Charchyan E.R., Breshenkov D.G., Neizvestnykh D.P., Chakal D.A., Belov Yu.V.
Petrovsky Russian Scientific Center of Surgery, Moscow, Russia

Quality of Life and Pain Syndrome in Patients With Thoracic Aorta Repair Using a Mini-Sternotomy

Aim	To determine the effect of minimally invasive interventions on the quality of life (QoL), pain syndrome, and cosmetic effect in patients with a pathology of chest aorta as compared with a group of traditional access.
Material and Methods	From 2016 through 2020, 77 of 226 (34%) patients with an aneurysm in the proximal chest aorta and mini-sternotomy were prospectively selected starting from 2017. To evaluate differences between the effects of mini-sternotomy and the traditional access on QoL and pain syndrome a control group of patients with full sternotomy (n=77) was formed using pseudorandomization. Intergroup comparison of QoL, pain syndrome, and cosmetic parameters was performed at various time points.
Results	Mini-sternotomy provided a decrease in pain syndrome both during the early period (day 3), and during movements upon discharge. Also, mini-sternotomy decreased the duration of stay in the hospital compared to full sternotomy (8.1±2.1 vs. 8.9±2.5 days, respectively; p>0.0331). A more frequent use of analgesics by patients with full sternotomy was noted. Mini-sternotomy was associated with a faster recovery of most QoL parameters according to the SF-36 questionnaire at one year after surgery. The questionnaire included summarizing parameters of physical and mental health components (Physical Health Component, Physical Health (PH): 54.3±11.9 vs. 58.2±8.2, respectively; p=0.046; Mental Health Component, Mental Health (MH): 53.8±6.8 vs. 57.8±9.5, respectively; p=0.013). In addition, patients with minimal access showed higher values of the cosmetic effect by a 5-score scale (4.08±0.8 vs. 4.39±0.8, respectively; p=0.049) and a greater interest to having a minimal access surgery.
Conclusion	Mini-sternotomy beneficially influences the pain syndrome, cosmetic outcome, and QoL and provides a shorter duration of rehabilitation and a sooner return to work and everyday life compared to full sternotomy.

Keywords	Aortic root aneurysm; aortic prosthesis; quality of life; mini-sternotomy; minimally invasive surgery; pain syndrome; cosmetic effect
For citations	Charchyan E.R., Breshenkov D.G., Neizvestnykh D.P., Chakal D.A., Belov Yu.V. Quality of Life and Pain Syndrome in Patients With Thoracic Aorta Repair Using a Mini-Sternotomy. Kardiologiia. 2023;63(3):46–54. [Russian: Чарчян Э.Р., Брешенков Д.Г., Неизвестных Д.П., Чакал Д.А., Белов Ю.В. Качество жизни и болевой синдром при операциях на грудной аорте из мини-стернотомии. Кардиология. 2023;63(3):46–54].

Corresponding author	Breshenkov D.G. E-mail: denisbreshenkov@gmail.com

Introduction

It has been more than 25 years since P.N. Rao and A.S. Kumar performed the first minimally invasive heart surgeries. In order to improve the quality of life (QoL) and cosmetic effect (CE), the authors performed aortic valve replacement in two young patients from right submammary minithoracotomy [1]. Most large studies have proven the benefits of minimally invasive techniques, and partial ministernotomy, including in patients with cardiac and thoracic aortic pathology: reducing surgical trauma, blood loss, duration of rehabilitation, and pain syndrome (PS), and improving QoL.

QoL and postoperative PS are the main parameters reflecting the degree of satisfaction, physical and mental health of a patient [2]. Postoperative PS is transient with a maximum intensity of on day 1, which is usually reduced by day 3 after surgery, and in certain cases is chronic [3]. The QoL is a subjective indicator that reflects the degree of patient's comfort after heart surgery. QoL can be adversely affected by a variety of factors, from CE and a specific type of postoperative scar to severe physical and social disability. The QoL assessment is based on the patient's subjective perception of his/her functioning and well-being. Despite the fact that some indicators of QoL can be objective, the patient's subjective perception is necessary to translate these indicators into the real assessment [2].

With growing popularity of minimally invasive techniques and the accumulation of experience in small incision surgeries, the assessment of their impact on the patient's QoL, postoperative PS, and the study of the dynamics of recovery of these parameters constitute an important stage in the development of minimally invasive techniques in cardiovascular surgery.

ISSN 0022-9040. Kardiologiia. 2023;63(3). DOI: 10.18087/cardio.2023.3.n1957

Objective

Determine the effect of minimally invasive interventions on QoL, PS and CE in patients with thoracic aortic pathology and compare these results with the conventional access group.

Material and methods

From 2016 to 2020, 77 (34%) patients were selected using ministernotomy of 226 patients with the proximal thoracic aortic aneurysms prospectively from 2017. The control group of patients having full sternotomy (n=77) was formed by pseudorandomization to study the differences between the effects of ministernotomy and conventional access on QoL and PS (Figure 1).

The assessment of PS included 3 components:

1. PS was assessed by patients by a 5-point score on day 3 after surgery (5 – intolerable pain, analgesia is ineffective; 4 – intolerable pain, opioid analgesia/blockade is required; 3 – moderate pain syndrome in motion, disappears at rest (nonsteroidal anti-inflammatory drugs and other non-opioid analgesics are required); 2 – mild pain syndrome, mainly at the drainage site (anesthesia is not required); 1 – no pain);
2. The use of analgesics, including the «opioid analgesia» and «need for analgesics after discharge» criteria;
3. PS was evaluated in the short-term using a pain-assessment visual analogue scale (VAS) 1 month after surgery and in 6 months at rest and in motion.

QoL was assessed using a conventional questionnaire Medical Outcomes Study 36 – Item Short Form Health Survey (SF-36). The assessment was performed before the surgery, immediately after discharge from the hospital, and 1 year after surgery to examine the rate of rehabilitation. The results of the QoL assessment are presented as a comparison of the SF-36 questionnaire results of the specified periods. The questionnaire consists of 36 individual items organized into 8 groups: Physical Functioning (PF), Social Functioning (SF), Role-Physical (RP), Role-Emotional (RE), Mental Health (MH), Vitality (VT), Bodily Pain (BP), and General Health (GH). The 8 scales can be combined into 2 higher-order supergroups representing the physical and mental aspects of QoL. Moreover, a 5-point scale of the cosmetic effect was also used in the study 6 months after surgery, as well as a questionnaire on the importance of cosmetic effect and access preference.

