Mechanical Prosthesis Is Reasonable for Mitral Valve Replacement in Patients Approximately 65 Years of Age

Takahiro Nishida, MD, PhD, Hiromichi Sonoda, MD, Yasuhisa Oishi, MD, Yoshihisa Tanoue, MD, Atsuhiro Nakashima, MD, Yuichi Shiokawa, MD, and Ryuji Tominaga, MD

Department of Cardiovascular Surgery, Kyushu University Graduate School of Medical Sciences, Fukuoka, Japan

Background. The long-term results of mitral valve replacement (MVR; n = 631) with a bileafl et mechanical prosthesis or a Carpentier-Edwards Perimount bioprosthesis were evaluated in Japanese patients of different age groups.

Methods. A total of 507 bileafl et mechanical prostheses and 124 bioprotheses have been implanted since 1982 at our institution. Follow-up was completed for 6,598 patient-years in 98.4% of the cases.

Results. Among the patients 70 years of age and older, the rate of freedom from valve-related death and valve-related morbidity at 10 years after surgery were significantly better in the bioprostheses group (93.3% ± 6.4% and 83.7% ± 8.7%, respectively; n = 35) than in the mechanical prostheses group (71.1% ± 8.0% and 60.9% ± 8.9%, respectively; n = 82), and neither structural valve deterioration (SVD) nor resulting re-MVR were observed for bioprostheses. In contrast, among the patients 64 years and younger, no significant differences were observed in long-term survival between the mechanical prostheses group (n = 347) and the bioprotheses group (n = 76), while significantly lower rates of freedom from SVD and re-MVR were observed in the bioprostheses group compared with those obtained in the mechanical prostheses group. As for the controversial intermediate-age group of 65 to 69 years, the general tendencies were similar to those observed in the group 64 years and younger.

Conclusions. Based on our comparative evaluation, bioprostheses should be chosen for MVR in patients 70 years of age and older, whereas mechanical prostheses were better in the patients 64 years of age and younger. The use of bioprostheses in Japanese patients 65 to 69 years of age is not preferable for preventing SVD and subsequent re-MVR.


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The use of bioprostheses (BPs) has been increasing along with improvements in durability [1, 2]; however, which type of prosthesis should be selected for mitral valve replacement (MVR) according to the patient’s age remains a controversial issue. Although two large randomized prospective studies [3, 4] demonstrated the superiority of mechanical prostheses (MPs) for both long-term survival and prevention of structural valve deterioration (SVD), the prostheses used in these studies were older types of valves, such as the Bjork-Shiley MP and Hancock porcine BP, which are no longer used in valve replacement.

The current American College of Cardiology and American Heart Association guidelines, revised in 2006 [5], indicate that BPs are reasonable for MVR in patients 65 years of age or older (Class IIa). In contrast, the guidelines published by the Japanese Circulation Society in 2007 recommend the use of BPs in the patients aged 70 (but not 65) years of age or older if the patient does not have a risk of thromboembolism (Class IIb), including atrial fibrillation. Due to of the lack of durability data for BPs used for MVR, it is considered dangerous to reduce the age limit from 70 to 65 years in using a BP. Surprisingly, however, one report [6] recommends the use of BPs for MVR in patients older than 60 years of age despite the higher incidence of SVD in this population. Other reports [7–9] have shown better results when using BP in patients older than 70 years of age with [8] and without [7, 9] comparing outcomes achieved with MPs.

The purpose of this study was to analyze our 30-year clinical experience with bileafl et MPs and the Carpentier-Edwards Perimount (CEP) BP for MVR in different age groups, to clarify the optimal age for the use of a BP for MVR.

Patients and Methods

This study involved human subjects and was reviewed and approved by the Institutional Review Board at Kyushu University. Informed consent for this study was waived because no individual patients were identified.

Accepted for publication May 10, 2013.

Address correspondence to Dr Nishida, Department of Cardiovascular Surgery, Kyushu University Graduate School of Medical Sciences, 3-1-1 Maidashi Higashi-ku Fukuoka 812-8582, Japan; e-mail: tnishida@heart.med.kyushu-u.ac.jp.

