

- [18] Kamijikkoku S, Murohara T, Tayama S *et al.* Acute myocardial infarction and increased soluble intercellular adhesion molecule-1: a marker of vascular inflammation and a risk of early restenosis? *Am Heart J* 1998; 136: 231–6.
- [19] Ohta T, Saku K, Takata K, Adachi N. Soluble vascular cell-adhesion molecule-1 and soluble intercellular adhesion molecule-1 correlate with lipid and apolipoprotein risk factors for coronary artery disease in children. *Eur J Pediatr* 1999; 158: 592–8.
- [20] Blann AD, McCollum CN. Circulating ICAM-1 in peripheral arterial disease as a predictor of adverse events. *Lancet* 1998; 351: 1135.
- [21] Flemming TR, DeMets DL. Surrogate endpoints in clinical trials: Are we being misled? *Ann Int Med* 1996; 125: 605–13.

*European Heart Journal* (2001) 22, 1159–1161

doi:10.1053/euhj.2000.2762, available online at <http://www.idealibrary.com> on IDEAL®

## Cardiac surgery in octogenarians: who, when and how?

See page 1235 for the article to which this Editorial refers

As the percentage of the ageing population increases so does the prevalence of coronary artery disease and of calcific degenerative valvular disease. Major advances have been made in surgical procedures, anaesthetic techniques, myocardial preservation and postoperative care. Thus, elderly patients with severe cardiac disease are more frequently referred for cardiac surgery<sup>[1]</sup>. Several reports have demonstrated that despite a higher incidence of in-hospital complications and mortality, as compared with younger patients, cardiac surgery can be performed in the elderly with acceptable risk, resulting in improved quality of life<sup>[2–6]</sup>. However, these patients usually have more advanced and diffuse cardiovascular disease with higher co-morbidity, such as cerebrovascular and peripheral vascular disease, diabetes, pulmonary and/or renal dysfunction, carrying a greater risk of significant disabling complications and prolonged hospital stay. Furthermore, biological ageing is quite heterogeneous and precise algorithms should be replaced by integrative individualized management. The most difficult aspects of decision making are choosing the appropriate timing of surgery and the necessity of whether or not to perform combined valve and coronary procedures.

The report of Kolh and associates in this issue<sup>[7]</sup> addresses the early and late outcome of 182 octogenarians submitted to cardiac surgery, with a mean follow-up of more than 3 years, providing 459 patient years of observation. Among the 182 octogenarians, 24 (13%) died during the hospital stay and 107 (59%) had one or more complications. Most patients recovered. Reoperation was required in 14 patients

(8%). Only five patients (3%) developed stroke: ascending aortic atheromatous disease, as assessed during operation, was the single predictor of stroke. Urgent operation was performed in 33 patients (18%). Forty-five patients (25%) were in functional class III and 46 (also 25%) were in class IV. Independent predictors of early in-hospital mortality were duration of extracorporeal circulation, urgent operation and functional class IV. Independent predictors of late mortality were urgent surgery again and pre-operative myocardial infarction.

In this retrospective study, few patients underwent mitral valve repair or replacement. Seventy patients were submitted to isolated aortic valve replacement, 70 to isolated coronary artery bypass grafting and 30 had combined aortic valve replacement and coronary artery bypass grafting. Hospital mortality was relatively low in the patients submitted to a single operation (8.5% and 10%, respectively) but was much higher among patients with combined valve and coronary surgery (26.5%).

Although the results of this and other studies clearly indicate that surgery should not be denied to octogenarians on the basis of age only, several improvements could potentially reduce the short- and the long-term risks. Urgent surgery, a too long duration of extracorporeal circulation and delayed surgery until the patient is in functional class IV should be avoided as much as possible.

### Aortic valve replacement

Among the 100 patients submitted to aortic valve replacement in the series of Kolh *et al.*<sup>[7]</sup>, 31 were in class IV and 21 had an urgent procedure. The patients presented with a mean of 2.3 of the four classical

symptoms: dyspnoea, angina, syncope and heart failure. This suggests that surgical indication should probably have been considered earlier in some patients, before the development of severe haemodynamic impairment. Kolh *et al.*<sup>[7]</sup> do not report whether some patients presented with heart failure due to a previously unsuspected severe aortic stenosis.

