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Open Heart Surgery in Haseki Training and Research Hospital: Evaluation of the First 500 Cases

Haseki Eğitim ve Araştırma Hastanesi'nde Açık Kalp Cerrahisi: İlk 500 Olgunun Değerlendirilmesi

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Abstract

Aim: The purpose of this study was to evaluate outcomes of the first 500 open heart surgeries performed in the Department of Cardiovascular Surgery at Haseki Training and Research Hospital, which was founded in 2014.

Methods: Records of 500 open heart surgeries performed between December 2014 and February 2017 were evaluated retrospectively. A total of 374 patients underwent coronary artery bypass grafting, 11 Bentall operation, 41 aortic valve replacement, and thirty eight patients underwent mitral valve replacement (MVR). Tricuspid ring annuloplasty was performed in four patients who had previously undergone MVR and atrial septal defect closure in 12 patients, while five patients were operated due to cardiac myxoma and 20 patients due to type 1 aortic dissection.

Results: The mean age of the patients was 57.6±13.1 years (17-84 years). Hypertension (54.4%) was the most common comorbidity, followed by hyperlipidemia (43.1%), diabetes mellitus (34.36%), Chronic Obstructive Pulmonary disease (21.5%), and peripheral arterial disease (9.3%), respectively. In-hospital death occurred in 22 of 480 (4.58%) patients and 10 of 20 patients (50%) who were operated due to type 1 aortic dissection. The overall hospital mortality rate was 6.4% (26 of 500 patients).

Conclusion: Our experience showed that world class cardiac care is provided in our center.

Keywords: New center, open heart surgery, coronary artery bypass grafting, valve replacement

Öz

Amaç: Bu çalışmanın amacı, 2014 yılında faaliyete geçen Haseki Eğitim ve Araştırma Hastanesi Kalp ve Damar Cerrahisi Kliniği'nde yapılan ilk 500 kalp ameliyatının sonuçlarını değerlendirmektir.

Yöntemler: Aralık 2014 - Şubat 2017 tarihleri arasında 500 olgu retrospektif olarak değerlendirildi. Toplam 374 olguda koroner arter bypass cerrahisi uygulandı. On bir hasta Bentall operasyonu, 41 hasta aort kapak replasmanı, 38 hasta mitral kapak replasmanı (MVR), MVR yapılan 4 hasta triküspit ring anuloplasti, 12 hasta atriyal septal defekt kapatılması, 5 hasta kardiyak miksoma, 20 hasta ise tip 1 aort diseksiyonu nedeni ile opere edilmiştir.

Bulgular: Hastaların yaş ortalaması 57,6±13,1 (17-84 yaş) idi. Hipertansiyon (%54,4) en sık eşlik eden hastalık olup bunu hiperlipidemi (%43,1), diabetes mellitus (%34,36), Kronik Obstrüktif Akciğer hastalığı (%21,5) ve periferik arter hastalığı (%9,3) takip ediyordu. Hastane mortalitesi 480 hastada 22 (%4,58), tip 1 aort diseksiyonu nedeni ile opere edilen 20 hastada ise 10 hasta (%50) olarak, totalde ise 500 hastada 26 (%6,4) olarak gerçekleşti.

Sonuç: Deneyimlerimiz, merkezimizde dünya çapında kalp bakımı sağlandığını gösterdi.

Anahtar Sözcükler: Yeni merkez, açık kalp cerrahisi, koroner arter bypass greftleme, kapak replasmanı

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Introduction

From a historical point of view, for physicians, the heart has always been perceived as a feared organ that especially needs to be kept away from surgery. In the 17th century, nothing could be done to heart injuries. In the 17th century, the belief that "nothing can be done to heart injuries" started to change. Ludwig Reh was the first surgeon to save a patient by stitching myocardium in a heart injury. This operation, performed in 1896, is considered to be the beginning of the heart surgery (1). In the late 19th and early 20th centuries, advances in various branches of medicine -as a natural consequence of scientific and technological developments- played a major role in the rapid development of heart surgery.

The first steps of modern cardiac surgery were taken in Turkey with closed mitral commissurotomy.

