Appetite Predicts Clinical Outcomes in High Risk Patients Undergoing Trans-Femoral TAVI

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Summary

Transcatheter aortic valve implantation (TAVI) has been recognized as a standard therapy for severe aortic valve stenosis. However, since some patients who receive TAVI have poor outcomes, the predictors of clinical outcomes after TAVI are important. The aim of this study was to investigate the association between appetite and long-term clinical outcomes.

We screened consecutive cases who received TAVI at our medical center between July 2014 and October 2018. A total of 139 patients who received transfemoral TAVI were included as the final study population. They were divided into a good appetite group (n = 105) and a less appetite group (n = 34) according to their dietary intake rate (> 90%: good appetite group, ≤ 90%: less appetite group). We defined the intake rate as the average for breakfast, lunch, and dinner on the day just before discharge. We defined two-year major adverse cardiovascular and cerebrovascular events (MACCE) as a composite of cardiovascular death, myocardial infarction, any coronary revascularization, history of hospitalization due to heart failure, and disabling acute cerebral infarction. Kaplan-Meier analyses and multivariate Cox regression analysis were performed.

The median duration of the follow-up period was 372 (189-720) days. Kaplan-Meier curves showed that the less appetite group got MACCE more frequently (event free rate of the less appetite group: 76.5% versus the good appetite group: 94.3%, Log Rank P = 0.01). In multivariate Cox regression analysis, having less appetite was a significant predictor of two-year MACCE (HR 5.26, 95%CI 1.66-16.71, P < 0.01).

In conclusion, among the patients who received trans femoral TAVI, appetite status just before discharge was significantly associated with long-term outcome.

Key words: MACCE, Long-term, Predictor, Intake rate, Clinical Frailty Scale, GNRI, Elderly, Gender

Transcatheter aortic valve implantation (TAVI) has been recognized as a standard therapy for severe aortic valve stenosis (AS) in patients with high or moderate surgical risk. In fact, long-term clinical outcomes were the same as or better in TAVI than surgical aortic valve replacement in some populations. However, since some patients who undergo TAVI may have poor clinical outcomes, predictors of long-term outcomes after TAVI are important. It has been reported that being elderly, male gender, history of atrial fibrillation (AF), hemodialysis, high Society of Thoracic Surgeons (STS) score, nutrition state, and being frail are major predictors of long-term clinical outcomes after TAVI. The approach site and severity of residual para-valvular leakage (PVL) were also reported as significant predictors.

Most studies have reported that predictors were derived from baseline information before TAVI. On the other hand, there are some important predictors derived from information after TAVI, however, which tend to be limited to complications. We focused on the fact that appetite loss was sometimes observed in specific patients after TAVI. We hypothesized that appetite status just before discharge may be associated with long-term outcomes in patients who underwent transfemoral TAVI. The aim of this study was to investigate the association between appetite status and long-term clinical outcomes.

Methods

Patients: We screened consecutive cases who underwent TAVI at our medical center between July 2014 and October 2018. All candidates for TAVI was referred to the heart team in our medical center, and the treatment strategy was discussed in a weekly heart team conference. Patients who underwent transfemoral TAVI were included while those who required laparotomy or thoracotomy dur-
The final study population was divided into two groups according to appetite status just before hospital discharge. Appetite status was expressed by dietary intake rate on one day. We defined the intake rate as the averaged intake rate for breakfast, lunch, and dinner on the day just before discharge. The good appetite group was defined as having a dietary intake rate > 90% just before discharge. The less appetite group was defined as dietary intake rate ≤ 90%. The total calories, kind of meals, and upper limits of salt and/or protein consumption were decided by heart team members. We decided on the calorie intake for each patient based on their height and weight, and selected either 1200, 1400, 1600 or 1800 kcal/day. Among the 139 patients, 4 consumed ≤ 1200 kcal/day, 35 consumed 1400 kcal/day, 73 consumed 1600 kcal/day, and 27 consumed 1800 kcal/day. We also modified the types of meals according to their oral condition or swallowing function. If a patient had any history of cardiovascular disease, the upper amount of daily salt intake was limited to 0.6 g/ideal weight.

The primary endpoints were major adverse cardiovascular and cerebrovascular events (MACCE) until two-years post-procedure. MACCE was a composite of cardiovascular death, myocardial infarction, any coronary revascularization, history of hospitalization due to acute decompensated heart failure (ADHF), and disabling acute cerebral infarction. We defined the discharge day as the index day in this analysis.