The diagnosis of aortic stenosis by physical examination is more difficult in elderly patients. The systolic murmur can be soft despite severe disease. A slow rising carotid pulse, although quite specific, has a low sensitivity. When a correct diagnosis of significant calcified aortic stenosis has been made, a regular follow-up should include the identification of the onset of symptoms or left ventricular dysfunction and a careful Doppler echocardiogram. Precise information should be given to the patient and his/her family. Predictors of the rate of haemodynamic progression of aortic stenosis in the individual patient are still unknown. The usual risk factors of cardiovascular diseases such as smoking, hypertension, diabetes and hypercholesterolaemia most probably contribute to the pathogenesis of aortic valvular lesions. There are no data providing evidence that the correction of these risk factors could make the progression slower. It is, however, important to address these risk factors appropriately, at least to reduce the development or progression of concomitant coronary artery disease. Surgery should certainly not be decided on the basis of numbers only, such as mean transaortic gradient or mean valve area in asymptomatic patients >80 years old. In symptomatic patients with severe aortic stenosis (valve area <1 cm<sup>2</sup> or 0.62 . m<sup>-2</sup>), aortic valve replacement should, however, be done before development of unstable symptoms and not as a desperate measure in class IV patients.

### Concomitant surgical procedures

Combined coronary and valve surgery was associated with a threefold increase in mortality in the series of Kolh *et al.*<sup>[7]</sup>. Previous investigators have found that the performance of concomitant surgical procedures exposes elderly patients to higher early mortality<sup>[2,4,8]</sup>. Several recent series, however, have not found such a combined procedure to be a predictor of death<sup>[9,10]</sup>. Other studies found that only women had a higher risk with the combined procedure<sup>[11,12]</sup>. This could be explained by smaller arteries, more diffuse atherosclerosis and perhaps late referral associated with female gender. Women were also prominent among patients submitted to concomitant procedures in Kolh's series. Concomitant revascularization

obviously led to a longer duration of cardiopulmonary bypass time (35 min more) and of mean aortic cross clamp time (17 min more). All coronary stenoses >50% were bypassed, whereas carotid endarterectomy was performed only in the presence of a carotid stenosis >80%. Should the cut-off point, for deciding to perform revascularization, be higher as suggested by the authors in their discussion? This remains a difficult question. Patients who have unrecognized and ungrafted coronary artery disease at the time of aortic valve replacement may be at high risk for a peri-operative myocardial infarction or death<sup>[13]</sup>. Functional evaluation of coronary stenoses by exercise or pharmacological stress testing should not be performed in such patients because of a significant risk of complications. Similarly, calculation of fractional flow reserve in the catheterization laboratory by the infusion of adenosine is not recommended in this setting. It is not reported by Kolh *et al.*<sup>[7]</sup> whether some patients requiring concomitant procedures had primarily coronary artery disease and incidental findings of aortic valve disease. Combined surgery in such patients should only be done if valve stenosis is severe. Moderate stenosis (valve area >1 cm<sup>2</sup>) should not be operated on, because it is associated with an excess mortality for unnecessary valve replacement<sup>[14]</sup>. The probability of an octogenarian progressing from moderate to severe aortic stenosis is, because of life expectancy, relatively low.

### Coronary artery bypass

The experience of Kolh *et al.* is not different from that reported by other institutions in patients submitted to isolated bypass grafting<sup>[1,13,15]</sup>. In their series, 94% of patients had unstable angina but operation was considered to be urgent in only 13%; this discrepancy is somewhat unclear. No patient underwent minimally invasive surgery and the left internal mammary artery was used in only 45% of patients. Surgical revascularization should be performed in octogenarians if the patient remains symptomatic despite complete medical treatment. The choice between surgery and percutaneous procedures is not easy. The severity of co-morbidity, and the extent and severity of coronary artery disease should be considered. The results of randomized, controlled trials are not necessarily applicable in the elderly population. An 8.2% in-hospital mortality was observed after percutaneous coronary interventions in octogenarians treated in the same institution as Gach *et al.*<sup>[16]</sup>. Incomplete revascularization was an independent predictor of both in-hospital and 1-year mortality.

