

**Olgu sunumu**

**Nursing Care For a Patient with Left Ventricular Assist Device According to The Roy Adaptation Model**

**Roy Adaptasyon Modeli'ne Göre Sol Ventrikül Destek Cihazı Takılan Bir Hastanın Hemşirelik Bakımı**

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**Abstract:** Heart failure is significant chronic a disease with multiple effects. The fact that these patients have a left ventricular assist device requires them to adapt to a new lifestyle. Therefore, holistic and individualized nursing care becomes even more important in the process. The use of models in the care process is effective for nurses to provide qualified care to patients. According to the Roy Adaptation Model (RAM), which is one of these models, nurses; aim to enable patients to adapt to the process and to reduce their maladaptive behaviors. Patients with an implanted left ventricular assist device have to face various challenges and adapt to new changes. It is extremely important to consider and develop the adaptation process of patients from a holistic perspective. This case study aims to explore the patient output and nursing care in patients with an implanted left ventricular assist device based on the Roy Adaptation Model.

**Key Words:** Adaptation; physiological; psychological; heart failure; heart-assist devices.

**Özet:** Kalp yetmezliği, hastaları birçok yönden etkileyen önemli kronik bir hastalıktır. Bu hastaların, sol ventrikül destek cihazına sahip olmaları, onların yeni bir yaşam biçimine uyum sağlamalarını gerektirmektedir. Dolayısıyla bu süreçte, bütüncül ve bireyselleştirilmiş bir hemşirelik bakımı daha da önemli hale gelmektedir. Bakım sürecinde modellerin kullanılması, hemşirelerin hastalara nitelikli bakım verebilmelerinde etkili olmaktadır. Bu modellerden biri olan Roy Adaptasyon Modeli'ne göre hemşireler; hastaların sürece uyumlarını sağlamayı ve uyumsuz davranışlarını azaltmayı amaçlamaktadır. Sol ventrikül destek cihazı olan hastalar birçok farklı durumla karşılaşmakta ve bu durumlara uyum sağlamak zorunda kalmaktadır. Hastaların uyum sürecinin bütüncül bir açıdan ele alınması ve geliştirilmesi son derece önemlidir. Bu nedenle sol ventrikül destek cihazına sahip olan hastaların Roy Adaptasyon Modeli'ne göre değerlendirilmesinin doğru olacağı düşünülmektedir. Bu olgu sunumunda, kalp yetmezliği tanısı ve sol ventrikül destek cihazına sahip olan bir hastaya ait veriler ve bakım süreci, Roy Adaptasyon Modeli doğrultusunda ele alınacaktır.

**Anahtar Kelimeler:** Adaptasyon; fizyolojik; psikolojik; kalp yetmezliği; kalp destek cihazları.

## **Introduction**

Heart failure (HF) is a disease in which the heart cannot meet the needs of the tissues even at rest.<sup>(1,2)</sup> Patients with this disease may experience dyspnea, fatigue, and activity limitation due to decreased cardiac output.<sup>(2)</sup> As a result of the inability to complete the treatment process of patients, or in other words, to not ensure recovery, these symptoms continue for life and make patients' lives more negative.<sup>(3,4)</sup> Heart failure is one of the most important causes of mortality and morbidity in the world. It is known that the prevalence of HF is 1-2% in developed countries and increases by 10% or more with age. In addition, according to these data, the number of patients admitted to hospitals due to heart failure is increasing day by day.<sup>(5)</sup>

The golden treatment for end-stage heart failure is heart transplantation. However, due to the limitation of organs, heart transplantation cannot be performed in patients, and alternative treatments are needed. For this reason, the use of left ventricular assist devices (LVADs) implanted in the heart is rapidly becoming a treatment method today. These devices reduce patients' heart failure symptoms and increase the functional capacity of the heart.<sup>(6,7)</sup> Therefore, they improve the quality of life of patients by easing the burden of the heart.<sup>(6-8)</sup> They also reduce the negative effects of heart failure on organs and systems until heart transplantation. Left ventricular assist devices are a way of long-term survival while maintaining eligibility for transplantation in patients with advanced heart failure. In addition, they are used as a treatment option to maintain the functioning of the existing heart in the remaining life expectancy of patients who are not suitable for heart transplantation due to other diseases.<sup>(4,9,10)</sup>