The study was approved by the ethics committee of the site. Each patient signed the informed consent to be included in the study.

Statistical analysis was performed in Jamovi v.1.2 (Project, 2019). Normally distributed quantitative data are presented as means ± standard deviations, and non-normally distributed quantitative data are expressed as medians and interquartile ranges (Me [Q1; Q3]). Categorical variables are represented as numerical values and percentages of the total number. The sample distribution was evaluated using the Shapiro–Wilk test. The Student's t-test was used to compare normally distributed quantitative values. Non-normally distributed dependent and independent samples were compared using the Wilcoxon test and the Mann–Whitney test, respectively. The chi-square test and Fisher's exact test were used to compare categorical variables. The correlation strength between the variables was determined by calculating the Cramer V-test and the odds ratio (OR) with a 95% confidence interval (CI). Pseudorandomization was conducted using the 1:1 nearest neighbor matching considering the baseline characteristics of the groups. The differences were statistically significant with p value being less than 0.05.

Results

Preoperative parameters are presented per study groups in Table 1. The median age of patients was 55 (37–62) years

Figure 1. Study design

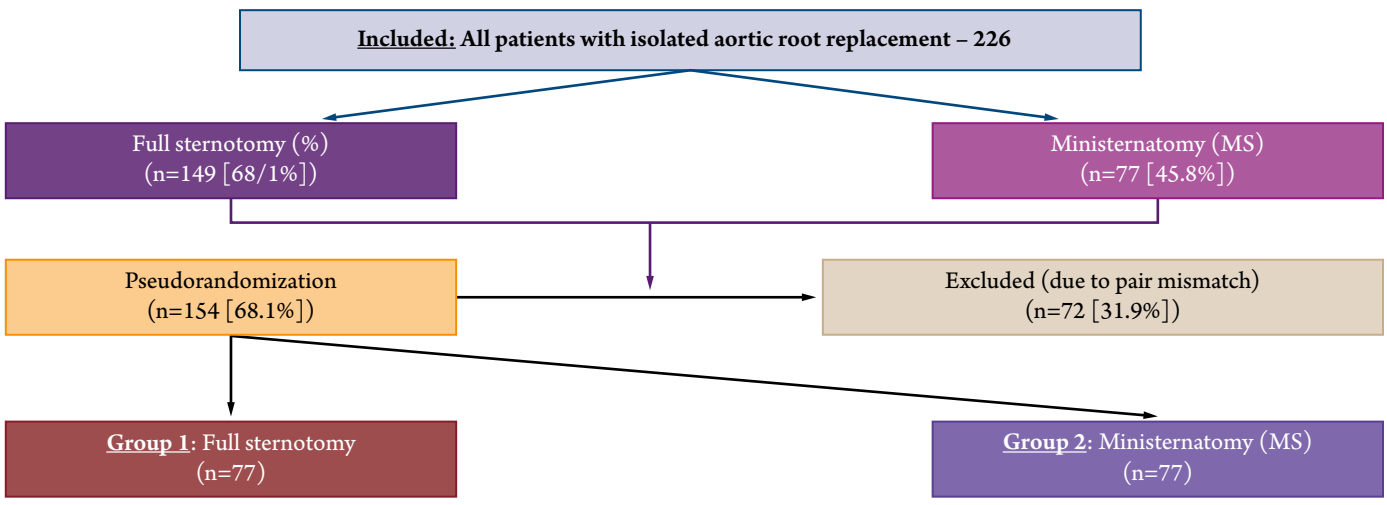


Table 1. Preoperative characteristics of the groups

Parameter	Group 1 (n=77)	Group 2 (n=77)	p
Age, years	55 [37; 62]	53 [40.5; 62]	0.824
Sex, male	60 (77.9)	66 (85.7)	0.210
Height, m	1.76 [1.7; 1.82]	1.76 [1.72; 1.82]	0.251
Weight, kg	83.9±14.8	87.4±15.3	0.154
BMI, kg/m2	27.1 [23.8; 30.3]	26.6 [24.4; 30.5]	0.526
Overweight	22 (28.6)	22 (28.6)	1.000
BSA, m2	2.02±0.193	2.06±0.206	0.194
CTD	28 (36.4)	24 (31.2)	0.496
CAD	22 (28.6)	3 (3.9)	<0.001
Arterial hypertension	52 (67.5)	45 (58.4)	0.243
History of cancer	6 (7.8)	6 (7.8)	1.000
History of CVA	5 (6.5)	1 (1.3)	0.096
Smoking	24 (31.2)	31 (40.3)	0.239
COPD	9 (11.7)	9 (11.7)	1.000
Diabetes mellitus	5 (6.5)	3 (3.9)	0.468
Peripheral atherosclerosis	11 (14.3)	21 (27.3)	0.047
Bicuspid AoV	20 (26)	24 (31.2)	0.476
LVEF, %	56.8±7.13	58±5.29	0.134
CHF FC III-IV (NYHA)	22 (28.6)	17 (22.1)	0.354
Conduction disorders	12 (15.6)	7 (9.1)	0.221
AF	12 (15.6)	5 (6.5)	0.072
CKD stage ≥ III	7 (9.1)	6 (7.8)	0.772
Aortic insufficiency grade ≥ 3	48 (62.3)	54 (70.1)	0.307
Aortic stenosis	15 (19.5)	9 (11.8)	0.194
AoV calcification	14 (18.2)	7 (9.1)	0.100
Aortic root aneurysm	66 (83.1)	59 (76.6)	0.216
AA aneurysm	65 (84.4)	61 (79.2)	0.403
Aortic arch aneurysm	8 (10.4)	5 (6.5)	0.385

The data are expressed as absolute and relative rates (n (%)), means±standard deviations (M±SD), medians and interquartile ranges (Me [Q1; Q3]). BMI, body mass index; BSA, body surface area; CTD, connective tissue dysplasia; CVA, cerebrovascular accident; AoV, aortic valve; FC, functional class; AF, atrial fibrillation; CKD, chronic kidney disease; CA, ascending aorta.

in Group 1 and 53 [40,5; 62] years in Group 2. The groups differed significantly in the presence of coronary artery disease (CAD) (p<0.001) and peripheral atherosclerosis (p=0.047) and did not differ by other parameters.

