Introduction

Coronary revascularization for ischaemic heart disease is an established method capable of effective relief of symptoms of ischaemia and improving the long-term prognosis of the patients. Due to the excellent results the surgical procedure is continuously being offered to the older population (Fig. 1). Though yielding similar benefits the surgical revascularization in elderly is accompanied by higher incremental risks caused by age-related morbidity and probably a globally reduced vital capacity.

Materials and Methods

A total of 1584 coronary revascularization procedures were performed at our cardiac surgery unit in years 1995 – 1997. From this cohort 1475 patients in whom CABG was performed as an isolated procedure were enrolled in the study. These patients were divided in two groups: I - the patients of the age below 70, and II - the patients of the age 70 and older.

A complete set of preoperative, operative and postoperative data were analysed. The data were retrieved from the Patient Analysis Tracking System Database provided by Medicon CZ and completed from the patients medical documentation. The paired values for groups I and II were compared using two sample T test and chi-square test for contingency tables. A statistically significant difference was accepted at a p value = 0.05.

Results

Three categories of parameters were analysed containing 1) the demographic preoperative data, 2) the data characterizing the surgical procedure and 3) postoperative course.

There were significant differences found between group I and II in all three data categories.

In demographic data there were significant differences both in BMI (27.5 vs. 26.4, p (0.001) and BSA (1.94 vs. 1.86, p ≤ 0.001). The prevalence of diabetes was higher among the elderly (27.4 vs. 41.7 %, p ≤ 0.005). There were significant differences in frequency of haemodynamically important carotid lesions (23.6 vs. 31.1%, p ≤ 0.05) and obliteratorative arteriosclerosis of peripheral vessels (14.2 vs. 20.5%, p ≤ 0.05). The renal dysfunction was present in 19 %
of elderly patients compared to 10.8 % in the younger group, and the preoperative serum creatinine level in elderly was higher respectively (90.5 vs. 99.1 µmol/l, p ≤ 0.006). A markedly different distribution in NYHA (dyspnoea) and CCS (angina) classification was present (Fig. 2) with pronounced shift towards higher stages in both classifications. Interestingly, the prevalence of current smokers was lower in elderly (21.2 vs. 8.6 %, p ≤ 0.005). On the contrary, the differences in hypercholesterolaemia, hypertension, history of TIA or stroke, previous myocardial infarction, cardiological or cardiosurgical interventions and ejection fraction were not found significant (Tab. 1).

The revascularization procedure was performed as elective in 62% of the younger patients while only in 38% of the elderly (non-elective procedure being defined as any other than by the waiting list: the urgent transfer from the catheterization room or CABG performed because of severe/unstable angina, postinfarction angina or presence of critical coronary lesions within the same hospitalization). The length of cardiopulmonary bypass, aortic cross-clamp, number of distal anastomoses, total blood loss, length of intubation and the use of intra-aortic balloon pumping were examined but with exception of longer extracorporeal circulation in older group (73.8 vs. 81.3 min, p ≤ 0.05) no other significant differences were found (Tab. 2).

The 30-days mortality of the whole cohort of isolated CABG was 2.9 %, but it was markedly different between the younger and the elderly (2.3 vs. 7.3 %, p ≤ 0.005). Similarly, the incidence of NearMiss+ which is defined as occurrence of one or more major complications almost leading to death of the patient was significantly higher in the older group (18.4 vs. 36.4 %, p ≤ 0.005). The incidence of postoperative complications in elderly was higher both globally (34.6 vs. 56.3 %, p ≤ 0.005) and in all analysed types of complications. Renal and respiratory failure, neurological and neuropsychological disorders, arrhythmias and low cardiac output were the complications strikingly more pronounced in the elderly group. The older patients required more transfusions of autologous blood (2.2 vs. 3.3 transfusion units, p ≤ 0.001) and stayed longer at ICU (56.3 vs. 66.0 hours, p ≤ 0.04). The length of hospital stay since operation was also longer in older patients (11.8 vs. 13.1 days, p ≤ 0.006) (Tab. 3).

Discussion

The elderly patients have been recognized as high-risk candidates for open-heart procedures since the beginnings of routine cardiac surgery (4,7,9,11,14). Nevertheless, due to continuous refinement of operative techniques, optimization of the cardio-pulmonary bypass and sophistication of the postoperative care cardiac surgery showed out to be feasible even in patients of a very advanced age (1,10). The accumulating surgical experience has reflected in a changing attitude towards the elderly candidates of heart surgery in general and also resulted in a shift of opinion on of elderly patients compared to 10.8 % in the younger group, and the preoperative serum creatinine level in elderly was higher respectively (90.5 vs. 99.1 µmol/l, p ≤ 0.006). A markedly different distribution in NYHA (dyspnoea) and CCS (angina) classification was present (Fig. 2) with pronounced shift towards higher stages in both classifications. Interestingly, the prevalence of current smokers was lower in elderly (21.2 vs. 8.6 %, p ≤ 0.005). On the contrary, the differences in hypercholesterolaemia, hypertension, history of TIA or stroke, previous myocardial infarction, cardiological or cardiosurgical interventions and ejection fraction were not found significant (Tab. 1).

