

Vpliv vadbe v napravi e-go na izboljšanje ravnotežja in hoje pri pacientu po možganski kapi – poročilo o primeru

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Uvod: Funkcija hoje je eden najpomembnejših dejavnikov kakovosti življenja in glavni cilj pacientov po možganski kapi v času rehabilitacije. Moteno dinamično ravnotežje pri pacientih po možganski kapi je povezano z večjo pogostostjo padcev, kar negativno vpliva na samostojno izvajanje dejavnosti vsakodnevnega življenja (1). Razvit je bil prototip naprave za urjenje dinamičnega ravnotežja med hojo, imenovane E-go (2). Namen prispevka je bil ugotoviti vpliv vadbe z napravo E-go kot dodatek običajni fizioterapiji na ravnotežje in funkcijo hoje pri pacientu po možganski kapi. **Metode:** 44-letni pacient je petkrat na teden vadil hojo v napravi E-go, poleg tega je bil deležen fizioterapevtske obravnave po uveljavljenih nevrotapevtskih metodah. Pred začetkom in ob koncu tritedenske vadbe v napravi E-go je bil pacient testiran z Bergovo lestvico za oceno ravnotežja, z lestvico za oceno ravnotežja po možganski kapi (angl. Postural Assessment Scale for Stroke – PASS), z lestvico kategorij funkcionalnega premikanja (angl. Functional ambulation category – FAC), testom hoje na 10 metrov in s šestminutnim testom hoje. **Rezultati:** Po obravnavi so se izboljšali vsi rezultati prej navedenih testov. Izboljšala sta se ravnotežje po Bergovi lestvici (pred vadbo: 6 točk; po vadbi: 10 točk) in lestvici PASS (pred vadbo: 14 točk; po vadbi: 25 točk) ter sposobnost hoje po FAC-u (pred vadbo: stopnja 0; po vadbi: stopnja 2). Pacient je bil ob koncu obravnave sposoben hoje z eno berglo in plastično peronealno ortozo za gleženj in stopalo, potreboval je zmerno asistenco ene osebe. **Zaključek:** Prednosti vadbe v napravi E-go so, da ta omogoča delno razbremenitev telesne teže glede na trenutno funkcijsko stanje pacienta in nadzor hitrosti hoje, ki jo določa fizioterapevt prek krmilnega modula ter jo lahko sproti prilagaja. Naprava pri vadbi z manjšo stopnjo opore omogoča tudi kardio-respiratorno vadbo in tako izboljšuje pacientovo telesno vzdržljivost. Možna je vadba hoje na daljše razdalje tudi pri pacientih z večjimi omejitvami gibanja, ki bi drugače s terapevtovo izdatno pomočjo prehodili le nekaj metrov, tako pa naprava precej razbremeni fizioterapevta.

Ključne besede: motorizirana naprava E-go, hoja, ravnotežje, možganska kap.

Effect of the e-go device on the recovery of balance and gait in a hemiparetic stroke patient – case report

Background: For stroke patients gait function is one of the most important factors influencing their quality of life and it is their main goal in rehabilitation. Impaired dynamic balance after stroke is related to higher frequency of falls, and has a negative impact on the activities of daily living (1). Therefore a prototype of a device for dynamic balance training during walking (E-go) was developed (2). The aim of the study was to establish an effect of training with this device on a stroke patient. **Methods:** A 44-year-old male patient trained walking with the E-go device 5 times per week and was also included into regular neurotherapeutic treatment. Prior and after the 3 weeks of training with the E-go device, the patient was tested with the following: Berg Balance Scale, Functional ambulation category (FAC), Postural Assessment Scale for Stroke (PASS), 10-meter walk test and 6-minute walk test. **Results:** The results of all of the above-mentioned tests improved. In the end, the balance improved according to the Berg Balance Scale (before: 6 point; after: 10 point), as well as the scale PASS (before: 14 point; after: 25 point). The ability of walking also improved (FAC – before: 0, after: 2). At the end of the treatment, the patient was able to walk with one crutch and a plastic peroneal ankle-foot orthosis. He needed moderate assistance of one person. **Conclusion:** Training with the E-go device enables different levels of supporting force on the pelvis according to the patient's current functional state, and enables to control the walking speed that is supervised by a physiotherapist. With the lower level of supporting force the device offers cardiovascular training and thus improves the patient's physical endurance. The device enables gait training on longer distances also for patients with larger movement disabilities and therefore significantly facilitates the physical therapists' work.

Key words: mechanical device E-go, gait, balance, stroke.

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Vpliv vadbe hoje na lokomatu na srčni utrip in porabo kisika pri pacientih z nepopolno okvaro hrbtenjače