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Patients

Between February 26, 1982, and November 19, 2012, 632 patients underwent MVR with bileafl et MP (n = 507) or CEP (Edwards Lifesciences, Irvine, CA; n = 124) BP. Among the bileafl et MP groups, CarboMedics valves (CarboMedics, Inc, Austin, TX) were used in 378 patients, St. Jude Medical valves (SJM; St. Jude Medical Inc, Minneapolis, MN) were used in 124 patients, and ATS valves (ATS Medical Inc, Minneapolis, MN) were used in 5 patients.

Table 1 shows baseline patient demographics and etiology of their mitral valve disease. Preoperative atrial fibrillation was detected in 72.1% (456 of 632) of patients. No significant differences were noted in the rate of redo valve replacement across groups. Structural valve deterioration of previously implanted BP was the predominant cause of redo valve replacement in all groups.

Methods

The details of the surgical procedures and patient care have been described previously [10]. In brief, all patients underwent surgery with standard cardiopulmonary bypass and moderate hypothermia (at 28°C to 34°C). Either cold crystalloid or blood cardioplegia were delivered antegrade, retrograde, or both. Everting mattress sutures with 2-0 braided polyester sutures reinforced with polytetrafluoroethylene (Teflon; DuPont, Wilmington, DE) felt pledges were predominantly used to suture the valves [11].

Heparin was used until the international normalized ratio of the prothrombin time reached the therapeutic range with oral warfarin administration. After discharge from our hospital, the international normalized ratio of the prothrombin time was measured at least every 4 weeks and maintained between 2.0 and 2.8 throughout the patient’s lifetime in those implanted with a MP, whereas warfarin was used similarly for the first 3 months after surgery and then terminated in the patients implanted with a BP if the heart beats were in sinus rhythm. When atrial fibrillation was observed in the patients implanted with a BP, warfarin was given throughout their lifetime as well.

Postoperative follow-up was performed by us in our outpatient clinic, by referring physicians or via mail or telephone questionnaires. Ten patients could not be contacted; thus, the follow-up was completed in 98.4% of the patients. Hospital and late deaths, as well as all valve-related mortalities and complications, were strictly defined according to the published guidelines of the American Association for Thoracic Surgery/The Society of Thoracic Surgeons [12].

Table 1. Baseline Patient Demographics and Etiology of Mitral Valve Disease

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>≥70 (n = 117)</th>
<th>65–69 (n = 91)</th>
<th>≤64 (n = 423)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MP (n = 82)</td>
<td>BP (n = 35)</td>
<td>MP (n = 77)</td>
</tr>
<tr>
<td>Male (n)</td>
<td>36</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>Age, mean ± SD (years)</td>
<td>73.4 ± 0.3</td>
<td>75.7 ± 0.7</td>
<td>66.7 ± 0.2</td>
</tr>
<tr>
<td>Etiology of disease (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rheumatic/degeneration</td>
<td>48</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>Active IE</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Healed IE</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Active PVE</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Healed PVE</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paravalvular leakage</td>
<td>8</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>SVD of previous BP</td>
<td>10</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Valve thrombosis</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pannus formation</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>After mitral valve plasty</td>
<td>5</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Acute MR</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Chronic IMR</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>56</td>
<td>25</td>
<td>62</td>
</tr>
<tr>
<td>Redo MVR</td>
<td>20</td>
<td>5</td>
<td>29</td>
</tr>
</tbody>
</table>

BP = bioprosthesis; IE = infective endocarditis; IMR = ischemic mitral regurgitation; MP = mechanical prosthesis; MR = mitral regurgitation; MVR = mitral valve replacement; PVE = prosthetic valve endocarditis; SVD = structural valve deterioration.
Statistical Analysis
All continuous variables are presented as the means ± standard error of the mean (SEM). Fisher’s exact test and Student’s t-tests were used for the univariate analyses. Differences attributed to age (three age groups), the type of prostheses (MP or BP), and the interaction between these variables were evaluated with respect to each adverse event using a proportional hazard model (Cox regression model; Table 2). Comparisons between the MP and BP groups regarding adverse events in each age group were made using an actuarial life table (Kaplan-Meier) method, and the estimates were evaluated by using the log-rank test. The level of statistical significance was set at p < 0.05.

