

Difference of Functional Outcome Measurements between Total Knee Arthroplasty and Knee Amputation

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국문 요약

슬관절 절단과 슬관절성형술간의 기능 수행 측정

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임상 결과의 측정에서 새로운 관점을 갖는 것은 중요하다. 의료 재활은 심리적 측정의 질들(표준화, 신뢰도, 타당도)에서 충분한 노력에 수행되어지지 않아 왔기 때문에 환자와 프로그램 사이에 일반화된 기능적인 평가 범위가 부족하다. 장애의 적절한 측정을 위한 요구는 기능적인 상태에서 변화들을 알리고 치료의 필요성을 평가하고 치료를 계획하고 결과를 예측하고 보상 방법을 측정하기 위한 환자의 치료와 임상 연구에서 모두 나타난다. 세계적으로 사용되어지고 있는 기능 평가 도구인 FIM 으로부터 이 연구는 신체적 측정의 기대되어진 것에 유사한 비율로 기능적 평가 측정들을 구성한다. 노인 재활에서 기능적인 결과의 측정은 중요한 몇 가지 점이 있다. 첫째는 접근에 기초한 기능적인 결과는 치료 목표 설정에 필요하다. 둘째는 도구는 기능적인 향상을 예상하는데 유용해야 한다. 셋째는 기능 평가는 적절한 타당도와 신뢰도와 함께 고려되어야만 한다. 넷째는 다른 기능적 도구들이 함께 평가되어야 할 필요가 있다는 것이다. FIM의 목록의 어려운 점들은 손상을 입은 집단에서는 다소 다양하다. 가장 중요한 부분이기 때문에 하나의 운동 범위는 요통과 화상을 입은 환자를 제외한 모든 손상을 입은 집단들에게 적용되어 질 수 있다. 기능의 운동과 인지적인 면은 구분되어지는 것이 중요하였고 분리되어져서 치료되어 졌다. 어려운 목록들은 손상을 입은 집단에서 다양하였고, 다양한 손상의 종류의 독특한 영향을 반영하였다. FIM은 기능적인 장애를 측정하기 위해 고안되어진 또 다른 도구이다. 그리고 다른 것들은 의료 재활을 위한 국제적 자료 체계를 만들기 위한 것이다. FIM의 목적은 의료 재활의 결과를 확인하고 장애의 정도의 측정을 포함한다. FIM은 7 가지 수준에서 사회적 인지, 의사 소통, 이동, 움직임(mobility), 소변 관리, 자조 활동을 평가한다. 범위는 총체적 도움의 비율로부터 완전하게 독립적인 것까지의 범위이고 도움, 감독, 도구의 사용의 범위를 고려한다. 27,669의 환자를 조사한 최근 검사 기록들은 FIM이 움직임(motor)과 인지 기능을 평가하는 것이라는 것을 보여준다(Hinemann, 1993). FIM의 저자들은 자료가 프로그램 평가의 시도에서 즉각적으로 적용 할 수 있기를 기대한다. FSI은 어떤 과제 of 수행에서 어려움에 관계된 정보를 제공하는 것을 나타내고 과제를 수행하기 위한 환자를 위한 변경된 전략들을 발달시키기 위해 노력하는 임상가들에게 유용할 수 있다. 두 도구 모두는 전통적인 범위들보다 고관절 골절을 동반한 장애의 좀더 정확한 정보를 모으도록 할 수 있다. 고찰된 모든 연구의 결과들은 골절 후에 남아 있는 잔여 장애의 중요한 수준을 강조한다. 골절 전의 보행으로 회복된 사람은 매우 드물었다. 대부분은 기본적인 움직임 혹은 옷입기, 개인 위생에 관계된 활동들에서 의존적이었다. 많은 사람들은 사회에서 활동을 할 수 없었다. 장애의 적절한 측정의 요구는 환자 치료와 기능적인 상태에서 변화를 알고 치료의 요구도를 측정하고 치료를 계획하고 결과를 예상하고 보상 수단을 결정하는 임상적 연구에서 모두 나타난다. 물리치료 분야는 분야의 다른 영역에서 기능적인 결과를 충족시키고 발달시키는 것이 필요하다.

