

Vpliv vadbe hoje na sistemu lokomat na zmanjšanje mišičnega tonusa pri pacientki s popolno okvaro hrbtenjače – poročilo o primeru

Edita Behrić, dipl. fiziot.; **Janez Špoljar**, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Edita Behrić, dipl. fiziot.; e-pošta: behric.edita@gmail.com

Uvod: Spastičnost je pri pacientih z okvaro hrbtenjače pogosta, pojavlja se v 65 do 78 odstotkih primerov (1). Pri vadbi hoje na tekočem traku z robotsko napravo lokomat so tri študije (2–4) s pacienti z nepopolnimi okvarami prikazale statistično značilno znižanje refleksne in intrinzične spastičnosti mišice gastrocnemius po štiritedenski vadbi. Predstavljene so že prve klinične izkušnje s pacienti s popolnimi okvarami, pri katerih je bil namen vadbe na sistemu lokomat zmanjšanje spastičnosti (5). Namen prispevka je bil ugotoviti vpliv vadbe hoje na lokomatu kot dodatek običajni fizioterapiji na spastičnost pri pacientki s popolno okvaro hrbtenjače. **Metode:** V poročilo o primeru smo vključili 47-letno pacientko s popolno okvaro hrbtenjače, štiri mesece od začetka okvare. Okvara je nastala zaradi zožitve hrbtencičnega kanala v prsnem predelu. Za obravnavo spastičnosti je med vadbo prejela enako vrsto in odmerek zdravil ter bila deležna standardne fizioterapevtske obravnave. V treh tednih je desetkrat vadila hojo na lokomatu, vsaka obravnava je trajala 30 minut, s 50-odstotno razbremenitvijo telesne teže, hodila je s hitrostjo 1,5 km/h. Pred prvo in zadnjo obravnavo smo tonus mišic fleksorjev kolkov in kolen ocenili po modificirani Ashworthovi lestvici. Mišični tonus smo ocenjevali tudi s pripomočkom L-stiff, ki je sestavni del lokomata. Meri mehanično togost mišic in navore v kolkih in kolenih med nadzorovanimi pasivnimi gibi spodnjih udov v mogočem obsegu giba, v podobnih gibih kot pri ocenjevanju z Ashworthovo lestvico. Veljavnosti in zanesljivosti pripomočka še niso preverjali. Osredotočili smo se na spremembo navorov v smeri ekstenzije kolkov in kolen, s čimer smo preverjali velikost upora mišic fleksorjev kolkov in kolen. Spremembe navorov smo merili znotraj pete obravnave. Poleg tega smo primerjali razlike med prvo in zadnjo obravnavo, obakrat smo upoštevali meritev pred začetkom vadbe. Spremembe smo izrazili v odstotkih. **Rezultati:** Po modificirani Ashworthovi lestvici se ocena ni spremenila in je ostala 3. Znotraj pete obravnave je prišlo do znižanja navorov v smeri ekstenzije levega kolka za 43 % in desnega za 36 %. Navori v smeri ekstenzije levega kolena so se zmanjšali za 42 % in desnega za 19 %. Med prvo in zadnjo obravnavo so se navori v smeri ekstenzije znižali za 4 % v levem kolku in 2 % v levem kolenu, medtem ko so se v desnem kolku povečali za 22 %, v desnem kolenu pa za 47 %. **Zaključki:** Znotraj pete obravnave so se navori zmanjšali. Po navedbah preiskovanke je bil učinek kratkotrajen, naslednji dan je bil zvišan mišični tonus spet enak. Po desetih obravnavah so se navori v desnem spodnjem udu povišali, kar morda lahko pripišemo spreminjajoči se naravi zvišanega mišičnega tonusa. V prihodnje bi bilo treba preveriti veljavnost in zanesljivost pripomočka L-stiff. Učinki vadbe na lokomatu na spastičnost so pri pacientih s popolno okvaro hrbtenjače nejasni, zato so potrebne nadaljnje raziskave.