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Uvod: Za paciente z nepopolno okvaro hrbtenjače je aerobna vadba zaradi pareze velikih mišičnih skupin velik izziv. Za izboljšanje srčno-žilne in dihalne zmogljivosti se odraslim priporoča redna aerobna vadba vsaj zmerne intenzivnosti, ki vključuje velike mišične skupine in ne zahteva veliko spretnosti za izvedbo (1). Vadba hoje na robotski napravi lokomat ustreza tem merilom. Pacientom z okvaro hrbtenjače raziskovalci (2) priporočajo vadbo od tri- do petkrat na teden za 20 do 60 minut pri intenzivnosti od 50 do 80 odstotkov najvišjega srčnega utripa ali največje porabe kisika. Zaradi možnih pridruženih motenj avtonomnega živčevja in nizke telesne zmogljivosti sta pri tej skupini pacientov oba parametra bistveno nižja od predvidenih maksimalnih vrednosti pri zdravih osebah enake starosti (3). Zaradi pareze smo z možnimi fizioterapevtskimi postopki, ki bi zagotavljali tako intenzivnost vadbe, omejeni. Vadba na lokomatu lahko učinkovito vpliva na odzive srčno-žilnega in dihalnega sistema (3). Namen raziskave je bil ugotoviti intenzivnost vadbe pri hoji na lokomatu. Želeli smo opredeliti, kakšen odstotek najvišjega srčnega utripa in največje porabe kisika dosežejo pacienti med hojo v primerjavi z doseženimi vrednostmi pri obremenitvenem testiranju. **Metode:** V raziskavo smo vključili priložnostni vzorec osmih preiskovancev z nepopolno okvaro hrbtenjače (3 ženske, 5 moških), starih povprečno 53,5 leta (SO 13 let), povprečno 11 tednov po začetku okvare (SO 5 tednov). Pri štirih je bila vzrok okvare poškodba, pri drugih bolezen. Pri dveh je bila posledica okvare parapareza, pri drugih tetrapareza. Najvišji srčni utrip in največjo porabo kisika smo določili z obremenitvenim testiranjem na ročnem kolesu z neposrednim merjenjem porabe kisika in telemetričnim zapisom elektrokardiograma (Oxicon Mobile - Viasys). Meritve na sistemu lokomat (Hocoma) smo opravili po 10 minutah hoje, pri hitrosti 1,5 km/h, s povprečnim 48-odstotnim (SO 8,2 %) odvzemom telesne teže. Preiskovance smo z razlago pomena in delovanja povratne informacije o aktivni udeležbi spodbudili k čim dejavnejši hoji. Za merjenje srčnega utripa in porabe kisika smo uporabili enak sistem kot pri obremenitvenem testiranju. Raziskavo je odobrila Komisija za medicinsko etiko Univerzitetnega rehabilitacijskega inštituta - Soča. **Rezultati:** Preiskovanci so v povprečju dosegli 69,1 % (SO 13,5 %, razpon 52–89 %) najvišjega srčnega utripa, doseženega na obremenitvenem testiranju. Sedem preiskovancev je v povprečju doseglo 78,4 % (SO 14,6 %, razpon 59,2–96,8 %) največje porabe kisika. En preiskovanec je med vadbo na lokomatu dosegel 1,4 % večjo porabo kisika kot pri obremenitvenem testiranju. Povprečna vrednost porabe kisika na lokomatu je bila 10,1 mL/kg/min (SO 2 mL/kg/min, razpon 7,3–12,6 mL/kg/min). **Zaključki:** V povprečju so preiskovanci dosegli vrednosti srčnega utripa in porabe kisika, ki bi ob primernem trajanju in pogostosti vadbe lahko vplivale na izboljšanje srčno-žilne in dihalne zmogljivosti. Povprečna vrednost porabe kisika naših preiskovancev med hojo na lokomatu je bila primerljiva z vrednostmi drugih raziskovalcev (4, 5). Tako srčni utrip kot poraba kisika se ob spodbujanju preiskovancev k dejavnejši hoji povečata (5), k čemur je verjetno pripomogla povratna informacija o aktivni udeležbi med hojo. Omejitve naše raziskave so bile majhen in priložnostni vzorec ter heterogenost preiskovancev.

Ključne besede: poškodbe hrbtenjače, robotika, intenziteta vadbe, rehabilitacija.

Influence of gait training using lokomat on heart rate and oxygen uptake in patients with incomplete spinal cord injury

Background: Aerobic exercise presents great challenge to patients with incomplete spinal cord injury due to paresis of large muscle groups. For improving cardiovascular and respiratory capacity recommendations for adults include regular aerobic exercise of at least moderate intensity, which includes large muscle groups and does not require great skills for execution (1). Gait training using lokomat meets these criteria. For patients with spinal cord injury, exercising three to five times a week for 20 to 60 minutes with intensity of 50 to 80 % of peak heart rate or peak oxygen uptake is recommended (2). Due to possible disorders of autonomic nervous system and low physical capacity both are significantly lower in this group of patients than in healthy persons regarding the age (3). Physiotherapeutic procedures of appropriate intensity are difficult to apply due to paresis. Gait training using lokomat may effectively influence cardiovascular and respiratory system (3). The purpose of the study was to determine intensity of gait training using lokomat. We wanted to define the percentage of peak heart rate and peak oxygen uptake during walking compared to values attained with exercise stress testing. **Methods:** We included convenience sample of eight subjects with incomplete spinal cord injury (3 females, 5 males), aged 53.5 years (SD 13 years), on average 11 weeks after injury onset (SD 5 weeks). Impairment was caused by injury in four subjects, in others the cause was a disease. In two the result of impairment was paraparesis, in others tetraparesis. Peak heart rate and peak oxygen uptake were determined with exercise stress testing using arm ergometer with direct measurement of oxygen uptake and telemetric electrocardiogram record (Oxycon Mobile – Viasys). Measurements on the lokomat (Hocoma) were conducted after 10 minutes of walking, with speed set at 1.5 km/h and average body weight support of 48 % (SD 8.2 %). With the explanation and usage of feedback information about active participation subjects were encouraged to actively participate in gait. For heart rate and oxygen uptake measurements the same system was used as with the exercise stress testing. Study had been approved by the Ethics committee of University rehabilitation institute. **Results:** Subjects achieved on average 69.1 % (SD 13.5 %, range 52–89 %) of peak heart rate. Seven subjects achieved on average 78.4 % (SD 14.6 %, range 59.2–96.8 %) of peak oxygen uptake. One subject achieved 1.4 % higher value of oxygen uptake than with exercise stress testing. Average oxygen uptake on the lokomat was 10.1 mL/kg/min (SD 2 mL/kg/min, range 7.3–12.6 mL/kg/min). **Conclusions:** On average subjects achieved values of heart rate and oxygen uptake that might, in case of adequate duration and frequency, improve cardiovascular and respiratory system capacity. Average oxygen uptake during gait training using lokomat was comparable with values in other studies (4, 5). Heart rate and oxygen uptake increase with encouragement towards active gait (5), to which feedback information about active participation during gait training probably contributed. Limitations of the study were small sized and convenience sample and heterogeneity of subjects.

Key words: spinal cord injuries, robotics, training intensity, rehabilitation.