Transfemoral TAVI procedure: In our study population, 92.8% of the transfemoral TAVI procedures were performed under general anesthesia. Before general anesthesia, we inserted a 5 Fr sheath into the femoral artery and femoral vein for emergent rescue. After anesthesia, we also inserted a temporary pacemaker into the apex of the right ventricle via the internal jugular vein for rapid or control pacing. We inserted a stiff guide wire via the femoral artery and introduced the main sheath (14 to 20 Fr) through the stiff wire. Valve crossing was performed using a straight wire. After successful valve crossing, we exchanged the straight wire for a stiff wire that has a pre-shaped safety curve. According to the agreement of our heart team, we performed balloon aortic valvuloplasty in 51.6% of the cases and protection of the coronary arteries when the coronary height was less than 10 mm or huge calcification on the top of leaflets before implantation was present. Then, we implanted a bioprosthesis aortic valve (balloon-expandable type or self-expandable type). During the operation, the activated coagulation time was maintained at ≥ 250 seconds.

Definitions: Hypertension was defined as receiving treatment for hypertension before admission. Dyslipidemia was defined as total cholesterol > 220 mg/dL, low-density lipoprotein cholesterol > 140 mg/dL, or medical treatment for dyslipidemia before admission. Diabetes mellitus (DM) was defined as hemoglobin A1c (HbA1c) > 6.5% (national glycol-hemoglobin standardization program (NGSP) value) or medical treatment for DM. Malignant diseases included a current malignancy or history of malignancy. Estimated glomerular filtration rate (eGFR) was calculated by modification of diet in renal disease (MDRD) method adjusted for the Japanese population.12,13) Frailty was evaluated according to the Clinical Frailty Scale (CFS) by medical professionals who cared for the patients directly before TAVI and just before discharge. Each STS score4,5,7 and logistic EuroSCORE6,8,9 was calculated before the procedure using online available calculators. The left ventricular ejection fraction was measured using the modified Simpson method. Aortic valve peak velocity and mean pressure gradient were investigated by echocardiography. Aortic valve area was calculated using the equation of continuity. Echocardiography also revealed the severity of aortic valve insufficiency according to the distance reached by regurgitant color jet and mitral valve insufficiency according to percent jet area. The presence of pulmonary hypertension was defined as the pressure gradient of tricuspid valve regurgitation exceeding 30 mmHg when investigated by echocardiography. We also performed contrast enhanced computed tomography (CT) to discuss and decide upon the strategy of TAVI and the devices.

Statistical analysis: Categorical data are presented as the number and percentage, and continuous data are presented as the mean ± standard deviation (SD). Normally distributed continuous variables were compared using the unpaired Student t-test. Other continuous variables were compared using the Mann-Whitney U-test. Categorical data were compared using the chi-square test or Fisher’s exact test. Kaplan-Meier survival analysis was performed.
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Results

A total of 139 patients who underwent transfemoral TAVI were included as the final study population, and divided into a good appetite group (n = 105) and a less appetite group (n = 34) (Figure 1). Table I shows the comparison of baseline characteristics between the two groups. The prevalence of prior myocardial infarction was lower in the good appetite group than in the less appetite group (2.9% versus 14.7%, P = 0.02), and hemoglobin levels were greater in the good appetite group than in the less appetite group (11.6 g/dL versus 10.7 g/dL, P < 0.01). The clinical frailty scale and STS scores were lower in the good appetite group than in the less appetite group.

Table II shows a comparison of TAVI procedure and complications, and Table III presents a comparison of in-hospital outcomes between the two groups. There were no significant differences in TAVI procedure, complications, or in-hospital outcomes between the two groups with the exceptions of daily calorie and intake rate.

Table III shows that the total ordered calories for the good appetite group and the less appetite group were 1593 ± 158 kcal/day and 1485 ± 220 kcal/day, respectively (P = 0.05). We also performed multivariate Cox regression analysis to identify independent factors associated with MACCE. In this model, MACCE was used as a dependent variable. We adopted known risk factors (being elderly, gender, history of AF, residual PVL and so on) and marginally significant variables (P < 0.10: past history of old myocardial infarction, peak velocity of bioprosthetic valve after TAVI, minimum Hb value after procedure, diuretics user at discharge, CFS at discharge, and intake rate just before discharge) in univariate comparisons as independent variables. Variables that had missing values were not included in the multivariate analysis. Hazard ratios (HR) and 95% confidence intervals (95% CI) were calculated. A P value < 0.05 was considered statistically significant. All analyses were performed using statistical software (SPSS PASW Statistics 18, release 18.0.0 /Windows, IBM Corp.).