The characteristics of the interventions performed, and immediate outcomes are shown per study groups in Table 2. Groups did not differ significantly by these parameters.

Pain syndrome

Significantly lower scores of PS were noted in the mini-access group (p=0.031) (Table 3) of the 5-point scale (mentioned above) on day 3 after surgery. In the conventional approach group, the chances of using opioid analgesia in the early postoperative period increased 2.185-fold (95% CI 0.78–6.16).

In the long-term period, the results of the VAS questionnaire were studied in 117 (75.9%) of 154 patients: 60 (51.3%) in Group 1 versus 57 (48.7%) in Group 2 (p=0.695). The VAS score of PS at rest did not differ significantly between the groups immediately after discharge (p=0.588), but the PS score in motion was significantly lower in the ministernotomy group (p=0.0315). At 6 months after the intervention, the PS scores were comparable both at rest (p=0.631) and in motion (p=0.657). The data on the patient's dependence on analgesics in the postoperative period were comparable in both groups (p=0.62), but there was a trend to 2.95-fold chances of taking analgesics in the full sternotomy group (95% CI 0.298–29.194).

Table 2. Characteristics of the interventions performed and immediate outcomes

Parameter	Group 1 (n=77)	Group 2 (n=77)	p
Bentall procedure	43 (55.8)	43 (55.8)	1.000
David procedure	34 (44.2)	34 (44.2)	1.000
Neurological complications (CVA, TIA)	0	1 (1.3)	1.000
Myocardial infarction	1 (1.3)	1 (1.3)	1.000
Respiratory failure	6 (7.8)	4 (5.3)	0.746
ARF	3 (3.9)	1 (1.3)	0.620
MODS	1 (1.3)	0	1.000
Continuous dialysis needed	0	0	–
Resternotomy for bleeding	4 (5.2)	1 (1.3)	0.367
Conversion to full sternotomy	—	2 (2.6)	—
Superficial wound infection	2 (2.6)	3 (3.9)	1.000
Deep sternal infection	5 (6.5)	1 (1.3)	0.209
Atrial fibrillation	15 (19.5)	11 (14.3)	0.519
Transverse atrioventricular block	7 (9.1)	3 (3.9)	0.327
Permanent pacemaker insertion	5 (6.5)	2 (2.6)	0.442
Peripheral access revision	0	2 (2.6)	0.499
Postoperative delirium	1 (1.3)	1 (1.3)	1.000
Hospital mortality	0	1 (1.3)	1.000
30-day mortality	0	2 (2.6)	0.497

The data are expressed as the absolute and relative values (n (%)). ARF, acute renal failure; CVA, acute cerebrovascular accident; TIA, transient ischemic attack; MODS, multiple organ failure syndrome.

ISSN 0022-9040. Kardiologiia. 2023;63(3). DOI: 10.18087/cardio.2023.3.n1957

Table 3. Evaluation of pain syndrome

Parameter	Group 1 (n=77)	Group 2 (n=77)	p	Cramer V-test	OR (95 % CI)
Pain syndrome on day 3, score	1.53±0.68	1.3±0.674	0.031	—	—
Opioid analgesia	12 (15.6)	6 (7.8)	0.128	0.121	2.185 (0.78–6.16)
Pain according to VAS					
• At rest (discharge)	3 [1; 4]	3 [2; 4]	0.588	—	—
• In motion (discharge)	4.1±1.93	3.37±1.68	0.0315	—	—
• At rest (6 months)	1 [1; 1]	1 [1; 1]	0.631	—	—
• In motion (6 months)	1 [1; 2]	1 [1; 2]	0.657	—	—
Analgesics after surgery	3 (5)	1 (1.75)	0.62	0.089	2.947 (0.298–29.19)

The data are expressed as absolute and relative rates (n (%)), means±standard deviations (M±SD), medians and interquartile ranges (Me [Q1; Q3]). OR, odds ratio; CI, confidence interval; VAS, visual analogue scale.

