

## Risk of falls in the rheumatic patient at geriatric age

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### Abstract

Evaluating the risk of falling of a geriatric rheumatic patient plays an essential role not only in planning and carrying out the physiotherapeutic process. The consequences of falls may be different and, although they do not always result in serious repercussions such as fractures or injuries, it is sufficient that they generate the fear of falling and cause a significant reduction in physical activity. Assessing functional capacity to define the risk of falling is of utmost importance in the case of patients after joint arthroplasty surgeries. The specificity of rheumatic patient's falls is determined by numerous factors. It is not always possible to avoid them. However, it becomes vital to include fall prevention in the rehabilitation process as well as to prepare the house for the needs of an elderly person so that they are safe and as self-dependent as possible.

**Key words:** geriatrics, risk of falling, joint endoprosthesis.

The risk of falling in the geriatric patient is increasingly frequently taken into account not only in planning and conduction of physiotherapy. The degree of difficulty increases when we discuss a rheumatic patient at advanced age, after articular endoprosthesis. That type of procedures are performed with increasing frequency in seniors as a subsequent stage of treatment, enabling self-dependence and significantly improving the quality of life. Providing safety of the patient already from the first stages after the surgical procedure to independent functioning at home becomes a priority. Falls in elderly people are associated with many serious consequences. It is estimated that these unfavourable events are the sixth most frequent cause of death in the elderly population [1]. Falls are also, more frequently than in other age groups, the cause of disability, which results in a higher burden for the carers, frequently associated with the necessity of providing the injured with a round-the-clock care and is the reason of a more frequent institutionalization [2].

Over 30% persons after 65 years old and 50% persons after 85 years old is experiencing collapses [3, 4].

In 10–25% of cases, the consequences of falls include: wounds, fractures or other trauma requiring long-

term hospitalization. In consequence, the quality of life of elderly people becomes significantly lowered, and significant psychosocial problems, disability, dependence on other persons and even death occur [5].

Although some falls have their isolated, specific causes, the majority of them are multifactorial and together with growing number of risk factors, also the risk of falling grows [6]. Tinetti et al. [6] estimated that in 48% of elderly people, who fell at least once, fear of another fall developed, and 26% of people reduced their everyday activity for that reason.

Costello and Edelstein [7] in their review of papers demonstrated that exercises applied as the only therapeutic action, significantly reduced the number of falls. The authors of the meta-analysis recommend exercises strengthening the muscles combined with equilibrium exercises or with an endurance-increasing training. They should be performed at least thrice weekly for 30 minutes and the course should last at least 12 weeks [7]. According to Żak et al. [8] such activities as getting up, sitting down, beginning of walk and turning around are fraught with the highest risk of falling.

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In people living in their own environment the percentage of falls ranges from 20% to 40%, while in those remaining in care of institutions, these numbers are twice higher [9].

The risk of falls increases with age. In the population at 65 years of age such events take place in 30% of people while at the age of over 75 years that percentage is much higher [10].

## Fall risk assessment

An assessment of a geriatric patient before the beginning of rehabilitation process should include tests assessing the risk of fall. The tests most frequently conducted in geriatric patients include:

The “stand up and go” test is a very simple and easy to perform test for the assessment of the functional fitness and the risk of fall. On the command “START” the subject assessed has to: 1) rise from a chair, 2) walk a distance at normal speed, 3) make a 180° turn, return to the chair and again assume sitting position. The obtained results: below 10 s – normal fitness, low risk of fall; 10–19 s – patient self-dependent in most everyday activities, needs no walking-assisting equipment, a more detailed assessment of the risk of fall is recommended; over 19 s – significantly limited functional fitness, the patient cannot go out alone, walking-assisting equipment is recommended, high risk of falls; 20–29 s – partially limited functional fitness; above 30 s – significantly limited functional fitness, the patient cannot go out, walking-assisting equipment is recommended, the patient requires assistance in almost all everyday activities [11].

The Tinetti’s scale enables an assessment of the risk of fall [12]. In the section concerning equilibrium, such activities are assessed as: equilibrium in sitting position, rising from a chair, equilibrium just after taking upright position and during standing, nudging test with open and closed eyes, a 360° turn and sitting down. In the section concerning gait the following are assessed: how the patient starts walking, how the work of the trunk looks and how the patient puts his/her feet during walking. The patient can score in the equilibrium section maximally 16 points and in the gait section – 12 points, that is 28 points in total. A result below 26 points means a problem. On the other hand, less than 19 points means that the patient is at 5 times higher risk of fall than a person, who scored 28 points [13].