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ference in the topic despite unanimously worse trends. Though risky, the coronary revascularization in older age groups has... the decades and, moreover, even the patients of a very advanced age are now considered suitable candidates for CABG.

Most of the published papers study the population of highly developed western countries - mainly US, UK or Japan - and a limited knowledge is available about the outcome of CABG in elderly patients in Czech Republic (2.3.). Set for many decades in a different socioeconomic situati-
on and with its elderly patients influenced by different life-

3. Frélich M., Štětka F., Němec P., Wagner R., Šimková M., Šimek P. Naše zkušenosti s chirurgickou revaskularizací myokardu u 70letých a starších nemocných. Cor Vasa 2001;43(1):28-32.

2. Čoček D., Pirk J., Šetina M., Mokráček A. Srdeční operace u pacientů nad 75 let. Zdraví 2000;2:147-51.

1. Alexander KP, Anstrom KJ, Muhlbaier LH et al. Outcomes of cardiac surgery in patients > or = 80 years: results from the National Cardiovascular Network. J Am Coll Cardiol 2000;35(3):731-8.

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In fact, the proportion of elderly patients in coronary revascularization for ischaemic heart disease is the most frequent type of cardiac surgery due to the prevalence of atherosclerosis in developed countries. The renal dysfunction is another potent threat jeopardi-

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which age exactly presents a threshold of substantially higher risk. Moreover, the cardiac surgeons from all the developed countries have been faced with an increasing demand for cardiac surgery in elderly caused by overall ageing of their populations. This demographic phenomenon caused both a prolongation of lifespan as well as reduced natality in the developed countries will bring unforeseen changes in medical, social and economic aspects in oncoming decades.

Coronary revascularization for ischaemic heart disease is the most frequent type of cardiac surgery due to the prevalence of atherosclerosis in developed countries. Identification of risk-stratified groups of patients and construction of predictive models for various patient subs-ets has become increasingly important with regard both to the individual’s risk/benefit ratio and to the cost-effectiveness in general.

Several authors analysed their results of coronary revascularization in patients of older age throughout the three recent decades (8,13). In a chronological review of main papers dealing with this topic there is clearly evident that the results of CABG have been constantly improving in the course of time (Tab. 4). Similar improvement can be traced in the older groups of patients as well as cumulating experience with CABG in octogenarians and nonagenarians. Despite these positive trends the operative mortality in patients over 70 years still remains considerably higher than in younger groups and the mortality in patients over 80 levels up to 10-12%.

Most of the published papers study the population of highly developed western countries - mainly US, UK or Japan - and a limited knowledge is available about the outcome of CABG in elderly patients in Czech Republic (2.3). Set for many decades in a different socio-economic situati-on and with its elderly patients influenced by different life-style patterns - resulting in high cardiovascular morbidity and mortality - there is an obvious need for comparison of results and risk stratification in this specific subset of population.

In our study we performed retrospective analysis of isolated CABG procedures with respect to age in a consecutive series of our patients; this cohort will then be a subject to further longitudinal follow-up.

What are the recognized risk factors of elderly candida-tes of CABG? In a clear presumption of worse outcomes of surgery in these patients we do not in no way be surprised by a presence of important risk factors: higher stage of NYHA and CCS, diabetes, manifestations of extracardiac obliterative arteriosclerosis, renal dysfunction. The advanced stage of cardiac disease is principally caused by its longer dura-tion and partly also by previous postponement of radical treatment in otherwise risky patients - this is globally ex-pressed in a higher percentage of urgent, non elective CABG procedures. The prevalence of diabetes was signifi-cantly higher in elderly in our study and this comorbidity presents an important potential for multiple negative ef-fects - advanced young-onset diabetes, atherosclerosis, renal dysfunction or impaired wound healing. With regard to the age of CABG candidates the presence of diabetes displays a higher incidence in the whole of patients and especially more frequent in septuagenarians it again decreases in octogenarians and older patients to values of middle-age population (9). This phenomenon is probably caused by a declining rate of young onset diabetic patients for CABG treatment as well as a reduced life span in diabetic patients.

A higher percentage of stenotic carotid lesions is well documented in our study due to routine Doppler ultrasound examination, which was part of our standard pre-operative protocol in these years. Though the preoperative history of strokes decreases in elderly patients and moreover, even the percentage of patients of a very advanced age are now considered suitable candidates for CABG.