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Vpliv vadbe gibalnih dejavnosti na grobo gibalno funkcijo otrok z downovim sindromom – pilotska študija z uporabo protokola kontrolne klinične študije

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Uvod: Vadba motoričnih aktivnosti omogoča sodelovanje otrok z Downovim sindromom (DS) pri uradnih športnih tekmovanjih specialne olimpijade. Zagotavlja enake možnosti zanje pri doseganju uspešnosti v gibalnih veščinah, potrebnih za posamezen šport specialne olimpijade oziroma tudi med vadbo gibalnih dejavnosti (1). Naraščajoča zahteva po celostnem pristopu pri večdimenzionalni rehabilitaciji otrok z Downovim sindromom potrebuje raziskovalni protokol, ki bi znanstveno ocenil predhodno netestiran vpliv specifične vadbe gibalnih dejavnosti na grobo gibalno funkcijo teh otrok (2). Pri določanju namena nevrofizioterapevtske obravnave in kratkoročnih ciljev ter izbiri primernih gibalnih nalog je fizioterapevt odgovoren za analizo trenutnih otrokovih zmogljivosti in identifikacijo gibalnih spretnosti (3), s katerimi bo prek motoričnega učenja ob upoštevanju načel razvojnonevrološke obravnave dosegal postavljene cilje pri tovrstni vadbi (4, 5). **Namen:** Namen pilotske študije je bil ugotoviti vpliv vadbe gibalnih dejavnosti na motorično učenje otrok z Downovim sindromom in vpliv na grobo gibalno funkcijo za doseganje bistvenih veščin, ki jih fizioterapevti identificiramo za doseganje napredka. Veljavnost učinkovitosti specifične vadbe gibalnih dejavnosti je bila ob upoštevanju načel razvojnonevrološke obravnave za grobo gibalno funkcijo otrok z Downovim sindromom raziskana z uporabo protokola kontrolne klinične študije, da bi bila tovrstna vadba v prihodnje del sodobne medicinske rehabilitacije otrok z Downovim sindromom. Sekundarni namen te pilotske študije pa je bil določiti izvedljivost prihodnje, večje kontrolne klinične študije o vplivu in učinkih vadbe gibalnih spretnosti pri otrocih z Downovim sindromom v kliničnem okolju. **Metode:** Deset otrok z Downovim sindromom iz Zavoda za usposabljanje, delo in varstvo Dobrna je bilo naključno razvrščenih v študijsko (N = 5) in kontrolno skupino (N = 5). Skupini sta bili deležni razvojnonevrološke obravnave, študijska skupina pa je bila deležna še vadbe gibalnih dejavnosti. Meritve grobih gibalnih funkcij GMFM 88 (6) v treh različno dolgih časovnih intervalih so med 12-mesečno študijo izvedli raziskovalci, ki niso vedeli, ali so bili otroci z Downovim sindromom v kontrolni ali študijski skupini. Podatke smo statistično obdelali s programom Statistical Package for Social Sciences (SPSS), različica 22. Uporabili smo analizo variance s ponovljenimi meritvami za analizo sprememb kvantitativnih podatkov med prvim testiranjem na začetku kontrolirane pilotske klinične študije, drugim testiranjem po 6 mesecih in tretjim po 12 mesecih. **Rezultati:** Statistično značilne razlike med skupinama so bile ugotovljene pri testu grobih gibalnih funkcij (GMFM-88). Študijska skupina je z dodatno možnostjo motoričnega učenja in vadbe gibalnih dejavnosti pridobila nove spretnosti, potrebne za posamezen šport specialne olimpijade. **Zaključki:** specifična vadba gibalnih dejavnosti zagotavlja otrokom z Downovim sindromom številne pozitivne učinke na telesno dejavnost, izboljšanje telesne pripravljenosti in funkcijske spretnosti. Rezultati kažejo, da bi tovrstna vadba lahko bila uporabna v nevrofizioterapevtski obravnavi otrok z DS, ki imajo slabšo grobo gibalno funkcijo.

Ključne besede: otroci z Downovim sindromom, specialna olimpijada, vadba gibalnih dejavnosti, razvojnonevrološka obravnava (RNO), GMFM-88, kontrolirana klinična pilotska študija.

Motor activities training program effects on gross motor function in children with down syndrome – pilot study using randomized control study design

Introduction: Motor activities training program leads to participation of children with Down Syndrome (DS) in official special olympics and tends to create equal opportunities for them in order to perform their personal best effort in those skills in a culminating event during a regular special olympics or during a separate motor activity training program (1). The growing demand for holistic approach to multidimensional Down syndrome rehabilitation requires a research program to evaluate scientifically previously untested impact of motor activities training program on gross motor function of children with DS (2). In order to set goals and short-term objectives, and select appropriate motor training activities during the neurodevelopmental treatment (NDT), a physiotherapist is responsible to determine the children's present abilities (3), identify motor skills on which the children train with NDT principles and develop goals and short-term objectives for the motor activities training program (4, 5).

Purpose: The purpose of the pilot study was to gather data on the short term effects of the motor activities training program on motor learning in children with DS and its impact on skills considered essential in the recognized skill progressions. The efficacy of motor activities training program on gross motor function was validated by a true experimental study design in order to be used as an integral part of contemporary medicine rehabilitation of children with DS. The secondary aim of this pilot study was to determine the feasibility of conducting a clinical trial of motor activities training program's impact on children with DS in a clinical care setting. **Methods:** 10 children with DS from ZUV Dobrna were randomised to the experimental (N=5) and to the control group (N=5). Both groups received the same NDT, while the experimental group additionally received motor activities training program. An experimental repeated measures design was used to investigate the GMFM-88 differences (6) over a 12-month period by blinded investigators using a standardised test. The data was analysed using Statistical Package for Social Sciences (SPSS) program v22. A repeated measures analysis of variance (ANOVA) was used to analyze the within subject changes over time: baseline, at 6 months and by 12 months. **Results:** Significant differences were found between the experimental and control groups in GMFM-88 scores over the study period and an ability for the experimental group to provide motor learning and training opportunities for children with DS in the study group to acquire skills considered essential in the recognized skill progressions leading to participation in Official Special Olympics. **Conclusions:** There are numerous benefits for children with DS who participate in the Special Olympics Motor Activity Training Program especially an increased physical activity that leads to improvement in motor skills, physical fitness and functional ability. The results indicate that motor activities training program could be a useful clinical intervention for the children with DS with low GMFM-88 scores.

