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Research article

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Quality of life and It's association with physiotherapy in patients after total knee replacement- A correlational study

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ABSTRACT

Background

Degenerative joint disease, or osteoarthritis, is generally the main cause of physical deficiencies among elderly people. The pain and functional limitation caused by this condition, especially in the lower limbs, present a strong correlation with reduced quality of life among these individuals. There are many factors that affect the individual quality of life after TKR like patients psychology behind surgical procedure, poor awareness about physiotherapy rehabilitation procedure. So the purpose of study was to evaluate the quality of life in patients after TKR.

Aim

To evaluate quality of life and its correlation with physiotherapy in patients after total knee replacement.

Methods

In this correlation study, 72 total knee replacement patients were taken. Collection of demographic data & Communication was done through visiting patient's home and through telecommunication media. Patients were evaluated for quality of life using WOMAC and EQ-5D. To find out association of quality of life with physiotherapy in total knee replacement patients, 72 patients were divided in 2 groups, who received physiotherapy and who didn't. After that results were carried out.

Results

Chi-square test for association between physiotherapy taken and quality of life (WOMAC) carried out, $P < 0.05$. Chi-square test for association between physiotherapy taken and quality of life (EQ-5D) were considered significant. (P value is <0.05)

Conclusion

The patient who received physiotherapy treatment after TKA seems to show a significant improvement in quality of life. Since pain and function are the most important predictor of improved quality of life and also better dynamic balance as compared to patient who didn't received physiotherapy protocol.

Keywords: Total knee replacement, Quality of life, WOMAC, EQ-5D

INTRODUCTION

The knee is the largest joint in the body. It is subject to wear and tear as the result of physical activity, obesity and certain autoimmune conditions such as rheumatoid arthritis. An orthopedic surgeon may suggest a total knee replacement when knee pain limits functional abilities such as climbing stairs and getting up from a chair.

The knee joint consists of the femur, tibia and patella. The femur or thighbone is the bone connecting the hip to the knee. The tibia or shinbone connects the knee to the ankle. The patella or kneecap is the small bone in front of the knee. The fibula is a shorter and thinner bone running parallel to the tibia on its outside. The joint acts like a hinge but with some rotation. [1]

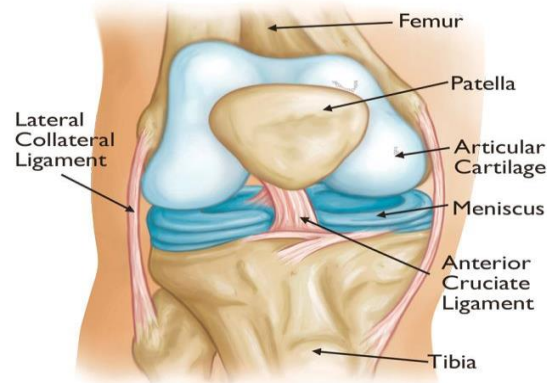


Fig. Normal knee anatomy

The knee is connected by strong ligaments and surrounded by muscles. The ligaments of the knee joint stabilize the knee allowing it to function normally. The cruciate ligaments (anterior and posterior) are important structures, which guide the knee in its normal motion.

Articular cartilage is the smooth surfaces at the end of the femur and tibia. It is the damage to this surface, which causes arthritis. The meniscus is a

specialised structure within the knee joint between the femur and tibia. There is a medial and lateral meniscus. These help distribute load, absorb shock, and stabilize the knee and aid in lubrication. [2]

The most common cause of chronic knee pain and disability is arthritis. Although there are many types of arthritis, most knee pain is caused by just three types: osteoarthritis, rheumatoid arthritis, and post-traumatic arthritis.