In 1953 and 1954, Dr. Nihat Dorken and Dr. Fahri Arel in İstanbul and Dr. Orhan Mumin and Dr. Hilmi Akın in Ankara were the pioneers of this advancement (2). The first open heart surgery, using extracorporeal circulation, was perfomed by Dr. Mehmet Tekdoğan in Hacettepe University Hospital. The first series of open heart surgeries were performed by Dr. Aydın Aytaç in Hacettepe Children's Hospital in 1962 (3).

Currently, there are 75.000 open heart surgeries per year in a total of 260 heart centers, including 42 ministry of health, 52 university and 164 private hospitals (4).

The purpose of this study was to present our experience and results of open heart surgery from the first year of our operation in the Department of Cardiovascular Surgery at Haseki Training and Research Hospital.

Methods

Records of 500 patients who underwent open heart surgery between December 2014 and February 2017 in Haseki Training and Research Hospital were retrospectively reviewed (Table 1). A total of 374 patients underwent coronary artery bypass grafting (CABG), and among them, six patients had carotid endarterectomy, one left ventricle aneurysm repair, five aortic valve replacement (AVR), three mitral valve replacement (MVR), four mitral ring annuloplasty, and one patient had mitral ring annuloplasty with neochord implantation simultaneously. Out of 374 CABG procedures, 24 cases were performed as off pump, and in three cases, minimal invasive direct CAB (MIDCAB) was preferred. Bentall operation was performed in 11 patients, AVR in 41 patients, MVR in four patients, tricuspid ring annuloplasty in four patients who had previously undergone MVR, and atrial septal defect (ASD) closure in 12 patients were performed, while five patients were operated due to cardiac myxoma and 20 due to type 1 aortic dissection.

In addition to routine preoperative examinations, patients with a history of Chronic Obstructive Pulmonary disease (COPD) or patients with pathological auscultation findings on examination were referred for pulmonology consultation and pulmonary function tests. In CABG preparation, patients with a previous history of cerebrovascular event and peripheral arterial disease and patients over 65 years were examined with bilateral carotid Doppler ultrasonography. Carotid artery angiography was performed in case of significant stenosis in Doppler ultrasonographic evaluation.

Blood sugar levels were closely followed up in diabetic patients and insulin therapy was initiated in patients with high levels after consultation. Patients scheduled for valve surgery were routinely examined by a dental consultant.

Median sternotomy was performed except three MIDCAB cases via left anterior thoracotomy. During cardiopulmonary bypass, mean arterial pressure was maintained at 50-70 mmHg.

Myocardial protection was achieved with continuous retrograde blood cardioplegia, whereas antegrade blood cardioplegia was performed at 20 minute intervals. During coronary bypass, proximal anastomoses were performed under side clamp. Antegrade cardioplegia was delivered in only cases with short estimated operation period. Proximal anastomoses were made under cross clamping in the ones with aortic calcifications. Temporary pace

Table 1. Case distribution

Operation	Number of cases	Percent (%)
CABG	374	74.8
CABG + Carotid endarterectomy	6	-
CABG + LV Aneurism repair	1	-
CABG + AVR	5	-
CABG + MVR	3	-
CABG + Mitral valve repair	5	-
Off-pump CABG	24	-
MIDCAB	3	-
AVR	41	8.2
MVR	38	7.6
MVR+ tricuspid ring annuloplasty	4	-
Type 1 aortic dissection	20	4
Ascending aortic aneurism	11	2.2
ASD closure	10	2
Cardiac myxoma	4	0.8
Infectious endocarditis	2	0.4

CABG: Coronary artery bypass grafting, AVR: Aortic valve replacement, MVR: Mitral valve replacement, LV: Left ventricle, MIDCAB: Minimal invasive direct coronary artery bypass, ASD: Atrial septal defect

maker was fitted in coronary bypass and valve patients suffering from arrhythmia. In patients who had uneventful intensive care unit stay, thoracic drains and Foley catheters were removed on the second postoperative day and the patients were taken to the follow-up clinic.

Statistical Analysis

No statistical tests were used. Data was expressed as mean ± standard deviation.