With the rise of managed care as a primary form of health care delivery in the US, Functional Outcome Measurement has become an important issue in the physical therapy profession. Measurement is a crucial consideration for those who require accurate and appropriate assessment tools (Kane, 1981).

Measurement of functional status is the most useful overall indicator of therapeutic outcome to assist those who care for elderly patients, but there are significant challenges to functional outcome assessment in this population. First, they are subject to multiple diagnoses, and second, the physical, mental, and social well being of an elderly individual are very closely interrelated.

The purpose of this case report is to compare different measurement outcome using Functional Independence Measurement(FIM) tool. About 60% of rehabilitation facilities in US use this tool (Granger, 1986). This has to be a performance-oriented, comprehensive tool that assess factors significant to functional outcome in orthopedic patients.

Case report I. TOTAL KNEE ARTHROPLASTY

Introduction

Total knee arthroplasty is often the best therapeutic choice provided that other medical complications do not supersede the surgical procedure especially when the patient with an osteoarthritis knee is functionally disabled by pain.

Mrs. Gill is a 68 years old lady who was

admitted 5/12/97 for right total knee replacement, reconstruction medial collateral ligament and hardware removal. She is considered by some to be an end-stage procedure for the osteoarthritic knee.

The approach to rehabilitation of total knee arthroplasty patients should be directed at functional improvement of strength, balance, and proprioception(Barrack, 1984). Mrs. Gill is a good candidate to diminish her pain and to improve her activity level. She is very interesting case in terms of her patellofemoral dysfunction which is the most common source of dissatisfaction following total knee arthroplasty.

Methodology

PAST MEDICAL HISTORY: She has history of osteoarthritis and has been treated with different nonsteroidal antiinflammatory medications (NSAIDs). She had history of gallbladder surgery and severe degenerative joint disease of the knees. She has a significant deformity of both knee joints present. Flexion is only about 35-40 degrees. Pulses are good. Movement of the ankles is also restricted; flexion is about 20 degree; extension about 25-30 degrees. Hip joint movement shows abduction rotation slightly restrictive with diffuse osteoarthritis.

HISTORY OF PRESENT ILLNESS: The patient was initially seen in 1993 with problems in terms of limitation of function and joint line tenderness in her right knee. She returned to the office on 1-29-97 with increasing symptomatology. Twenty years ago, she had a surgical procedure (medial collate-

ral ligament reconstruction) done for her knee after a motor vehicle accident.

INTERVIEW DATA (Prior Surgery): The rehabilitation team was updated on her functional and social status prior to her knee surgery. PT reports that she has poor tolerance and endurance and has only been ambulating 20 feet x 2 with a standard walker and mod assist. Also, the patient's quality of ambulation is not very good and she is only bending from 30-40 degrees active and assistively. OT reports that patient has been dressing with moderate assist and min assist for Upper Extremity. Pt demonstrated decreased safety and awareness of knee protocol and is very delayed in her responses. Nursing reports that patient's hemoglobin is still low and is believed that this is directly contributing the patient's slow progress in therapy. Patient's incision is clean and dry.

Physical Examination and Data (Post Surgery):

OBJECTIVE:

Pt is slow to respond to questions and commands. Pt's hemoglobin is 6 and is to receive blood following therapy. Patient's right knee examination indicates a marked valgus deformity of approximately 30 degree. She complains of severe pain and with the deformity becoming increasingly symptomatic. Review of x-rays shows complete loss of the articulating surface laterally with significant patellofemoral and medial joint line disease as well. She is status post traumatic injury by history from motor vehicle accident and a staple is noted in the medial aspect of the tibial plateau, probably secondary to a high tibial osteotomy.

ROM: Within Functional Limits with the exception of the right knee(passive ROM 40 degree).

General Strength: Right UE: 5/5. Right LE: 2/5. Left LE: 5/5.