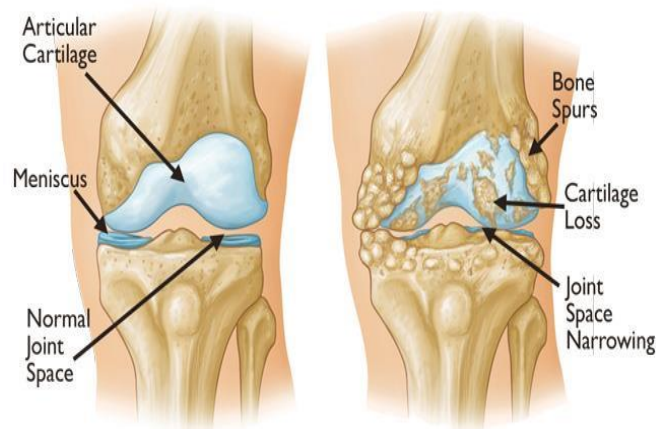


Fig. Changes in Osteoarthritis knee

Osteoarthritis. This is an age-related "wear and tear" type of arthritis. It usually occurs in people 50 years of age and older, but may occur in younger people, too. The cartilage that cushions the bones

of the knee softens and wears away. The bones then rub against one another, causing knee pain and stiffness.

Rheumatoid arthritis. This is a disease in which the synovial membrane that surrounds the joint becomes inflamed and thickened. This chronic inflammation can damage the cartilage and eventually cause cartilage loss, pain, and stiffness. Rheumatoid arthritis is the most common form of a group of disorders termed "inflammatory arthritis."

Post-traumatic arthritis. This can follow a serious knee injury. Fractures of the bones surrounding the knee or tears of the knee ligaments may damage the articular cartilage over time, causing knee pain and limiting knee function.

Degenerative joint disease, or osteoarthritis, is generally the main cause of physical deficiencies among elderly people. [2] The pain and functional limitation caused by this condition, especially in the lower limbs, present a strong correlation with reduced quality of life (QOL) among these individuals.⁽¹¹⁾ In the case of degenerative knee osteoarthritis, total knee replacement (TKR) is the preferred therapeutic option for cases of greater severity. Due to OA there is decrease in physical activity in patients with a real negatively impact on the quality of life. [3]

Knee replacement surgery was first performed in 1968. Total knee replacements are one of the most successful procedures in all of medicine. India is a country of 1.2 billion people with significant knee and hip arthritis population. According to Frost and Sullivan research, the arthroplasty market is expected to grow at a compound annual growth rate of 26.7% during 2010-2017. According to this survey, almost 70,000 joint replacement surgeries were performed in India in the year 2011. According to the Agency for Healthcare Research and Quality, more than 600,000 knee replacements are performed each year in the United States. [4]

A total knee replacement is surgery to remove damaged portions of those three bones and replace them with metal and plastic. A long vertical incision is made down the center of the knee, which is disruptive to the quadriceps muscles. [10]

The quality of life in general is described as limitations in daily essentials activities which could further impact the health of person and interventions could improve such health status. [5] Currently TKR is the most common surgical treatment carried out standard of care for advanced OA. [5-8] Waimann et al. concluded that TKR is an effective surgical intervention which reduces pain

and improve functional status among patients with knee OA. [9]

The principle is assessing the ideal management of any disease is to gauge the quality of life at the end of treatment. [12] Total knee arthroplasty was reported to improve QOL, but to this date the QOL post-TKA was not assessed and also the physiotherapy rehabilitation has whole and sole role to improve quality of life of patient. Exercise play an important and integral role in improving quality of life of patient with TKA.

Indications for surgery

1. Severe joint pain with weight bearing or motion that compromises functional abilities.
2. Extensive destruction of articular of the knee secondary to advanced arthritis.
3. Marked deformity of the knee
4. Gross instability
5. Failure of non-operative management or a previous surgical procedure.

Type of knee arthroplasty

- 1) Number of compartments replaced :-
 - i. Uni-compartmental
 - ii. Bi-compartmental
 - iii. Tri-compartmental
- 2) Implant design :-
 - i. Unconstrained
 - ii. Semi-constrained
 - iii. Fully-constrained
- 3) Surgical approach :-
 - i. Standard
 - ii. Quadriceps splitting
- 4) Implant fixation :-
 - i. Cemented
 - ii. Un-cemented
 - iii. Hybrid

The current methods for assessing the results from TKR are based mainly on clinical signs and symptoms, physical examination. [11] There are many factors that affects the individual quality of life also after TKR, so the present study is design to evaluate quality of life & which factors affects individual quality of life and to compare the quality of life between patients who received physiotherapy and who did not after post- surgery.