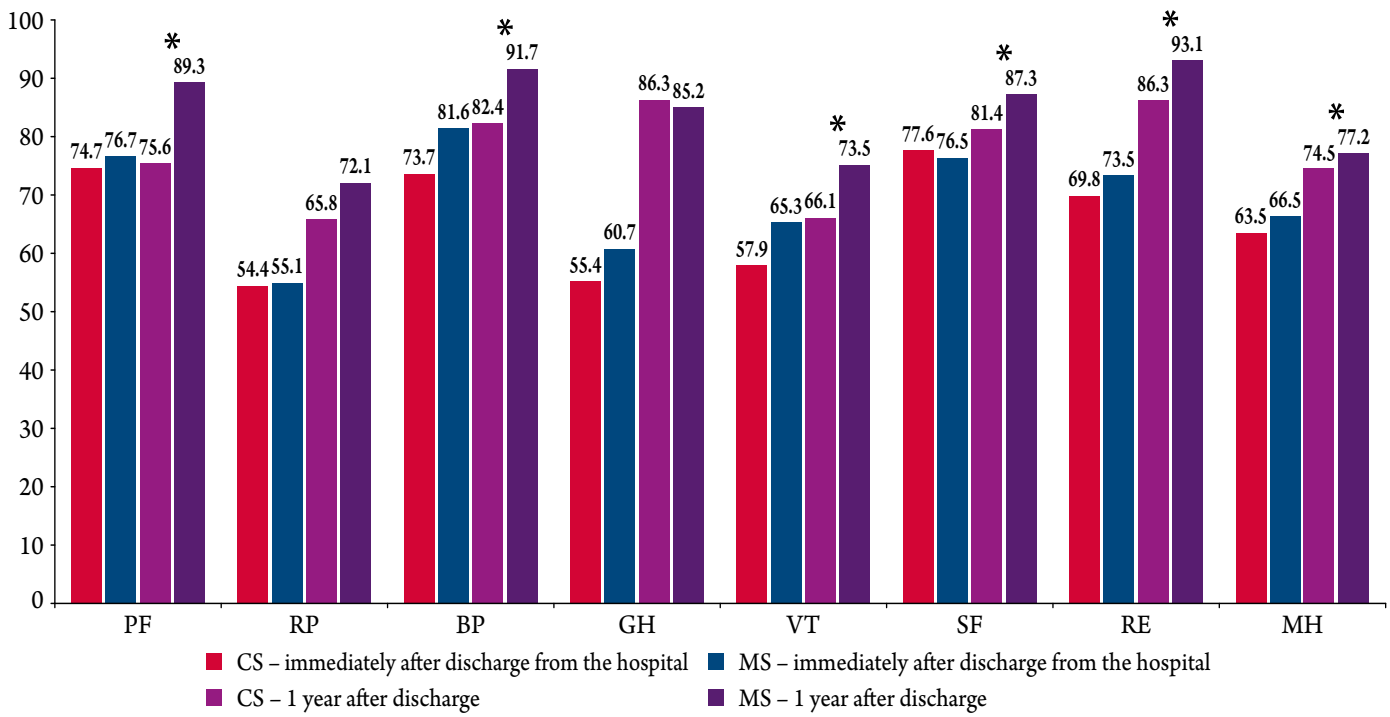
Quality of life

The data of full QoL questionnaire survey for all specified periods were obtained from 110 (71.4%) of 154 patients: 52 (47.27%) patients in Group 1and 58 (52.73%) patients in Group 2 (p=0.419). The baseline assessment of the QoL parameters using the SF-36 questionnaire before surgery showed no significant differences between Group 1 and Group 2 in the following indicators: General Health (p=0.0014) and Role Emotional Functioning (p=0.0059). The groups were comparable by other scales of the questionnaire (Table 4). Analysis of the questionnaire data immediately after discharge and 1 year later shows significant benefits of the minimally invasive approach and a faster recovery of indicators in 1 year (Table 5). One year after the intervention, patients having ministernotomy had significantly higher scores of PF (p=0.0003), BP (p=0.0002), VT (p=0.0006), SF (p=0.0217), and RE (p=0.0052; Figure 2). It should also be noted that the assessment of changes in the generalized indicators, PH and MH, significantly higher rates were found in the ministernotomy group (PH 54.3±11.9 in Group 1 versus 58.2±8.2 in Group 2; p=0.0460; MH 53.8±6.8 in Group 1 versus 57.8±9.5 in Group 2; p=0.0134; Figure 3).

Cosmetic outcome

The assessment of the cosmetic effect expectedly showed significant benefits in the mini-access group. For example,

Figure 2. The evaluation of the patient's quality of life immediately after discharge and 1 year after surgery using the SF-36 questionnaire



* Significant differences in the groups. Physical Functioning (PF), Role–Physical Functioning (RP), Bodily pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role Emotional (RE), Mental Health (MH).

Table 4. Evaluation of preoperative quality of life in the groups using the SF-36 questionnaire

Parameter	Group 1 (n=52)	Group 2 (n=58)	p
Physical Functioning	85.4±17.1	82.3±12.9	0.2826
Role Physical	58.3±11.4	60.1±13.6	0.4564
Pain	94.81±6.9	97.6±11.51	0.3079
General Health	84.6±16.1	72.7±21.3	0.0014
Vitality	74±10.3	69.3±21	0.1477
Social Functioning	96.4±9.4	92.1±15.3	0.0835
Role Emotional	79.6±19.5	89.5±17.5	0.0059
Mental Health	62.3±13.6	58.9±12.3	0.1714

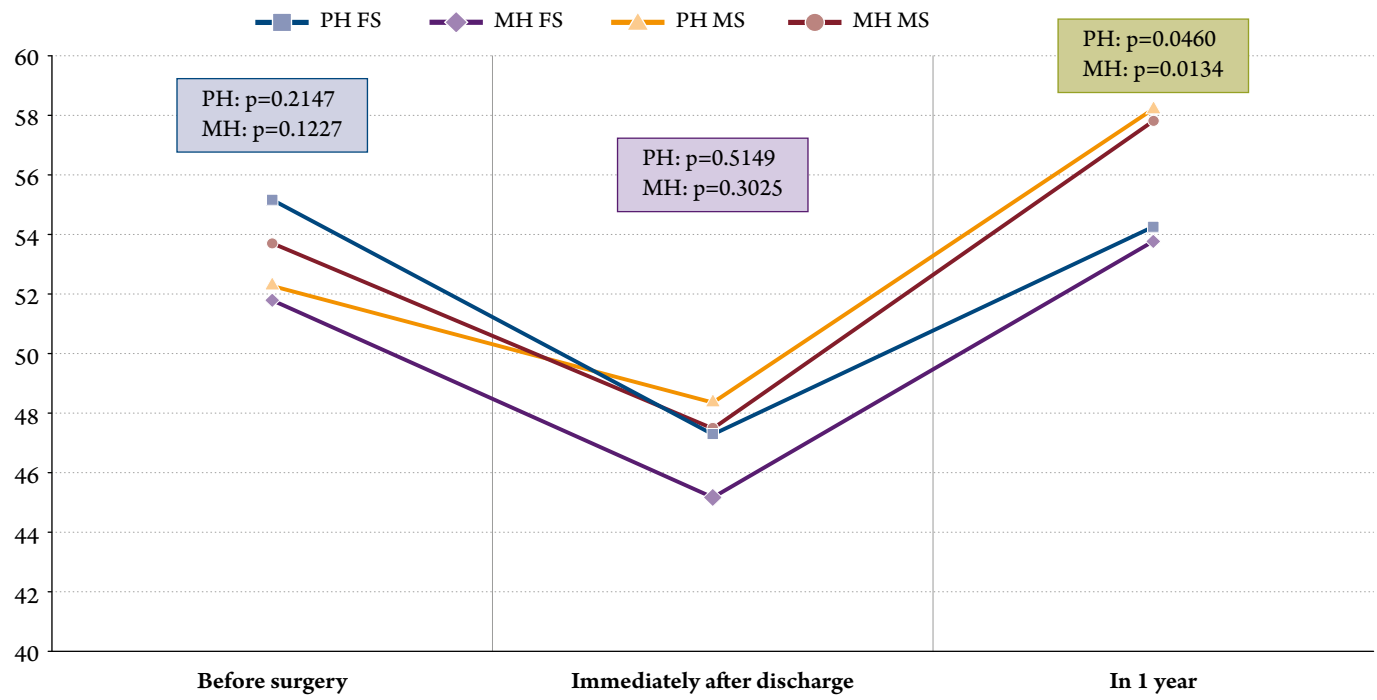
The data are expressed as the means and standard deviations (M±SD).

