

Preparation for implantation of mechanical circulatory support: psychological adjustment and treatment of mental disorders in the pre- and postoperative period

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Summary

Treatment of patients with advanced heart failure (HF) with the use of left ventricular assist devices (LVADs) improves the quality of life and the length of survival. Despite the undeniable benefits associated with improved physical performance, as a result of the decrease of the underlying disease symptoms, it carries the risk of complications in the area of the patient's somatic and psychological status. Long-term circulatory failure can contribute to a weakening of the adaptative mechanism and consequently lead to a variety of emotional disruptions. Patients must face the fear of imminent physical, family, and social changes that LVAD requires. They may experience sleep disorders, mood disorders, anxiety disorders, and in the early postoperative period also disorders of consciousness with a pattern of delirium. For this reason, it is advisable to provide multidisciplinary medical care for the patient at all stages of treatment, including regular monitoring of general health and mental health. This article presents risk factors for psychiatric disorders in patients with LVADs and ways of pharmacological and non-pharmacological management when these factors are identified and disorders are diagnosed.

Key words: LVAD, mental health

Introduction

This article aims to discuss the mental health risk factors and psychiatric disorders present in a group of patients with advanced congenital heart failure (CHF) treated with left ventricular assist devices (LVADs), including pharmacological and non-pharmacological treatments for these disorders. The presented content is a joint position of specialists in the field of mental health – clinical psychologists and psychiatrists, coming from two centres with the greatest experience in treating CHF with the above-mentioned method in Poland. The article is a part of RHROT Project (STRATEGMED2/266798/15/NCBR/2015), and it is a continuation of a publication discussing psychosocial criteria for qualifying patients with CHF for treatment with mechanical circulatory support (MCS). Together, the two articles provide a compendium of knowledge for professionals interested in collaborating with this patient group and present a comprehensive view of the mental health of patients with LVAD.

Preoperative period – preparation for LVAD implantation

Long-term circulatory failure can contribute to a weakening of adaptive mechanisms and consequently lead to a variety of emotional disruptions [1]. Most patients must cope with conflicting feelings, sourcing from various goals of this therapy. Those for whom LVAD is a bridge to heart transplantation (HTx) often feel relieved that it can alleviate the symptoms of their disease and increase their chance of long-term survival [2], but they may also be disappointed that their condition does not allow them to qualify for transplantation without additional surgery. They must face the fear of worsening symptoms of heart disease, the fear of pain, the risk of death, surgery itself, and the imminent physical, emotional, family, and social changes that LVAD requires [2, 3]. For this reason, in addition to assessing the psychiatric and/or psychological contraindications to treatment with LVADs and HTx, the psychiatrist and clinical psychologist prepare, emotionally and cognitively, the patient for the surgery. It includes pharmacological and non-pharmacological treatments of the presented mental disorders, which are usually reactive in their nature at this stage of the treatment [1].

‘Psychological preparation’ is a broad term in this context, encompassing various types of strategies for changing dysfunctional beliefs, emotions or behaviours into ones that facilitate the patient’s ability to de-escalate negative emotions, enhance the process of adaptation to a new and difficult situation, and promote the curative process [4]. It has been proven that the patient’s attitude, and emotions before the surgery, influence the recovery rate after the surgery and the length of hospital stay. Individuals with high preoperative anxiety experience more pain in the postoperative period, and high levels of life stress and personality traits, such as low levels of optimism and conscientiousness, indicated by patients in the preoperative period, have been linked to a slower wound healing [5-7]. Some researchers have also described the effect of stress on the healing process, which they explain by psychoneuroimmunological mechanisms [5, 8, 9].

Therefore, it seems reasonable to educate the patient before the surgery, to create an opportunity to express his/her thoughts and emotions, and, if necessary, to help to make the patient's ideas about the healing process more realistic in order to alleviate distress and emotional tension, including anxiety. Psychological care also includes preparing the patient for lifestyle changes after LVAD implantation and reinforcing a positive attitude towards the device and future daily life with it. Early psychoeducation and professional psychological support counteract subsequent mental health difficulties and disorders and contribute to an improved quality of life and the level of concordance with medical staff. In patients who express the belief that they have no other choice but to undergo the surgery, it is important to develop a higher level of control over this situation and an attitude towards treatment as a joint decision between the patient and the treatment team. This increases a sense of responsibility for one's behaviour, promotes engagement in the treatment process, and develops a constructive patient-treatment team relationship. It is also important to create opportunities for encounters with patients who are already supported by LVADs so that the candidate can benefit from the experience of LVADs users [10]. In improving the psychosomatic condition of patients, it is important to include pre-rehabilitation, early rehabilitation in the postoperative period and long-term cardiac rehabilitation, taking into account new technologies enabling telecare and home-based telerehabilitation.