LVAD is a very important treatment method that increases the quality of life and survival rates of HF patients. However, the complexity of care can cause adjustment disorders in most patients with LVAD implantation. With the continuation of this situation, vital problems may occur.<sup>(11)</sup>

The results show that the adaptation process of patients with LVAD is an important criterion to

be considered. However, there is no study in the literature examining the adaptation process of LVAD patients.

### **Aim of Study**

The adaptation process of patients with LVAD implantation will be evaluated and developed with the Roy Adaptation Model (RAM), which is one of the nursing models.

### **Roy Adaptation Model**

The adaptation model was developed by Sister Callista Roy in 1976 and allows us to evaluate the adaptation process of individuals. According to the model, individuals are in an ongoing interaction with their environment and this interaction cannot be considered independently of the environment. It is also stated in the model that stimuli are taken from the internal and external environment. These stimuli are examined in three groups.<sup>(12)</sup>

**Focal stimuli:** These stimuli trigger behaviors. Since individuals focus all their attention and energy on these events, they first try to adapt to this event itself.<sup>(12-14)</sup>

**Contextual stimuli:** These are other stimuli that contribute to the effect of focal stimuli.<sup>(13,14)</sup>

**Residual stimuli:** The individual is affected by residual stimuli but is not aware of them. These stimuli cannot be measured objectively. They take their source from the past and affect the individual's treatment response.<sup>(15,16)</sup>

In the following stages, coping processes emerge in response to perceived stimuli. Coping processes are explained in two subsystems: regulator and cognator. In the regulator subsystem, the individual responds to stimuli with innate physiological modes. In the cognition subsystem, the individual responds in cognitive and affective modes. However, according to the model, coping processes and stimuli cannot be observed directly and these processes need to be evaluated adaptively. In the model, four adaptive modes are defined.<sup>(16,17)</sup>

**Physiologic:** These are the individual's bodily responses to stimuli from the environment. According to RAM, all systems have five basic physiological needs: Oxygenation, nutrition, elimination, protection, physical activity, and rest. To meet these needs, four main functions, senses, fluid-electrolyte balance, acid-base balance, and neurologic and endocrine functions, are used.<sup>(12,18)</sup>

**Self-Concept:** This mode is covered under two headings.

The physical self includes individuals' feelings and experiences about their bodies.

Personal identity includes individuals' behaviors, ideals, moral values, and standards.<sup>(12)</sup>

**Role Function:** This adaptive mode aims to ensure social integrity. These roles in individuals are grouped under three headings.

Primary roles are the roles that we do not have the option to choose (age, gender, etc.).

Secondary roles are the roles that we have the option to choose partially (spouse, parents, etc.).

Tertiary roles are temporary roles that we can choose freely (occupation, etc.).<sup>(12)</sup>

**Interdependence:** It is the entire relations with special people and support systems in an individual's life. The individual maintains his/her inner integrity by establishing interactions with these people and their support systems.<sup>(13,14,19)</sup>

The purpose of these four adaptive behaviors defined by RAM; is to ensure the integration of individuals with the environment. The purpose of nursing is to improve the individual's adaptation to the environment and to reduce maladaptive behaviors. In addition, it is aimed to improve the adaptation process of the individual by supporting adaptive behaviors. According to RAM, the nursing process consists of six stages.<sup>(18)</sup> These are as follows: assessment of behavior, assessment of stimuli, nursing diagnosis, goal setting, nursing interventions, and evaluation.

## Case Report

### Evaluation

**Introductory characteristics:** K.Ö. is 57 years old, married, and has two children. He has a shop on security camera systems and operates with his son. K.Ö. lives with his wife and daughter.