with respect to MACCE, cardiovascular death, and hospitalization because of ADHF and life-threatening stroke for two years from the index day. The differentiation between the two survival curves was compared by the log rank test and P < 0.05 was considered statistically significant. We adopted known risk factors (being elderly, gender, history of AF, residual PVL and so on) and marginally significant variables (P < 0.10: past history of old myocardial infarction, peak velocity of bioprosthetic valve after TAVI, minimum Hb value after procedure, diuretics user at discharge, CFS at discharge, and intake rate just before discharge) in univariate comparisons as independent variables. Variables that had missing values were not included in the multivariate analysis. Hazard ratios (HR) and 95% confidence intervals (95% CI) were calculated. A P value < 0.05 was considered statistically significant. All analyses were performed using statistical software (SPSS PASW Statistics 18, release 18.0.0 /Windows, IBM Corp.).

Table 1. Comparison of Baseline Characteristics

|                      | Overall (n = 139) | Good appetite group (n = 105) | Less appetite group (n = 34) | P value |
|----------------------|------------------|------------------------------|-----------------------------|---------|
| Age (years)          | 83.6 ± 5.2       | 83.3 ± 5.2                   | 84.5 ± 5.2                  | 0.29    |
| Female gender (%)    | 88 (63.3)        | 63 (60.0)                    | 25 (73.5)                   | 0.16    |
| Height (cm)          | 151.3 ± 9.9      | 152.2 ± 10.1                 | 148.6 ± 9.0                 | 0.07    |
| Weight (kg)          | 51.4 ± 10.8      | 52.1 ± 11.1                  | 49.3 ± 9.6                  | 0.29    |
| Body surface area (m²) | 1.46 ± 0.18   | 1.48 ± 0.19                  | 1.42 ± 0.16                 | 0.13    |
| Body mass index      | 22.4 ± 4.0       | 22.4 ± 3.9                   | 22.4 ± 4.3                  | 0.92    |
| Smoking (%)          | 19 (13.9)        | 14 (13.5)                    | 5 (15.2)                    | 0.50    |
| Hypertension (%)     | 111 (79.9)       | 82 (78.1)                    | 29 (85.3)                   | 0.36    |
| Dyslipidemia (%)     | 65 (46.8)        | 48 (45.7)                    | 17 (50.0)                   | 0.66    |
| Diabetes mellitus (%)| 36 (25.9)        | 25 (23.8)                    | 11 (32.4)                   | 0.32    |
| History of atrial fibrillation (%) | 22 (15.8) | 16 (15.2) | 6 (17.6) | 0.74 |
| Old myocardial infarction (%) | 3 (5.8) | 3 (2.9) | 5 (14.7) | 0.02 |
| Old cerebral infarction (%) | 10 (7.2) | 8 (7.6) | 2 (5.9) | 0.54 |
| History of malignancy (%) | 29 (20.9) | 23 (21.9) | 6 (17.6) | 0.60 |
| History of gastro-intestinal resection (%) | 15 (10.8) | 12 (11.4) | 3 (8.8) | 0.48 |

Laboratory data

|                      | Overall (n = 139) | Good appetite group (n = 105) | Less appetite group (n = 34) | P value |
|----------------------|------------------|------------------------------|-----------------------------|---------|
| eGFR (mL/min/1.73 m²) | 54.5 ± 22.1      | 55.8 ± 22.9                  | 50.5 ± 19.4                 | 0.32    |
| Hemoglobin (g/dL)    | 11.4 ± 1.7       | 11.6 ± 1.7                   | 10.7 ± 1.7                  | <0.01   |
| Echocardiogram       |                  |                              |                             |         |
| LV EF (Simpson) (n = 57) (%) | 60 ± 15            | 61 ± 13                     | 56 ± 19                     | 0.23    |
| Peak velocity of aortic valve (m/second) | 4.73 ± 0.71       | 4.75 ± 0.66                  | 4.67 ± 0.84                 | 0.60    |
| Clinical frailty scale at admission | <0.01 |
| 1-3                  | 68 (48.9)        | 59 (56.2)                    | 9 (26.5)                    |         |
| 4-6                  | 41 (29.5)        | 31 (29.5)                    | 10 (29.4)                   |         |
| 7-9                  | 30 (21.6)        | 15 (14.3)                    | 15 (44.1)                   |         |
| STS score (%)        | 6.4 ± 6.4        | 6.1 ± 6.8                    | 7.5 ± 5.1                   | <0.01   |
| Logistic EuroSCORE (%) | 9.0 ± 6.9            | 8.5 ± 6.5                    | 10.8 ± 7.8                  | 0.07    |

