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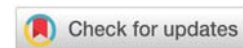
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Research Article

Functional progression in post-osteoporotic fracture: A case study

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Abstract

Introduction: Osteoporosis is characterized by a loss of bone mass along with alterations in its structure, with subsequent increase in bone fragility and susceptibility to fractures, ultimately reinforcing the importance of its prevention by the reduction of the risk of falling.

In this paper we propose to analyze the functional progression of a patient, integrated in a multidisciplinary program (TOMBO-Therapeutic Occupational Multidisciplinary approach to the Benefit of Osteoporosis), after an osteoporotic fracture.

Methods: Retrospective descriptive case-study of the first patient included in the TOMBO program. Data were gathered for Time Up and Go Test (TUGT), Sit to Stand in 30 secs. (SS-30), 10m Walking Test (10m-WT), Barthel Index (BI) and Morse Scale (MS) in 3 different moments: baseline (ward, at discharge: M0), 2 and 6-months after surgery (multidisciplinary appointments: MD2, MD6).

Results: TUGT- M0: no capability; MD2: 18,8 secs.; MD6: 8 seg. SS-30 - M0: no capability; MD2: 9 stands; MD6: 10 stands. 10m-WT - M0: 30 secs.; MD2: 13 secs.; MD6: 8 secs. BI - M0: 60; MD2, 80; MD6: 100. MS - M0: 85, MD2: 50; MD6: 15.

Conclusion: This case-study revealed us that the first patient admitted to this innovative multidisciplinary approach improved some functional parameters (level of dependency and risk of falling) as shown by its favorable progression on the tests and scales applied.

Introduction

Osteoporosis is a “systemic skeletal disease characterized by the loss of bone mass and impaired micro-architecture of bone tissue, with subsequent increase in bone fragility and susceptibility to fracture” [1].

At advanced age, most fractures result from low-impact events, ultimately reinforcing the importance of its prevention by the reduction of the risk of falling [2]. Current literature points out the benefit of implementing exercise programs

along with security home measures, as a way to contribute to decrease this risk [3,4].

Taking this into account, and filling up an existing gap in the diagnosis and treatment of osteoporosis, with special focus on secondary prevention, we develop TOMBO program - Therapeutic Occupational Multidisciplinary approach to the Benefit of Osteoporosis. Its innovative feature is that congregates a multidisciplinary team of Rheumatologists, Rehabilitation Nurses and Nutritionist. This multidisciplinary approach adds value to treatment and monitoring of these

patients, focusing on health literacy, fall-risk assessment, a rehabilitation program, a nutrition care plan, alongside with medical treatment.

Assessment tools used in different moments of the rehabilitation process allow us to gather precise data on functional progression as well as risk of falling. To this respect, multiple instruments have been created and used along the years but we selected those that perform the best to this end [5].

This well-planned structure optimizes existing resources and simultaneously improves healthcare quality of services [6,7].

Methodology

A retrospective and descriptive case study analysis was performed. Inclusion criteria for TOMBO program are patients aged <90 years, with low-impact femur fracture and with potential for mobility rehabilitation after surgery.

We applied the following measuring scales and instruments: Time Up and Go Test (TUGT), Sit to Stand in 30 seconds (SS-30s), 10-meter walking test (10m WT), Barthel Index (BI) and Morse Scale (MS). These tests were performed at baseline (inward, at discharge: Mo) and afterwards at 2 an 6-month after surgery (at multidisciplinary appointments: MD2, MD6).

Development

This case-study illustrates the benefits of a multidisciplinary approach, highlighting the role of the rehabilitation nurse specialist in it, with the first patient enrolled in TOMBO program. The time period took place between September 13th 2019 and June 8th 2020. Every ethical aspects, including an informed consent, as proclaimed by the last revision of Helsinki Declaration were respected and gathered.