**Anamnesis:** The patient has been followed up in the heart failure outpatient clinic for one year. The patient was admitted to the hospital with complaints of dyspnea and edema; He was admitted to the hospital and his treatment was started.

**History:** The patient had an acute inferior myocardial infarction in 2007 and had a stent inserted. Then he had unstable angina pectoris (USAP) in 2008 and was taken under medical follow-up. In 2013, the patient needed re-insertion of a stent and he was diagnosed with heart failure in 2015 with an EF of 35%. During this period, the patient stated that he had a fear of death and became depressed. At the same time, he stated that he could not support his young son in business. K.Ö., who applied to the hospital in 2016, He stated that he could climb a maximum of one flight of stairs. The patient was followed up medically in the heart failure outpatient clinic for one year. He was admitted to the hospital due to increased dyspnea and edema, and his treatment was started. In the echocardiography performed in March 2017, the patient's EF decreased to 25% and he was diagnosed with NYHA 4 (Congestive Heart Failure Classification). The heart transplantation council decided to insert a left ventricular assist device in the patient. In the ongoing process, K.Ö. accepted the surgery due to his wife's and daughter's insistence. He said, "I wanted this surgery myself, but I can't overcome the surgery, so I said goodbye to all the members of my family." At the same time, when his wife asked K.Ö, "What will we do if you lose the chance for device implantation", the patient said that he was thinking of committing suicide. After the implantation of the device, Warfarin was added to the drugs

that the patient needed to use continuously. In December 2020, one week after the left ventricular assist device was inserted, the patient had an infection, one of the most encountered complications, was observed in the driveline of the device (from the right middle abdominal quadrant). MSSA (Methicillin-sensitive Staphylococcus aureus) grew in the culture taken from this region of the patient. The patient was treated with antibiotics and dressed. This infection lasted for about a month.

**Physical examination:** In the last examination of the patient before the left ventricular assist device was inserted, the patient had an increased shortage of breath and decreased functional capacity. His blood pressure was 116/79 mm/Hg; pulse was 62/min; ECG measurement was determined as NSR (normal sinus rhythm). If there was no relief in the patient's symptoms, it was decided to continue his treatment as long as he remained in the hospital. During this process, communication with the patient was maintained. Since the patient's complaints did not decrease or even increase, he was hospitalized and the LVAD implantation process started. In this section of the article, the nursing care process of the patient with a Left Ventricular Assist Device, which was determined according to the Roy Adaptation model, will be explained (Table 1).

**Table 1. Nursing Care Process According to Adaptation Modes of Roy Adaptation Model**

ADAPTATION MODES	ASSESSMENT OF BEHAVIOR	ASSESSMENT OF STIMULI			NURSING DIAGNOSIS
		FOCAL	CONTEXTUAL	RESIDUAL	
<b>Physiologic Adaptation Mode</b>	<p><b>Pre-LVAD:</b> The patient expressed that his shortness of breath has increased in recent days and gets tired quickly while walking. He said he couldn't support his son at work and didn't want to deal with anything.</p> <p><b>Post-LVAD:</b> He also said that he could not perform the maintenance of the device alone, that he could not touch the driveline entrance in the abdomen at first, and that he received support from his wife.</p>	Heart failure	Having shortness of breath and getting tired quickly when performing activities of daily living	Experiencing stress due to the thought that he will have shortness of breath when he moves	<ul style="list-style-type: none"> <li>● Risk of infection</li> <li>● Activity intolerance</li> </ul>
<b>Self-Concept Adaptation Mode</b>	The patient stated that he was aggressive when the device was first inserted and did not want to talk to anyone. He also said that he could not perform the maintenance of the device alone, that he could not touch the driveline	Left ventricular assist device	Thinking that his appearance has changed due to device implantation, being unable to look at, touch, and dress the driveline,	Thinking about how people perceive him when those around him look at his bag that he has to carry with him all the time	<ul style="list-style-type: none"> <li>● Disturbance in body image</li> <li>● Readiness to strengthen knowledge level</li> <li>● Anxiety</li> <li>● Lack of information</li> </ul>