Key words: children with Down Syndrome, Special Olympics, Motor Activity Training Program, neurodevelopmental treatment (NDT), GMFM-88, randomised controlled pilot study.

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Senzorni sistem za vadbo prezgodaj rojenih otrok

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Uvod: Prezgodaj rojeni otroci z majhno porodno težo spadajo v najbolj ogroženo skupino v smislu nevroloških motenj. Pogostnost cerebralne paralize znaša od 2 do 3 primere na 1000 rojstev, vendar se poveča na 40 do 100 primerov na 1000 rojstev v primeru prezgodaj rojenih otrok (1). Sodobne tehnologije omogočajo zgodnje zaznavanje nevroloških motenj in ukrepanje v prvih mesecih življenja, ko so možgani še zelo prilagodljivi. Vadbo otrok je mogoče v domačem okolju izvajati v posebej prirejeni igralnici, ki je opremljena z raznovrstnimi senzorji in zvočno-svetlobnimi dražljaji, vgrajenimi v pametne igrače. Senzorji omogočajo nemoteče spremljanje otrokovega razvoja (uravnavanje drže in ravnotežja prek pritiskovne merilne podloge in inercialnega senzorja na trupu ter spretnosti rokovanja in drugih gibalnih sposobnosti prek inercialnih senzorjev na zgornjih udih in v igračah). Zvočno-svetlobni dražljaji spodbujajo različne dejavnosti otroka in ga za pravilno izvedbo tudi nagrajujejo. Razvoj otroka je mogoče ocenjevati s kvantitativnimi parametri, ki vrednotijo nadzor gibanja trupa, glave, zgornjih udov in spretnosti prijemanja (2). **Metode:** V okviru projekta CareToy je bila razvita pametna igralnica in izvedena klinična študija, ki je vključevala 40 prezgodaj rojenih otrok, starih od 3 do 7 mesecev (popravljen starost). Študija je potekala s šestimi pametnimi otroškimi igralnicami hkrati. Tri igralnice so bile nameščene pri družinah prezgodaj rojenih otrok v Italiji, tri pa pri družinah na Danskem. Otroci so v igralnici vadili po en mesec. V tem času je vsak otrok izvedel približno 200 vadb s skupnim trajanjem vadbe vsaj 9 ur. Strokovni nadzor nad vadbo je bil izveden na podlagi koncepta telerehabilitacije. Vsakega otroka sta spremljala otroški nevrolog in fizioterapevt. Zanj sta pripravila individualni program vadbe. Strokovna klinična ocena otrokovih sposobnosti je bila izvedena pred vadbo in po njej. Podrobnosti protokola so predstavljene v (3). **Rezultati:** Rezultati študije kažejo na pozitivne spremembe v motoričnem razvoju, ki so posledica vadbe v igralnici. Pozitivne spremembe je mogoče zaznati tako v kliničnih ocenah kot tudi na podlagi objektivnih meritev s senzorji, vgrajenimi v igralnici. Spremembe so opazne v povezavi z gibanjem trupa, gibanjem zgornjih udov in prijemanjem igrač. Otroci so v igralnici v povprečju napredovali hitreje, kot bi bil pričakovani normalni razvoj brez dodatne spodbude. Negativni učinki vadbe niso bili zaznani. Sistem je bil pri starših dobro sprejet, čeprav so se v nekaterih primerih pojavljale tehnične težave, značilne za prototipne naprave. **Zaključki:** Koncept inteligentne igralnice omogoča prezgodaj rojenim otrokom, da skozi igro in pod nadzorom staršev zmanjšajo možnost pojava nevroloških motenj ali vsaj ublažijo njihove posledice. Prav prvi meseci življenja so najbolj kritični, saj so možgani še zelo plastični in pravilna vadba lahko pomembno vpliva na razvoj funkcij, ki so kritične za normalno življenje. Koncept pametne igralnice lahko postane primerno klinično orodje za spodbujanje pravilne vadbe otrok, ki zmanjša posledice nevroloških motenj v poznejših obdobjih razvoja. **Zahvala:** Raziskavo je delno financirala Evropska unija v okviru projekta CareToy po pogodbi ICT-2011.5.1-287932.

Ključne besede: prezgodaj rojeni otroci, nevrološke motnje, vadba, ocenjevanje.

