

# 学位論文の要旨

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学位論文名 Relationship Between Oral Bacterial Count and Postoperative Complications Among Patients With Cardiovascular Disease Treated by Surgery: A Retrospective Cohort Study

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## 論文内容の要旨

### INTRODUCTION

In recent years, it has been reported that bacteria-related postoperative complications encountered in the treatment of cardiovascular diseases, including valve surgery, result in a delayed recovery period and increased postoperative mortality. Oral bacterial counts in the perioperative period have received much attention, oral status, including daily oral bacterial counts, may also influence postoperative complications. In recent years, instead of counting colony-forming units, which are the gold-standard for bacterial counting, the dielectrophoretic impedance measurement method has been used to measure the number of oral bacteria easily. Accordingly, we hypothesized that the high prevalence of periodontal disease in patients with cardiovascular disease may be a background factor that exacerbates the incidence of postoperative complications in cardiovascular treatment. Thus, A retrospective observational study using an oral bacteria counter was conducted to evaluate the trends in the number of oral bacteria in the perioperative period of cardiovascular disease patients and to verify the relationship between perioperative oral care (POM) and postoperative complications.

### MATERIALS AND METHODS

The study design of this study is a retrospective, single-center cohort study with risk factors for postoperative complications as the primary outcome. All patients received POM by oral specialists between April 2012 and December 2018 at Kagawa Prefectural Central Hospital, Kagawa, Japan prior to cardiovascular disease surgery. Oral bacterial count on the central dorsal

surface of the tongue and the bacterial detection device (Panasonic Healthcare, Tokyo, Japan). Bacteria counts were measured on the day of pre-hospitalization, pre-operation, and post-operation, and background data was also collected retrospectively. Based on the Clavien-Dindo classification version 2.0, the following complications were considered as postoperative complications: pericardial fluid storage, postoperative pneumonia, surgical site infection, mediastinitis, seroma, postoperative infective endocarditis, lung torsion, and pericardial effusion. To adjust for confounding factors between the two groups, propensity scores were calculated, and confounding adjustment was performed using the inverse probability of treatment weighting. Odds ratios at each time point were calculated using generalized estimating equations. The study protocol was approved by the Research Ethics Committee of Shimane University.

## **RESULTS AND DISCUSSION**

In total, 470 consecutive patients were enrolled in the study. The incident rate of postoperative complications was 10.4% (pericardial fluid storage: n=21, postoperative pneumonia: n=13, surgical site infection: n=9, Mediastinitis: n=2, seroma: n=1, postoperative infective endocarditis: n=1, lung torsion: n=1 and pericardial effusion: n=1). The Wilcoxon signed-rank test showed significantly higher oral bacteria counts at pre-hospitalization compared to pre- and post-operation ( $p < 0.05$ ). In the group comparison, there were significant difference in gender, cerebrovascular disease and operation time as background factors ( $P < 0.05$ ). In the results of the Friedman test, Oral bacterial count levels were significantly different ( $P < 0.05$ ) at each time point (pre-admission, pre-operative and post-operative). In addition, Bonferroni's multiple comparison test showed significant differences between all groups ( $P < 0.05$ ). between pre-hospitalization and postoperation, and between pre- and postoperation (all  $P < 0.05$ ). The results of multivariate analysis using propensity scores showed a significant association between oral bacteria count at post-operation and the postoperative complication (odds ratio 1.26, 95% confidential interval: 1.00-1.60,  $P = 0.05$ ).

## **CONCLUSION**

The study showed that POM can continuously reduce the level of oral bacteria in patients with cardiovascular disease, that the postoperative oral bacteria count is the only risk factor for postoperative complications, and that continuous intervention by dentists/oral surgeons and dental hygienists before hospital admission is essential to prevent complications. Since the development of cardiovascular complications is a multifactorial process, this study cannot show that oral care reduces complications but indicates that continuous intervention by dentists/oral surgeons and dental hygienists before hospital admission may be essential to prevent

complications. Therefore, POM may play an important role in the perioperative management of patients with cardiovascular disease.