected with physical fragility or death in community-dwelling older persons. However, there has been inadequate evidence to indicate a relationship between oral health status and physical function in stroke patients. Even in patients after cardiovascular surgery, our results demonstrated a correlation between dental health and physical function. There was still a correlation between the number of teeth and functional recovery after controlling for physical function. Predicting the onset of fragility and the success of postoperative rehabilitation following cardiovascular surgery may be possible by examining the patient's oral health. Therefore, one way to check for physical fragility is to count the number of teeth that are still there (Takahashi et al.,2015).

Patients with less than ten remaining teeth had a greater prevalence of postoperative pneumonia. Pulmonary infections, such as ventilator-associated pneumonia, can have their origins in the mouth and the bacteria that live there. Postoperative pneumonia was more likely to occur in patients with poor dental health following heart surgery. There has been a lot of focus on the efficacy of preoperative oral management in preventing nosocomial pneumonia in patients undergoing cardiovascular surgery in recent years. Reducing the risk of surgical infection can be achieved with preoperative periodontal therapy, as demonstrated by Suzuki et al. However, it is still not known if dental care before to cardiovascular surgery reduces the risk of postoperative problems, according to a recent comprehensive review. Early detection of oral disorders is necessary to evaluate and prevent postoperative respiratory difficulties and aid functional recovery in older patients (Hamaguchi et al.,2016).

However, the details of the precise therapies and timing are contentious. Oral health concerns require special attention in clinical practice, and there has to be a plan to improve people's habits of brushing and flossing, encourage them to keep their natural teeth, and ensure they get the oral care they need before surgery. Oral examinations and preoperative interventions are especially beneficial for elderly, fragile patients with reduced reserve capacity, who are at high risk for surgery. Various staff members

and doctors provided CVD patient care, according to a nationwide survey in Japan. In order to decrease the risk of readmission in patients who have undergone heart surgery, our results show that a multidisciplinary team approach is better than standard care. Postoperative rehabilitation, long-term prognosis, and patient-reported outcomes can be better understood with additional research into the role of a multidisciplinary approach (Ogawa et al.,2017).

Conclusions:

Patients experiencing significant tooth loss had worse oral health than a control group of the same age. Patients experiencing significant tooth loss had an increased risk of developing postoperative pneumonia. Additionally, functional recovery was independently correlated with preoperative oral health condition. Our research shows that it's crucial to assess patients' oral health before surgery in order to predict how they'll do after the procedure. Future research should examine the relationship between oral health status and prognosis and long-term results.

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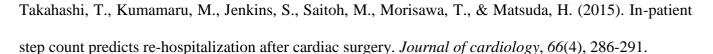
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