Hybrid procedures could be the most appropriate approach in some patients: one of the vessels — usually the left anterior descending artery — bypassed using a minimally invasive technique and other vessels treated by percutaneous coronary intervention in the catheterization laboratory<sup>[17]</sup>. Registries involving prospectively collected data should certainly be helpful in determining whether this strategy decreases the complication rate in elderly patients.

**L. A. PIERARD**  
*University Hospital,  
 Liège, Belgium*

## References

- [1] Akins CW, Daggett WM, Valhakes GJ *et al.* Cardiac operations in patients 80-years-old and older. *Ann Thorac Surg* 1997; 64: 606.
- [2] Tsai TP, Chau A, Matloff JM *et al.* Ten-year experience of cardiac surgery in patients aged 80 years and over. *Ann Thorac Surg* 1994; 58: 445–51.
- [3] Gehlot A, Mullany CJ, Ilstrop D *et al.* Aortic valve replacement in patients aged eighty years and older: early and long-term results. *J Thorac Cardiovasc Surg* 1996; 111: 1026–36.
- [4] Flayda MAA, Hall RJ, Reul RM. Aortic valve replacement in patients 80 years and older. Operative risks and long-term results. *Circulation* 1993; 88 (Part 2): 11–16.
- [5] Fremes SE, Goldman BS, Ivanov J, Weisel RD, David TE, Salerno T and the Cardiovascular Surgeons at the University of Toronto. Valvular surgery in the elderly. *Circulation* 1989; 80 (Suppl I): I-77–I-90.
- [6] Edmunds LH, Stephenson IW, Edie RN, Ratcliffe MB. Open-heart surgery in octogenarians. *N Engl J Med* 1988; 319: 131–6.
- [7] Kolh P, Kerzmann A, Lahaye L, Gerard P, Limet R. Cardiac surgery in octogenarians: perioperative outcome and long-term results. *Eur Heart J* 2001; 22: 1235–43.
- [8] Freeman WK, Schaff HV, O'Brien PC, Orszulak TA, Naessens JM, Tajik AJ. Cardiac surgery in the octogenarian: perioperative outcome and clinical follow-up. *J Am Coll Cardiol* 1991; 18: 29–35.
- [9] Sundt TM, Bailey MS, Moon MR *et al.* Quality of life after aortic valve replacement at the age of >80 years. *Circulation* 2000; 102 (Suppl III): III-70–III-74.
- [10] Kirsch M, Guesnier L, LeBesnerais P *et al.* Cardiac operations in octogenarians: perioperative risk factors for death and impaired autonomy. *Ann Thorac Surg* 1998; 66: 60–7.
- [11] Aranki SI, Rizzo RJ, Couper GS *et al.* Aortic valve replacement in the elderly: effect of gender and coronary artery disease on operative mortality. *Circulation* 1993; 88 (Suppl II): II-17–II-23.
- [12] Lytle BW, Cosgrove DM, Loop FD *et al.* Replacement of aortic valve combined with myocardial revascularization: determinants of early and late risk for 500 patients, 1967–1981. *Circulation* 1983; 68: 1149.
- [13] Mullany CJ, Elveback LR, Frye RI *et al.* Coronary artery disease and its management: influence on survival in patients undergoing aortic valve replacement. *J Am Coll Cardiol* 1987; 10: 66–72.
- [14] Rahimtoola SH. 'Prophylactic' valve replacement for mild aortic valve disease at time of surgery for other cardiovascular disease? No. *J Am Coll Cardiol* 1999; 33: 2009–15.
- [15] Glower DD, Christopher TD, Milano CA *et al.* Performance status and outcome after coronary artery bypass grafting in persons aged 80 to 93 years. *Am J Cardiol* 1992; 70: 567–71.
- [16] Gach O, Legrand V, Martinez Ch, Kulbertus H. Predictors of in-hospital outcome and 1 year follow-up of percutaneous transluminal coronary angioplasty (PTCA) in octogenarians (Abstr). *Acta Cardiol* 2001; 56: 58.
- [17] Cohen HA, Zenati M, Smith AJC *et al.* Feasibility of combined percutaneous transluminal angioplasty and minimally invasive direct coronary artery by-pass in patients with multivessel coronary artery disease. *Circulation* 1998; 98: 1048–50.