BALANCE:

Sitting: Good. Standing: Good-

TRANSFERS:

Supine to Sit: Min+ of one, Sit to Supine: Min+ of one to two, Sit to Stand: Min of two, Comments: Pt with no complaints, She did well for her first time up. Intolerance of light headedness reported.

GAIT: Ambulation: 10feet x 2 with min assistance of two and standard walker, toe touch to partial weight bearing. Stairs/Incline: Assist was bilateral min assist. Adherence to Weight Bearing Status: Yes. Comments: Stairs: Safety Awareness: Questionable. Endurance: Poor secondary to low hemoglobin.

ASSESSMENT: Pt has a good rehabilitation potential to reach her treatment goals. However, she has a difficulty of transfers, ambulation, strength, endurance, and safety awareness. She also complains of pain on right knee.

Potential Placement: Skilled Nursing Facility

Patient/Family Goals :Unable to state at present time.

PT STG: (1) ROM: 80-90 degrees flexion, -5 to-10 extension.

(2) Strength: Sufficient to transfer and ambulate with very min assist of one. Right

knee strength 3/5.

(3) Balance: Sitting: maintain with mod resistance. Standing: maintain with SBA.

(4) Transfers: minimal of one person.

(5) Gait: ambulation: standard walker and very min of one. Endurance: 30feet x 2. Safety awareness: Touch to partial WB.

(6) Exercise Instruction/Home Exercise Program: TK protocol. Patient/Family Education: TK protocol, ambulation, transfers and safety.

LONG TERM FUNCTIONAL OUTCOME
GOAL : Return to patient's apartment independent in ambulation with walker, independent ADLs with use of adaptive equipment / techniques as needed.

PLAN: See BID to work towards above stated goals. Treatment Plan: TK protocol, gait training, transfer training, and education. Potential to Reach Goals: Good. Comments: Duration: 1-2 weeks BID. Physician notified of care plan.

Outcome

FUNCTIONAL INDEPENDENCE MEASURE (FIMS)

Levels of Function: 1. Total Assistance 2. Maximal Assistance
3. Moderate Assistance 4. Minimal Assistance
5. Supervision. 6. Modified Independence
7. Complete Independence

	A	P		A	P
Eating	(5)	(5)	Transfer Toilet	(2)	(6)
Grooming	(5)	(5)	Transfer Tub	(1)	(4)
Bathing	(3)	(6)	Locomotion	(1)	(5)
Dress Upper Body	(5)	(6)	Stairs	(1)	(2)
Dress Lower Body	(5)	(6)	Comprehension	(7)	(7)
Toileting	(3)	(7)	Expression	(7)	(7)
Bladder	(1)	(7)	Social Interaction	(6)	(6)
Bowel	(6)	(6)	Problem Solving	(7)	(7)
Transfer Bed	(5)	(6)	Memory	(7)	(7)
A=Admit Score [P=Projected D/C Score] TOTAL			(77)	(105)	

Discussion

Functional progressions for total knee arthroplasty should be utilized and individualized to meet the needs of the patient. Mrs. Gill typically has a history of progressive functional disability over a period of 20 ye-

ars. Since she has had reconstruction medial collateral ligament and hard ware removal, she is one of case who is dissatisfied following total knee arthroplasty.

Patellofemoral dysfunction occurs commo-

nly in total knee arthroplasty patients owing to the joint trauma and selective inhibition of quadriceps muscles(Cameron, Fedorkow, 1982), in particular the Vastus Medialis Obliquus muscle(VMO). Attention should be directed to stretching of tight lateral structures and to reeducation of the quadriceps muscles.

Mrs. Gill needs to be augmented with biofeedback training to increase muscle strength of the VMO. Leg extension exercises tend to load the patellofemoral joint and should be avoided. A thorough assessment of lower extremity mechanics is necessary in order to identify static and dynamic factors that contribute to the patients dysfunction because the knee joint is magnificently suited by virtue of its arthrokinematics.