METHODOLOGY

Study design: Cross -sectional study

Study setting: MVP'S medical college and hospital, Nashik

Duration of study: 6 months

Sample size: 72

Sampling technique: Cluster sampling technique

Method of data collection

In this study 72 subjects were included as sample size using cluster sampling. Permission from Institutional ethical committee and from the concerned hospitals were taken. List of TKR subjects was collected from MVP'S medical college and hospital, and orthopedic hospital around Nashik. Data collection and communication with TKR subjects were done through telecommunication media and survey.

Demographic data were collected and subjects were evaluated for quality of life using WOMAC and EQ-5D. To find out association between quality of life and physiotherapy rehabilitation in total knee replacement patients, 72 patients were divided in 2 groups, 1st group consisted of subjects who received physiotherapy and group 2 consisted of subjects who didn't received physiotherapy rehabilitation. After that results were carried out.

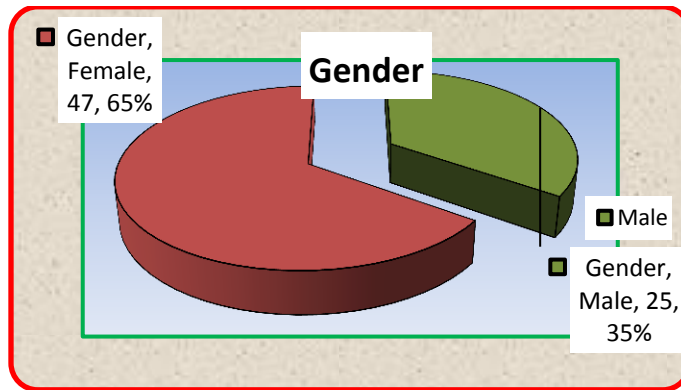
DATA ANALYSIS

The collected data was analyzed statistically using GraphPad Instat. To find association between quality of life and physiotherapy rehabilitation Chi square test were carried out.

STATISTICAL ANALYSIS

Table 1- Gender distribution

Table no.1 represents gender distribution graph. Out of total sample size there was 25 males & 47 females.



Variable	Groups	No. of subjects	Percent
Gender	Male	25	34.72
	Female	47	65.28

Table no.2 represents No of patients received physiotherapy.

Variable	Groups	No. of subjects	Percentage
Physiotherapy Received	Yes	48	67%
	No	24	33%

Out of total sample size 48 patients received physiotherapy rehabilitation protocol after total knee replacement & 24 didn't received.

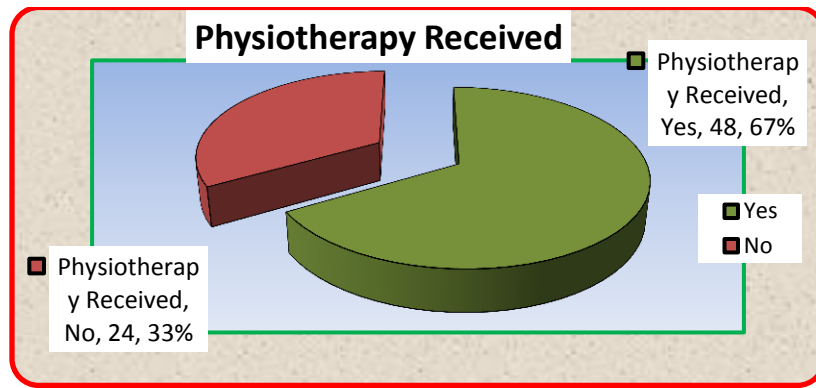


Table no 3. WOMAC score.

WOMAC	No. of Patients	Percentage
>50 Score	26	36.12 %
<50 Score	46	63.88 %

Out of total 72 patients, 26 patients score more than 50 & remaining 46 patients score less than 50.

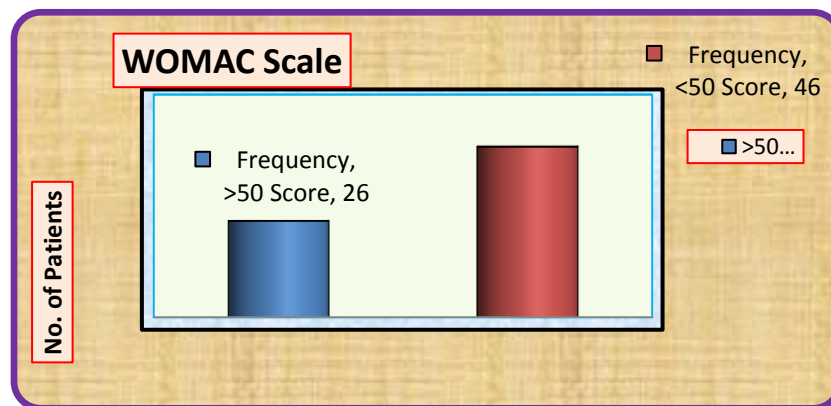


Table no.4- EQ5-D score.

