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QUALITY OF LIFE OF PATIENTS TREATED BY VALVE-SPARING AORTIC ROOT REPLACEMENT

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Summary

The aim. To determine the effectiveness of David valve-preserving operation in comparison with Bentall operation based on the analysis of patients' quality of life after operations.

Materials and methods. The study included 107 patients who underwent planned and urgent surgical treatment at the Heart Institute of the Ministry of Health of Ukraine from 2015 to 2023. The patients were divided into two groups depending on the type of surgical intervention: group A consisted of 53 patients (49,11±1,54 years; 47 (88,68 %) males), who underwent the David procedure (valve-sparing replacement of aortic root and ascending aorta), group B – 55 patients (52,36±1,56 years; 53 (96,36 %) males), who underwent Bentall surgery (replacement of the valve, root and ascending part of the aorta). The quality of life was assessed before the operation for each group, and in the long-term period after operation. The quality of life of the patients of both groups was compared. It was assessed using the Medical Outcomes Study Short Form 36 (MOS SF-36) questionnaire.

Results. The obtained data indicated that the average preoperative values of quality of life indicators of patients of both groups with different types of aneurysm correction were significantly different from ideal health. The performed operations significantly improved the assessment of the quality of life. When comparing the quality of life in the remote period of the patients of both groups, the indicators were significantly better in group A. We noticed that the patients of group A had a significantly better psycho-social component, which probably influenced the assessment of other scales. Group A patients had statistically better all indicators of quality of life after surgery comparing with group B patients. Group B patients complained about the sound of the artificial aortic valve prosthesis, sometimes the occurrence of minor nosebleeds and the need for frequent visits of the doctor to monitor blood «thinning» indicators.

Conclusions. The obtained results indicate a positive change in the quality of life in patients of both groups. When David operation is performed for aortic root and ascending aortic aneurysms, the quality of life is significantly better than in patients after Bentall operation. We recommend performing David operations at the highly specialized cardiac centers.

Keywords: quality of life; David operation, Bentall operation, aortic valve, ascending aorta, aortic root aneurysm

INTRODUCTION

Recently, attention has been paid to the concept of quality of life. It is an important factor influencing the development of diseases and determining their prognosis in the world practice. Each new generation determined the criteria of its «normality» and «quality». The World Health Organization (WHO) conducted significant research work

on the development of basic criteria for the quality of human life at the end of the 20th century. WHO defines quality of life as «individuals' perception of their position in life in the context of the culture and value systems in which they live, and in accordance with their own goals, expectations, standards and concerns» [1, 2].

In recent years, the number of publications devoted to the quality of life on the Internet has exceeded 4.5 million.

This trend of growing interest in the study of quality of life increases every year. There are special methodical guidelines in addition to information on the Internet [3, 4]. The concept of quality of life is widely used in medicine and is an integral indicator that reflects a person's adaptation to the disease and his ability to perform usual functions [4].

Today, there are a significant number of methods for assessing the quality of life, which are divided into general, suitable for assessing the quality of life in any disease, and disease-specific, aimed at patients with a specific disease [4, 5]. These methods reflect subjective indicators of the state of health and the evaluation of the expression of symptoms by the patient. However, the wide variety of methods for assessing the quality of life significantly complicates determining the reliability of research results on the same problem [6, 7].

The study of quality of life among patients undergoing cardiac surgery remains a less studied issue. The modern cardiac surgery has a tendency performing valve-sparing operations. This trend is widely followed not only in cases of valve repair surgery, but also in operations on the root and ascending part of the aorta. Numerous centers of cardiac surgery in the West consider valve-sparing operations for aneurysms of the aortic root and ascending part as the gold standard in cases where the aortic valve has not organic changes [8, 9, 12]. David operation, in which the patient's own valve is preserved, only recently began to be performed in Ukraine. This operation is technically difficult, but has many advantages. Ukrainian surgeons for many years performed Bentall operation in cases of aortic insufficiency with aneurysm of the root and ascending part of the aorta [10, 11]. It is a fact of a lot of complications after Bentall operations [13]. The Bentall operations had such

a «popularity» due to the lack of experience in performing valve-sparing operations and the lack of data of the benefits of these operations. Today, the number of surgeons who use valve-sparing operations in their practice is increasing.

Of course, the fact that there is no need to take anti-coagulants after David operation is reliable. There are many advantages in patients who do not have a prosthetic aortic valve, as provided for in the Bentall operation. It is known that the question of quality of life after these types of operations was not raised in modern cardiosurgical science. In this study, we want to show how different the quality of life of patients is after these two types of surgery.