Male patient, aged 83 years, admitted to the emergency setting with functional impairment of the lower right limb. Diagnostic images (CT and X-ray) confirmed sub-capital femur fracture.

The patient was well self-aware and oriented, previously independent in all activities of daily living, including walking. Regularly medicated with Acetylsalicylic acid, Lisinopril and Hydrochlorotiazide and pravastatin. No known smoking nor alcoholic habits and allergies.

Objective examination: weight 70 kilograms, height 1.67meters, dorsal kyphosis, with regular neurological and rheumatological evaluations.

Admitted in the Orthopedics ward on September 4th 2019, was kept with limb traction of 3kg, without urocirculatory complications prior to surgery. On September 9th was submitted to cemented bipolar hemiarthroplasty of the right hip, without peri or post-operative complications. Control x-ray showed well implanted prosthesis.

Passive and active-assisted / active mobilizations of the

intervened limb were initiated 24 hours after surgery, as well as verticalization and 3-point gait training with walker and 3rd person support.

Inclusion criteria for TOMBO program were met. The program was readily initiated by the rehabilitation nursing staff, which engaged with a health literacy session (included hand-delivery of a “Fall Prevention and Osteoporosis” flyer) and applied evaluation scales abovementioned.

After hospital discharge, the patient was then monitored in moments MD2 and MD6. In both these moments the rehabilitation nurse approach consisted in the projection and visualization of videos allusive to osteoporosis and fall prevention, in the demonstration and train-assisted musculoarticular exercises for the lower and upper limbs (active, active-assisted and resistive) and in the gait training with the level of support needed for the patient’s ability *in casu*. Another flyer was hand-delivered “Osteoporosis – Exercise Guide”, in order to ensure exercise plan continuity at home. Also, evaluation scales were reapplied as planned.

Results

This patient improved his scores in every test performed, reflecting a positive and favorable progression in physical ability and functional independence and lower risk of falling, as expected. At discharge he was not able to perform TUGT nor SS-30s.

Results are summed up in Table 1.

Test/Scale	Timing		
	MO	MD2	MD6
Time Up and Go Test (seconds)	0.0	18.8	8.0
Sit to Stand in 30 secs (number of stands)	0	9	10
10-m walking test (seconds)	30.0	13.0	8.0
Morse Scale	85	50	15
Barthel Index	60	80	100

Discussion

The first patient who joined the TOMBO Program, and who, consequently, benefited from an innovative approach, in which a multidisciplinary team sought after by Rheumatologists, Nutritionists and Rehabilitation Nurses over a period of 6 months after orthopedic surgery, there was a clear improvement in functional independence and a decrease in the risk of falls, as evidenced by the favorable evolution of tests and scales.

It should be noted that during the hospitalization period it was not possible to carry out the Sit to Stand and Time Up and Go Test tests, an aspect that we believe to be associated with several factors, namely post-surgical stress, anemia (hypovolemia), previous physical condition and short hospital stay.

However, in the following assessment moments, there was a gradual improvement in the results of the application of these



scales, which translates into an improvement in the patient's physical performance, which is expected in the time horizon of the assessment, associated with the presence of bone callus, as required by the literature.

In this approach, through the optimization of existing resources, an intervention was developed at the level of the implementation of a rehabilitation / exercise plan, a nutritional care plan, and a pharmacological therapeutic plan for osteoporosis / secondary prevention, which came to add value to the treatment and accompanying thus, improving the quality of health services provided.

Conclusion

The present study revealed that the patient who suffered an osteoporotic fracture and who was included in the TOMBO Program benefited from an innovative and multidisciplinary approach, in which the Rehabilitation Nurse had a relevant role in the different moments of implementation (hospitalization and multidisciplinary appointments), having presented an improvement in functional independence and a decrease in the risk of falls, reflected in the favorable evolution of the tests and scales applied.

We suggest that, in the future, it should necessarily be implemented in larger populations with similar characteristics, and consequently study its impact.

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