Results
Early Mortality
There were 29 early deaths occurring within 30 days of surgery and in-hospital deaths occurring within any time interval after surgery. The early mortality rate was 6.8% (8 of 117) in the patients 70 years and older, 6.5% (6 of 91) in the patients 65 to 69 years of age, and 3.5% (15 of 423) in the patients 64 years and younger (Table 3). There was one hospital death due to prosthetic valve endocarditis (PVE) that developed after active infective endocarditis. The cause of early death was predominantly low output syndrome (in 18 patients) resulting in multiple organ failure. Liver dysfunction (in 2 patients), renal failure (in 2 patients), colon perforation (in 1 patient), and cerebral bleeding (in 1 patient) due to head trauma were the other causes of early death.

Late Mortality
As to late mortalities, significant differences were observed in all-cause death among the three age groups (p = 0.0002 according to the Cox model; Table 2); however, no differences were observed according to type of prosthesis (p = 0.9241; Table 2). Significant differences in the interaction between age and prosthesis were observed with respect to both all-cause death (p = 0.0035; Table 2) and cardiac death (p = 0.0209 according to the Cox model; Table 2). From the Kaplan-Meier analysis of the long-term survival rate, the rates of freedoms from valve-related death (p = 0.0310; Fig 1A and Table 3), cardiac death (p = 0.0029), and actuarial survival (p = 0.0139; Fig 1B and Table 3) were significantly better in the BP group than in the MP group among the patients 70 years of age and older. In contrast, no significant differences were observed between the MP and BP groups in valve-related death, cardiac death, or all-cause death among the patients 65 to 69 years of age (p = 0.3950, 0.9549, and 0.3520 according to the Kaplan-Meier method, respectively; Figs 1C, 1D and Table 3) or the patients aged 64 years and younger (p = 0.3515, 0.9623, and 0.2253 according to the Kaplan-Meier method, respectively; Figs 1E, 1F and Table 3).

Table 2. p Values According to the Multivariate Proportional Hazard Model (Cox Regression Model)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>Prosthesis</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve-related death</td>
<td>0.0706</td>
<td>0.0517</td>
<td>0.99</td>
</tr>
<tr>
<td>Cardiac death</td>
<td>0.0748</td>
<td>0.2647</td>
<td>0.0209</td>
</tr>
<tr>
<td>All cause death</td>
<td>0.0002</td>
<td>0.9241</td>
<td>0.0035</td>
</tr>
<tr>
<td>Valve-related morbidity</td>
<td>0.7079</td>
<td>0.0002</td>
<td>0.0004</td>
</tr>
<tr>
<td>SVD</td>
<td>0.0319</td>
<td>&lt;0.0001</td>
<td>0.251</td>
</tr>
<tr>
<td>PVL</td>
<td>0.3842</td>
<td>0.0055</td>
<td>0.385</td>
</tr>
<tr>
<td>Reoperation</td>
<td>0.0074</td>
<td>&lt;0.0001</td>
<td>0.3192</td>
</tr>
<tr>
<td>Bleeding events</td>
<td>0.0135</td>
<td>0.275</td>
<td>0.289</td>
</tr>
<tr>
<td>Thromboembolism</td>
<td>0.4308</td>
<td>0.1902</td>
<td>0.5102</td>
</tr>
</tbody>
</table>

*a Age = the three age groups of ≥70, 65–69, and ≤64 years. b Prosthesis = the mechanical prostheses or bioprosthesis.

PVL = paravalvular leakage; SVD = structural valve deterioration.

