Long-term quality of life and posttraumatic stress following elective cardiac surgery: preliminary findings of a 5-year follow-up study

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Background. Heart surgery is a major stressful event that can have a significant negative effect on patients’ quality of life (QoL) and may cause long-term posttraumatic stress reactions. The aim of this pilot study was to estimate the longitudinal change and predictors of health-related quality of life (HRQOL) dynamics and identify factors associated with PTS at 5-year follow-up (T2) after elective cardiac surgery and associations with pre-surgery (T1) QoL.

Materials and methods. Single-centre prospective study was conducted after Regional Bioethics Committee approval. Adult consecutive patients undergoing elective cardiac surgery were included. HRQOL was measured using the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) questionnaire before (T1) and 5-years after (T2) cardiac surgery. Posttraumatic stress was assessed using the International Trauma Questionnaire.

Results. The pilot study revealed a significant positive change at 5-year follow-up in several domains of SF-36: physical functioning (PF), energy/fatigue (E/F), and social functioning (SF). Prolonged postoperative hospital stay was associated with change in SF ($p < 0.01), E/F ($p < 0.05$) and emotional well-being ($p < 0.05$). The percentage of patients that had the posttraumatic stress disorder (PTSD) at T2 was 12.2%. Posttraumatic stress symptoms were associated with longer hospitalization after surgery ($p < 0.01$).

Conclusions. HRQOL improved from baseline to five years postoperatively. Patients with lower preoperative HRQOL scores tended to have a more significant improvement of HRQOL five years after surgery. A prolonged postoperative hospital stay had a negative impact on postoperative social functioning, energy/fatigue, and emotional well-being. Increased levels of PTSD were found in cardiac surgery patients following five years after the surgery.

Keywords: cardiac surgery, health-related quality of life, posttraumatic stress
INTRODUCTION

Health-related quality of life (HRQOL) not only captures the functional impact of illness but also reflects overall patient satisfaction with the procedure or treatment. Heart surgery is a major stressful event that can have a significant negative effect on patients’ quality of life (QoL) (1, 2) and may cause long-term posttraumatic stress reactions and increased risk for posttraumatic stress disorder (PTSD) (2, 3).

We present preliminary findings of broader research aimed at estimating the longitudinal change and predictors of HRQOL dynamics and identifying factors associated with PTS at 5-year follow-up (T2) after elective cardiac surgery and associations with pre-surgery (T1) QoL.

MATERIALS AND METHODS

Participants. Single-centre prospective pilot study was conducted after Regional Bioethics Committee approval. In total, 41 adults, 13 females (31.7%) and 28 males (68.3%), consecutive patients undergoing elective cardiac surgery from March to May of 2013 were included in data analysis. Three types of heart surgery were performed: coronary artery bypass grafting, valve surgery, and combined surgery. The age of the participants ranged from 37 to 89 years, with a mean age of 67.38 ± 10.39 at 5-year follow-up (T2).

Measures. Cardiac operative risk was evaluated using Euroscore II (European system for cardiac operative risk evaluation) (4–5). The length of ICU and postoperative hospital stay were recorded for each participant.

HRQOL was measured using the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) questionnaire before (T1) and 5-years after (T2) cardiac surgery (6). Quality of life was assessed in six domain subscales: physical functioning (PF), energy/fatigue (E/F), and social functioning (SF). Pre-surgery mean EuroSCORE II value at T1 was 1.72% ± 0.97. Majority of patients (61%, n = 25) underwent coronary artery bypass grafting, 29.3% (n = 12) valve surgery, and 9.8% (n = 4) combined surgery. Mean ICU stay was 2 ± 1.4 days, postoperative hospital stay – 13 ± 4.9 days and ranged from 7 to 30 days. Patients’ baseline characteristics are summarized in Table 1.