ACEI indicates angiotensin converting enzyme inhibitors; ARB, angiotensin II receptor blockers; eGFR, estimated glomerular filtration rate; BNP, brain natriuretic peptide; LV EF, left ventricular ejection fraction; CT, computed tomography; and STS, Society of Thoracic Surgeons.
Comparison of Procedures and Complications

| Devices                  | Overall (n = 139) | Good appetite group (n = 105) | Less appetite group (n = 34) | P value |
|--------------------------|-------------------|-------------------------------|----------------------------|---------|
| Balloon expandable       |                   |                               |                            | 0.39    |
| SapienXT                 | 28 (20.1)         | 19 (18.1)                     | 9 (26.5)                   |         |
| Sapien3                  | 72 (51.8)         | 55 (52.4)                     | 17 (50.0)                  |         |
| Self expandable          |                   |                               |                            |         |
| Corevalve                | 12 (8.6)          | 8 (7.6)                       | 4 (11.8)                   |         |
| Evolut series            | 27 (19.4)         | 23 (21.9)                     | 4 (11.8)                   |         |

| Size                     |                   |                               |                            | 0.35    |
| 20 mm                    | 9 (6.5)           | 8 (7.6)                       | 1 (2.9)                    |         |
| 23 mm                    | 60 (43.2)         | 42 (40.0)                     | 18 (52.9)                  |         |
| 26 mm                    | 52 (37.4)         | 39 (37.1)                     | 13 (38.2)                  |         |
| 29 mm                    | 18 (12.9)         | 16 (15.2)                     | 2 (5.9)                    |         |

| Operation time (minutes) | 134 ± 39          | 132 ± 36                      | 141 ± 48                   | 0.27    |
| Exposure time (minutes)  | 44 ± 15           | 43 ± 15                       | 45 ± 15                    | 0.61    |
| Contrast volume (mL)     | 145 ± 61          | 148 ± 64                      | 136 ± 53                   | 0.33    |
| Complications (n) (%)    | 15 (10.8)         | 13 (12.4)                     | 2 (5.9)                    | 0.24    |
| Acute coronary stenosis  | 3 (2.2)           | 3 (2.9)                       | 0 (0)                      | 0.43    |
| Disabling acute cerebral infarction | 2 (1.4) | 1 (1.0) | 1 (2.9) | 0.43 |
| New pacemaker implantation | 10 (7.2) | 9 (8.6) | 1 (2.9) | 0.25 |