Valve-Related Morbidity
The valve-related morbidity includes all of the cases of SVD, paravalvular leakage (PVL), reoperation, bleeding events, thromboembolism, valve thrombosis, PVE, and pannus formation. Valve-related morbidity was significantly ascribed to both the type of prosthesis (p = 0.0002) and the interaction between age and prosthesis (p = 0.0004); however, the frequency of valve-related morbidity was not significantly different between the three age groups (p = 0.7079; Table 2). The Kaplan-Meier analysis revealed a significantly lower rate of freedom from valve-related morbidity in the MP group among the patients 70 years of age and older (p = 0.0425; Fig 2A and Table 3). In contrast, a significantly higher rate of freedom from valve-related morbidity was observed in the MP group among the patients aged 64 years and younger (p = 0.0001; Fig 2C and Table 3). Although the rate of freedom from valve-related morbidity in the patients 65 to 69 years of age did not reach statistical significance (p = 0.0506; Fig 2B and Table 3), the MP group exhibited better outcome than the BP group among patients in this controversial age group, suggesting that BP use should be contraindicated in this age group, at least among Japanese patients.

Structural Valve Deterioration
A total of 42 cases of SVD were observed in the BP group. Significant differences in the occurrence of SVD were observed between the three age groups (p = 0.0319) and between the MP and BP groups (p < 0.0001 according to the Cox model; Table 2). Among the patients 70 years of age and older, SVD was not observed in either the MP or BP group. In contrast, a significantly higher incidence of SVD was observed in the BP group compared with that detected in the MP group among both the patients 65 to 69 years of age (p < 0.0001) and the patients aged 64 years and younger (p < 0.0001). The rate of freedom from SVD at 18 years, calculated using the Kaplan-Meier method, was 31.0% ± 25% in the BP group of the patients 65 to 69 years of age and the rate of freedom from SVD at 20 years was 11.8% ± 5.8% in the patients aged 64 years and younger.

Paravalvular Leakage
A total of 44 cases of PVL were observed, and a significant difference was noted in the occurrence of PVL due to the type of prosthesis (p = 0.0055 according to the Cox model; Table 2). Most instances (43 of 44) of PVL occurred in the MP group in
any age group, while only one case of PVL was observed in the BP group in a patient aged 64 years and younger. No significant differences, however, were observed in the occurrence of PVL between the MP and BP groups among all age groups (p = 0.2308 in the patients aged 70 or older, p = 0.3367 in the patients 65 to 69 years, and p = 0.1006 in the patients aged 64 years younger according to the Kaplan-Meier method).

Among the 35 cases of PVL in the MP group in the patients aged 64 years and younger, 97% (34 of 35) of the instances of PVL occurred after redo MVR. No significant differences were observed in the incidence of PVL between the SJM valve (9 of 116) and CarboMedics valve (26 of 181) groups in this age group.

REOPERATION. A total of 95 reoperations were performed. The predominant causes of reoperation were SVD (41 cases) and PVL (41 cases). Other causes of reoperation included active PVE (five cases), valve thrombosis (five cases), pannus formation (one case), concomitant aortic valve replacement (one case), and detachment of the preserved mitral valve (one case). Significant differences were observed in the occurrence of reoperation between the three age groups (p = 0.0074) and between the type of prosthesis (p < 0.0001 according to the Cox model; Table 2). Only one re-MVR was required due to PVL in a patient 70 years of age and older who underwent MVR with a CarboMedics MP. In contrast, the rate of freedom from reoperation was significantly higher in the MP group than in the BP group among both the patients 65 to 69 years of age (p = 0.0004) and the patients aged 64 years and younger (p < 0.0001 according to the Kaplan-Meier method). The rate of freedom from reoperation at 18 years in the BP group of patients 65 to 69 years of age was 22.9% ± 25%, while the rate of freedom from reoperation at 20 years in the BP group of the patients aged 64 years and younger was 12.8% ± 6.2%.

BLEEDING EVENTS. A total of 54 bleeding events (50 in the MP group versus four in the BP group) were observed. A significant difference was observed in the occurrence of bleeding events between the three age groups (p = 0.0135); however, no significant differences were observed between the type of prosthesis (p = 0.275 according to the Cox model; Table 2). The incidence of bleeding events was greater in the MP valve group (26 intracranial bleedings, nine gastrointestinal bleedings, and one urinary tract bleeding) than in the BP group (one intracranial bleeding) and the rate of freedom from bleeding events was significantly higher in the BP group than in the MP group among the patients aged 64 years and younger (p = 0.0496 according to the Kaplan-Meier method; Table 3). In this age group, the rate of freedom from the bleeding events at 20 years in the BP and MP groups was 98.5% ± 1.5% and 86.6% ± 2.5%, respectively.