Sensory system for training of preterm infants

Introduction: Prematurely born children with low birth weight represent the most endangered group in terms of neurological disorders. The incidence of cerebral palsy is 2 to 3 cases per 1000 births, but increases to 40 to 100 cases per 1000 births in the case of preterm infants (1). Modern technologies enable early detection of neurological disorders and targeted actions in the first months of life, when the brain is still very adaptive. Training of infants at home can be conducted in a specially designed gym equipped with various sensors and sound and light stimuli embedded in smart toys. Sensors allow for unobtrusive monitoring of child's development. Sounds and lights can stimulate a variety of child's activities as well as provide reward for properly completed actions. Child's development can be followed through various quantitative parameters that assess trunk, head and upper limbs control as well as grasping (2). **Methods:** Within the CareToy project a smart instrumented gym was developed and a clinical study with 40 three to seven months old (corrected age) preterm infants was conducted. Infants spent one month training in the gym. Within that period each infant performed approximately 200 training sessions in total duration of at least 9 hours. Clinical supervision of training was conducted based on the telerehabilitation approach. Each infant was monitored by a child neurologist and a physiotherapist that also prepared an individual training program for the particular infant. Clinical assessment of the infant's capabilities was obtained before and after the training. Details of the protocol are presented in (3). **Results:** The results of the study indicate a positive change in the motor development of children as a result of training in the gym. Positive changes can be detected in both clinical assessments as well as on the basis of objective measurements by sensors embedded in the gym. Changes are noticeable in relation to the movement of the trunk, movement of the upper limbs and grasping the toys. The children on average progressed faster while training in the gym than what would have been expected as a normal development without additional intervention. Negative effects of training were not detected. The system was well accepted by the parents, although in some cases, technical problems typical of prototype devices were encountered. **Conclusions:** The concept of the intelligent gym enables preterm infants to play under the supervision of their parents and through playing to reduce the chances of neurological disorders or at least mitigate their consequences. The first months of life are the most critical, because the brain is very plastic and appropriate training can have a significant impact on the development of functions that are critical for normal life. The concept of a smart gym can become a clinically relevant tool for encouraging proper training of infants, thus lowering the consequences of neurological disorders in later stages of development. **Acknowledgment:** This work was partially funded by the European Union Collaborative Project CareToy grant ICT-2011.5.1-287932.

Key words: preterm infants, neurological disorders, training, assessment.

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Kako starši in strokovni sodelavci vidijo postopke oskrbe kronično bolnih otrok v programih zdravljenja in rehabilitacije

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Uvod: V zadnjih desetletjih se je v postopkih zdravljenja in rehabilitacije kronično bolnih otrok uveljavil koncept obravnave, ki je usmerjena v družino (1). Želeli smo preveriti, kako starši in strokovni sodelavci ocenjujejo postopke oskrbe v programih zdravljenja in rehabilitacije. **Metode:** K sodelovanju v raziskavi smo povabili starše, katerih otroci so bili vključeni v postopke oskrbe v različnih zdravstvenih ustanovah leta 2010. K sodelovanju smo povabili tudi strokovne sodelavce iz istih ustanov. Za ocenjevanje smo uporabili Vprašalnik za ocenjevanje postopkov oskrbe (angl. Measures of Processes of Care, MPOC-20), ki so ga izpolnili starši, in Vprašalnik za ocenjevanje postopkov oskrbe, ki so ga izpolnili strokovni sodelavci (MPOC-SP) (2). Vprašalnik MPOC-20 vključuje 20 vprašanj (pet podlestvic), vprašalnik MPOC-SP pa 27 vprašanj o postopkih oskrbe (štiri podlestvice). Na vsako vprašanje je mogoče odgovoriti z oceno od 7 (v zelo veliki meri) do 1 (sploh ne). Na voljo je tudi ocena 0, ki pomeni, da na vprašanje ni mogoče odgovoriti. **Rezultati:** V raziskavo se je vključilo 235 staršev (80 odstotkov mater; 55 odstotkov otrok je bilo dečkov) in 67 strokovnih sodelavcev (14 zdravnikov, 14 fizioterapevtov, 18 medicinskih sester, šest delovnih terapevtov, tri učiteljice, sedem logopedov ter pet psihologov in socialnih delavcev, trije niso označili strokovne izobrazbe; povprečna starost strokovnih sodelavcev: 43,9 leta, povprečna delovna doba v timu za delo s kronično bolnimi otroki: 17 let). Starši so poročali o dobrih ocenah vedenja strokovnjakov. Povprečne ocene posameznih lestvic MPOC-20 so bile 5,83 (SD 1,10) za Koordinirano in celotno oskrbo, 5,62 (SD 1,12) za Spoštljivo oskrbo, 5,45 (SD 1,23) za Partnerstvo in omogočanje aktivne vloge, 5,33 (SD 1,61) za Posredovanje specifičnih informacij o otroku in 4,59 (SD 1,65) za Posredovanje splošnih informacij. Podobno so o svojem vedenju v postopkih oskrbe poročali tudi strokovni sodelavci: povprečna ocena 7,5 (SD 0,7) za Spoštljiv odnos do ljudi, 5,2 (SD 1,5) za Občutljivost v medosebnih odnosih, 4,8 (SD 1,5) za Posredovanje specifičnih informacij o otroku in 4,3 (SD 1,3) za Posredovanje splošnih informacij. Starši in strokovni sodelavci so menili, da sta v postopkih oskrbe najbolj pomanjkljivi prav posredovanje splošnih informacij in posredovanje specifičnih informacij o otroku. **Zaključki:** Starši in strokovni sodelavci so bili najmanj zadovoljni s posredovanjem informacij v postopkih oskrbe, zato bo v prihodnosti na tem področju treba pripraviti izobraževanje o postopkih oskrbe, ki so usmerjeni v družino, in izboljšati organizacijo dela.

Ključne besede: postopki oskrbe, starši, strokovni sodelavci, ocenjevanje, MPOC.

Processes of care for chronically disabled children: views of parents and care providers

Background: The model of family centred care has been implemented for the last decades for treatment and rehabilitation of chronically ill children (1). We wanted to explore how parents feel about services of care and how service providers report on their own behaviours in treatment programs and rehabilitation. **Methods:** We invited parents whose children were involved in the processes of care at different health care institutions in 2010. We invited also the service providers from the same institutions. Parents filled in the Measure of processes of care, MPOC-20 (2); service providers filled in the MPOC-SP (2). The questionnaire MPOC-20 consists of 20 questions (five subscales), while the MPOC-SP consists of 27 issues (four subscales). The items are answered on a 7-point scale ranging from 7 (»to a very great extent«) to 1 (»not at all«), with a 0 for »not applicable«. **Results:** 235 parents participated in the study (80% mothers, 55% of the children were boys) and 67 service providers (14 medical doctors, 14 physiotherapists, 18 nurses, six occupational therapists, three teachers, seven speech therapists and five psychologists and social workers. Three didn't mark their profession. The average age of service providers was 43.9 years. They served at their current position for the last 16.6 years (SD 8.1 years) and all of them were employed for a full time. Parents reported a quite high level of satisfaction with the processes of care. The mean scores were high on all the MPOC-20 scales except Providing General Information: mean scores were 5.83 (SD 1.10) for Coordinated and Comprehensive Care, 5.62 (SD 1.12) for Respectful and Supportive Care, 5.45 (SD 1.23) for Enabling and Partnership, 5.33 (SD 1.61) for Providing Specific Information about the Child and 4.59 (SD 1.65) for Providing General Information. Service providers reported similar results: the MPOC-SP mean subscale scores were 5.2 (SD 0.9) for Showing interpersonal sensitivity, 4.3 (SD 1.3) for Providing general information, 4.8 (SD 1.5) for Communicating specific information and 5.7 (SD 0.7) for Treating people respectfully. **Conclusion:** Parents and experts were least satisfied with providing of specific and general information, so in the future we have to prepare training on family centred services and improve the organization of work.