At the same time, it is necessary to respond promptly to the psychological difficulties that arise during this period as a consequence of the overlapping stressful situation of the previous circulatory failure, often associated with a decrease in the perfusion of the central nervous system. The patient should be clearly informed that the anxiety and depressive symptoms that occur are typical and treatable during this period. The addition of psychopharmacological support should not be delayed, according to the principles and recommendations applicable to heart failure patients.

The postoperative period

The stay in the postoperative ward can be experienced as critical and demanding due to waking up in a new, unfamiliar place filled with medical equipment, whose sounds can increase anxiety and promote anxious self-observation. A specific issue is the shock of seeing and feeling the LVAD for the first time and facing the task of integrating it into the body. Disturbances of circadian rhythm related to the somatic state, the pharmacotherapy used, or the conditions in the room (artificial lighting, noise) are also challenging at this stage of treatment. After some time after the surgery, the patient's clinical condition stabilises, the pain subsides, physical capacity increases, and sleep quality improves (meaning its efficiency increases and sleep fragmentation decreases) [11-13]. Paradoxically, the return to functional performance similar to that before the disease may become a source of fear of additional cardiac surgery (for LVAD explantation or HTx). Probable future surgery is associated with the prospect of losing the mechanical circulatory support on which the patient relies and is burdened with the

risk of temporary deterioration (pain and weakness during the recovery period) or loss of life [14]. However, the prospect of regaining autonomy and returning to functioning independently of the medical device is a source of hope in these circumstances [2].

The psychological comfort of the patient with LVAD is limited by the knowledge that the device may one day fail (as a result of the device's malfunction or the patient's inattention [15]) or that the patient will experience an adverse event such as gastrointestinal or CNS bleeding, thromboembolic incident, ischaemic stroke, infection near the LVAD supply line or premature death. Worrying about alarms generated by the LVAD, or its possible failure, has been correlated with sleep disturbances, depression, anxiety, and reduced quality of life [2, 16] and the anxiety associated with managing LVAD can cause feelings of isolation and the development of psychiatric disorders [17]. The limited number of possible sleeping positions (on the back or on the side opposite the drive system) or the weight of the device, which causes shoulder pain in some patients, can also be a source of discomfort [18].

The occurrence of LVAD-related complications has a major impact on patients' perception of the benefits associated with this form of treatment. Those in whom these complications did not occur, or were transient, showed better acceptance of the device and more trust in the healthcare system compared to those in whom the complications were severe or required prolonged hospitalization [3]. The patient can also display ambivalent emotions towards LVAD, which, due to external elements, may adversely affect self-image and make the patient perceive themselves as dependent on and less attractive to others, despite knowing that it alleviates the symptoms of heart failure and improves well-being and quality of life. Some patients may experience an identity crisis focused on the question 'Who am I now?'. Concerns about social situations and stigma are common [2, 17-21], and developing a new concept of personal life is often a part of adapting to life with LVAD.

The emotional and cognitive response to an implanted LVAD depends on individual factors such as personality traits, the presence of psychiatric disorders, the level of social support and cultural and religious factors. It is also frequently related to the meaning attributed to the disease, which depends on the age of HF onset, the patient's previous health experiences and their expectations for the future [3]. Before LVAD implantation, these expectations may be overly optimistic, leading to disappointment in the postoperative period [22, 23]. All patients with LVADs face the need to integrate the device into the body image so that it seems a natural part of their body. Those for whom the adaptation process is optimal achieve a kind of habituation in which the device can be 'forgotten' for an extended period of time. Others never reach this stage, and in some patients, the ability to cope with this treatment deteriorates with time [2]. However, some patients experience posttraumatic growth after the postoperative recovery period [24].