Table 5. Evaluation of the patient's quality of life immediately after discharge and 1 year later using the SF-36 questionnaire

Parameter	Immediately after discharge			1 year after surgery		
	1-я группа (n=52)	2-я группа (n=58)	p	1-я группа (n=52)	2-я группа (n=58)	p
Physical Functioning	74.7±20.56	76.7±18.68	0.594	75.6±13.3	89.3±22.9	0.0003
Role Physical	54.4±13.6	55.1±9.7	0.755	65.8±14.9	72.1±20.1	0.064
Pain	73.7±25	81.6±23.51	0.091	82.4±11.7	91.7±13.7	0.0002
General Health	55.4±25.18	60.7±18.58	0.209	86.3±20.56	85.2±17.2	0.7607
Vitality	57.9±22.3	65.3±17.19	0.053	66.1±13.7	75.3±13.7	0.0006
Social Functioning	77.6±23.6	76.5±20.61	0.795	81.4±17.4	87.3±7.9	0.0217
Role Emotional	69.8±21.2	73.5±26.5	0.424	86.3±10.1	93.1± 14.3	0.0052
Mental Health	63.5±21.16	66.5±17.42	0.417	74.5±16.9	77.2±14.8	0.3737

The data are expressed as the means and standard deviations (M±SD).

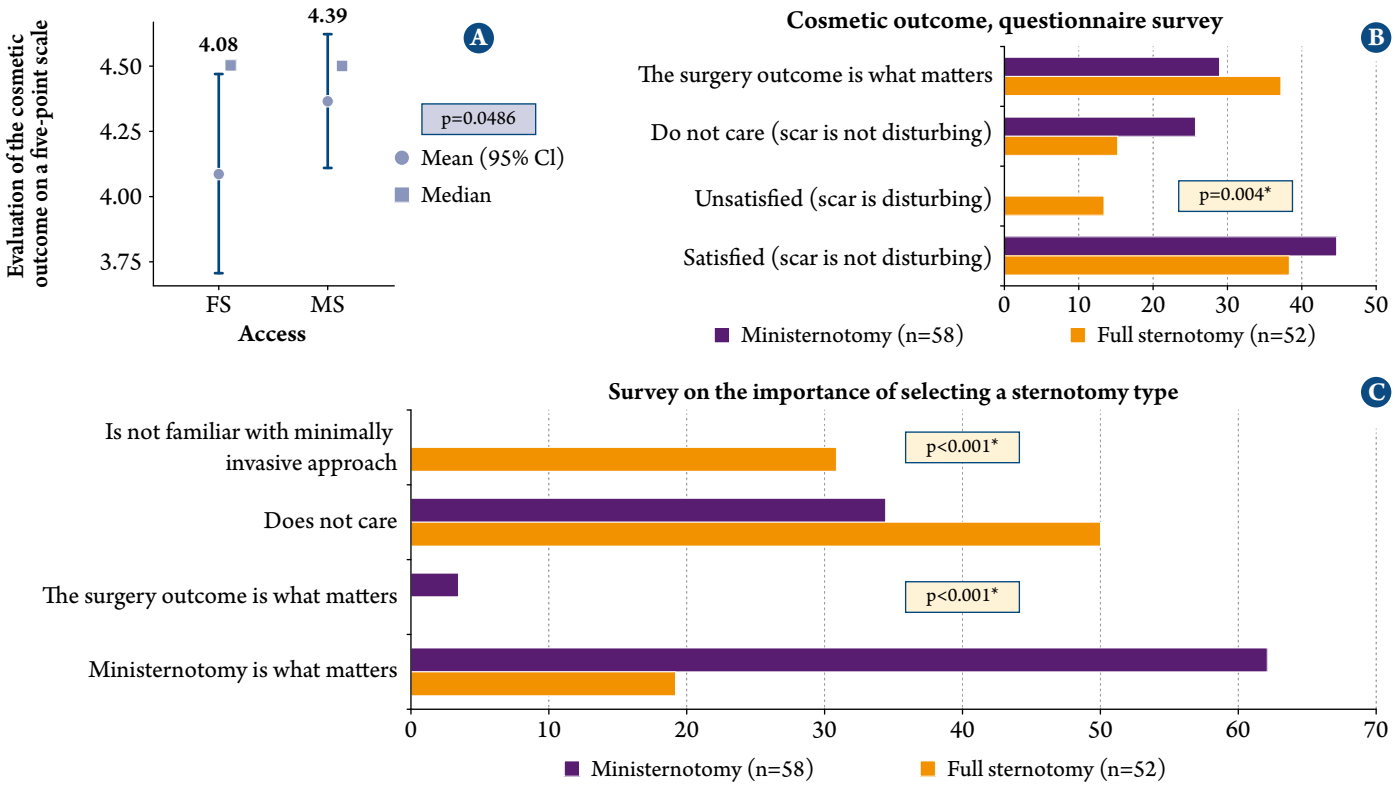
Figure 3. Changes in the indicators of the physical health (PH) and mental health (MH) components according to the SF-36 questionnaire by periods (before, immediately after and 1 year after surgery)



The figure shows that patients recover more quickly from minimally invasive surgeries.
Physical Health (PH), Mental Health (MH).

ISSN 0022-9040. Kardiologiia. 2023;63(3). DOI: 10.18087/cardio.2023.3.n1957

Figure 4. Assessment of the cosmetic effect and the importance of choosing ministernotomy per groups



A – score on a 5 point scale;

B – results of the survey on the importance of the cosmetic effect;

B – results of the survey on the importance of choosing a type of sternotomy.

the evaluation of the cosmetic effect by a 5-point scale had higher scores in the ministernotomy group (4.08±0.83 and 4.39±0.799, respectively; p=0.0486; Figure 4, A). The analysis of the questionnaire on the role of the cosmetic effect in daily life in the long term showed that patients having full sternotomy were significantly more likely to be dissatisfied with a postoperative scar, and there were no such cases in the mini-access group: 7 (13.5%) cases versus 0; p=0.004), which, despite the subjective nature of the data obtained, once again demonstrates the important aesthetic benefit of minimally invasive techniques (Figure 4, B). The groups were comparable by other items of the questionnaire (Table 6).

