

Proceedings

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“Ageing and its implications”

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PHYSIOTHERAPEUTIC DIAGNOSTIC APPROACH AND REHABILITATION OF ELDERLY FRAIL PATIENTS

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The rising of the life expectancy in Western civilization, during the past decades, has led to the development of the frailty syndrome. Frailty, is a serious medical condition that is associated with that explosive increase of the number of elderly people, and is the main point of interest for geriatrics. Been given the characterization of a ‘geriatric condition’, the frailty syndrome concerns mainly individuals that are experiencing their third stage of life (65 and older) and is associated with deficiencies in homeostatic mechanisms, as well a steady decline of several crucial functions of the human organism. The trade-mark of the syndrome is a state of increased susceptibility to endogenous, as well exogenous stress factors. Frailty syndrome has successfully been named as a central point between the states of independency and morbidity and has been associated with cases of disability, increased risk of falls, hospitalization and other comorbidities.

A quite difficult task for today’s health practitioners and researchers, is the finding of a definition for that geriatric syndrome, yet alone the intervention as a whole (diagnosis and rehabilitation). There is a state of confusion regarding frailty which leads to many more definitions and theories, while at the same time all these theories will lead to unsuccessful interventions. Among those definitions and indexes, the ones from Linda P Fried and Dr. Kenneth Rockwood are the most used from the Physiotherapy community.

Linda P. Fried and her team, understanding that the absence of a definition for the frailty syndrome is a major obstacle in the intervention tried to ‘build up’ a phenotype

for the frail patient. They proposed a model, a phenotype that is characterized by at least three of the following pathologies:

- Weakness
- Slow walking pace
- Decreased physical activity
- Low energy
- Loss of weight

Dr. Kenneth Rockwood and his team, tried to give an insight to the frailty syndrome, taking in consideration the dynamic and multifactorial nature of that pathological state. For that reason, having in mind strong geriatric focus points such as cognitive function, mobility etc., they proposed the theory of deficit accumulation. According to an index they presented to the scientific community incorporating nine points of focus, the more deficits a patient had the more frail he or she was.

Having set the ground for the diagnosis of the frailty syndrome, the physiotherapist continues performing more examinations in order to identify other pathological states of the patient. For that reason, the physiotherapeutic-initial kinesiology examination should be the following:

- Examination of the posture of patient
- Palpation of the associated bone structures and musculature
- Evaluation of the range of motion in the joints
- Examination of the muscle strength as well muscle length
- Neurological examination
- Examination of the balance of the patient
- Anthropometric examination

The diagnosis is one part of the physiotherapeutic intervention. The other part has to do with the therapeutic plan, what is the physiotherapist going to do now that he/she has acquired the needed information. The physiotherapist has to make a therapeutic plan and set

some goals for the patient according to the findings of the initial examination. In every aspect the physical therapist, has to respect the needs and the wants of the patient in order to establish a healthy relationship that will lead to better results.

IMAGING EVALUATION OF COMBINED OSTEOPOROSIS AND SARCOPENIA

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Osteoporosis is a systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to an increase in bone fragility and susceptibility to fractures. Sarcopenia is a combination of muscle mass loss and muscle function deterioration, attributed either to ageing (primary sarcopenia) or to other factors (secondary sarcopenia). Taking into account the frequent co-existence of low bone density and low muscle mass in the elderly, as well as the common pathophysiological pathways resulting in the two conditions, the terms "osteosarcopenia", "sarco-osteopenia" and "sarco-osteoporosis" have been proposed to describe the combined forms of these diseases.

As the ageing population increases worldwide, the prevalence of these two diseases is also on the rise, thus becoming a concern for the welfare of patients and the health industry.

Combined forms of osteoporosis and sarcopenia are classified into primary – related to old age, and secondary – due to factors which simultaneously influence bone and muscle tissues. The secondary forms are caused by endocrinological, neuromuscular, or nutritional disorders, other chronic diseases, muscle disuse, or zero-gravity conditions. Clinical syndromes which overlap with combined osteoporosis and sarcopenia are osteosarcopenic obesity, frailty syndrome and cachexia.

It has been shown that the presence of osteoporosis and sarcopenia increases the risk of fracture and overall mortality and morbidity of patients. Furthermore, coexistence of these conditions with other chronic diseases may reduce overall survival.