THE AIM OF THE STUDY

To determine the effectiveness of David valve-preserving operation in comparison with Bentall operation based on the analysis of patients' quality of life after operations.

MATERIALS AND METHODS

The study included 107 patients who underwent planned and urgent surgical treatment at the Heart Institute of the Ministry of Health of Ukraine from 2015 to 2023. The patients were divided into two groups depending on the type of surgical intervention: group A consisted of 53 patients (male 47 (88.68 %)) who underwent the David procedure (valve-sparing replacement of aortic root and ascending aorta), group B – 55 patients (male 53 (96.36 %)) who underwent Bentall surgery (replacement of the valve, root and ascending part of the aorta). The average age of patients in group A was 49.11 ± 1.54 years, group B – 52.36 ± 1.56 years ($p = 0.141$) (table 1).

Table 1

Baseline characteristics of the patients

Scale		Group A (n=53)	Group B (n=55)	p
Gender	male	47 (88,68)	53 (96,36)	0,130
	female	6 (11,32)	2 (3,64)	
Age, years		$49,11 \pm 1,54$	$52,36 \pm 1,56$	0,141
Weight, kg		$180,83 \pm 1,18$	$180,073 \pm 1,05$	0,632
Height, cm		$87,58 \pm 2,23$	$87,43 \pm 2,52$	0,965
BMI kg/m ²		$26,81 \pm 0,65$	$26,93 \pm 0,74$	0,905

Quality of life was assessed before surgery and in the long-term period after surgery using the Medical Outcomes Study Short Form 36 (MOS SF-36) questionnaire. The survey was conducted after the informed consent of the patient to participate in the study. The rules for filling out the questionnaires were explained to the patients. Then, within 10-15 minutes, the patient filled out the Ukrainian version of the SF-36 questionnaire on his own. Results were calculated without the presence of the patient.

The questionnaire included 36 items, which are grouped in 8 scales: physical functioning (PF), role limitations due to physical health (RP), body pain (BP), general health (GH), vitality (VT), social functioning

(SF), role limitations due to emotional problems (RE) and mental health (MH). The patient chose the answer to the proposed question. Each answer is evaluated in points. When forming one or another scale, these points are added up and mathematically processed according to standard formulas.

The results were presented in the form of scores on 8 scales, composed in such a way that a higher score indicates a higher level of quality of life. The indicators of each scale vary between 0 and 100, where 100 represents the best quality of life. Quality of life was assessed before and after surgery for each group. Finally, the quality of life after surgery was compared in groups A and B. Due to the normal distribution, statistical data are presented as mean

and standard deviation. Mean values were compared using Student's t-test. The difference at $p < 0.05$ was considered statistically significant.

RESULTS

The data we received indicated that the average values of quality of life indicators of patients of both groups with different types of aortic root and ascending aortic aneurysm correction were significantly different from ideal health. The initial data of group B before the operation indicated that the most underestimated indicators were physical functioning, role limitations due to emotional problems, vitality and assessment of the general state of health. The presence of pathology interfered the daily physical activity. Patients noted rapid fatigue and low emotional state. Knowledge of the presence of pathology led to depressive episodes (table 2).

The performed Bentall operation contributed to a statistically significant increase in indicators. This was especially noticeable in the desire of the physical activity and improvement of the emotional component (table 2).

The lowest indicators of physical functioning, vital energy, and emotional functioning were obtained during the further study of the values of quality of life indicators in group A (David's operation). The presence of pathology caused complaints as bad health, rapid fatigue, and fear of pain. These complaints were an obstacle to a well-balanced life.

The performed operation significantly improved the indicators. Patients positively perceived the information about the absence of an artificial heart valve and concomitant use of anticoagulants (table 3).

The results obtained during the comparison of both groups after surgery were especially important. A statistically significant difference was noted in both groups in all scales (table 4).

We noticed during the assessment, that the patients of group A had a better psycho-social component, which probably affected the assessment of other scales (fig.1). Group B patients complained about the sound of the aortic valve prosthesis, sometimes the occurrence of minor nosebleeds and the need for frequent visits to the doctor to control blood thinning indicators.

