

**Special
Report**

Annual Report for 2018 by the Japanese Association for Coronary Artery Surgery (JACAS)

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Purpose: The principal of this analysis was to understand global feature of the number and type of grafts and number of diseased vessels of those undergoing coronary artery bypass grafting (CABG) and their short-term clinical results.

Methods and Results: This report presents annual report on the collective data of CABG in the year 2018 (1 January–31 December). Data were collected based on the series of questionnaire which has been performed by The Japanese Association for Coronary Artery Surgery (JACAS), capturing the corresponding data from the Japan Adult Cardiovascular Surgery Database (JCVSD). We also analyzed descriptive clinical results of those undergoing surgeries for acute myocardial infarction and ischemic mitral regurgitation.

Conclusion: This is the first article summarizing the results from annually performed questionnaires by JACAS based on JCVSD, on the trend of CABG procedures and clinical results in Japan as a scientific manuscript.

Keywords: coronary artery bypass grafting, annual report

Introduction

The Japanese Association for Coronary Artery Surgery (JACAS) has been collecting clinical information

and summarizing descriptive statistics for all types of surgery to treat ischemic heart disease since 2002. Data collection was performed through questionnaires sent to all JACAS-recognized cardiovascular surgery units throughout Japan. It is quite unique for any professional society to collect clinical information consecutively for more than 15 years. The members of our association should be proud of this long-standing data collection project, and they also published their results in a special report section in 2019.¹⁾ However, the response rate from cardiovascular units has not been satisfactory, which was approximately 50%–70% of all the cardiovascular units recognized through the country. In addition, the quality of the collected data is uncertain.

The Japan Cardiovascular Surgery Database (JCVSD) emerged as a data registry system in 2001. It has grown to cover almost 100% of the cardiac surgery cases. Of note, JCVSD data are directly used to assess board certification for cardiovascular surgery specialists. Thus, the rate of data collection is close to 100%. It is also notable that data quality is secured through

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Table 1 Yearly number of CABG (by procedure-base) in 2017 and 2018 from two different data sources

	2018 (data from JCVSD)			2017 (from questionnaire by JACAS)*		
	Total	Initial elective	Non-elective	Total	Initial elective	Non-elective
Yearly CABG cases	20,271			12,584		
Isolated CABG	13390 (66%)	10847	2543	8497 (68%)	7144	1353
OPCAB		6069 (56%)	1178 (46%)		4562 (64%)	646 (48%)
ONCAB		4778 (44%)	1365 (54%)			
Concomitant CABG**	6881 (34%)			4087 (32%)		

*Questionnaire collection rate = 62%. **Concomitant CABG: CABG cases with valve, aorta, other cardiac, or other non-cardiac as defined by National Clinical Database

CABG: coronary artery bypass grafting; JCVSD: Japan Adult Cardiovascular Surgery Database; JACAS: Japanese Association for Coronary Artery Surgery; OPCAB: off-pump coronary artery bypass; ONCAB: on-pump coronary artery bypass

close monitoring by the JCVSD. Sending data to the JCVSD and responding to the JACAS questionnaires are considered duplicative and burdensome to surgeons or personnel in charge.

Along with advances in data collection systems in the field of cardiovascular surgery described earlier, the JACAS has decided to change from collecting data via questionnaires to using JCVSD data. The JACAS intends to become a co-sponsor of JCVSD activities.

The 2018 Annual Report is the first challenge for presenting descriptive statistics particular to the JACAS dataset based on data collected through the JCVSD in 2018.