	entrance in the abdomen at first, and that he received support from his wife. The patient asked many questions about how to maintain his life with the device.		expressing that he should learn this		<ul style="list-style-type: none"> <li>• Risk of changes in sexual life</li> </ul>
<b>Role Function</b> <b>Adaptation</b> <b>Mode</b>	<p>The patient stated that he had a fear of death during this period and became depressed. He also stated that he did not want to deal with anything and felt empty. He said he could not support his son at work and was very upset about this situation since his son is young.</p> <p><b>Primary Role:</b> Being a 57-year-old man</p> <p><b>Secondary Role:</b> Being a husband, father, and business owner</p> <p><b>Tertiary Role:</b> Being unable to do his job and work</p>	Left ventricular assist device	Effects of disease and treatment process	Worrying about not being able to support his son at work and losing everything in this process	<ul style="list-style-type: none"> <li>• Inability to cope individually: Depression</li> <li>• Ineffectiveness in role performance</li> <li>• Social isolation</li> </ul>
<b>Interdependence</b> <b>Adaptation</b> <b>Mode</b>	The patient said that he thought that he would not be able to overcome this	Left ventricular assist	Patient's fear of death due to surgery	Being hesitant to have the device	<ul style="list-style-type: none"> <li>• Disruption in the continuity</li> </ul>

	<p>surgery when he talked about the device, so he said goodbye to his family. Moreover, according to his wife's response, the patient stated that he was considering committing suicide if he could not complete this process successfully. The patient's family stated that they insisted on having this surgery, but the patient's way of communication changed a lot (aggressive, not wanting to talk to anyone, not even answering the phones) after the device was inserted).</p>	<p>device</p>		<p>inserted. Still, his wife and daughter insist on the implantation of the device</p>	<p>of family processes</p> <ul style="list-style-type: none"> <li>● Disruption in social interactions</li> <li>● Social isolation</li> <li>● Risk of self-harm due to feelings of hopelessness and loneliness</li> </ul>
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**Nursing diagnosis 1:** Risk of infection (Physiologic Adaptation Mode) <sup>(20-23)</sup>

**Goal:** To prevent the development of infection in the patient's driveline area.

**Nursing interventions:**

- The patient was taught how to dress the driveline by applying it together with the patient.

- The clinical signs of the hand washing process and its technique were explained. Hand washing was performed with the patient.
- The importance of nutrition and the type of nutrition program needed to prevent infection (foods rich in protein and calories) were explained to the patient and his family.

**Evaluation:** One week after the implantation of the left ventricular assist device, it was observed that an infection developed in the driveline (from the right middle abdominal quadrant) of the device (Methicillin-sensitive *Staphylococcus aureus*). The points where the patient could not adapt to the process were determined (dressing, hand hygiene). In addition, the patient and his family were informed about antibiotic treatment and dressing. Infection symptoms were observed in the patient for a month. Afterward, the patient adapted to the practices required for his care, and no signs of infection were observed in the patient.

**Nursing diagnosis 2:** Activity intolerance (Physiologic Adaptation Mode) <sup>(20-23)</sup>

**Goal:** Individual's independent fulfillment of self-care needs and balancing physical activity tolerance.

**Nursing interventions:**

- The patient's physical activity intolerance, nutrition, and sleep status were evaluated (with the interview with the patient).
- The patient's physical activity level and mobility were evaluated (with the interview with the patient).
- The patient was encouraged to do physical activities when he felt most energetic.
- Adequate rest periods between individual exercises were allowed and encouraged.
- Daily breathing exercises were taught.
- His daily routine and the drugs he used were determined.

- The patient was recommended to avoid clothes that may affect blood flow, respiratory rhythm, and physical comfort, and to wear more comfortable clothes.

**Evaluation:** The patient stated that if rest periods were placed between physical activity activities, he did not have any difficulty in doing his daily routine.