Senior Fitness Test (earlier called Fullerton Functional Fitness Test) was created by Americans Rikli and Jones. The Senior Fitness Test [14] was used for the assessment of the basic parameters associated with physical fitness. The assessed activities included:

1) rising from a chair (number of repetitions in 30 s),

- 2) forearm bending (number of bending repetitions with a 5 lb (2.27 kg) weight for women and 8 lb (3.63 kg) weight for men, in 30 s),
- 3) two-minute step – raising legs to a predetermined height measured at half the distance between the knee cap and the iliac crest; the result was the number of raisings of the right foot to the adequate height in two minutes,
- 4) sit and touch – the subject examined, sitting of a chair with one leg extended and foot placed at 90° angle in relation to the shank, was asked to reach with his/her hand to the toes; the distance between the fingers and toes was measured,
- 5) hands meeting behind the back – the examined subject sitting on a chair with one hand reaching over the shoulder and the other reaching from below to the middle of the back, tried to make the fingers of both hands meet; the distance in centimetres was measured between the outermost fingers,
- 6) stand up and go – the examined subject was sitting on a chair and was asked to stand up, walk a distance (8 steps) of 2.44 m, make a turn and return to the sitting position on the chair. The result was the time of covering the distance [15].

Katz scale (Activities of Daily Living – ADL) also can be used. That scale assesses patient’s abilities to move, eat, control physiological functions and maintain body hygiene. The tested patients can score 0–6 points in Katz scale. That enables distinguishing three fitness groups” 5–6 points – complete fitness, 3–4 points – moderate disability, 0–2 points – severe disability [16].

Complex everyday activities are assessed by the Lawton scale (Instrumental Activities of Daily Living – IADL) [16]. These activities include: performing household activities such as cleaning, cooking, current repairs and possibility of shopping, ability to manage the finances and use a phone. A completely independent patient is assessed at 27 points, scoring 10–26 points means moderate independence (the patient requires partial assistance of other persons in performing complex everyday activities), while nine and less points mean a severe dependence [17].

## Rheumatic patient, specificity of fall

In the case of geriatric patients the changes in the locomotor system involve to a lesser or greater degree all its elements. The patients suffer from many comorbidities, e.g osteoporosis which causes that every fall, even innocent slumping over a bed or against a wall to the floor can lead to bone fracture. An increasing number of patients have more than one joint endoprosthesis (particularly patients with the diagnosis of rheumatoid arthritis (RA), ankylosing spondylitis,



**Fig. 1.** Characteristic mode of holding crutches by a patient with hand deformities in the course of rheumatoid arthritis, increasing the risk of falls.

osteoarthritis). A falling patient has no “better side” without an endoprosthesis and always falls on a joint operated on.

A rheumatic hand with typical deformities and particularly contractures is a “closed” hand, without a possibility of correct leaning on it during falling (Fig. 1). This is also the region increasingly frequently involved in surgical treatment. Patients usually realize that falling on the hand operated on causes injuries to the natural or artificial joints and, in consequence a necessity of operation. During falling, they would try at any cost not to lean on the hand operated on. The specificity of RA causes unfortunately changes of symmetric character, most patients have endoprostheses of metacarpophalangeal joints in both hands (Fig. 2).

Another problem is caused by painful elbow joints, which would not help to absorb the force of falling, and, of course by the shoulder girdle joints with extensive lesions. The glenohumeral joint can be regarded here as the crucial point, which frequently requires surgical treatment, but according to the patient’s assessment, takes a less important place than the knee and hip joints.

A separate but not less important problem are the foot joints. The deformities of the feet occur in more than 90% of patients with diagnosed RA. Painful, deformed feet cause significant disturbances of gait. They reduce its dynamics and also, in the case of loss of equilibrium, would not help the patient to prevent a fall (Fig. 3).

Rheumatic patients frequently use orthopaedic equipment – crutches, walking frames, orthopaedic shoes, shoes supporting the forefoot, orthopaedic collars, stabilizers, corsets. A rheumatic patient, walking with crutches after a surgical operation on the lower limb joints, usually falls in a very characteristic way (Fig. 4).



**Fig. 2.** Hand deformities make difficult using a walking frame and increase the risk of fall in a rheumatic patient at geriatric age after surgical procedures on lower limb joints.

That is associated with the specificity of changes in the course of RA or generalised osteoarthritis, and that picture overlaps onto a geriatric patient causing a situation, in which not only numerous injuries but also a damage to the inserted implant can occur. Joint endoprostheses can be found in the lower limbs, but increasingly frequently also in the upper extremities (particularly metacarpophalangeal and glenohumeral joints).