In-Hospital Outcomes after TAVI

| Overall (n = 139) | Good appetite group (n = 105) | Less appetite group (n = 34) | P value |
|-------------------|-------------------------------|-------------------------------|---------|
| Duration of ICU stay (days) | 2.5 ± 1.9 | 2.5 ± 2.0 | 2.7 ± 1.6 | 0.18 |
| Timing of the appetite evaluation-days after TAVI (days) | 9.9 ± 8.6 | 9.2 ± 7.6 | 12.2 ± 11.0 | < 0.01 |
| Echocardiogram after TAVI | 60 ± 13 | 61 ± 11 | 54 ± 15 | 0.06 |
| LVEF (Simpson) (n = 58) (%) | 2.33 ± 0.50 | 2.37 ± 0.49 | 2.21 ± 0.54 | 0.08 |
| Aortic valve peak velocity (m/seconds) | 1.47 ± 0.33 | 1.47 ± 0.34 | 1.45 ± 0.29 | 0.78 |
| Paravalvular leakage (n) (%) | None or trivial | 64 (46.0) | 43 (41.0) | 21 (61.8) | 0.15 |
| Mild | 74 (53.2) | 61 (58.1) | 13 (38.2) |         |
| Moderate/Severe | 1 (0.7) | 1 (1.0) | 0 (0) |         |
| Laboratory data before discharge | 1.12 ± 0.93 | 1.11 ± 0.98 | 1.18 ± 0.73 | 0.18 |
| Creatinine (highest) (mg/dL) | 9.7 ± 1.5 | 9.9 ± 1.5 | 9.3 ± 1.5 | 0.06 |
| Hemoglobin (lowest) (g/dL) | 9.7 ± 3.7 | 10.0 ± 3.9 | 8.9 ± 3.0 | 0.15 |
| Platelet (lowest) (×10^5/μL) | 188 ± 183 | 181 ± 175 | 210 ± 208 | 0.52 |
| BNP (n = 96) (pg/mL) | Medications at discharge (n) (%) | Oral anti-coagulants | 24 (17.3) | 18 (17.1) | 6 (17.6) | 0.95 |
| Statins | 73 (52.5) | 54 (51.4) | 19 (55.9) | 0.65 |
| ACE inhibitors or ARB | 76 (54.7) | 58 (55.2) | 18 (52.9) | 0.82 |
| β blockers | 56 (40.3) | 41 (39.0) | 15 (44.1) | 0.60 |
| Diuretics | 73 (52.5) | 50 (47.6) | 23 (67.6) | 0.04 |
| Oral hypoglycemic agents | 20 (14.4) | 15 (14.3) | 5 (17.6) | 0.57 |
| Insulin user | 3 (2.2) | 3 (2.9) | 0 (0) | 0.43 |
| Appetite and Nutrition* | Daily calorie (kcal) | 1567 ± 180 | 1593 ± 158 | 1485 ± 220 | < 0.01 |
| Intake rate (%) | 91.5 ± 14.2 | 97.8 ± 3.0 | 72.1 ± 17.2 | < 0.01 |
| Clinical frailty scale at discharge | 1-3 | 60 (43.2) | 50 (47.6) | 10 (29.4) | 0.13 |
| 4-6 | 28 (20.1) | 21 (20.0) | 7 (20.6) |         |
| 7-9 | 51 (36.7) | 34 (32.4) | 17 (50.0) |         |

ICU indicates intensive care unit; TAVI, transcatheter aortic valve implantation; LVEF, left ventricular ejection fraction; BNP, brain natriuretic peptide; ACEI, angiotensin converting enzyme inhibitors; and ARB, angiotensin II receptor blockers. * one day information just before hospital discharge.
Cox regression analysis is shown in the Supplemental Table. Being very elderly (≥90 years-old) was significantly associated with two-year MACCE after discharge following the TAVI procedure (versus <90 year-old: HR 9.80, 95%CI 2.91-33.00, P < 0.01). Female gender was inversely associated with two-year MACCE (HR 0.15, 95%CI 0.04-0.54, P < 0.01). The less appetite group was also significantly associated with two-year MACCE (HR 5.26, 95%CI 1.66-16.71, P < 0.01) even after adjustment for several popular predictors after TAVI.

Discussion

A total of 139 AS patients who underwent transfemoral TAVI at our medical center were divided into a good appetite group (n = 105) and a less appetite group (n = 34). Our main interest was whether a patient’s appetite just before discharge was associated with long-term outcomes after TAVI. Kaplan-Meier curves revealed that the incidence of MACCE was lower in the good appetite group than in the less appetite group (5.7% versus 23.5%, P < 0.01) following discharge after the TAVI procedure. Multivariate Cox regression analysis also revealed that the less appetite group was significantly associated with two-year MACCE. The appetite status just before discharge was significantly associated with long-term poor clinical outcomes, while CFS at discharge was not. Careful observation and monitoring of appetite status may be important for stratifying high-risk patients after transfemoral TAVI.

There are some important points that should be discussed. First, we must discuss why we focused on the appetite just before discharge after transfemoral TAVI. The Geriatric Nutritional Risk Index (GNRI), a well-known index reflecting nutrition status, has been reported as a good predictor of long-term outcomes after heart failure. Recent studies have reported that GNRI also predicts long-term outcomes after TAVI. Since GNRI is calculated using the following formula: GNRI = 14.89 x serum albumin (g/dL) + 41.7 x (Body Weight/ideal Body Weight), GNRI reflects the nutritional status of the patient rather than the appetite status. Because malnutrition is usually followed by decreased appetite, it may be important to intervene in a patient with a reduced appetite before malnutrition develops. Therefore, in the present study we focused on appetite status rather than nutrition status like GNRI does. The food intake rate, which is an objective indicator, would reflect appetite status directly. Therefore, we investigated the intake rate of meals as the factor reflecting appetite status. To the best of our knowledge, this was the first analysis to investigate the relationship between the appetite status following transfemoral TAVI and long-term outcomes.