THROMBOEMBOLISM. A total of 66 incidences of thromboembolism were occurred. No significant differences were observed in the occurrence of thromboembolism between the three age groups (p = 0.4308) or between the type of prosthesis (p = 0.1902 according to the Cox model; Table 2). A higher incidence of thromboembolism (39 brain infarctions, one transient ischemic attack, and three thromboembolisms to the peripheral arteries) was observed in the MP group than in the BP group (three brain infarctions) among the patients aged 64 years and younger. The difference in the rate of freedom from thromboembolism, however, was not statistically significant between the MP and BP groups among the patients 70 years of age and older (p = 0.1392), the patients 65 to
69 years of age ($p = 0.7879$), or the patients aged 64 years and younger ($p = 0.3766$), according to the Kaplan-Meier method (Table 3).

OTHER VALVE-RELATED COMPLICATIONS. No statistically significant differences were observed in the incidence of either valve thrombosis or PVE between the MP and BP groups among any of the age groups.

Comment

Based on our present 30-year follow-up results, we clearly reconfirmed the general principle that MPs exhibit better durability but worse antithrombotic and bleeding characteristics and are preferable for relatively young patients aged 64 years and younger, whereas that BPs exhibit...
worse durability but better bleeding characteristics and are preferable for elderly patients 70 years of age and older. In particular, CEP BP valves are excellent for patients aged 70 and older due to their lower rates of mortality and valve-related morbidity. This type of BP, however, should not be used in either (at least Japanese) patients 65 to 69 years of age or patients aged 64 years and younger due to its higher rates of valve-related morbidity primarily resulting in SVD and reoperation. As shown in the guidelines published by the Japanese Circulation Society in 2007, the use of BPs should be limited to patients 70 years of age and older, not older than 65. This limitation may be suitable for Japanese patients only because the life expectancy at birth in 2012 for Japanese (80.6 years for men and 87.4 years for women) is approximately 5 years longer than that for Americans (76.0 years for men and 81.0 years for women) according to data obtained by the Central Intelligence Agency. Both Jamieson and colleagues [8] in Canada and Kobayashi and coworkers [13] in Japan showed significantly higher incidences of SVD and resulting re-MVR in BP groups among patients between 61 and 70 years of age. These results are comparable with our present findings. The use of such BP, however, is preferable in relatively younger patients of 45 to 50 years of age if their life expectancy is less than 65 years due to the presence of other diseases.

In the two famous large randomized trials [3, 4] comparing the performance of Bjork-Shiley spherical disk MPs and the Hancock porcine BPs, the long-term results of aortic or mitral valve replacement showed that long-term survival itself after MVR was not different between the two prostheses, although SVD occurred more frequently after MVR with BPs in the patients younger than 65 years of age. Although other studies [13–15], using relatively new prostheses, also support these principals for long-term survival between the MPs and BPs, Jamieson and associates [8] reported that, in their study, survival itself was worse in the BP group than in the MP group in the patients 51 to 70 years of age. In our present results, however, the rate of actuarial freedom from long-term death was significantly better in the BP group than in the MP group among the patients 70 years of age and older, recommending the use of BPs in such elderly patients. Another Japanese report [13] also supports our conclusion.

Atrial fibrillation is a common complication in patients requiring MVR and is a major risk factor for thromboembolism. The Japanese Circulation Society recommends the use of BPs in the patients 70 years of age or older only when the patient does not have a risk of thromboembolism. The use of BPs in patients 70 years of age and older, however, appears to be reasonable whether or not atrial fibrillation exists preoperatively. In our series, atrial fibrillation was observed preoperatively in 72.3% of all patients; thus, warfarin was not terminated throughout the lifetime in the patients with atrial fibrillation. In other words, when warfarin is equally used, BPs are probably better than MPs in patients with atrial fibrillation with regard to postoperative thromboembolism. Due to the fact that we did not compare the long-term results between the elderly BP-implanted patients with and without atrial fibrillation in our study, further investigations are therefore required to confirm this point.