Patients

Data from the JCVSD from January 1, 2018, to December 31, 2018, were included in the analysis. In total, there were 68987 registered cardiac surgeries during the above period. This included 20271 coronary artery bypass grafting (CABG) procedures, of which 13390 were isolated CABG cases. We also analyzed the number of cases involving ischemic mitral regurgitation or left ventricular (LV) failure due to acute myocardial infarction (AMI). The isolated CABG cases were already analyzed in our publication about patient characteristics published by *Asian Cardiovascular and Thoracic Annals* (2). Thus, we calculated the factors particular to previously presented JACAS data, which included procedure-based analyses of cardiopulmonary bypass (CPB) use (off-pump coronary artery bypass [OPCAB], on-pump coronary artery bypass [ONCAB]), age and gender distributions, and short-term outcomes (mortality). For isolated CABG cases, we also evaluated the number of anastomoses and postoperative strokes by

Table 2 Patient distribution by age and gender

Age range (years)	Male	Female	Total
<50	576 86%	91 14%	667
50–59	1310 88%	186 12%	1496
60–69	3222 83%	654 17%	3876
70–79	4222 77%	1253 23%	5475
80≤	1260 67%	616 33%	1876
Total	10590 79%	2800 21%	13390

either OPCAB or ONCAB, as well as graft selection and frequency of graft use.

Results

Table 1 presents the number of CABGs and detailed distribution by procedure in 2018. Results from 2017 are also presented in the same table for comparison. The case volume in 2017 was much lower than that in 2018. In subsequent tables, we only present data from 2018 derived from the JCVSD. **Table 1** Yearly number of CABG (by procedure-base) in 2017 and 2018 from two different data sources

Table 2 shows the age and gender distribution for patients who underwent isolated CABG (n = 13390) including initial elective cases, non-elective cases, and OPCAB or ONCAB cases. Most patients were male, but there was a slightly higher proportion of female patients in the elderly population.

Figures 1 and **2** show procedure-related data. Figures present the number of anastomosis per case by the procedure. Graft selection and use are also presented. Details about the use of combination grafts, single or bilateral internal thoracic artery grafts, and all arterial grafts can be found in our previous publication.²⁾

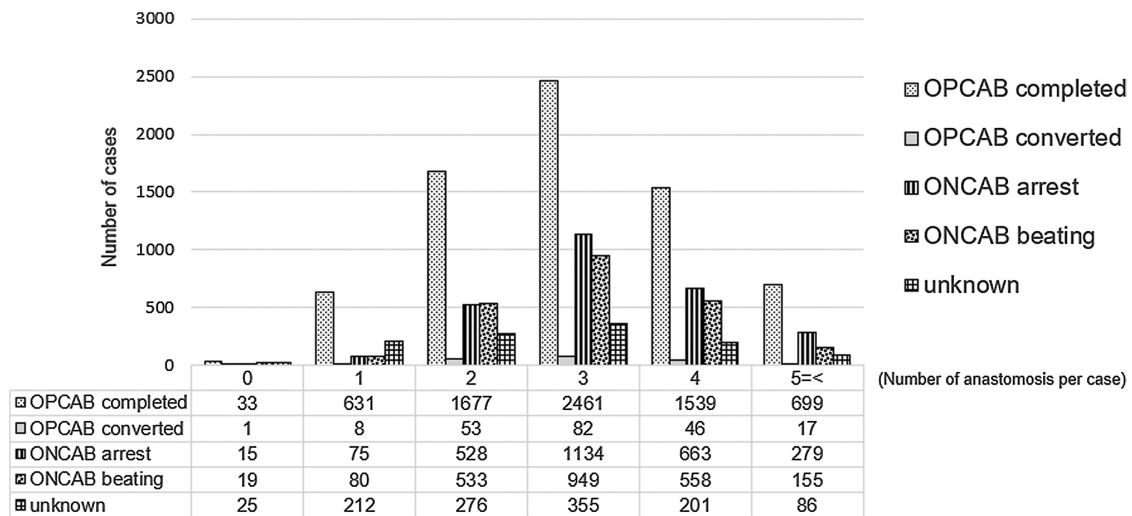


Fig. 1 Number of cases and anastomoses per case are presented by a procedure (OPCAB or ONCAB, with or without cardiac arrest). OPCAB: off-pump coronary artery bypass; ONCAB: on-pump coronary artery bypass