Aging is a well known predictor of long-term outcomes after TAVI. In this study, patients over 90 years-old had slightly worse long-term outcomes. Recently, Yokoyama, et al. reported that cardiovascular death was more frequently observed in patients over 90 years-old after TAVI. It is not surprising that very elderly patients had poor long-term outcomes given their limited remaining lifetime. Moreover, elderly patients tend to have more underlying diseases like hypertension, diabetes, and/or malignancy.

In the present study, women had better long-term outcomes than men after TAVI. Previous studies also reported that gender was related to long-term outcomes after TAVI. Generally, in-hospital mortality was lower in men than women. On the other hand, long-term outcomes were better in women. Women have lower incidences of coronary artery disease, AF, and left ventricular ejection fraction. Furthermore, our sub-analysis showed that a history of smoking was lower in women. The progression of atherosclerosis might be more suppressed in women than men.

We also should discuss the relationships between appetite and MACCE. In the present study, the most frequent MACCE was hospitalization due to acute decompensated heart failure. Hypoalbuminemia, which may be related by decreased appetite, was significantly related to worsening heart failure. Weight loss and cachexia, which may be related with decreased appetite, also predict poor survival in patients with heart failure. Furthermore,
Table V. Multivariate Cox Regression Analysis

| Independent variables: “MACCE at 2 years” | HR   | 95%CI | P value |
|------------------------------------------|------|------|---------|
| Elderly (≥ 90 years-old versus < 90 years-old) | 9.80 | 2.91-33.00 | < 0.01 |
| Female gender                             | 0.15 | 0.04-0.54  | < 0.01 |
| Less appetite just before discharge       | 5.26 | 1.66-16.71 | < 0.01 |

MACCE indicates major adverse cardiovascular or cerebrovascular events: composite of cardiovascular death, myocardial infarction, any coronary revascularization, history of hospitalization due to acute decompensated heart failure, and disabling acute cerebral infarction.

Figure 2. Kaplan-Meier survival curve analyses. MACCE indicates major adverse cardiovascular or cerebrovascular events: composite of cardiovascular death, myocardial infarction, any coronary revascularization, history of hospitalization due to acute decompensated heart failure, and disabling acute cerebral infarction; and ADHF, acute decompensated heart failure.

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a reduced appetite sometimes reflects congestion of the intestinal system or low output syndrome accompanied by heart failure. Moreover, patients with decreased appetite might suffer from malignancy. Therefore, a reduced appe-
tite might be related to poor long-term outcomes because of heart failure and malignancy. Because we did not routinely check the CFS of the patients after discharge, it was impossible to show CFS after discharge. Some patients went back to their family doctors immediately after discharge, which made it difficult to check their CFS after discharge. The exact mechanisms connecting the reduced appetite and the incidence of MACCE after TAVI are unknown. In the present study, since we included only transfemoral TAVI, adverse effects on the digestive system should be minimal. Nevertheless, some patients lost their appetite after TAVI, which might reflect weakness of their digestive system before TAVI. Such weakness of the digestive system might be one of the causes of MACCE.

This study has several limitations. Since it was a retrospective study, there was a potential selection bias. Sample size was limited, partly because it was a single center study. Because TAVI was started in 2013 in Japan, we implanted several old generation valves, which are not used in contemporary TAVI. The indication of TAVI was limited among the patients who had high surgical risk. We arbitrarily defined the cut-off value for reduced appetite as being 90% intake of the meals served just before discharge because there were no clear cut-off values for reduced appetite in patients after TAVI. In this study, we could not gather information regarding appetite after discharge from the hospital. It was unknown whether the patients in the good appetite group actually had a good appetite after discharge. The present study has another important limitation. Since the length of hospitalization was much longer in our hospital as compared to that in the United States or European countries, the meaning of the dietary intake rate on the day just before discharge would be different between our hospital and other hospitals in the United States or European countries. Although the safety of minimized hospitalization after TAVI has been reported, the drive to minimize the length of hospitalization may be weaker in Japan than in other countries, partly because the cost of additional hospital stay, especially the self-pay burden, is lower in Japan. Therefore, we should be careful when generalizing our findings to the United States or European countries.

Conclusion

Among the patients who received transfemoral TAVI, appetite status just before discharge was significantly associated with long-term outcomes.

Disclosure

Conflicts of interest: The authors declare that there are no conflicts of interest to report.

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Supplemental Files

Supplemental Table
Please see supplemental files; https://doi.org/10.1536/ihj.19-258