Common emotional problems in this group of patients include distress. Modica et al. [3] have shown that emotional distress is common in patients immediately after LVAD implantation, and its level does not decrease at mid-term follow-up [3]. Other

authors have shown that psychological distress is common in patients after device implantation [12, 25, 26], and that approximately 25% of patients suffer from it after returning home [25, 27]. The source of stress or anxiety in this group of patients is both the fact of being discharged from the safe environment of the hospital and the feeling of being overwhelmed by the responsibility of managing the LVAD by themselves after hospitalization [18]. Another source of chronic emotional strain is the inability to accurately determine the duration of the need for mechanical support [11, 28]. The risk of developing mental disorders in response to the stress associated with the device is usually highest approximately one month after its implantation [29].

The consciousness disorders with a pattern of delirium are the most common psychiatric disorders in the early postoperative period. Due to the high prevalence of this phenomenon, it is common not to ask for the support of a psychiatrist in the treatment, unless standard treatment is unsuccessful [14]. The aetiology of these disorders is multifactorial. One of the risk factors for delirium is heart failure itself [30], and other factors include the patient's older age, sudden changes in blood oxygenation and organ perfusion, or electrolyte / metabolic fluctuations [31]. Noufi et al. [30] in his study found postoperative delirium in 26.1% of patients after LVAD implantation, which was associated with higher in-hospital mortality. Another study found that patients ≥ 65 years of age had a higher risk of developing postoperative delirium (17.90%) compared to younger patients (11.92%) [32], and although in this study it did not correlate with in-hospital mortality, it was associated with a lower likelihood of the patient being discharged from the hospital straight home [32].

The prevalence of depression and anxiety varies at different stages of LVAD treatment. It increases just before implantation, subsides shortly after, and rises again if the patient's adjustment difficulties outweigh their coping skills [2, 33]. In patients with end-stage heart failure, depressive symptoms are most often associated with the severity of heart disease, including poorer physical functioning and a worse long-term prognosis. Although LVAD implantation usually relieves depressive symptoms, approximately 30-40% of patients still present clinical symptoms after 3 months, increasing the risk of rehospitalisation. Kitagaki et al. [34] showed that 56% of patients had depressive symptoms after LVAD implantation, which was higher compared to other studies where the percentage varied between 26%-41% [3, 35].

Another difficulty that can occur in patients with LVADs is cognitive impairment. This may be a priori related to heart failure, due to low cardiac output, which often leads to end-organ damage, including the brain, and can range in severity from mild to severe [36, 37]. These impairments may also be due to endocrine or metabolic factors and adverse drug effects [15] or may be a consequence of stroke as an adverse event related to LVAD use.

Mental disorders – psychological interventions and non-pharmacological treatment of mental disorders

Psychological and psychotherapeutic interventions or, if necessary, their combination with appropriate pharmacotherapy, have a beneficial effect on the patient's mental state, help the patient maintain an adequate level of self-care, and improve health-related quality of life. The psychologist, through the knowledge of the cognitive, emotional, and behavioural aspects of the patient's functioning, teaches the patient to recognise distressing mental health symptoms and effective forms of coping. A reduction in anxiety, improvement in mood, and strengthening of emotional self-regulation translate into a faster return to normative functioning in all spheres of life.

Among the psychotherapeutic interventions possible for patients with advanced somatic illness, the most relevant and effective are those of a cognitive-behavioural nature. They improve the emotional state and have a beneficial effect on the patient's beliefs about influencing health through their own behaviour. There are also increasing number of reports related to the use of other strategies, such as the mindfulness approach or motivational dialogue [38-40]. The latter technique, as a communicative approach, can be used by all healthcare professionals. The recommendations, regarding inpatient psychological interventions for LVAD patients, mentioned: psychological support in adjusting to life with the device through stress management, relaxation, counseling, and psychotherapeutic interventions. They also mention education on illness prevention and health behaviours [2, 41]. Furthermore, in patients with cognitive or executive dysfunctions, as a consequence of heart failure or stroke, it is necessary to counteract the patient's disability by implementing neuropsychological rehabilitation. In this area, traditional methods based on verbal exercises or paper-and-pencil techniques can be applied, or dedicated computer programs can be used.