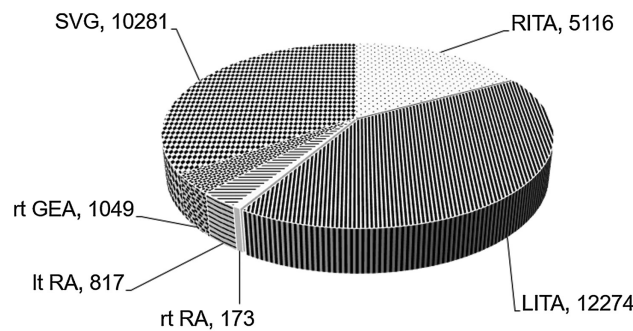


Fig. 2 Graft type and frequency of use for isolated CABG are presented. CABG: coronary artery bypass grafting; SVG: saphenous vein; RITA: right internal thoracic artery; LITA: left internal thoracic artery; GEa: gastroepiploic artery; RA: radial artery

Table 3 presents short-term results after isolated CABG. **Figure 3** presents the operative mortality rate, which includes 30-day mortality or in-hospital mortality by extent of coronary artery disease. Most cases were intended to be performed with OPCAB; however, 161 (2.65%) cases required conversion to ONCAB based on intraoperative judgment. **Figure 3** includes cases without preoperative catheter evaluation, which typically means that the preoperative assessment was performed using other imaging modalities, such as computed tomography. There is no information on cases with “no vessel disease”. **Figure 4** presents stroke rate by the procedure. Along with operative mortality, stroke rate was significantly high with OPCAB converted to ONCAB during the procedure.

Table 4 presents surgical results for cases with LV failure due to AMI. Results for LV aneurysm were acceptable, with an operative mortality rate of 8.7%. On the other hand, papillary muscle rupture and LV rupture (blow-out or oozing type) were associated with a high mortality rate. **Table 5** shows procedures with ischemic mitral valve etiology, in which valvuloplasty yielded acceptable results (operative mortality rate, 5.8%) compared to replacement (13.6%).

Comments

The JACAS has collected information on coronary artery surgery since 2002 through questionnaires. In the first report, released in 2002, there were 262 participating hospitals, which was approximately half of the hospitals performing coronary artery surgery in Japan (<http://www.jacas.org/enquete/2002.html>). The mortality rate for initial isolated elective surgery was 1.02%; this outcome was excellent compared to worldwide data. This project has been continued every year by members of the JACAS Scientific Committee with great efforts by member surgeons to answer the long questionnaire. This information has contributed substantially to the professionals, co-workers, and patients in coronary artery surgery. On the other hand, the questionnaire system potentially has several limitations. The response rate and responses from participating hospitals have been far from satisfactory. An audit cannot be performed with the questionnaire system. After starting another nationwide registration system, JCVSD, responding to the

Table 3 Operative results of isolated CABG mortality

	N	30-day mortality	Operative mortality
Isolated cases	13390	209 (1.6%)	332 (2.5%)
Isolated, initial, elective	10847	82 (0.8%)	146 (1.3%)
On-pump intended			
Arrest	2247	20 (0.9%)	35 (1.6%)
Non-arrest, Vf	1622	18 (1.1%)	36 (2.2%)
Information missed	909	6 (0.7%)	13 (1.4%)
Off-pump intended			
Completed	5908	34 (0.6%)	55 (0.9%)
Converted	161	4 (2.5%)	7 (4.3%)

CABG: coronary artery bypass grafting; Vf: ventricular fibrillation

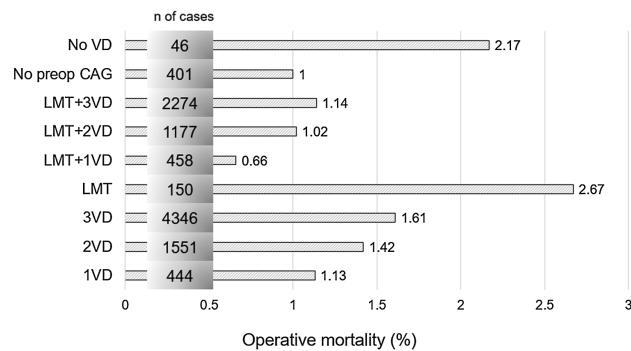


Fig. 3 Operative mortality by extent of CAD among initial elective cases. CAD: coronary artery disease; CAG: coronary angiography; LMT: left main trunk; VD: vessel disease