When studying the importance of choosing the access for a curtain patient, a survey was conducted in the long-term period: patients expectedly significantly more often noted the importance of choosing ministernotomy in the mini-access group (p<0.001). In the full sternotomy group, 10 (19.5%) patients also noted the possible benefits of ministernotomy. Also, patients having full sternotomy often did not know about the possibility of ministernotomy (16 (30.8%) versus 0; p<0.001; Figure 4, B), which is due to the technical impossibility and the presence of contraindications for minimally invasive surgery in this group of patients. Despite the lack of objectivity, such survey results contribute to understanding the patient's attitude to minimally invasive techniques.

Discussion

At the present stage of cardiac surgery, given the current trend towards lower mortality and incidence of clinically significant postoperative complications, including minimally invasive interventions emerging over the past four decades, the effect on the functional state of patients, their performance and the time required for full rehabilitation and improvement of daily life is increasingly considered as a key indicator of the outcomes of surgical treatment. The quantitative assessment of QoL and PS by questionnaire survey in the postoperative period is an important factor, as well as the symptoms of the underlying disease and direct time in hospital.

The assessment of PS is one of the most promising areas of focus in the comparison of full sternotomy and ministernotomy, nevertheless it remains the most subjective factor due to the different pain thresholds in different individuals. Despite differences in the PS assessment time, the methods to assess PS intensity are not standardized. Thus, many authors focus on the PS scales filled in by patients [4] and health professionals [5], other authors try to objectify the data obtained by focusing on doses of the

administered analgesics [3]. There is a discrepancy effect even in this approach. Calderon et al. [6] used, as well as PS VAS, patient-controlled injectors with opioid analgesics, and obtained a discrepancy effect: the number of analgesics administered was significantly lower with higher PS scores in the ministernotomy group than in the full sternotomy group. The authors attribute this to the fact that patients having ministernotomy psychologically felt less trauma and volume of intervention and did not use an injector [6]. Large studies did not show significant differences in PS in patients having full sternotomy and ministernotomy [7, 8]. We used different periods in our study (day 3, the time of discharge, and 6 months after surgery), different scales (5 point scale, VAS) at rest and in motion, and the patient's need for analgesia. According to our data, ministernotomy provides lower PS both in the early period, on day 3, and in motion after discharge, and also reduces time in hospital compared with that in the case of full sternotomy (8.1±2.1 days versus 8.9±2.5 days, respectively; p>0.0331). Moreover, there is a trend to more frequent use of analgesics in patients having full sternotomy.

Currently, with closely correlated medical sciences and psychological and social disciplines, the assessment of the patient's QoL has become an interdisciplinary summary indicator of the patient's physical and psycho-emotional state [2, 9]. This indicator can be an important predictor of the patient's condition worsening in the postoperative period and used to determine treatment strategy. QoL is a subjective factor, fully dependent on age, sex, social status, and other significant factors [2, 3, 10, 11]. Given the above, we focused in our study on the postoperative changes in of QoL and the duration of the patient's rehabilitation rather than the absolute indicators. Questionnaire survey is the main method of the QoL assessment (SF-12, SF-36, MQOL, WHOQOL, GQOL, etc.) in a certain period [9, 12, 13]. It should also be emphasized that many authors point out the lack of correlation between QoL and such indicators as time in intensive care unit and in hospital, complications, etc. [2, 14, 15]. Literature data differ sharply in favor of either mini-access or conventional access. Unfortunately, there is almost no standardization in this issue, which is why such indicators are not assessed in large reviews and meta-analyses [7, 8]. Moreover, many authors argue that despite the general trend to worser QoL after surgery, minimally invasive interventions can also improve QoL [16–21].

In our study, we used the most common questionnaire SF-36 in various periods: before surgery, immediately after discharge and 1 year after surgery. The important results of our research comprised a faster recovery of many indicators of the scale 1 year after the surgery, including the summary indicators of the physical and psychological health. We believe this is an important finding, which proves faster postoperative rehabilitation of patients having mini-access sternotomy.

Table 6. Changes in the indicators of physical and mental health according to the SF-36 questionnaire, the cosmetic effect, and the importance of choosing a type of sternotomy for the patient

Parameter	Group 1 (n=52)	Group 2 (n=58)	p
Cosmetic outcome, score	4.08±0.83	4.39±0.799	0.0486
Cosmetic outcome, questionnaire survey			
• Satisfied (scar is not disturbing)	20 (38.5)	26 (44.8)	0.500
• Unsatisfied (scar is disturbing)	7 (13.5)	0	0.004
• Do not care (scar is not disturbing)	8 (15.4)	15 (25.8)	0.178
• The surgery outcome is what matters	17 (37.2)	17 (29)	0.702
Importance of selecting a sternotomy type			
• Ministernotomy is what matters	10 (19.2)	36 (62.1)	<0.001
• Surgery outcome is what matters	0	2 (3.4)	0.177
• Does not care	26 (50)	20 (34.4)	0.100
• Is not familiar with minimally invasive approach	16 (30.8)	0	<0.001
PH before surgery (SF-36), score	55.2±11.9	52.3±12.4	0.2147
MH before surgery (SF-36), score	51.8±5.5	53.7±7.1	0.1227
PH immediately after discharge (SF-36), score	47.3±9.81	48.4±7.82	0.5149
MH immediately after discharge (SF-36), score	45.2±12.9	47.5±10.35	0.3025
PH in 1 year (SF-36), score	54.3±11.9	58.2±8.2	0.0460
MH in 1 year (SF-36), score	53.8±6.8	57.8±9.5	0.0134

The data are expressed as the absolute and relative rates (n (%)), means±standard deviations (M±SD). PH, physical health; MH, mental health.