Case report II. Right below knee amputation

Introduction

The geriatric lower extremity amputee is faced with many obstacles as they relate to normal aging and the cause of amputation. Providing the amputee with a prosthesis and training can greatly improve the psychosocial aspect of the geriatric patient. However, the achieving the conceptual clarity is magnified with an elderly group. Under such conditions, the assessment is sometimes based on hypothetical situations: the instrument assesses capability to perform the given task if the opportunity were present.

Mrs. Aguilar is a 74 year old widowed female with pertinent medical history of NID-

DM, HTN, and COPD, who underwent a right below knee amputation 10 months ago secondary to a gangrenous right heel wound. Mrs. Aguilar underwent rehabilitation in a rehabilitation hospital, but was discharged after a brief period of treatment due to lack of progress. The patient reports that she was able to get around her small home with the close assistance of her husband who has since passed away suddenly. Being without assistance at home and after experiencing several near-falls, she spent most of her day in a recliner chair, except when a niece brought meals in the morning and evening. She was hospitalized with UTI and pneumonia 1 month ago, and is now admitted to a SNF unit for 20 days of HMO approved therapy. She has recently been diagnosed with CHF. It is anticipated that she will remain in the facility at the ICF level of care. Her insurance will not pay for therapy beyond the 20th day. She has no other financial source to pay for therapy service. Her niece remains available and involved.

Methodology

Mental status : The patient is oriented but sometimes confused about her medical condition and prognosis. She is generally eager to become a participant in the activities of the facility.

Mobility status: The patient demonstrates good standing balance, but only fair walking balance due to 25 degree right knee flexion contracture. She is not independent with a walker-she requires minimal assistance for balance and occasionally minimal assistance for support during weight bearing on the

right, especially when she begins to fatigue. She fatigues quickly after gait of more than 40 feet. She is able to transfer from her bed to wheelchair or bedside chair with minimal assistance for support through the first half of the standing movement. She requires minimal assistance to move from sit to supine, and is independent with all other bed mobility skills. During all mobility skills in standing, she frequently voices fear of falling and requests that the caregiver hold her tight.

Assessment: This patient is was previously mobile in her home with supervision and close assistance, who now presents with a decline in function secondary to recent hospitalization for UTI and pneumonia, and appears appropriate for skilled physical therapy intervention to return to her prior level of function. It is not anticipated that this patient will make spontaneous gains in mobility as she is significantly compromised by COPD and fear of falling. Her condition is of a level of complexity that necessitates physical therapy intervention to ensure a timely, safe recovery. Considering that this patient will only receive a maximum of 20 days of the rapy due to financial restrictions, establishment of a functional maintenance program is necessary to enhance functional skills that are gained by the end of the approved treatment period.

Treatment Plan: Physical Therapy treatment 5x/week with treatment consisting of (1) therapeutic exercise, (2) bed mobility training, (3) transfer training, (4) gait training, (5) establishment of functional maintenance program.

Treatment Goals: In 20 days, the patient will be performed sit to supine in bed, and transfer bed to bedside chair independently 100% of the time in 2 consecutive days, to allow freedom of movement in her room.

- (1) Gait: ambulate with wheeled walker 75 feet with right prosthesis in place with at most contact guard assistance.
- (2) Demonstrate right knee extension to -10 degree actively 80% of the time in 2 consecutive days, to enable safe, functional transfers and gait.
- (3) Perform right knee range of motion daily independently
- (4) Participate in daily functional maintenance program to ensure enhancement of functional skills

INTERIM PHYSICAL THERAPY EVALUATION(After 1 week)

- (1) Transfers- the client is able to perform sit to supine independently 100% of the time. She requires contact guard during transfer, bed to bedside chair, primarily because she voices fear of falling during all standing tasks. Staff and family have been trained in providing appropriate levels of assistance during transfers.
- (2) Tight knee range of motion-the client continues to exhibit a 25 degree flexion contracture. She frequently states that she is too tired to perform her range of motion exercises.
- (3) Gait- the client ambulates with a wheeled walker up to 45feet with complaints of fatigue and shortness of breath. She has ex-

perienced several events when her right knee gave way, most recently following a therapy session. She requires contact guard assistance during ambulation- at times requiring up to minimal assistance for support during episodes as described above.