The role of imaging on combined forms of osteoporosis and sarcopenia comprises the following: screening, diagnosis, disease severity evaluation, follow-up, treatment efficacy evaluation, imaging of the functional muscle-bone unit, and complementary tests (body composition – fat tissue analysis, central nervous system imaging). Imaging tests may be performed either with the primary purpose of diagnosing and evaluating osteosarcopenia or imaging tests already performed for other reasons may be used to

extract relevant data. Through imaging osteosarcopenia can be assessed qualitatively and quantitatively. Moreover, advanced techniques – CT and MRI – may be used to evaluate bone and muscle quality as well as morphological, biochemical and biomechanical properties.

The imaging techniques used are: dual X-ray absorptiometry (DXA), computed tomography (CT, QCT, vQCT), magnetic resonance imaging (MRI, HR-MRI, pMRI), peripheral quantitative computed tomography (pQCT, HR-pQCT), and ultrasonography (US, QUS). The aforementioned imaging techniques are either central or peripheral, and may or may not emit ionizing radiation. Most widely used in clinical practice are DXA and CT, but MRI is a very promising technique, owing to its continuous evolution and gradually wider availability.

MUSCLE MASS PRESERVATION AND SARCOPENIA PREVENTION

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Ageing is associated with the progressive loss of neuromuscular function, often leading to progressive disability and loss of independence. Sarcopenia is defined as a disease (M62.84) characterized by progressive and generalized loss of skeletal muscle mass and strength, associated with a risk of adverse outcomes such as physical disability, poor quality of life and death. These negative outcomes affect mainly the aged subjects. The prevalence of sarcopenia may reach 30% for people over 60 and will increase in future in older European populations. After the seventh and eighth decades of life, the maximum strength decreases, on average, 20-40% in men and women in proximal and distal muscles. Sarcopenia occurs mainly in people with reduced physical activity; however, it occurs in people who remain physically active throughout their lives. Thus, although physical activity is necessary, physical inactivity is not the only contributing factor. Sarcopenia is a multifactorial process: some factors lead to the development of sarcopenia and its associated negative effect on physical function.

Although age-related, strength reduction per unit of muscle mass and muscle quality, may play a role, thus most of the muscle loss can be explained by reduced muscle mass. The loss of skeletal muscle fibers secondary to the reduced number of motor neurons appears to contribute significantly to the disorder, which may further include reduced levels of hormones (particularly GH, IGF-1, MGF, and testosterone), lack of protein and calories of the diet, oxidative stress, inflammatory processes etc. Sarcopenia requires a rehabilitation program to improve physical performance but also nutrition. The implementation of physical activity

for elder populations should be done throughout a good organized program tailored to the individual and his comorbidities with the aim to improve muscular mass and/or strength, to reduce risk of falls etc. In elderly population balanced protein supplementation of 1 to 1.5 g/kg/day combined with exercise may be useful in preventing and reversing sarcopenia, as a part of a multimodal therapeutic approach. Leucine-enriched balanced amino acids and creatine enhance muscle strength, and vitamin D supplementation in doses enough to raise levels above 100 nmol/L should be given as adjunctive therapy.

The relationship between sarcopenia and disability emphasizes the need for ongoing research into the development of effective interventions to prevent or at least partially reverse the sarcopenia, including the role of muscle strengthening, nutrition and new pharmacological interventions.

SARCOPENIA AND HIP FRACTURE

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Age-related mechanisms and factors influence negatively muscle and bone metabolism, affecting both tissues in terms of anatomy and function. Adding to that the decrease of function of several other systems in the elderly, we would combine the augmentation of hip fractures with osteosarcopenia. However, it is a matter of research whether the fracture is attributed to sarcopenia or vice versa. Even though the operational procedures have evolved and health care systems are better organized nowadays, old people still lose their lives to hip fractures one year postoperatively and those who survive never regain their functionality in terms of independence, quality of life and role fulfillment. Research is needed to define algorithms according to which decisions about prevention of falling, type of operational therapy and rehabilitation strategies should be organized especially for the elderly, as they are a part of the population not included in scientific research so far.

SARCOPENIA & FALLS OF THE ELDERLY PEOPLE

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Life expectancy is constantly increasing, but the human body undergoes significant changes during the aging process. An important change is the loss of skeletal muscle, sarcopenia. Today approximately 20 million Europeans suffer from sarcopenia and this number is expected to increase to 32.4 million (64%), in 2045.