Key words: processes of care, parents, professionals evaluation, MPOC.

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

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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 obravnava 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.

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Učinki električne stimulacije z mrežno rokavico na funkcijo zgornjega uda pri pacientu po operaciji možganskega tumorja – poročilo o primeru

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Uvod: Pri nevroloških obolenjih, ki prizadenejo delovanje zgornjega motoričnega nevrona, kot je na primer možganski tumor, je pomanjkanje uravnavanja gibanja zgornjega uda pogosta posledica. Do zdaj je bilo uporabljenih veliko različnih fizioterapevtskih tehnik za izboljšanje funkcije zgornjega uda, med drugim tudi različne oblike električne stimulacije. Dosedanje raziskave kažejo, da uporaba električne stimulacije z mrežno rokavico učinkovito vpliva na zmanjšanje zvišanega mišičnega tonusa, izboljšanje funkcije in zavedanja okvarjenega zgornjega uda (1, 2). Mrežna rokavica je narejena iz več 100 kovinskih obročkov in predstavlja skupno anodo, ki je nameščena na roki. Dve samolepilni elektrodi, ki sta nameščeni na volarni in dorzalni strani zapestja, predstavljata katodi. Namen prispevka je bil ugotoviti vpliv stimulacije z mrežno rokavico na tonus mišic zapestja, obseg gibljivosti in bolečino v zgornjem udu ter posledično na izboljšanje motorične funkcije. **Metode:** V poročilo o primeru je bil vključen 62-letni pacient, 6 mesecev po operaciji možganskega tumorja (meningeom), s klinično sliko levostranske hemipareze. Poleg običajnega programa fizioterapije smo dva tedna izvajali še stimulacijo z mrežno rokavico, petkrat na teden, po 30 minut na dan. Stimulacija je bila podprazna, s frekvenco 50 Hz in časom trajanja impulza 300 mikrosekund. Uspešnost terapije smo preverili na začetku in po koncu desetih stimulacij. Ocenjevali smo pasivno gibljivost v zapestnem, komolčnem in ramenskem sklepu, tonus mišic fleksorjev in ekstenzorjev zapestja z modificirano Ashworthovo lestvico (MAS) in morebitno bolečino z vidno analogno lestvico. Za oceno funkcije zgornjega uda smo uporabili Wolfov test gibalnih funkcij (angl. Wolf motor function test – WMFT) in del ocene po Fugl-Meyerju (angl. Fugl-Meyer Assessment – FMA), in sicer za zgornji ud. **Rezultati:** Po obdobju električne stimulacije z mrežno rokavico je prišlo do izboljšanja pasivne gibljivosti zapestja v smeri dorzalne fleksije za 5° in v smeri volarne fleksije za 15°. V komolcu in ramenskem sklepu ni prišlo do spremembe pasivne gibljivosti. Prav tako preiskovanec ni navajal bistvenega zmanjšanja bolečine. FMA za zgornji ud je pokazal izboljšanje v 11 od 33 zahtevanih aktivnostih (25 na 36 točk). Pri oceni z WMFT je prišlo celo do poslabšanja skupnega povprečnega časa, ki je potreben za opravljanje funkcionalnih nalog, in sicer s 44,3 s na 45 s, vendar se je kakovost opravljenih nalog izboljšala z 1,9 na 2,1 točke. **Zaključki:** Glede na rezultate tega poročila o primeru in drugih objavljenih študij se zdi uporaba električne stimulacije z mrežno rokavico uporabna dopolnilna metoda v rehabilitaciji bolnikov po operaciji možganskih tumorjev. Za natančnejšo oceno indikacij za uporabo in učinkov stimulacije so potrebne dodatne raziskave.

Ključne besede: električna stimulacija z mrežno rokavico, funkcija zgornjega uda, mišični tonus.

Effects of mesh-glove electrical stimulation on the upper limb function in a patient after brain tumor operation – case report

Background: Impairment of motor control is a common deficit of neurological diseases, such as brain tumor, that affect upper motor neuron function. A lot of different physiotherapeutic approaches and also different types of electrical stimulation were developed to improve the upper limb function. The results from previous studies have shown that application of electrical mesh-glove stimulation resulted in reduction of muscle tone, improved function and awareness of the affected upper limb (1, 2). The aim of this case report was to describe an effect of mesh-glove electrical stimulation on muscle tonus, range of motion, pain and hand motor function. **Methods:** A case report of a 62-year-old man, 6 months after brain tumor (meningioma) surgery. The patient had left-sided upper limb hemiparesis. Additional to standard neurophysiotherapy, the patient also received 10 days of 30 min mesh-glove electrical stimulation. We used stimulation frequency of 50 Hz and pulse width of 300 microseconds and stimulation was performed below the sensory threshold. A mesh glove that consists of 100 conductive wires is fitted over the hand and represents the common anode. Two self-adhesive electrodes are placed on the volar and dorsal side of the wrist and represent cathodes. Before and after 10 days of stimulation the effects of mesh-glove electrical stimulation were evaluated which included an assessment of the passive range of motion of the wrist, elbow and shoulder joint, pain with the Visual Analog Scale (VAS) and muscle tonus with Modified Ashworth Scale. Hand motor functions were evaluated with the Wolf Motor Function Test (WMFT) and the upper extremity Fugl-Meyer Assessment (FMA). **Results:** After the end of mesh-glove electrical stimulation, we documented the increased passive range of motion in wrist dorsale flexion for 5° and volar flexion for 15°. The passive range of motion in elbow and shoulder didn't change. We didn't document any pain decrease. The motor function of the upper limb evaluated with the FMA improved in 11 of 33 activities that were evaluated (from 25 to 36 points). The WMFT showed even a slight prolongation of the average time required for functional activities (from 44.3 s to 45.0 s), although the quality of the activity performance improved (from 1.9 to 2.1 points). **Conclusion:** Based on the results of our case report study and according to the results of previous studies, it seems that the use of the mesh-glove electrical stimulation of the upper limb is a useful complementary rehabilitation method for patients after brain tumor surgery. For further evaluation of indications and effects of stimulation additional research is still needed.