Table 1. Patient baseline characteristics (N = 41)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (%) / Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographical data</strong></td>
<td></td>
</tr>
<tr>
<td>Sex, males</td>
<td>28 (68.3%)</td>
</tr>
<tr>
<td>Age, years</td>
<td>67.38 ± 10.39</td>
</tr>
<tr>
<td><strong>Operative risk</strong></td>
<td></td>
</tr>
<tr>
<td>EuroSCORE II</td>
<td>1.72% ± 0.97</td>
</tr>
<tr>
<td><strong>Operation type</strong></td>
<td></td>
</tr>
<tr>
<td>CABG</td>
<td>25 (61%)</td>
</tr>
<tr>
<td>Valve surgery</td>
<td>12 (29.3%)</td>
</tr>
<tr>
<td>Combined surgery</td>
<td>4 (9.8%)</td>
</tr>
<tr>
<td><strong>Length of hospital stay</strong></td>
<td></td>
</tr>
<tr>
<td>ICU stay, days</td>
<td>2 ± 1.4</td>
</tr>
<tr>
<td>Postoperative hospital stay, days</td>
<td>13 ± 4.9</td>
</tr>
</tbody>
</table>

SD – standard deviation; Euroscore II = European system for cardiac operative risk evaluation; CABG = coronary artery bypass grafting.

Pilot study revealed significant positive change at 5-year follow-up in several domains of SF-36: physical functioning (PF), energy/fatigue (E/F), and social functioning (SF). HRQOL dynamics pre-surgery and at 5-year follow-up is well demonstrated in Table 2. The PF change significantly correlated with baseline SF (r = –0.34, p < 0.05). Change of emotional well-being (E/W) and E/F at five year follow-up was associated with the same dimensions preoperatively (r = –0.71, p < 0.001) and, respectively (r = –0.63, p < 0.001). Prolonged

Data analysis. Statistical data analysis was performed using IBM SPSS Statistics v. 23.0. Paired sample t-test was used for comparisons of data at T1 and T2. Cohen’s d was used to estimate within group effect sizes. A p value of <0.05 was considered statistically significant.

RESULTS
Quality of life and posttraumatic stress after cardiac surgery

Postoperative hospital stay was associated with a change in SF ($r = 0.35$, $p < 0.01$), E/F ($r = -0.35$, $p < 0.05$), and E/W ($r = -0.39$, $p < 0.05$).

High levels of PTSD symptoms were found in the sample of cardiac surgery patients following five years after the surgery. About one of eight patients (12.2%, $n = 5$) had the risk of posttraumatic stress disorder (PTSD) at T2. PTSD symptoms were associated with longer hospitalization after surgery ($r = 0.45$, $p < 0.01$). The correlation between higher ITQ scale values/PTS symptoms and prolonged postoperative hospital stay is shown in Figure. Furthermore, we found that PTSD symptoms at T2 were associated with SF-36 pain domain at T1 ($r = 0.33$, $p < 0.05$). We did not find an association with PTSD symptoms and other SF-36 domains.

**DISCUSSION**

Health-related quality of life is a multidimensional concept covering self-perceived mental, emotional, and physical health alongside with social well-being. Post-procedural outcomes are frequently evaluated from deficit – mortality and morbidity aspect. However, over the last decades patient-centred care is evolving and HRQOL has become an important component of public health surveillance and outcome analysis (9). Aging population and increased incidence of chronic co-morbidities raise the question whether complex cardiac surgical treatment brings an improvement of health related quality of life and what the main factors associated with decline of self-perceived well-being are.

<table>
<thead>
<tr>
<th>SF-36 subscales</th>
<th>Pre-surgery M (SD)</th>
<th>5-year follow-up M (SD)</th>
<th>$t$-test</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical functioning</td>
<td>54.51 (23.92)</td>
<td>74.15 (27.77)</td>
<td>-5.28 ***</td>
<td>0.76</td>
</tr>
<tr>
<td>Energy/fatigue</td>
<td>55.90 (15.47)</td>
<td>62.31 (14.36)</td>
<td>-2.26 *</td>
<td>0.43</td>
</tr>
<tr>
<td>Emotional well-being</td>
<td>59.79 (19.33)</td>
<td>65.13 (16.36)</td>
<td>-1.47</td>
<td>0.29</td>
</tr>
<tr>
<td>Social functioning</td>
<td>62.50 (29.84)</td>
<td>77.49 (28.85)</td>
<td>-2.47 *</td>
<td>0.51</td>
</tr>
<tr>
<td>Pain</td>
<td>50.92 (24.91)</td>
<td>61.57 (32.03)</td>
<td>-1.86</td>
<td>0.37</td>
</tr>
<tr>
<td>General health</td>
<td>50.00 (16.34)</td>
<td>33.21 (15.15)</td>
<td>6.09 ***</td>
<td>1.09</td>
</tr>
</tbody>
</table>

SF-36 – Medical Outcomes Study 36-Item Short-Form Health Survey.