A frequently observed behaviour in the case of sudden loss of equilibrium in geriatric patients walking with crutches is elevation of the crutches held in both hands. This, unfortunately, accelerates the fall and the patient cannot protect him/herself against its consequences. A falling patient with diagnosed RA usually keeps the crutches in his/her hands or holds on to the walking frame until the end. That is an unfavourable situation causing additional injuries resulting from contact with metal elements of the orthopaedic equipment. That causes injuries of the head and face, which, not protected by hands, hit the ground.

That situation is the consequence of many elements:

- an elderly person moves more slowly,
- a rheumatic patient due to pain and hand deformities cannot dynamically throw away the crutches during falling,
- if the hands are occupied holding crutches or a walking frame no protective reflex of the hands can occur, protecting the head and face against injury,



**Fig. 3.** Feet deformities in the course of RA making difficult wearing shoes and normal walking.

- patients usually try to fall on the side non-operated on, what additionally causes a torsion and frequently non-natural position of the body,
- a senior with rheumatic disease, in view of involvement of the whole locomotor system, has no lower or upper limb in such condition to be able to absorb the impact of falling to the ground.

If we add to that a vision impairment, slowing of reactions, muscle strength weakening, and articular mobility reduction, all of them typical of a geriatric patient, we will see that each fall brings about a great danger.

### Ensuring the safety of the patient

Therefore, the main problem for the physiotherapist after surgical treatment of such patient is to provide safety. This can be achieved through:

- active safety measures provided by the physiotherapist,
- active monitoring of the patient's well-being during the exercises,
- constant contact with the attending doctor in order to obtain current information on the patient's health condition,
- correctly selected exercise positions,
- application of individually selected orthopaedic equipment and teaching the patient how to use it correctly,
- individualization of exercises,
- grading of difficulty,
- a briefing concerning safe conduction of self-service activities.

Unfortunately, training in falling techniques is contraindicated in that group of patients – although such physiotherapeutic procedure is available. Therefore, we strive to minimise the risk, since we cannot teach how to fall safely, in a controlled way.



**Fig. 4.** Hand orthoses, worn by a patient after hand surgery also can worsen the situation during falling.

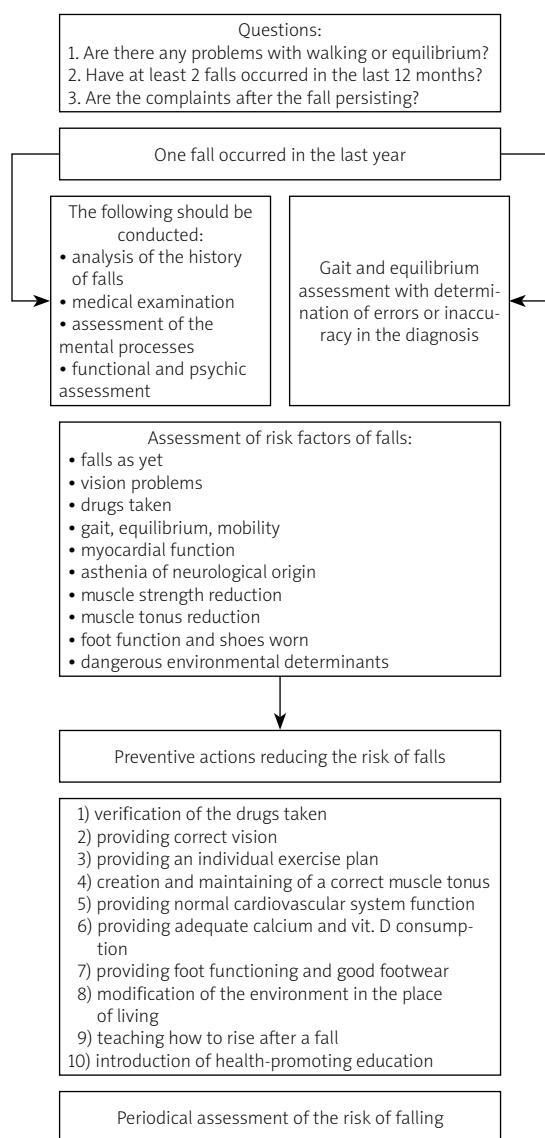
- We put emphasis on that, that the patient:
- should not hurry when walking with crutches or a walking frame,
  - should raise the feet; walking with a shuffle is characteristic of both geriatric and rheumatic patients after surgical treatment of the lower limbs,
  - should wear adequate shoes with flat, rubber i.e. anti-slip soles,
  - in the case of rheumatic patients, the majority of whom have feet deformities, they should wear orthopaedic insoles or orthopaedic shoes.