Key words: mesh-glove electrical stimulation, upper limb function, muscle tonus.

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Pojavnost padcev pri pacientih po možganski kapi, ki živijo v skupnosti

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Uvod: Ogroženost za padce je pri pacientih po možganski kapi visoka v vseh fazah (1). Med prebivalci, ki živijo v skupnosti, so padci pogostejši pri ljudeh po možganski kapi kot pri ljudeh brez kapi (2). Pojavnost padcev med posamezniki z možgansko kapjo, ki živijo v skupnosti, v Sloveniji še ni bila raziskana. Namen raziskave je bil predvideti pojavnost in dejavnike za padce pri vzorcu pacientov po možganski kapi, ki živijo v skupnosti. **Metode:** Izvedli smo presečno študijo na posameznikih, ki živijo v skupnosti. 233 članom ljubljanskega in ptujskega kluba bolnikov s cerebrovaskularno boleznijo je bil razdeljen 30-delni vprašalnik. Obsegal je demografske podatke, datum možganske kapi in njene posledice, sigurnost pri hoji, uporabo pripomočkov, pogostnost in posledice ter predvidene notranje in zunanje dejavnike padca v zadnjih šestih mesecih. **Rezultati:** Odzivnost je bila 54,9 %. Padlo je 41,4 % preiskovancev, od katerih je bilo 64,2 % moških. Tisti, ki so padli, so bili v povprečju stari 63 let (SO: 11,4) in v povprečju 11 let (SO: 9,1) po možganski kapi. 62,3 % preiskovancev, ki so padli, je imelo levostransko hemiplegijo in pri skoraj dveh tretjinah (71,7 %) sklepamo na posledično zanemarjanje polovice telesa. Vsi, ki so padli, so poročali o motnjah hoje, četrtnina o resnejših, zato je večina preiskovancev (62,3 %) uporabljala pripomočke za hojo, najpogosteje eno berglo (26,4 %), voziček (22,6 %) in sprehajalno palico (17,0 %). Večina padcev se je zgodila dopoldan (39,9 %) in popoldan (34,0 %), manj zvečer ali ponoči. Več kot polovica jih je padla enkrat, 28,3 % dvakrat in 30,2 % več kot dvakrat. 59,0 % padcev se je zgodilo doma in 18,9 % pred stanovanjskim objektom. Do več kot polovice padcev je prišlo med hojo, 22,6 % se jih je zgodilo med stojo in 15,1 % med vstajanjem s stola ali postelje. Po padcu 64,2 % preiskovancev ni bilo sposobnih samostojno vstati. Najpogostejše posledice padca so bile udarnine ali odrgnine (66,0 %) in 20,8 % jih je potrebovalo zdravniško oskrbo. Po mnenju preiskovancev so bili glavni notranji dejavnik za padeč moteno ravnotežje (52,8 %), težaven dvig stopala med korakom (35,9 %), slabše občutenje okvarjene noge (28,3 %) in vrtoglavice (26,4 %). Kot glavni zunanji dejavnik za padeč so označili drseča tla (20,8 %), visok prag vrat ali rob pločnika (18,8 %) in neravna tla (11,3 %). 73,6 % preiskovancev je navedlo strah pred ponovnim padcem, zaradi katerega jih 49,1 % omejuje svoje gibalne dejavnosti. Med preiskovanci, ki so padli, in tistimi, ki niso, nismo ugotovili statistično značilnih razlik v spolu in strani hemiplegije. **Zaključki:** Preprečevanje padcev je pri pacientih po možganski kapi pomemben cilj zdravstvene oskrbe (3). Ta presečna študija daje podatke za razumevanje odnosa med možgansko kapjo in padci ter omogoča slovenskim fizioterapevtom, da obravnavajo padce kot temeljno grožnjo, zaradi katere bi bilo v prihodnje treba pregledovati ogroženost in delovati preventivno. Za ugotavljanje dejanske pojavnosti padcev med pacienti po možganski kapi, ki živijo v skupnosti, je potrebna študija na večjem vzorcu.

Ključne besede: nezgodni padci, značilnosti, dejavniki, možganska kap.