In our relatively younger group of patients (aged 64 years and younger), the occurrence of bleeding events, thromboembolism, and PVL was more frequent in the MP group than in the BP group, although the incidence of valve-related morbidities, including SVD, was higher in the BP group. Therefore, MPs are usually recommended for relatively younger patients requiring MVR. Since the total number of the bleeding events (50 cases) plus thromboembolism (43 cases) in our patients 64 years of age and younger implanted with MPs reached 78% of the total number of events (93 of 120) and since the rate of SVD itself was almost negligible in the MP group, the future of the MPs will be bright if the anticoagulation problems are cleared. In this sense, newly available anticoagulants, such as rivaroxaban and apixaban, may become strong alternatives to warfarin for reducing the rate of bleeding and thromboembolic complications associated with MPs, although another new anticoagulant, dabigatran, has recently been prohibited for use in mechanical valve cases according to a safety communication from the US Food and Drug Administration (http://www.fda.gov/Drugs/DrugSafety/ucm332912.htm). Further clinical studies comparing the efficacy of these new anticoagulants and warfarin in patients implanted with MPs should be conducted urgently.

In this study, most (97%) cases of PVL occurred after our re-MVR with MPs. Although the precise reasons are unclear, the leakage appears to occur sometime during the follow-up period because no leakage was detected in the operating room. Our results may be due to either a destructive mitral annulus developing after the removal of the previous BP or the characteristics of the sewing ring of the MP we used, with or without minor operative technical errors that cannot be detected on intraoperative echocardiograms. In any case, reoperation after MVR can be avoided by using MPs from the beginning, particularly in young patients.

In conclusion, our long-term experience confirmed that the BPs such as CEPs should be chosen for MVR in patients 70 years of age and older whether or not atrial fibrillation exists preoperatively, whereas MPs are better in patients 64 years of age and younger. Moreover, the use of CEPs in Japanese patients 65 to 69 years of age is not preferable for preventing SVD and subsequent re-MVR surgery.

We thank Mr Brian T. Quinn for reviewing this manuscript.

References


INVITED COMMENTARY

Nishida and colleagues [1] have brought forward an important consideration in their paper "Mechanical prostheses are reasonable for mitral valve replacement in patients approximately 65 years of age." The investigators evaluated the performance of mechanical prostheses and pericardial bioprostheses with implantation commencing in 1982 and extending over 20 years. Their recommendation is that mechanical prostheses are preferable over bioprostheses for implantation in the age group 65 to 69 years to prevent the occurrence of structural valve deterioration and reoperative mitral valve replacement.

This recommendation comes at a time when bioprostheses are more frequently considered for valve replacement surgery, especially for aortic valve replacement, and most frequently for mitral valve replacement when valve repair is not advisable. The publications from the University of British Columbia [2, 3] and joint unpublished research endeavors from the University of British Columbia and Erasmus University support the recommendation of Nishida and colleagues [1] for the management of patients requiring mitral valve replacement surgery. Bioprostheses are only favored for patients for mitral valve replacement in patients more than 70 years of age. The freedom from reoperation, particularly for structural valve deterioration, favors mechanical prostheses for mitral valve replacement in all age groups except those older than 70 years. The more recently published work from Duke University and Vanderbilt University [4] confirmed better survival for mitral valve repair over valve replacement and that mechanical prostheses achieve better outcomes over bioprostheses, even in the elderly. This study concluded that bioprostheses should be reserved only for patients with absolute contraindications to anticoagulation therapy who are not amenable to repair.

There are now acceptable recommendations that bioprostheses are acceptable for patients requiring aortic valve replacement who are 60 years of age and older, but for mitral valve replacement, mechanical prostheses should be considered, at least for all patients less than 70 years of age, inclusive of patients 65 to 69 years of age.

W. R. Eric Jamieson, MD

Cardiovascular and Thoracic Surgery
University of British Columbia
486 Burrard Bldg
St. Paul’s Hospital
1081 Burrard St
Vancouver, BC V6Z 1Y6, Canada
e-mail: eric.jamieson@UCH.ca

References