It should be kept in mind that the pathological process involves also the vertebral column, which is increasingly frequently treated surgically. That also influences the functional abilities of patients, e.g. surgically produced ankylosis of the head-neck junction can increase the risk of fall through a limitation of the field of vision. Multilevel discopathies resulting from the changes associated with ageing, are the cause of development of a strong, recurrent pain, which significantly hampers everyday functioning, intensifies with body position changing, can cause loss of equilibrium and fall. The changes in the limbs and vertebral column also make it difficult for a patient to rise after a fall.

The algorithm of behaviour to reduce the risk of falling, proposed by Rotermund et al. [18] is an attempt at a correct diagnosis of falls and application of adequate procedures to eliminate or reduce their incidence in elderly people (Fig. 5).

### Consequences of falls

Each fall causes many negative experiences and becomes in the future a cause of fear of another similar event. At the time of falling, the patient lying on the



**Fig. 5.** Algorithm of protection against fall or risk of its occurrence in the elderly [acc. 18].

ground should think whether the place is safe for him. If he is in no direct danger, he can at the first stage try to calm down and start to breathe regularly. Only after controlling the emotions it is recommended to make an attempt at rising from the floor. After falling it is important for the patient to check if he can move his limbs and if a fracture has occurred, since in such case a medical first aid would be necessary. If no significant abnormalities have been found and the patient is strong enough to stand up unassisted, he should lean on a stable piece of furniture, best on an armchair. The method of rising from the floor is individual and depends on the functional status and joints operated on. A patient with endoprosthesis of the hip joint cannot perform adduction and flexion of the joint operated on above 90°, i.e.

he can rise through kneeling. Conversely, a patient with knee joint endoprosthesis should not kneel on the joint operated on, therefore rising through a sitting position is recommended. Patients after operation on the hands could have problems with a firm and safe grip or leaning on the hands during an attempt at rising. In such cases leaning on the elbows or forearms is recommended. The persons in direct surroundings of the patient should, in the first place, keep calm and let the injured patient to regain psychic equilibrium. The patient should be advised to take several deep breaths, which favours regaining a steady heart rhythm. Only then a check-up should be carried to see what injuries have been suffered and whether the injured person requires a professional assistance. In the case of suffering significant injuries, the patient should be placed in a comfortable position and wrapped in a blanket in order to avoid hypothermia and assisted until the arrival of an ambulance.

The consequences of falling are very serious and include:

1. Fractures – are very frequent complications of falls in rheumatic patients at geriatric age. They are particularly dangerous since they may lead to many unfavourable consequences, such as exchange of an endoprosthesis, which could have been damaged. As the result of long-term staying in bed after the trauma decubitus ulcers, muscle atrophy, articular contractures or deep vein thrombosis may develop.
2. Extensive contusion.
3. Dehydration – similarly as hypothermia, it is a relatively rarely occurring consequence, which, however, could have a very significant outcome, since in the case of elderly people such condition is life-threatening.
4. Hypothermia – is a far less frequently observed consequence of falling. It develops in underheated apartments, when the patient cannot rise and spends many hours on the floor at the site of falling.
5. Fear – is a negative result of falling. It causes in the patient a reluctance to leave home, and if it has occurred in an apartment, it frequently leads to a limitation of everyday activity. The consequence of that is loneliness, feeling of isolation and worthlessness, depression and obesity [2].

### Preparation of a safe home for seniors

Preparation of a home for an elderly person is an important element of the prophylaxis of falling. The rooms used by an elderly person should be adapted by the family as soon as the problem has been perceived.

1. The objects should be removed from the walkways, particularly when the patient moves with a walking frame or crutches.

2. The chairs and bed must be of adequate height; chairs with rollers, so much liked by patients, are not a safe solution.
3. The objects, which are frequently used should be put in places accessible without climbing chairs or ladders.
4. Slippery or wet floors must be avoided.
5. The patient should wear a signalling device on the wrist, raising the alarm in case of danger.
6. The patient should only get up at night after switching on the light; a good solution could be a lamp with a motion detector.
7. The patient should take his drugs under medical supervision. The non-prescription medicines should be checked in view of their adverse effects, since they can cause somnolence or dizziness, increasing thus the risk of falling.
8. When performing difficult activities, which can cause a fall, an assistance of the relatives should be sought. The consequences of falling are very serious and can include fear, frequently causing a reluctance to leave home, or a limitation of everyday activity. This may lead to loneliness, feeling of isolation and worthlessness or depression. Fractures are a very frequent complication of falling in rheumatic patients at geriatric age and are particularly dangerous since they may cause a necessity to exchange a damaged or luxated endoprosthesis. On the other hand, as a result of long-term lying in bed after a trauma, decubitus ulcers, muscle atrophy, articular contractures or deep vein thrombosis may develop. It is thus so important to do everything possible to protect the elderly against falling, carrying out activities in all fields.

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