**Nursing diagnosis 3:** Disturbance in body image (Self-concept Adaptation Mode) <sup>(20-23)</sup>

**Goal:** To ensure the patient uses coping methods and adapts to his appearance.

**Nursing interventions:**

- The patient was encouraged to express his emotions, feelings, and thoughts.
- Information was given about the questions that he wanted to be answered.
- The support systems were strengthened by enabling the patient to communicate with his close environment.
- The patient was ensured to meet and talk to people who have similar problems (with patients who have the same disease and are treated with the same treatment method in the clinic).

**Evaluation:** The patient stated that he was uncomfortable with his appearance at first, but he is not worried about his appearance at the moment.

**Nursing diagnosis 4:** Anxiety (Self-concept Adaptation Mode) <sup>(20-23)</sup>

**Goal:** To minimize the patient's anxiety.

**Nursing interventions:**

- The patient and his relatives were informed in detail about the planned treatment and encouraged to express their thoughts.

- Relaxation methods were taught to the patient (muscle exercises, breathing exercises, etc.).
- The patient's anxiety was evaluated and taken under control with relaxation methods and medical applications.

**Evaluation:** The patient expressed less concern.

**Nursing diagnosis 5:** Lack of Information (Self-concept Adaptation Mode) (pre-implantation)  
(20-23)

**Goal:** To reduce the uncertainties of the left ventricular assist device for the patient and his family.

**Nursing interventions:**

- The level of knowledge of the patient about his treatment was determined (with the interview with the patient).
- The patient's missing and incorrect information about the subject and treatment was determined (with the interview with the patient).
- Necessary information was given to the patient about his disease and left ventricular assist device.
- He was allowed to ask questions.
- A safe and effective communication environment was provided.
- Cooperation was established with the patient and his relatives.
- Visual materials were used in training.
- The patient was given a brochure and booklet at the end of the training.

**Evaluation:** The patient and his relatives stated that they have information about heart failure and the left ventricular device.

**Nursing diagnosis 6:** Readiness to strengthen the level of knowledge (Self-concept Adaptation Mode) (post-implantation) <sup>(20-23)</sup>

**Goal:** To increase the adaptation of the individual and his family to the process after the left ventricular assist device is implanted.

**Nursing interventions:**

- The patient's level of knowledge about heart failure and left ventricular assist device was evaluated (with the interview with the patient).
- The patient's questions were answered.
- Educational programs related to the use of the device, suitable for the patient's learning level, were applied.
- The patient and his family were informed about the dressing of the implantation site.
- Support of family members was received during this strengthening process.

**Evaluation:** The patient was able to apply what he learned about the use of the device and the dressing of the implantation site. He reported that he could apply the practices at home and had no problems.

**Nursing diagnosis 7:** Risk of changes in sexual life (Self-concept Adaptation Mode) <sup>(20-23)</sup>

**Goal:** To reduce/eliminate the patient's concerns about sexuality, to detect missing or incorrect information, and to ensure that the patient is informed correctly about the subject

**Nursing interventions:**

- The patient was encouraged to ask questions.

- Confidence was ensured that patient privacy would be protected and kept confidential while obtaining information.
- The patient was informed about possible sexual problems that may occur during or after the disease.
- The level of adaptation of the patient and his partner to the device was evaluated (with the interview with the patient and his partner).
- It was stated that he should share his concerns with his wife.

**Evaluation:** The patient stated that he had concerns about sexual activity. However, he said that he can now share these concerns with his wife.

**Nursing diagnosis 8:** Inability to cope individually (Role Function Adaptation Mode) <sup>(20-23)</sup>

**Goal:** Helping the patient to use appropriate coping methods and adapt to changes arising from the process.

**Nursing interventions:**

- The effect of the patient's illness on his work, family, and social life should be determined.
- The patient was encouraged to use effective coping methods in solving problems by maintaining communication with his relatives.
- Opinions of the patient's relatives about the treatment of heart failure were determined.
- The patient was allowed to communicate with other patients regarding the device.
- The patient was ensured to continue activities of daily life (nutrition, excretion, hygiene, dressing, etc.)
- Situations that caused the inability to cope with the patient's disease and the device have been identified.
- The patient was directed to the appropriate disciplines for the treatment (psychiatry and psychology, etc.).