EQ-5D	No. of Patients	Percentage
>50 Score	46	63.88
<50 Score	26	36.12

Out of total 46 patients score more than 50 & remaining 26 patients score less than 50.

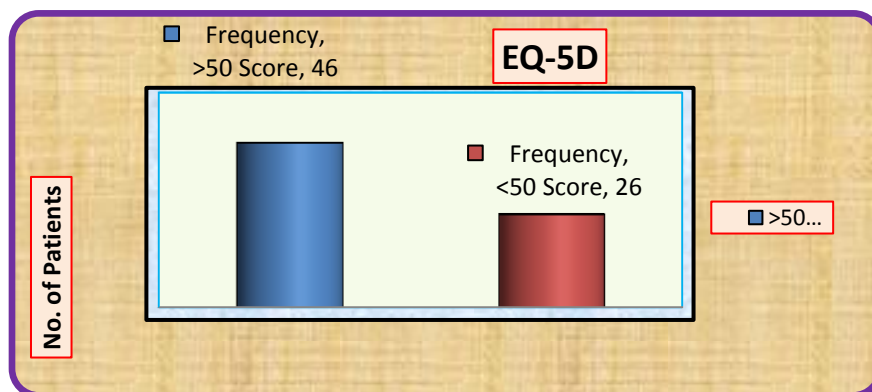


Table no.5 - comparison of QOL between patient who received physiotherapy rehabilitation & who didn't according to WOMAC.

Groups	Number of Patients	Quality of Life(WOMAC)			
		<50 score		>50 score	
		Freq	Percentage	Freq	Percentage
Physiotherapy Taken	48	37	77.08	11	22.92
Physiotherapy not taken	24	8	33.33	16	66.67

➤ Out of 48 patients who received physiotherapy rehabilitation protocol 37 patients had good quality of life & Quality Of Life of only 11 patients were found to be fair.

➤ Out of 24 patients who didn't received physiotherapy rehabilitation protocol quality of life of only 8 patients were good & 16 patients quality of life were fair