The cosmetic effect is also one of the main benefits of minimally invasive intervention, which directly depends on the patient's perception of his/her appearance and psycho-emotional state. For example, the Russian pioneers of the minimally invasive surgery Belov et al. [22] performed their first intervention in a young patient from a transverse ministernotomy precisely in order to achieve a cosmetic effect. However, one should not forget that the smaller the incision, the more technically complex the intervention in inverse proportion [23, 24]. New techniques are actively developed to ensure the cosmetic effect, such as the use of video equipment, robotic systems, peripheral perfusion, and special tools and cannulas. A coarse post-sternotomy scar can not only reduce self-esteem and cause emotional distress after a successful intervention, but also significantly deteriorate QoL in certain circumstances, especially for young patients and women [25]. Patients have 3 types of emotions before surgery:

1) the need for surgical treatment of the disease and hope for success;
2) psychological stress;
3) social stress [26].

ISSN 0022-9040. Kardiologiia. 2023;63(3). DOI: 10.18087/cardio.2023.3.n1957

Thus, if the size and location of the scar can affect the patient's mental health, then this factor must be considered during the surgery. With few studies examining these factors, psychological functioning and cosmetic effect are rarely considered in the literature. The psycho-emotional state and patient satisfaction influence the patient's recovery as well as complications and mortality. Positive and negative patient expectations are acute in cardiac surgery: on the one hand, symptom regression, increase in quality and length of life; on the other, serious risks of clinically significant complications, death, and changes in appearance. Massetti et al. [25, 26] showed in a group of young female patients having atrial septal defect corrected from a minithoracotomy that the main patient's expectation was curing heart disease, however, the outcome was determined by the appearance after surgery: they felt disappointed when buying underwear and clothes, doing sports and other social activities. Our research was able to demonstrate greater rates of cosmetic effect in the ministernotomy group and a high level of patient interest in undergoing the mini-access procedure, which further attests to the significant aesthetic benefit of the minimally invasive approach. Despite the lack of objectivity, these data contribute to understanding the patient's attitude to the minimally invasive approach.

Thus, since they reflect the patient's actual physical and psycho-emotional functioning in daily life, the results of the QoL and social functioning assessment along with the patient's demands are an essential contribution to the research of minimally invasive techniques.

Conclusion

In light of the results of this research, it can be concluded that ministernotomy, as opposed to full sternotomy, has a positive effect on the patient's physical and mental rehabilitation and is associated with faster return to work and daily life.

Funding

No funding was received for this study.

No conflict of interest is reported.

The article was received on 21/02/2022

REFERENCES

1. Rao PN, Kumar AS. Aortic valve replacement through right thoracotomy. Texas Heart Institute Journal. 1993;20(4):307–8. PMID: 8298332
2. Holmes SD, Fornaresio LM, Shuman DJ, Pritchard G, Ad N. Health-Related Quality of Life after Minimally Invasive Cardiac Surgery. Innovations: Technology and Techniques in Cardiothoracic and Vascular Surgery. 2016;11(2):128–33. DOI: 10.1097/imi.0000000000000255
3. Walther T, Falk V, Metz S, Diegeler A, Battellini R, Autschbach R et al. Pain and quality of life after minimally invasive versus conventional cardiac surgery. The Annals of Thoracic Surgery. 1999;67(6):1643–7. DOI: 10.1016/S0003-4975(99)00284-2
4. Dogan S, Dzemali O, Wimmer-Greinecker G, Derra P, Doss M, Khan MF et al. Minimally invasive versus conventional aortic valve replacement: a prospective randomized trial. The Journal of Heart Valve Disease. 2003;12(1):76–80. PMID: 12578340
5. Bonacchi M, Prifti E, Giunti G, Frati G, Sani G. Does ministernotomy improve postoperative outcome in aortic valve operation? A prospective randomized study. The Annals of Thoracic Surgery. 2002;73(2):460–5. DOI: 10.1016/S0003-4975(01)03402-6
6. Calderon J, Richebe P, Guibaud JP, Coiffic A, Branchard O, Asselineau J et al. Prospective Randomized Study of Early Pulmonary Evaluation of Patients Scheduled for Aortic Valve Surgery Performed by Ministernotomy or Total Median Sternotomy. Journal of Cardiothoracic and Vascular Anesthesia. 2009;23(6):795–801. DOI: 10.1053/j.jvca.2009.03.011
7. Harky A, Al-Adhami A, Chan JSK, Wong CHM, Bashir M. Minimally Invasive Versus Conventional Aortic Root Replacement - A Systematic Review and Meta-Analysis. Heart, Lung and Circulation. 2019;28(12):1841–51. DOI: 10.1016/j.hlc.2018.10.023
8. Rayner TA, Harrison S, Rival P, Mahoney DE, Caputo M, Angelini GD et al. Minimally invasive versus conventional surgery of the ascending aorta and root: a systematic review and meta-analysis. European Journal of Cardio-Thoracic Surgery. 2020;57(1):8–17. DOI: 10.1093/ejcts/ezz177
9. The Whoqol Group. The World Health Organization quality of life assessment (WHOQOL): Development and general psychometric properties. Social Science & Medicine. 1998;46(12):1569–85. DOI: 10.1016/S0277-9536(98)00009-4
10. Amonn K, Stortecky S, Brinks H, Gahl B, Windecker S, Wenaweser P et al. Quality of life in high-risk patients: comparison of transcatheter aortic valve implantation with surgical aortic valve replacement†. European Journal of Cardio-Thoracic Surgery. 2013;43(1):34–42. DOI: 10.1093/ejcts/ezs173
11. Shan L, Saxena A, McMahon R, Wilson A, Newcomb A. A systematic review on the quality of life benefits after aortic valve replacement in the elderly. The Journal of Thoracic and Cardiovascular Surgery. 2013;145(5):1173–89. DOI: 10.1016/j.jtcvs.2013.01.004
12. Burckhardt CS, Anderson KL. The Quality of Life Scale (QOLS): reliability, validity, and utilization. Health and Quality of Life Outcomes. 2003;1(1):60. DOI: 10.1186/1477-7525-1-60
13. Hardt J. A new questionnaire for measuring quality of life - the Stark QoL. Health and Quality of Life Outcomes. 2015;13(1):174. DOI: 10.1186/s12955-015-0367-5
14. Goruleva M.V., Ganenko O.S., Kovaltcova R.S., Kutuzova A.E., Petrova N.N., Demchemnko E.A. et al. Quality of life and psycho-cognitive condition in patients after coronary artery bypass graft surgery. Russian Journal of Cardiology. 2014;19(9):68–71. [Russian: Горулева М.В., Ганенко О.С., Ковальцова Р.С., Кутузова А.Э., Петрова Н.Н., Демченко Е.А. и др. Качество жизни и психо-когнитивный статус больных, перенесших аортокоронарное шунтирование. Российский Кардиологический Журнал 2014;19(9):68-71]. DOI: 10.15829/1560-4071-2014-9-68-71
15. Nikonov S.F., Olofinskaya I.E., Bagiyan L.S. A study of the quality of life in elderly patients after heart surgery. Quality Clinical Practice. 2003;1:56–9. [Russian: Никонов С.Ф., Олофинская И.Е., Багиян Л.С. Исследование качества жизни у пожилых больных после операции на сердце. Качественная Клиническая Практика. 2003;1:56-9]
16. Charchyan E.R., Breshenkov D.G., Belov Yu.V. Minimally invasive approach in thoracic aortic surgery: a single center experience. Russian Journal of Cardiology and Cardiovascular Surgery. 2019;12(6):522–35. [Russian: Чарчян Э.Р., Брешенков Д.Г., Белов Ю.В. Миниинвазивный подход в хирургии грудной аорты: опыт одного центра. Кардиология и сердечно-сосудистая хирургия. 2019;12(6):522-35]. DOI: 10.17116/kardio201912061522
17. Muratov R.M., Shamsiev G.A., Midinov A.Sh., Babenko S.I., Chekaeva T.V. J-shaped mini-sternotomy in surgical treatment of pathology of the aorta and aortic valve after cardiac surgical intervention performed earlier. Thoracic and cardiovascular surgery. 2013;3:4–8. [Rus-