Sarcopenia involves the loss of muscle mass, the reduction of muscle strength and ultimately the limitation of the person's functioning. Its impact is gradually increasing over the years and affects balance, walking & overall performance of the individual both in his daily activities and in his social participation.

Elderly over 75-year-old patients with episodic falls are 4 times more likely to need increased care services for more than one year. Falls of the elderly have the following consequences: activity limitation, fear of falling or mean gravity injuries such as bruises, brain injuries, fractures spinal, hip, ankle, arm & wrist fractures.

Appropriate prevention interventions, early diagnosis, proper nutrition & exercise are crucial to prevent consequences of sarcopenia.

EXERCISE IN THE ELDERLY: FACTS AND CHALLENGES

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Physical exercise has been proven to avert many of the age-related physiological decrements. Overall, physical exercise slows physiological changes of aging that impair functional capacity. It can also prevent illness and injury and change the course and symptoms of existing cardiac, pulmonary and metabolic disorders. Despite these benefits, studies show that physical activity participation decreases with aging in both amount of physically active time and intensity of activities performed. Also, prescribing exercise is usually overlooked from health providers and has not become yet common knowledge that many physical limitations accompanying aging are reversible through physical activity.

There are plenty of myths that stop older people from exercising. Common beliefs such as "it is dangerous for seniors to exercise" or "it is too late for sedentary older adults to start exercising" have no scientific evidence. The majority of adults can safely take up light to moderate exercise and the many well-established benefits greatly outweigh the risk of being physically inactive. Any risks associated with exercise are eliminated thanks to pre-exercise screening (PAR-Q test or recommended medical tests). However, an appropriate exercise program should be selected by a specialized health professional who knows the barriers and the limits of exercise in elderly.

In general, the exercise prescription for older adults should be gradual and multi-component, including endurance, strengthening, flexibility and balance. It is

always recommended to start with light to moderate exercise, such as walking, before following with vigorous exercise. Special attention should be given to "functional relevance", which encourages the selection of exercise activities that simulate movements associated with daily activities (e.g. climbing stairs, carrying weights). "Adaption" is also an essential practice aiming to adjust the intensity or duration of an exercise when additional health problems arise (disease, drugs' side effects or trauma) changing one's ability to exercise.

Prescribing exercise for older adults is both a science and an art. Not only should the health status and functional capabilities be considered but the social status, preferences for specific activities and cultural beliefs should also be considered. Every case is unique and general recommendations can hardly be applied to seniors, thus making improvisation essential.

Despite elderly special precautions and peculiarities, exercise remains the best "drug" for successful aging!

OTAGO – A BASE EVIDENCE EXERCISE PROGRAM FOR FALLS PREVENTION

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Clinical specialized exercise programs can help the falls prevention and the physical condition of this population. Prevention of falls is obligatory because all over the

world, the people who are over 60 years old are getting bigger than any other human population. Fear of falling is a frequent phenomenon among those who have falling experience. As a result, fear makes people to avoid physical or daily activities, which create more falls risk factors. Otago Exercise Program (OEP) can be an effective therapeutic procedure for falls prevention. The OEP was initially tried in New Zealand in 4 different trials, planned to make fall rates smaller by enforcing strength and balance in older people aged 80+ with previous falls background. The survey showed that the program was suitable even for people 80+. It also proved that improvement in strength and balance helped the stability to all groups. Both males and females are equally benefited with 35% reduction of falls. Additionally a 6 month period of OEP has proven falls decrease and cognitive function increase. The most recent research paper on OEP compared group exercise with the original home exercise version and shows that in fall-prone home-dwelling older people the OEP performed as group training is more effective for improving functional balance, muscle strength and physical health, but not fall efficacy and mental health than when performed as home training. In Europe have been trained almost 1955 health professionals as OEP leaders according to LLT courses and ProFouND European project. ProFouND, was an EC funded Thematic Network that completed in 2015 but retains a strong online presence updating falls prevention evidence and runs that annual European Falls Festival. LLT ran a work package delivering Cascade Training in the evidence based Otago Exercise Program and trained over 100 therapists across 11 countries to continue to deliver training locally.