Ključne besede: spastičnost, robotika, okvare hrbtenjače, rehabilitacija.

The effects of gait training using the lokomat system on reducing muscle tone in a patient with complete spinal cord injury – case report

Background: Spasticity is common in patients with spinal cord injury, it occurs in 65 % to 78 % of the cases (1). Three studies (2-4) using lokomat robotic device for treadmill training in patients with incomplete injury showed a statistically significant reduction in reflex and intrinsic gastrocnemius muscle spasticity as a result of a four-week training program. First clinical experience of reducing spasticity with lokomat in patients with complete lesions has already been presented (5). The purpose of this report was to determine the effects of gait training using lokomat in addition to conventional physiotherapy on reducing spasticity in a patient with complete spinal cord injury. **Methods:** We included a 47-year-old female with a complete lesion, four months after onset. Lesion was caused by spinal stenosis at the thoracic level. Antispastic drugs' type and dosage and standard physical therapy remained unchanged during training. She had ten sessions in three weeks, each lasted for 30 minutes, with 50 % of body weight support and walking speed of 1.5 km/h. Prior to the first and last session, we evaluated the muscle tone of hip and knee flexors using the Modified Ashworth scale. Muscle tone was also measured with a tool L-stiff, which is the integral part of lokomat. L-stiff determines the mechanical stiffness and torques which are produced in hips and knees during controlled passive movements of lower limbs across the range of motion of the joint, in similar movements as during the Modified Ashworth test. The tool has so far not been proven valid or reliable. We focused on the change in torque in the direction of hip and knee extension, consequently we checked the resistance of flexor muscles of hips and knees. Changes of torques were measured within the fifth session. We also compared the difference between the first and last session, we considered the measurement before treatment in both cases. The changes are shown in percentages. **Results:** Scores on Modified Ashworth scale remained 3. We noted a decrease in torques within the fifth session in the direction of left hip and knee extension by 43 % and 42 %, respectively. A decrease in the right hip and knee extension was 36 % and 19 %, respectively. Between the first and the last session, torques in the direction of the left hip and knee extension decreased by 4 % and 2 %, respectively. While the torques in the right hip and knee increased by 22 % and 47 %, respectively. **Conclusions:** The torques were reduced within the fifth session. According to the patient, the effect was short-term, increased muscle tone was the same the next day. After ten sessions, the torques in the right lower limb increased, which may be attributed to the changing nature of increased muscle tone. It is necessary to verify the validity and reliability of L-stiff in the future. Effects on spasticity of the training using lokomat in patients with complete spinal cord injury remain unclear, further research is required.

Key words: spasticity, robotics, spinal cord injuries, rehabilitation.

Literatura/References:

1. Adams MM, Hicks AL. Spasticity after spinal cord injury. *Spinal Cord* 2005; 43: 577–86.
2. Mirbagheri MM, Ness LL, Patel C, Quiney K, Rymer WZ (2011). The effects of robotic-assisted locomotor training on spasticity and volitional control. In: IEEE international conference on rehabilitation robotics, Rehab Week Zürich, ETH Zürich science city, Switzerland, June 29–July 1, 2011.
3. Mirbagheri MM, Niu X, Kindig M, Varoqui D (2012). The effects of locomotor training with a robotic-gait orthosis (lokomat) on neuromuscular properties in persons with chronic SCI. In: 34th annual international conference of the IEEE EMBS, San Diego, California, USA, August 28–September 1, 2012.
4. Mirbagheri MM, Kindig M, Niu X, Varoqui D, Conaway P (2013). Robotic-locomotor training as a tool to reduce neuromuscular abnormality in spinal cord injury. In: IEEE international conference on rehabilitation robotics, Seattle, Washington, USA, June 24–26, 2013.
5. Wirz M. Lokomat training with spinal cord injured ASIA A patients. http://knowledge.hocoma.com/fileadmin/user_upload/clinical_practice/lokomat/L_CEx_1_ASIA_A_Balgrist_la_unch.pdf. <25. 3. 2015>.