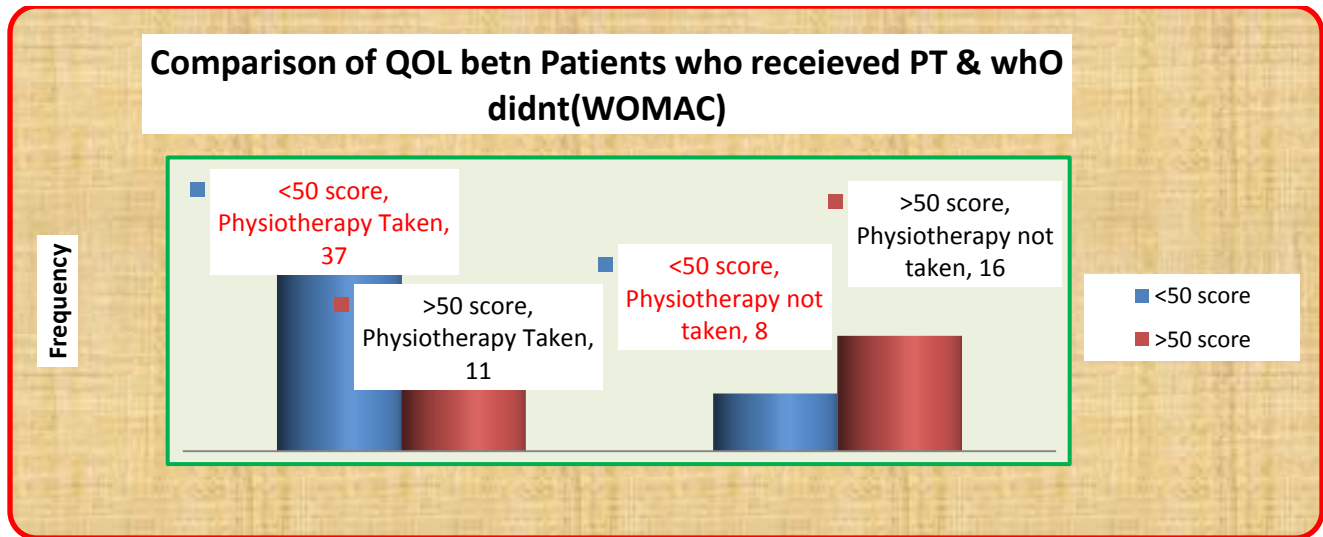


Table no.6 - comparison of QOL between patient who received Physiotherapy rehabilitation & who didn't according to EQ5-D.

Groups	Number of Patients	Quality of Life(EQ-5D)			
		<50 score		>50 score	
		Freq	Percentage	Freq	Percentage
Physiotherapy Taken	48	11	22.92	37	77.08
Physiotherapy not taken	24	15	62.50	9	37.50

➤ Out of 48 patients who received physiotherapy rehabilitation protocol 37 patients had good quality of life & Quality Of Life of only 11 patients hampered.

➤ Out of 24 patients who didn't received physiotherapy rehabilitation protocol quality of life of only 9 patients were good & 15 patients quality of life were hampered.

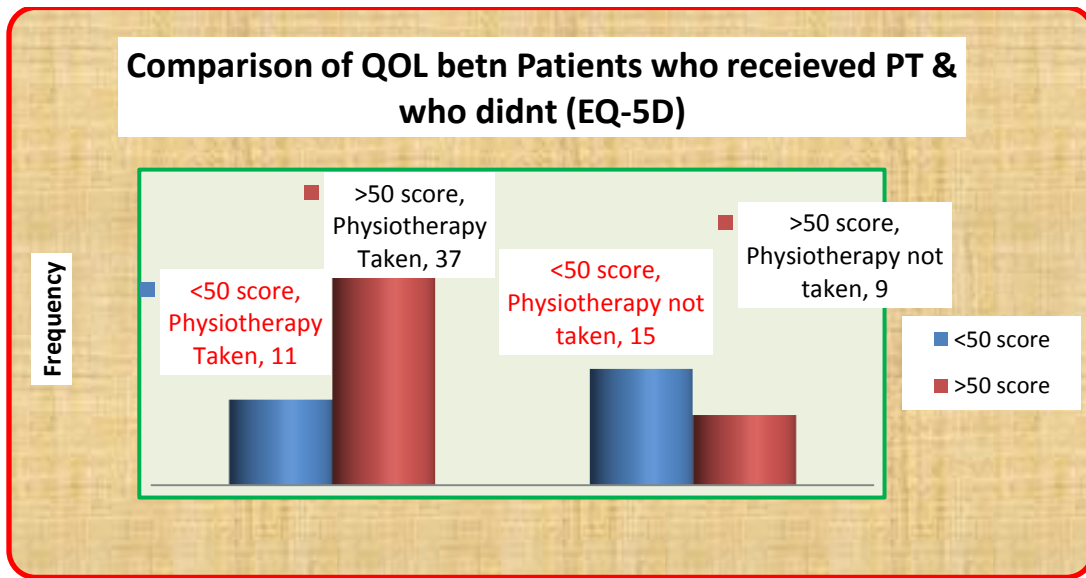


Table no. 7- Chi-square test for association between physiotherapy taken and quality of life.(WOMAC)

Physiotherapy	Quality of Life (WOMAC)		Chi-square	Degree of freedom	P value	Significance
	<50	>50				
Physiotherapy Taken	37	11	13.06	1	0.000	Significant
Physiotherapy not taken	8	16				

- The chi square test statistic value was 13.06, the P value of the test with 1 degree of freedom was 0.000.
- P value is <0.05 concludes there is significant association between physiotherapy taken and quality of life.

Table no. 8 - Chi-square test for association between physiotherapy taken and quality of life. (EQ-5D)

Physiotherapy	Quality of Life (EQ5D)		Chi-square	Degree of freedom	P value	Significance
	<50	>50				
Physiotherapy Taken	11	37	10.86	1	0.001	Significant
Physiotherapy not taken	15	9				

- The chi square test statistic value was 10.86. The P value of the test with 1 degree of freedom was 0.001.
- P value is <0.05 concludes there is significant association between physiotherapy taken and quality of life.