Assessment:

This patient is making moderate gains with mobility, particularly with skills that do not require standing or prolonged exertion. Her response to exercise and activity is consistent and appropriate for an individual with her diagnoses. She has difficulty complying with her daily ROM program if left to perform it independently. She continues

to require skilled intervention, with progression as appropriate for her medical condition. It is evident that daily participation in a functional maintenance program will be highly important if this patient is to remain reasonably independent following the end of the treatment period. Staff participation and support of this program will be essential for this client.

Plan: Continue with treatment with goals as stated in initial evaluation. Complete staff and family training in functional maintenance program by 20th day. Address issues of compliance with client, family, and medical social worker as appropriate.

Outcome

FUNCTIONAL INDEPENDENCE MEASURE (FIMS)

- Levels of Function: 1. Total Assistance 2. Maximal Assistance
 3. Moderate Assistance 4. Minimal Assistance
 5. Supervision 6. Modified Independence
 7. Complete Independence

	A	P		A	P
Eating	(7)	(7)	Transfer Toilet	(2)	(6)
Grooming	(4)	(7)	Transfer Tub	(2)	(4)
Bathing	(2)	(6)	Locomotion	(4)	(5)
Dress Upper Body	(4)	(6)	Stairs	(2)	(6)
Dress Lower Body	(4)	(6)	Comprehension	(7)	(7)
Toileting	(3)	(7)	Expression	(7)	(7)
Bladder	(1)	(7)	Social Interaction	(6)	(6)
Bowel	(5)	(6)	Problem Solving	(7)	(7)
Transfer Bed	(3)	(6)	Memory	(7)	(7)

A=Admit Score [P=Projected D/C Score] TOTAL (77) (113)

Discussion

Mrs. Aguilar is admitted to SNF for 20 days of HMO approved physical therapy. She is faced with unclear mental status and limited source of achieving conceptual clarity. Successful rehabilitation of the geriatric patient is most satisfying for all members of the rehabilitation team. Although geriatric patient is present challenge, improvement in the quality of their lives is the reward both the patient is and the rehabilitation team receive as a result of careful planning and efforts directed toward individual needs.

Mrs. Aguilar's assessment needs to be performed based on hypothetical situations. According to Moseley(1994), the six steps approach that uses functional improvement to evaluate the quality of geriatric population.

First step is the classification of patient rehabilitation potential. Since Mrs. Aguilar needs to be classified by the rehabilitation related to the medical diagnosis because the functional improvements vary by diagnosis (Harada, 1993). She may be diagnosed with debility secondary to CHF. She also can be grouped within diagnoses by individual and social characteristics that predict functional improvement. Stinman(1993) indicated that factors other than medical diagnosis predict improvement.

Second, complications that could interfere with goal attainment need to be identified. She underwent a right below knee amputation secondary to gangrenous right heel wound. Also, she was hospitalized with UTI and pneumonia 1 month ago. These are critical factors that could delay her progress.

Third, functional goal attainment thresholds for patients with the same rehabilitation potential and goals need to be set. Thresholds represent the percentage of patients who are expected to meet particular goals. This involves professional judgement and trial and error.

Fourth, a comparison of her goal attainment with the thresholds is needed.

Fifth, the antecedent rehabilitation process of patients who did not meet thresholds needs to be investigated.

Sixth, opportunities to improve care at an appropriate care plan meeting needs to be discussed. The team members must be decided that both problems present opportunities to improve care and developed an action plan.

Another important point is the limitations of functional outcome tools for those who have cognitive impairment groups. As I discussed case I, Mrs. Aguilar has same score of FIM with Mrs. Gill who has right knee arthroplasty.

FIM item difficulties vary somewhat across impairment groups. The FIM assesses self-care, sphincter management, mobility, locomotion, communication, and social cognition on a seven-level scale. For the most part, one motor scale can accommodate all impairment groups, except patients with back pain and burns. Motor and cognitive aspects of function were important to be distinguished and were treated separately. Item difficulties varied slightly across impairment groups, reflecting the unique impact of va-

rious kinds of impairments.