Table 2

Quality of life of patients before and after Bentall operation

Scale	before operation	after operation	p
Physical functioning, PF	35,00±0,80	79,63±0,95	0,000
Role limitations due to physical health, RF	45,00±0,91	82,37±0,73	0,000
Role limitations due to emotional problems, RE	38,88±0,33	78,97±0,99	0,000
Vitality, VT	34,36±1,31	78,97±0,99	0,000
Mental health, MH	44,75±0,79	82,50±0,86	0,000
Social functioning, SF	42,13±0,43	84,13±0,56	0,000
Body pain, BP	62,13±1,25	81,88±0,98	0,000
General health, GH	35,50±0,69	81,50±0,84	0,000

Table 3

Quality of life of patients before and after David operation

Scale	before operation	after operation	p
Physical functioning, PF	32,69±0,63	95,38±6,62	0,000
Role limitations due to physical health, RF	45,26±1,20	94,10±1,55	0,000
Role limitations due to emotional problems, RE	43,21±0,79	99,74±0,26	0,000
Vitality, VT	31,79±0,39	91,92±1,44	0,000
Mental health, MH	32,69±0,63	98,67±0,49	0,000
Social functioning, SF	54,36±0,74	99,31±0,41	0,000
Body pain, BP	62,31±0,68	94,74±1,15	0,000
General health, GH	36,03±0,59	91,18±1,62	0,000

Table 4

Indicators of quality of life according to the SF-36 questionnaire in the studied groups after surgery (M±m)

Scale	Group A	Group B	p
Physical functioning, PF	95,38±6,62	79,63±0,95	0,000
Role limitations due to physical health, RF	94,10±1,55	82,37±0,73	0,000
Role limitations due to emotional problems, RE	99,74±0,26	78,97±0,99	0,000
Vitality, VT	91,92±1,44	78,97±0,99	0,000
Mental health, MH	98,67±0,49	82,50±0,86	0,000
Social functioning, SF	99,31±0,41	84,13±0,56	0,000
Body pain, BP	94,74±1,15	81,88±0,98	0,000
General health, GH	91,18±1,62	81,50±0,84	0,000

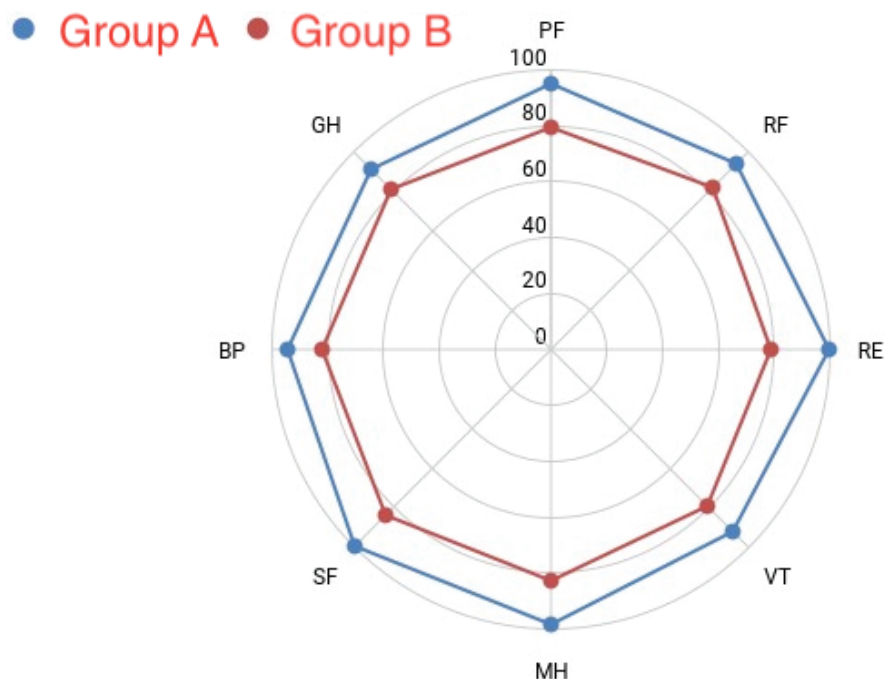


Figure 1. Quality of life of patients in both groups

DISCUSSION

Cardiosurgical operations carry many risks and cause negative emotions, disorders in patients. Low mood, anxiety, depression, and fear of future surgical treatment, especially in patients with a cardiac surgical profile, are combined with physical and mental health disorders.

Patients of both groups rated low all indicators before the intervention. The reason for this was complaints of shortness of breath, pain behind the sternum, dizziness, which prevented normal physical activity. These manifestations were direct signs of aortic valve dysfunction and aortic dilatation. Only the thought of the presence of such a pathology prevented normal communication and lowered the emotional state.

It is the fact that surgical intervention improved all parameters in both groups. Already after being transferred from the intensive care unit, the patients felt a clear improvement, which was manifested in positive emotions, a desire for communication, and minor physical activity.

Comparing the two groups after surgery, we noticed significant differences. The reason for the better results of David's operation is undoubtedly the preservation of the patient's aortic valve.