DISCUSSION

This study evaluate the quality of life of total knee replacement patient and its correlation with physiotherapy.

A total knee replacement is surgery to remove damaged portions of those three bones and replace them with metal and plastic. A long vertical incision is made down the center of the knee, which

is disruptive to the quadriceps muscles. [10] After TKA surgery, the muscles surrounding the knee and hip become weak and require exercises prescribed by a physical therapist to improve functional performance and independence.

The quadriceps muscles are the thigh muscles above the knee and serve as the primary knee stabilizer. These muscles are weak after a total knee replacement because of the direct trauma from the surgical incision, but also because swelling in the joint signals muscle inhibition, or shutdown, as a protective mechanism.

A study published in the February 2011 issue of "Physical Therapy" reports that improving hip muscle strength after a total knee replacement is crucial in returning to functional independence.

After a total knee replacement, physical therapy is important to improve the knee's range of motion and the lower extremity muscle strength. A major orthopedic surgery will globally affect the surrounding musculature, but the focus of therapy should be on the quadriceps and hip abductor muscle groups. Reduction of inflammation is another goal during the first few weeks after surgery to decrease pain and improve the performance of the quadriceps muscles.

The loss of quadriceps strength after TKA has been studied extensively and is a result of a combination of insults, including preexisting quadriceps weakness characteristic of knee OA, surgical trauma during TKA, and age-related limitations in the recovery of muscle function

Among the various factors evaluated that were associated with the concept of QOL, one of the factors most frequently seen was function. In an observational study, Gawel et al. found that there was a significant improvement in knee function among the patients when they used the leg for walking, going up stairs, standing and turning. [13]

With regard to pain, improvements have been observed in several studies. The positive effects from surgery can be observed as early as one, four or six weeks after the operation and have been seen to last for up to seven years after the surgery. [14] The improvement in pain has a close correlation with achieving better QOL scores, but if pain continues to be present in postoperative assessments, the possibility of attaining good results becomes lower.

Our results showed that there was significant improvement in the parameter of quality of life of total knee replacement patients who received physiotherapy.

Statistically our study showed that out of total sample size i.e.72, according to the outcome of measure WOMAC and EQ-5D score, 46 (63.88%) patient had good quality of life and 26 (36.12) had poor quality of life.

Out of total sample size 48 Patient took physiotherapy out of which 37 (77.08%) patient had good quality of life and 11 patient had poor quality of life and 24 patients who didn't take physiotherapy rehabilitation protocol out of which only 9 patients had good quality of life and 15 had poor quality of life.

The correlation between physiotherapy and quality of life of TKA patients was proved with the help of Chi-square test. Statistic value of chi-square test was 13.06, the P value of the test with 1 degree of freedom was 0.000.P value is <0.05 concludes there is significant association between physiotherapy taken and quality of life.

The patient who took physiotherapy rehabilitation protocol had good quality of life as compared to who didn't received.

The factors that were negatively associated were obesity, advanced age, co-morbidities, persistence of pain after the procedure and waiting a long time for the operation and patient who discontinued physiotherapy after discharge from hospital. As surgical approach consists of quadriceps weakness which may result in decrease force generation in quadriceps may used to develop extensor lag and stiffness. As also ACL resected it affects dynamic stability of knee in post-operated TKA patients.

Physiotherapy rehabilitation programme rehabilitate the patients accordingly to the activities of daily of patients.

It includes isometric training, strength training, balance training, plyometric drills. So patient doesn't suffer from above complications who received physiotherapy rehabilitation protocol. Ultimately the quality of life improve after TKA.

CONCLUSIONS

TKA is a procedure that is capable of providing overall improvement in patient quality of life. The patient who received physiotherapy treatment after TKA seems to show a significant improvement in quality of life. Since pain and function are the most important predictor of improved quality of life and also better dynamic balance as compared to patient who didn't received physiotherapy protocol. Other factors that were positively correlated with better QOL after TKA included good mobility, less claudication, better quality of sleep, physical activity practiced before the procedure, adequate social and familial support and fulfillment of patients' expectations regarding the results from the surgery.

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