Results

Three hundred ten cases were male (62%) and 190 were female (38%) and the mean age was 57.6±13.1 (31-84) years. According to the preoperative data of the patients, hypertension (44.4%) was the most common comorbid disease, followed by hyperlipidemia (35.2%), diabetes mellitus (31%), and COPD (17.6%). Twenty patients had preoperative renal dysfunction and one patient required chronic dialysis. Thirty eight patients had accompanying peripheral artery disease while 14 patients had a cerebrovascular event (Table 2).

According to the European System for Cardiac Operative Risk Evaluation (euroSCORE) risk scoring system, 170 patients were in the low-risk group (0-2 points), 235 in the medium-risk group (3-5 points) and 95 in the high-risk group (six and above).

The mean aortic cross clamp time and cardiopulmonary bypass time (CPB) were calculated as 64.3±25.9 minutes and 103.2±45.6 minutes, respectively. The longest pump time was 380 minutes in Bentall procedure+hemiarch replacement for type 1 aortic dissection. The shortest pump duration was 20 minutes with an ASD operation. Average drainage amount was 458.2±303.2 mL. The mean duration of intensive care unit stay was 34.7±15.0 hours and the mean length of hospital stay was 7.3±4.8 days.

Table 2. Demographic characteristics

	Number of patients	Percent (%)
Sex		
Female	190	38
Male	310	62
Hypertension	222	44.4
Hyperlipidemia	176	35.2
DM	155	31
COPD	88	17.6
Peripheral Arterial disease	38	7.6
CKD	20	4
CVE	14	2.8

DM: Diabetes mellitus, COPD: Chronic Obstructive Pulmonary disease, CKD: Chronic kidney disease, CVE: Cerebrovascular events

Preoperative ejection fraction (EF), calculated with echocardiography, was 53.12% (±25.8). The lowest EF was 25%. EF in 20 patients was below 35%. EF in 160 patients was between 30% and 50%. Five of the 26 deceased patients were over 70 years of age, and EF in six patients was less than 30%. The total perfusion and cross clamp times were longer than the mean total perfusion and cross clamp times in the lost patients.

Of the 500 patients who underwent open heart surgery, 32 died. The mortality rate was 6.4%. Ten deaths were due to emergent operation for type 1 aortic dissection; 14 had coronary bypass, one had AVR and one had MVR+CABG. Resuscitative sternotomy was performed in five cases of type 1 aortic dissection. Two of five cases died during procedure. Three of these five patients could not be weaned from CPB pump. The other two patients used extracorporeal membrane oxygenator. Three patients died due to cardiac failure whereas four patients died due to sepsis. Five of the 26 deaths were in patients over 70 years of age. According to euroSCORE II, 15 patients were belonged to high-risk; eight patients to moderate-risk, and three patients belonged to low-risk groups. Five patients failed to be weaned from the pump and died (three patients had aortic dissection and two patients had CABG). Intra-aortic balloon pump was inserted in three patients before operation, in eight patients during operation, and in seven patients during intensive care follow-up.

The number of revascularized vessels was 2.7±1.1 (1-5). Of 374 cases with CABG, full arterial revascularization was performed in four cases, and bilateral internal mammary artery (IMA) was used in 18 cases. In nine procedures, left IMA (LIMA) was not used due to dissection. Off-pump bypass was performed in 24 patients who had low EF and high risk factors for CPB, such as history of cancer. The mean number of bypasses in off-pump bypass patients was 1.1±1 (1-3).

Transesophageal echocardiography (TEE) was performed in patients who were scheduled for valve operations. Repair of mitral and tricuspid valve was performed in appropriate cases. Concomitant mitral ring annuloplasty was performed in four patients who underwent CABG, mitral ring annuloplasty and neocordal transfer in one patient, and tricuspid ring annuloplasty was performed in four patients who underwent MVR. All the patients who underwent valve repair were evaluated with preoperative TEE. None of the patients had more than mild levels of valve insufficiency in postoperative evaluation.

In 20 type 1 aortic dissection operations, one ascending aortic graft interposition, six Bentall operation and 13 Bentall+hemiarc replacement were performed. Femoral artery was cannulated in three cases which was performed

under open chest cardiopulmonary resuscitation while axillary artery was used in other cases. Total circulatory arrest (TCA) and anterograde cerebral perfusion was used routinely. The mean TCA duration was 13.5 (±5.8) min.

Primary repair was performed in two patients and pericardial patch was used in eight patients who underwent ASD repair.