When communicating with patients to assess the quality of life after the operation, we noticed several reasons for the slightly worse results of the Bentall operation – taking anticoagulants (warfarin), the need for frequent visits to doctors, laboratories to control coagulation indicators, the presence of the sound of the artificial valve prosthesis, and, of course, in some patients,

sometimes nosebleeds. In our opinion, these factors had a direct explanation for the lower assessment of the quality of life in patients of group B.

Certainly, two types of these operations take place in modern cardiac surgery. It is only necessary to follow clear indications, and still try to preserve the native valve (in the absence of organic changes) during replacement of the root and ascending part of the aorta. Today, a lot of surgeons use David procedure even in patients with bicuspid aortic valve. We think that it is a topic of future studying and development of this technique.

CONCLUSIONS

1. Patients after David operation have statistically better quality of life comparing to Bentall operation.
2. Both types of operations contribute to a significant improvement in the quality of life after surgical intervention, compared to the preoperative period.
3. The indicator of physical functioning (95.38 ± 6.62 vs. 79.63 ± 0.95 , $p 0.000$) and role limitations due to emotional problems (99.74 ± 0.26 vs. 78.97 ± 0.99) is significantly higher in group A compared to group B.
4. The SF 36 questionnaire is an effective method for assessing the quality of life.

Prospects for future research. It is reasonable to perform assessment of quality of life of larger number of the patients after these operations. In addition, the study of long-term results of valve prosthesis and native valve functioning remains relevant.

FUNDING AND CONFLICT OF INTEREST

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COMPLIANCE WITH ETHICAL REQUIREMENTS

The present study was conducted in accordance with the basic principles of the European Convention of Human Rights and Biomedicine, World Medical Association Declaration of Helsinki on the ethical principles for medical research involving human subjects and current Ukrainian regulations. The study protocol was approved by the local ethics committee. The written informed consent was obtained from all the patients.

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*Резюме***ЯКІСТЬ ЖИТТЯ ПАЦІЄНТІВ, ЯКИМ ВИКОНАНО КЛАПАНОЗБЕРІГАЮЧЕ ПРОТЕЗУВАННЯ КОРЕНЯ АОРТИ****Ігор О. Стецюк^{1,2}, Борис М. Тодуров^{1,2}, Олег В. Зеленчук^{1,2}, Любов Р. Стецюк², Ігор Ю. Мокрик², Всеволод І. Завійський³**

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Мета. Визначити ефективність клапанозберігаючої операції Девіда в порівнянні з операцією Бенталла на основі аналізу якості життя пацієнтів після операції.

Матеріали та методи. Обстежено 107 пацієнтів, яким виконано планове та невідкладне оперативне лікування в ДУ «Інститут серця МОЗ України» з 2015 по 2023 рр. Залежно від виду оперативного втручання пацієнтів було розподілено на дві групи: групу А склали 53 пацієнти (49,11±1,54 років (47 (88,68 %) чоловіків), яким виконано операцію Девіда (клапанозберігаюче протезування кореня аорти та висхідної аорти), група Б – 55 пацієнтів (52,36±1,56 років (53 (96,36 %) чоловіки), яким виконано операцію Бенталла (заміна клапана, кореня та висхідної частини аорти). Якість життя оцінювали до операції для кожної групи, а також у віддалений період після операції. Порівнювали якість життя пацієнтів обох груп. Оцінювали якість життя за допомогою опитувальника Medical Outcomes Study Short Form 36 (MOS SF-36).

Результати. Отримані дані свідчать про те, що середні доопераційні значення показників якості життя пацієнтів обох груп з різними видами корекції аневризми відрізнялися від ідеального стану здоров'я. Проведені операції значно покращили оцінку якості життя. При порівнянні якості життя у віддаленому періоді пацієнтів обох груп показники були достовірно кращими в групі А. Ми помітили, що пацієнти групи А мали достовірно кращий психосоціальний компонент, що, ймовірно, вплинуло на оцінку інших шкал. Пацієнти групи А мали статистично кращі всі показники якості життя після операції порівняно з пацієнтами групи Б. Пацієнти групи Б скаржилися на звук протезування штучного клапана аорти, інколи на появу незначних носових кровотеч і необхідність частого відвідування лікаря для контролю показників «розрідження» крові.

Висновки. Отримані результати свідчать про позитивну зміну якості життя пацієнтів обох груп. При операції Девіда з приводу аневризми кореня аорти і висхідної аорти, якість життя значно краща, ніж у пацієнтів після операції Бенталла. Ми рекомендуємо проводити операції Девіда у вузькоспеціалізованих кардіологічних центрах.

Ключові слова: якість життя, операція Девіда, операція Бенталла, аортальний клапан, висхідна аорта, аневризма кореня аорти