* $p < 0.05$; *** $p < 0.001$.

**Table 2.** Quality of life pre-surgery and at 5-year follow-up ($N = 41$)

**Figure.** PTSD symptoms and duration of the post-operative hospital stay

ITQ – International Trauma Questionnaire

<14 d.  | >14 d.  
-------|--------
1.54   | 4      

Duration of postoperative hospital stay
Preliminary data from our pilot study confirmed that five years after cardiac surgery, the majority of the patients noted overall improvement in all HRQOL domains except General Health (10–12). These findings are similar to other authors’ findings and might be related to overall aging of the patients (13–15). Patients with lower preoperative HRQOL tended to achieve a significant improvement of self-perceived health postoperatively. On the other hand, patients with satisfactory levels of health, not limiting their social well-being preoperatively, improved less. Reduced postoperative mobility, pain, the loss of social interactions and prolonged rehabilitation could result in a possible mismatch of expected and perceived postoperative recovery (16). These findings are supported by recent research. Psy-Heart trail researchers (17) indicated the importance of managing and optimizing patient expectations before the heart surgery. Analysis of factors associated with deterioration of HRQOL postoperatively revealed that a prolonged postoperative hospital stay had a negative impact on long-term quality of life – social functioning and emotional well-being, that could be related with a post-traumatic stress disorder or a more complex postoperative course (2, 18).

Our study has limitation associated with a small sample size. A larger patient group is needed to draw conclusions about the multifactorial nature of long-term postoperative well-being. Perioperative psychological interventions providing emotional support and general advice to patients undergoing complex surgical procedures are needed to control patients’ expectations and increase overall satisfaction with achieved treatment result.

CONCLUSIONS

Preliminary findings showed that HRQOL improved from baseline to five years postoperatively. Patients with lower preoperative HRQOL scores tended to have a more significant improvement of HRQOL five years after surgery. Prolonged postoperative hospital stay had a negative impact on postoperative social functioning, energy/fatigue, and emotional well-being. Our pilot study indicated increased levels of PTSD in a sample of cardiac surgery patients following five years after surgery.

Further data analysis and inclusion of a larger patient group are needed to confirm pilot findings and to explore the longitudinal change and long-term predictors of HRQOL dynamics and PTSD after cardiac surgery.

ACKNOWLEDGEMENTS

Not applicable.

CONFLICT OF INTEREST

None declared.

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References

ILGALAIKIAI GYVENIMO KOKYBĖS POKYČIAI IR PATIRIAMO STRESO REAKCIJOS PO PLANINIŲ ŠIRDIES OPERACIJŲ: PRELIMINARŪS REZULTATAI PRAĖJUS PENKERIAMS METAMS PO OPERACIJOS

Santrauka

Įvadas. Širdies operacija, kaip didelį stresą kelianti gyvenimo situacija, gali turėti reikšmingą neigiamą įtaką pacientų gyvenimo kokybei ir sukelti ilgalaikes patiriamos streso reakcijas.

Tyrimo tikslas. Ivertinti ilgalaikus gyvenimo pokyčius, nustatyti patiriamos streso reakcijų rizikos veiksnius ir jų sąsajas su priešoperacine gyvenimo kokybe praėjus penkeriems metams po planinės širdies operacijos.


Rezultatai. Pilotinis tyrimas nustatė itin didelius teigiamus SF-36 klausimyno pokyčius fizinio aktyvumo, energingumo / gyvybingumo ir socialinės funkcijos srityse praėjus planiniams penkeriems širdies operacijos po operacijoms. Patirę pacientai visada buvo susiję su socialinės funkcijos (p < 0,01), energingumo / gyvybingumo (p < 0,05) ir emocinės būsenos (p < 0,05) pokyčiais. Praėjus penkeriems metams po širdies operacijos 12,2 % pacientų susidūrė su padidėjusia rizika potrauminio streso sutrikimui išsivystyti. Patiriamo streso simptomai buvo susiję su padidėjusia socialinės funkcijos trukme po širdies operacijos (p < 0,01).


Raktažodžiai: širdies operacija, su sveikata susijusi gyvenimo kokybė, patiriamas stresas / potrauminis stresas