Tab. 4: Outcomes of CABG in the elderly: review of cohort studies in the literature.

| Author                  | Year of publ. | Patient aged under 70 | over 70 | over 75 | over 80 |
|-------------------------|--------------|------------------------|--------|--------|--------|
| Gann                    | 1977         | 6.7                    |        |        |        |
| Heijmeriks et al.       | 1992         | 5.2                    |        |        |        |
| Friedman                | 1991         | 12.0                   |        |        |        |
| Hannan                  | 1994         | 12.9                   |        |        |        |
| Kishimoto               | 1994         | 8.9                    |        |        |        |
| Katz                    | 1995         | 6.4                    |        |        |        |
| Moeurs                  | 1996         | 7.8                    |        |        |        |
| MEDICARE                | 1995         | 11.5                   |        |        |        |
| KCH - unit HK           | 2000         | 5.9                    |        |        |        |

- overall mortality of isolated CABG in 70+ patients in years 1995-2000 at our unit

30-days mortality (%)                                                                

In fact, the proportion of elderly patients in coronary revascularization in older age groups has brought also a dramatic reduction of mortality/morbidity which is not merely a reflection of the demographic ageing, but also the changes in other co-morbidities and also the technical problems of coronary intervention in these patients. Though risky, the coronary revascularization in older age groups has remained an attractive challenge for cardiac surgeons - especially in recent years. The percentage of patients of over 80 years of age is now considered suitable candidates for CABG.

Conclusions

Hereby accumulated evidence supports the thesis that the older patients are a distinct surgical entity - while management of elevated risks and worse outcomes of surgery due to higher co-morbid conditions and overall decreased vital capacity is not the same as in younger patients. This is not the case in elderly age groups where the patients are in a better condition and the previous operations have been already performed. The renal dysfunction is another potent threat jeopardizing the outcome of surgery in elderly. A higher percentage of stenotic carotid lesions is well documented in our study due to routine Doppler ultrasound examination, which was part of our standard pre-operative protocol in these years. Though the preoperative history of strokes decreases in older groups and moreover, even the percentage of patients of over 80 years of age are now considered suitable candidates for CABG.

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The Wolfram Syndrome that is also known as DID-MOAD syndrome is characterized with the presence of diabetes insipidus, diabetes mellitus, optic atrophy and deafness resulting from a degenerative process involving pancreatic β-cells, supraoptic and paraventricular nuclei, the optic nerve, and cranial nerve VIII. Dilatations in uro-genital system and variable neurological and psychiatric manifestations have been reported in Wolfram syndrome. Recent studies showed the gene of Wolfram syndrome is linked to the markers on the short arm of chromosome 4p.

Patients and Methods

Cases

Case One: An eighteen-year-old diabetic male patient was admitted with complaints of urinary retention and incontinence starting three months prior to admission. The patient had history of diabetes mellitus, gait ataxia and deafness. Myopia, optic atrophy, posterior polar cataract and strabismus were detected in the ophthalmologic examination.

Case Two: Twenty-nine year old male patient had Type 1 diabetes mellitus for ten years and were using insulin with poor compliance to treatment. He was admitted with complaints of numbness in extremities. Eye findings were myopia and marked pallor in the optic discs.

Case Three: This sibling is a thirty-two year old female. She had only complete deafness. From her history, it was learned that she had congenital mutism. In clinical examination, the Weber and Rinne tests revealed bilateral sensorineural hearing loss.

Introduction

The Wolfram Syndrome that is also known as DID-MOAD syndrome is characterized with the presence of diabetes insipidus, diabetes mellitus, gait ataxia and deafness resulting from a degenerative process involving pancreatic β-cells, supraoptic and paraventricular nuclei, the optic nerve, and cranial nerve VIII. Dilatations in urogenital system and variable neurological and psychiatric abnormalities may be associated with the disease. The inheritance of the syndrome is autosomal recessive and typical findings are only expected in homozygotes for disorder (6,9,12). Recent studies showed the gene of Wolfram syndrome is linked to the markers on the short arm of chromosome 4p.

This paper describes a family with six siblings of whom the first one has full expression of Wolfram syndrome; diabetes insipidus, diabetes mellitus, gait ataxia and deafness. The second one presents with diabetes insipidus (incomplete), diabetes mellitus, visual disturbance and deafness. The third one with only sensorineural hearing loss, and the fourth sibling is prediabetic and has early coronary heart disease whereas the other two siblings are healthy. The parents are first cousins and have no health problem.

Key words: Wolfram syndrome; DIDMOAD syndrome; Heterozygote carriers; Mutation