Conclusions from two case reports

It is important to have new perspectives to the measurement of clinical outcomes. Medical rehabilitation lacks functional assessment scales with generalization across programs and patients because not enough effort has been expended on the psychometric properties of measures: standardization, reliability, and validity.

The need for adequate measurement of disability is apparent both in patient care and clinical research: for determining compensation, predicting outcome, planning placement, estimation care requirements, and indicating changes in functional status. From a nationally used functional assessment scale, the FIM, this study constructs functional assessment measures, with properties similar to those expected of physical measurements.

There are a few important points to measure functional outcome in geriatric rehabilitation.

(1) The functional outcome based approach is required goal oriented.

Moseley(1994) provide an application of the six-step approach involves several issues. The literature provides little guidance on the use of rehabilitation potential, complications and setting thresholds in relation to individual goal attainment(Stineman, 1993). Granger (1990) have developed a system to classify rehabilitation patients by potential for outcome-based program evaluation, but this system is not designed around individual goal

attainment.

To implement the six-step approach, staff initially need to rely on professional judgment and trial and error. This entails potential validity problems. For example, rehabilitation potential classifications may not be the true classifications. Such validity issues can be dealt with two ways, one short term and the other long term.

(2) The tool has to be useful to predict functional improvement.

In the long run, rehabilitation potential characteristics should be analyzed statistically to determine whether they predict functional improvement. Characteristics that do not predict functional improvement should be eliminated. Patient complications should be validated in a similar fashion, i.e., analyzed to determine whether complications adversely affect outcomes. Validation should be ongoing because patient case-mix changes.

(3) It has to be considered the functional assessment with appropriate validity and reliability.

To be useful, functional measures must be constructed that have reliability and validity as well as clinical significance(Feinstein,1986). Reliability is the precision of measurement. Construct validity is concerned with whether the instrument measures the characteristic it purports to measure. Items should cooperate to support a single construct, and within that construct, they should be ordered in difficulty according to clinical experience.(Keith, 1984)

(4) It is necessary to consider to assess with other functional tools.

When I compare two cases which were TKA and BKA patients, the scores of FIM was same. However, it doesn't mean the same level of function between two groups.

FIM item difficulties vary somewhat across impairment groups. For the most part, one motor scale can accommodate all impairment groups, except patients with back pain and burns. Motor and cognitive aspects of function were important to be distinguished and were treated separately. Item difficulties varied slightly across impairment groups, reflecting the unique impact of various kinds of impairments.

The FIM is another tool designed to measure functional disability. And others to create a national uniform data system for medical rehabilitation. The purpose of the FIM include rating severity of patient disability and defining the outcomes of medical rehabilitation.

The FIM assesses self-care, sphincter management, mobility, locomotion, communication, and social cognition on a seven-level scale. The scale ranges from ratings of total assistance to complete independence and considers extent of assistance, supervision, and use of adaptive equipment. A recent examination of records from 27,669 patients demonstrates that the FIM yields measures for two fundamental subsets of items: motor and cognitive function (Heinemann, 1993).

The authors of the FIM expect that the data will have immediate application in qu-

ality assurance and program evaluation efforts. The FSI appears to provide information related to the persons difficulty in performing certain tasks and may be useful to the clinician who is trying to develop alternative strategies for the patient to accomplish a task. Both instruments can be used to gather a more complete picture of the disability that accompanies hip fracture than the more traditional scales.

The results of all the studies reviewed emphasize that a significant level of residual disability remains post fracture. Very few individuals appear to return to pre fracture ambulation; a majority of individuals are dependent in activities related to personal hygiene, dressing, or basic mobility ;and many individuals are unable to be active in the society.

The need for adequate measurement of disability is apparent both in patient care and clinical research: for determining compensation, predicting outcome, planning placement, estimating care requirement, and indicating changes in functional status. Physical therapy profession needs to develop and implement functional outcome in different are as of our profession.

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