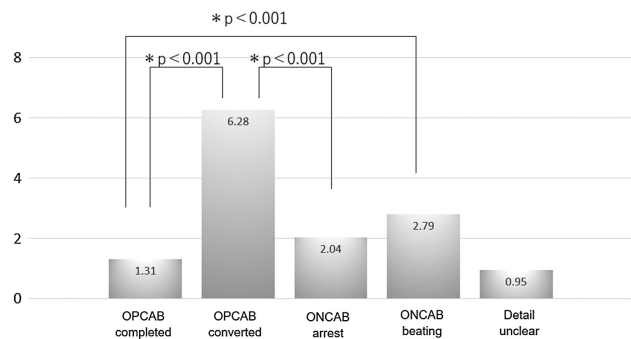


Fig. 4 Stroke rate is presented by a procedure (OPCAB or ONCAB, with or without cardiac arrest). OPCAB: off-pump coronary artery bypass; ONCAB: on-pump coronary artery bypass

questionnaire became a significant burden because of the duplicated workload for younger surgeons. Key members of the JACAS and JCVSD had multiple discussions to overcome these limitations. They decided to shift data collection from questionnaires to the JCVSD. Starting in 2018, the JACAS output is based on the JCVSD. The basic descriptive data are to be published in the affiliated journal, *Asian Cardiovascular and Thoracic Surgery*.²⁾ This report presented overall short-term results of

Table 4 Surgical results for left ventricular failure due to acute myocardial infarction

	N	30-day mortality	Operative mortality
Papillary muscle rupture	63	23 (36.5%)	24 (38.1%)
LV free wall rupture	241	75 (31.1%)	90 (37.3%)
Blow-out type	83	44 (53.0%)	54 (65.1%)
Oozing type	158	31 (19.6%)	36 (22.8%)
LV aneurysm	23	2 (8.7%)	2 (8.7%)

LV: left ventricular

Table 5 Surgical results for ischemic MR

	N	30-day mortality	Operative mortality
Ischemic MR	485	30 (6.2%)	42 (8.8%)
Mitral valve plasty (w/ LV procedure)	309	11 (3.6%)	18 (5.8%)
Mitral valve replacement (w/ LV procedure)	176	19 (10.8%)	24 (13.6%)
Mitral valve replacement (w/ LV procedure)	(10)	0 (0%)	0 (0%)

MR: mitral regurgitation; w/: with; LV: left ventricular

cardiac surgery for coronary artery disease (ischemic heart disease). There have been many clinical results highlighting isolated CABG procedures. The Society of Thoracic Surgeons (STS) has reported their results each year based on the STS National Database, with the most recent report from 2018.³⁾ JCVSD has been reporting clinical outcomes biannually since 2013 and through the annual report of the Japanese Association for Thoracic Surgery since 2017.⁴⁾

There have been a limited number of publications focusing on clinical data for patients with LV failure due

to acute or chronic phase myocardial infarction.^{5,6)} Clinical results based on the national clinical database would be informative because these data cannot be found anywhere else.

As shown in **Table 1**, approximately 20000 CABG procedures were recorded in the JCVSD in 2018. Compared with the JACAS questionnaire collection rate of 62%, the total number of procedures for 2018 is reasonable. The rate of OPCAB was 64% based on 2017 JACAS data, compared with 54% in 2018. The OPCAB rate seems lower; one possible reason is a change in the proportion of hospitals performing OPCAB. Until 2017, 60% of hospitals performing CABG in Japan (300 of 500 hospitals) returned the questionnaire to the JACAS. Among these 300 hospitals, many are thought to be accustomed to OPCAB. In 2018, the 200 other hospitals joined the registry; they may be less accustomed to OPCAB.

One limitation of these analyses is a data mining methodology that is not fully established. Thus, there are simultaneous annual reports basically derived from the same dataset, which should be combined into a more systematic and sophisticated annual report on coronary artery disease (ischemic heart disease) based on a national clinical database in the future.

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Disclosure Statement

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