sian: Муратов Р.М., Шамсиев Г.А., Мидинов А.Ш., Бабенко С.И., Чекаева Т.В. J-образная министернотомия при хирургическом лечении патологии аорты и аортального клапана после ранее выполненного хирургического вмешательства на сердце. Грудная и сердечно-сосудистая хирургия. 2013;3:4-8]

18. Snegirev M.A., Payvin A.A., Khubulava G.G. Minimally invasive aortic valve replacement. Thoracic and cardiovascular surgery. 2016;58(1):23–9. [Russian: Снегирев М.А., Пайвин А.А., Хубулава Г.Г. Миниинвазивное протезирование аортального клапана. Грудная и сердечно-сосудистая хирургия. 2016;58(1):23-9]
19. Boldyrev S.Yu., Kaleda V.I., Efremenko Yu.V., Barbukhatti K.O., Porkhanov V.A. Minimally invasive ascending aortic replacement in patient with chronic aortic dissection type A. Pirogov Russian Journal of Surgery. 2019;3:80–3. [Russian: Болдырев С.Ю., Каледа В.И., Ефременко Ю.В., Барбухатти К.О., Порханов В.А. Протезирование восходящей аорты из минидоступа у пациента с хронической диссекцией аорты типа А. Хирургия. Журнал им. Н.И. Пирогова. 2019;3:80-3]. DOI: 10.17116/hirurgia201903180
20. Chernov I.I., Makeev S.A., Kozmin D.Yu., Tarasov D.G. Multivalve heart surgery through a mini-access. Clinical and Experimental Surgery. Petrovsky journal. 2018;6(1(19)):21–6. [Russian: Чернов И.И., Макеев С.А., Козьмин Д.Ю., Тарасов Д.Г. Коррекция многоклапанных пороков сердца из минидоступа. Клиническая и экспериментальная хирургия. Журнал имени академика Б.В. Петровского. 2018;6(1(19)):21-6]
21. Rosseikin E.V., Kobzev E.E., Bazylev V.V. Minimally invasive Ozaki technique. Angiology and vascular surgery. 2019;25(3):142–55. [Russian: Россейкин Е.В., Кобзев Е.Е., Базылев В.В. Операция Ozaki из минидоступа. Ангиология и Сосудистая Хирургия. 2019;25(3):142-55]. DOI: 10.33529/ANGI02019319
22. Belov Yu.V., Gens A.P., Stepanenko A.B. Mini-access aortic valve replacement. Grekov's Bulletin of Surgery. 1998;157(3):47–9. [Russian: Белов Ю.В., Генс А.П., Степаненко А.Б. Протезирование аортального клапана из минидоступа. Вестник Хирургии им. И.И. Грекова. 1998;157(3):47-9]
23. Charchyan E.R., Breshenkov D.G., Belov Yu.V. Results of Minimally Invasive Valve-Sparing Aortic Root Valve Surgery: Propensity Score Matching Analysis. Kardiologiia. 2020;60(7):91–7. [Russian: Чарчян Э.Р., Брешенков Д.Г., Белов Ю.В. Результаты миниинвазивных клапансохраняющих вмешательств на корне аорты: анализ с применением метода «псевдорандомизации». Кардиология. 2020;60(7):91-7]. DOI: 10.18087/cardio.2020.7.n1098
24. Akopov G.A., Govorova T.N., Ivanov A.S. Valve-sparing operations on the aortic valve and the ascending aorta: radical correction of congenital and acquired heart diseases. Immediate outcomes. Russian Journal of Transplantology and Artificial Organs. 2021;23(1):84–90. [Russian: Акопов Г.А., Говорова Т.Н., Иванов А.С. Клапансохраняющие операции на аортальном клапане и восходящей аорте при радикальной коррекции врожденных и приобретенных пороков сердца. Непосредственные результаты. Вестник трансплантологии и искусственных органов. 2021;23(1):84-90]. DOI: 10.15825/1995-1191-2021-1-84-90
25. Massetti M, Babatasi G, Rossi A, Neri E, Bhoyroo S, Zitouni S et al. Operation for atrial septal defect through a right anterolateral thoracotomy: Current outcome. The Annals of Thoracic Surgery. 1996;62(4):1100–3. DOI: 10.1016/0003-4975(96)00440-7
26. Massetti M, Nataf P, Babatasi G, Khayat A. Cosmetic aspects in minimally invasive cardiac surgery. European Journal of Cardio-Thoracic Surgery. 1999;16(Suppl 2):S73-75. PMID: 10613561

ISSN 0022-9040. Kardiologiia. 2023;63(3). DOI: 10.18087/cardio.2023.3.n1957