**Evaluation:** The patient stated that he had a positive and enthusiastic opinion about his working life, meeting his daily needs and his social life, and that he started to think that he could support his son from home.

**Nursing diagnosis 9:** Ineffectiveness in role performance (Role Function Adaptation Mode)  
(20-23)

**Goal:** To make the patient feel adequate by supporting role performance.

**Nursing interventions:**

- The changes in the role performance due to the patient's disease were determined.
- Factors causing ineffectiveness in the role performance of the patient were determined (the constant wearing of the device).
- An opportunity was provided for the patient to express his feelings and thoughts.
- The patient was informed about not neglecting himself and the importance of meeting his physiological, psychological, and social needs.
- The importance of communicating with the environment was emphasized to the patient.
- Activity programs were organized following the physical performance of the patient.

**Evaluation:** The patient stated that he took new responsibilities regarding his work life, daily individual needs, and social life that he could undertake these responsibilities alone, and that he was satisfied with this situation.

**Nursing diagnosis 10:** Disruption in the continuity of family processes (Interdependence Adaptation Mode) (20-23)

**Goal:** To ensure the patient communicates with his family and friends effectively.

**Nursing interventions:**



- Methods of coping with problems (spending time with the family, sharing problems, and producing solutions) in family processes and social relations were taught. The family was encouraged to share their unexpressed emotions and thoughts.
- The patient was encouraged to communicate/interact with the family members.
- It was emphasized that family support and behaviors in the family play an important role in the recovery process.

**Evaluation:** The patient and his family talked about the disease-related problems and stated that they made a decision about the treatment together and were satisfied with the result.

**Nursing diagnosis 11:** Disruption in social interactions (Interdependence Adaptation Mode)

(20-23)

**Goal:** To ensure that the patient goes back to his social life.

**Nursing interventions:**

- The patient was allowed to express his feelings and thoughts.
- Daily social activities were planned and the patient was ensured to follow as much as possible.
- The patient was ensured to spend time with his loved ones frequently.
- The beneficial behaviors during the process were observed and it was suggested to increase them.
- It was recommended not to leave the patient alone as much as possible.

**Evaluation:** The patient stated that he exhibited relaxed behaviors in his social interactions.

**Conclusion**

In this case report, the care process of the patient with a diagnosis of heart failure and a left ventricular assist device was designed according to RAM. When this process was evaluated, it

was observed that the individual had positive adaptive responses developed in physiologic, self-concept, role function, and interdependence areas. In addition, as a result of the evaluations (The patient stated that he was uncomfortable with his appearance at first, but he is not worried about his appearance at the moment; The patient expressed less concern; The patient stated that he had a positive and enthusiastic opinion about his working life, meeting his daily needs and his social life and that he started to think that he could support his son from home; The patient stated that he took new responsibilities regarding his work life, daily individual needs and a social life that he could undertake these responsibilities alone and that he was satisfied with this situation; The patient and his family talked about the disease-related problems and stated that they made a decision about the treatment together and were satisfied with the result; The patient stated that he exhibited relaxed behaviors in his social interactions.), it was determined that the patient adapted to the left ventricular assist device more easily. For this reason, it is suggested that the Roy Adaptation Model is suitable for use in patients with left ventricular assist device implantation.

**Ethical Considerations:** The patient was informed about the purpose of the study. Written consent was obtained from the patient who agreed to participate in the study.

**Conflict of Interest:** The author(s) declared no potential conflicts of interest for the research, authorship, and/or publication of this article.

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**Author Contributions:**

Study conception and design: FEA, HY, TÇ, GAY, KD; Data collection: TÇ, GAY, KD; Data analysis and interpretation: TÇ, GAY, KD ; Drafting of the article: FEA, HY, TÇ, GAY, KD; Critical revision of the article: FEA, HY, TÇ, GAY, KD

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