To summarise, the psychological interventions which should be undertaken for LVAD patients, include:

- (1) provision of general procedural information which does not overlap with the competence of other members of the treatment team and which helps the patient to adjust to the current situation,
- (2) reinforcement of health-promoting behaviour, which could be helpful in the pre- and postoperative period,
- (3) psychoeducation on, among others, the source of the currently experienced negative emotions and ways to cope with them,
- (4) the alleviation of distress through, e.g. emotional support, the use of relaxation techniques, the reinforcement of a sense of security or the patient's influence over the situation, and the ability to use available resources,
- (5) psychosomatic rehabilitation interventions,
- (6) psychotherapeutic interventions,
- (7) crisis intervention [7, 42].

In order to assess the patient's mental state, identify his/her needs and difficulties, and choose the most appropriate psychological intervention, it is also helpful to establish with the patient answers to the questions listed below:

1. What areas of his/her life are positively or negatively affected by the LVAD?
2. Are there significant limitations in the patient's daily functioning following LVAD implantation?
3. Is there a psychological burden associated with the LVAD and how does the patient cope with it?
4. Does the patient perceive any changes in emotional functioning since LVAD implantation?
5. What personal and social resources is the patient able to use in demanding situations?
6. How does he/she envision his/her future life? [22]

Mental disorders – pharmacological management

Pharmacological treatment of psychiatric disorders in patients receiving mechanical circulatory support should be considered an essential part of illness management. This treatment aims not only to improve the patient's comfort but also to prevent mental complications resulting from prolonged immobility or lack of cooperation. Several principles should be taken into account when deciding whether (or not) to initiate pharmacotherapy.

1. If there is an indication for treatment, delaying the start of therapy is an error. A hesitant and biased physician's attitude towards psychiatric treatment makes it difficult for the patient to get optimal help.
2. Psychiatry is a part of medicine. Communicating to the patient about the need for treatment or the inclusion of psychopharmacological treatment should not be different from communicating similar information about the treatment of other types of health conditions.
3. The dose of medication should be initially low. It is necessary to reevaluate the patient's psychological state regularly and – usually – to increase the dose to the required level. The initial dose is rarely the target dose!
4. In candidates for LVAD implantation, the principles of treatment for patients with heart failure should be used. Post-implantation patients should avoid drugs that increase the risk of stroke.
5. The choice of drug depends not only on the clinical profile but also on potential interactions with drugs used for other conditions.
6. In the case of depressive, anxiety, and sleep disorders, any reduction in the dose of a psychopharmaceutical should be neither too rapid nor too radical. An exception to this rule is discontinuation of a drug due to its intolerance or adverse interaction.

A unique challenge is the treatment of somatogenic disorders of consciousness (delirium). It must be remembered that due to the multifactorial aetiology of de-

lirium, the first step in the management must be the precise levelling of biochemical parameters (electrolytes, glucose, protein, bilirubin, creatinine, etc.). Without this step, pharmacological treatment is usually ineffective. The second element of this treatment is to analyse the medications used and attempt to discontinue (possibly reduce the dose of) anticholinergic drugs and opioids. Psychopharmacological treatment is mainly included in cases of agitation increasing the risk of somatic complications (accidental drain removal, driveline damage, etc.). Antipsychotic drugs should be considered as first-line drugs, whereby, inversely to chronic treatment, first-generation antipsychotics (especially haloperidol) have some advantage over second-generation antipsychotics, of which quetiapine is mainly worthy of recommendation. Before possible inclusion of olanzapine, one should consider its anticholinergic effect, which can reduce the benefit of its use. Among other drugs that allow rapid sedation of the patient, it is worth considering dexmedetomidine, which has a neuroprotective effect. However, benzodiazepine derivatives should definitely be avoided as, despite their spectacular short-term effect, they could prolong the duration of delirium.

Treatment of depressive and anxiety syndromes in this group of patients generally does not differ from that of the general population with caution due to drug tolerance in the CHF or LVAD population. SSRIs, trazodone, and mirtazapine are commonly used, and continuous monitoring of coagulation parameters in this patient group means that possible adverse effects of these drugs on coagulation can be easily identified.

Conclusions

This article presents the most important principles of psychological care and psychiatric treatment in patients qualified for LVAD implantation at subsequent stages of treatment. Appropriate recognition of the patient's needs, attitudes and expectations towards treatment allows for an increased chance of favourable adaptation to life with a circulatory support device. In turn, adequate and promptly introduced therapy (pharmacological and psychological) of psychological difficulties and symptoms of mental disorders after the surgery allows for an improvement in the patient's quality of life and can positively influence the outcome of the treatment of heart failure.

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