The most frequent complication in 112 patients (22.4%) was atrial fibrillation (AF). Direct current cardioversion was performed in patients in whom initial medical cardioversion failed to restore sinus rhythm. Chronic AF was present in three patients. Low cardiac output syndrome and wound infections were other common complications. Mediastinitis developed in two patients (0.4%) (Table 3).

Table 3. Postoperative data

Mortality		Number	Percent (%)
Total cases	500	32	6.4
	480	22	4.58
Aortic dissection	20	10	50
Morbidity	Atrial fibrillation	112	22.4
	Superficial wound infection	14	2.8
	Mediastinitis	2	0.4
	Low cardiac output syndrome	30	6
	Intra-aortic balloon pump	28	5.6
	Respiratory failure	11	2.2
	Hemiparesis	6	1.2
	Hemiplegia	2	0.4
	Revision due to bleeding	14	2.8
	Revision due to sternum dehiscence	4	0.8
	Myocardial infarction	5	1
	Chronic atrial fibrillation	3	0.6
MICUS (days)	-	34.7±15.0	-
MHS (days)	-	7.3±4.8	-

MICS: Mean intensive care unit stay, MHS: Mean hospital stay

Discussion

In a crowded metropolis like İstanbul, each day a new heart center is being established. However, the most important pitfall in a new heart center is the efficacy. Taking into consideration the fact that the efficacy rate is less than 20% in 1/3 of the heart surgery centers in our country (5), reaching an open heart count of 500 in the first two years of a new clinic confirmed effective planning beyond the success. Since public hospitals provide health care to all citizens without social security distinction, open heart surgery makes these hospitals more advantageous for patients. It has been reported that mortality rate in combined surgeries and emergency surgeries are higher than in isolated and elective surgeries (6). In our clinic, the mortality rate in patients who underwent elective, emergency and combined surgeries significantly differed. It is known that mortality increases in patients with impaired left ventricular systolic function. Compared with younger patients, cardiac surgery in older patients is associated with higher mortality and morbidity (7,8). There was no correlation between age and mortality in our study, but low EF was significant. As stated in the literature, expected mortality rates in low-risk, middle-risk and high-risk patients are 1.11±0.07%, 5.18±2.08%, 8.78±3.54%, respectively (9). Our mortality rates were 0.5% in the low-risk group, 4.1% in the middle-risk group, 8.2% in the high-risk group and 5.2% in the total risk group. The incidence of postoperative new AF varies between 15% and 40% after cardiac surgery (10). AF occurred in 112 cases (22.4%) and three patients were discharged with AF. Although mediastinitis is a rare complication (1%-3%) of open heart surgery, it is one of the most lethal complications and the mortality rate is 10%-25% (11). Mediastinitis developed in two patients.

CABG is at the forefront in our clinic as it is in most centers. Today, there are many alternative surgical methods for CABG. Considering the long-term survival of the patient, we essentially selected LIMA for the graft of choice and preferred bilateral IMA when convenient. Appropriate patients were definitely operated under CPB whereas off-pump surgery was preferred for patients with high risk for CPB.

Our clinic has 10 inpatient beds, four intensive care beds and two operating rooms. With existing conditions, 500 open heart surgeries were performed with acceptable mortality and morbidity during this period since foundation. Our goal is not only to increase the number of operations, but also to increase the diversity of operations and to apply new surgical methods to appropriate patients in the light of new developments.

Study Limitations

This study has limitations. It is a retrospective study, with the typical limitations inherent in this study design. Besides, the number of patients was small. Although a small sample size was planned, as this was merely a pilot study, large randomized controlled trials should be performed in the future to confirm our results.

Conclusion

Our experience showed that world class cardiac care is provided in our center. High efficacy in cardiovascular

surgery can be maintained in a new clinic in an accurately organized hospital.

Ethics

Ethics Committee Approval: Retrospective study.
Informed Consent: It was taken.
Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: M.Ş. Concept: M.Ş. Design: S.Ö. Data Collection or Processing: C.Y., M.Ş. Analysis or Interpretation: F.T.İ.M. Literature Search: M.Ş., S.Ö. Writing: M.Ş.

Conflict of Interest: No conflict of interest was declared by the authors.

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