Falls prevalence in patients residing in the community after stroke

Background: Stroke survivors are at high risk for falls in all stages post stroke (1). Falls are more frequent among community residing patients after stroke than in people without stroke (2). The prevalence of falls among patients with stroke living in community was not established previously in Slovenia. The purpose was to estimate fall prevalence and identify factors related to fall occurrence in a sample of patients residing in a community after stroke. **Methods:** A cross-sectional study with individuals residing in the community was carried out. The 30 items questionnaire was distributed to the 233 members of the Ljubljana and Ptuj Stroke clubs. The questionnaire included demographic data, date of stroke and its consequences, confidence in walking, use of assistive devices, prevalence and circumstances, and the estimated intrinsic and extrinsic risk factors of a fall in the last six months. **Results:** Respond rate was 54.9 %. Falls occurred in 41.4 % of patients, 64.2 % of them were males. Fallers were in average 63 years old and in average 11 years after stroke. 62.3 % of fallers had left-sided hemiplegia and almost two thirds (71.7 %) probably had hemi-neglect. All fallers had gait disturbances; a quarter of them had severe disturbances. For these reasons majority of fallers (62.3 %) used assistive devices, most frequently a crutch (26.4 %), a wheelchair (22.6 %), and a walking stick (17.0 %). Most of the falls happened in the forenoon (39.9 %) and afternoon (34.0 %), and less in the evening or during the night. More than half of fallers fell once, 28.3 % fell twice and 30.2 % more than twice. 59.0 % falls occurred at home and 18.9 % near home. More than a half falls happened during walking, 22.6 % during standing and 15.1 % during rising from a chair or bed. After the fall 64.2 % of fallers were not able to get up by themselves. The most prevalent consequence of falls were contusions and abrasions (66.0 %) and 20.8 % of fallers needed medical care. By the opinion of fallers, the main intrinsic factor for falls were balance limitation (52.8 %), difficulty rising a foot (35.9 %), decreased sensory function of the affected leg (28.3 %) and dizziness (26.4 %). The main extrinsic factors were slippery walking surface (20.8 %), doorstep or pavement edge, which was too high (18.8 %), and uneven walking surface (11.3 %). 73.6 % had fear of falling and for that reason 49.1 % of them restricted their mobility. We did not find statistically significant difference in gender or side of hemiplegia between fallers and non-fallers. **Conclusions:** Preventing falls in patients affected by stroke is an important healthcare goal (3). These studies provide information for understanding the relationship between stroke and falls and enable Slovenian physiotherapists to acknowledge falls as an essential threat, implying a need for risk screening and prevention. To establish the actual prevalence of falls in patients residing in the community after stroke in Slovenia, a study on large sample size is needed.

Key words: accidental falls, characteristics, risk factors, CVI.

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Zgodnja fizioterapija po parezi obraznega živca z lagoftalmusom

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Uvod: Pareza obraznega živca je lahko posledica supranuklearnih, nuklearnih ali infranuklearnih lezij. Glede na raven poškodbe ločimo centralni in periferni tip pareze živca. Pri centralnem tipu pride do lezije supranuklearno, pri perifernem tipu pa je poškodba v jedru ali stebelu obraznega živca (1). Obrazni živec je mešani živec, zato se pri osebi poleg težav z gibanjem ene polovice obraza pojavljajo tudi spremljajoče težave: suho in pekoče oko, občutljivost na svetlobo, pretirano soljenje ali pomanjkanje solz, oteklina obraza, bolečina v ušesu, hiperakuzija, šumenje v ušesu, težave pri žvečenju, oteženo požiranje, suha usta, moteno okušanje, težave pri govoru in mimiki (2, 3). Prognoza je večinoma dobra, odvisna je od ravni okvare in stopnje prizadetosti živca (1, 2, 3). Namen prispevka je poudariti pomen zgodnje fizioterapije po nastanku pareze za doseganje čim boljše funkcije zapiranja očesa in preprečitev negativnih posledic za vid. **Metode:** Prikaz fizioterapevtske obravnave pacientov s hujšo prizadetostjo obraznega živca, vključno z uporabo nove tehnike lepjenja elastičnih lepilnih trakov za izboljšanje funkcije zapiranja očesa. **Rezultati:** Uspešnost zapiranja očesa se po redni in vodeni fizioterapiji bistveno izboljša. V posameznih primerih pa je potrebno še dodatno kirurško ukrepanje. **Zaključek:** Z zgodnjo vključitvijo bolnika s parezo obraznega živca v fizioterapevtsko obravnavo dosežemo hitrejšo regeneracijo živca ter zmanjšamo resnost in pogostost težav zaradi lagoftalmusa, zmanjšamo število kirurških intervencij in omogočimo boljše ohranjanje vida.

Ključne besede: mimične mišice, fizioterapija, elastični lepilni trakovi.

Early physiotherapy treatment after facial nerve palsy with lagophthalmus

Background: Facial nerve palsy may be due to a lesion on the supranuclear level, in the nucleus itself or on the infranuclear level. Considering the level of the injury, facial paralysis is divided into a central and peripheral type. At central type there is a lesion on the supranuclear level, at the peripheral type there is an injury in the nucleus or in the stalk of a facial nerve (1). A facial nerve is a mixed nerve, the patient has difficulties with mimetic muscle movements on the affected side of the face as well as the accompanying symptoms: a dry and burning, sore eye, a photosensitive, excess tearing or reduced lacrimal fluid production, a swelling of the face, a pain inside of the ear, a hyperacusis, a tinnitus, problems with mastication and swallowing, a dry mouth, taste disorders, as well as problems with speech and facial expression (2, 3). The prognosis is mostly good, depending on the level of the lesion and the degree of the nerve injury (1, 2, 3). The purpose of this presentation is to emphasize the meaning of the early physical therapy after the onset of facial nerve palsy for achieving the best eye closure and preventing negative consequences for the vision. **Methods:** Physical therapy treatment presentation of the patient with a severe impairment of a facial nerve, including the new method of applying an elastic adhesive tape to improve the eye closure function. **Results:** The success of the eye closure after regular and guided physical therapy has significantly improved. In some cases however, a further surgical intervention is required. **Conclusion:** Early physical therapy after facial nerve palsy allows faster facial nerve rehabilitation, decreases severity and the frequency of a lagophthalmus issue, decreases the number of surgical interventions and ultimately allows better preservation of the vision.

Key words: mimetic muscles, physical therapy, elastic adhesive tape.

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Funkcionalni izid po dorzalni rizotomiji in fizioterapiji pri deklici s cerebralno paralizo – študija primera

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Uvod: Eden izmed možnih terapevtskih pristopov za zmanjšanje spastičnosti pri otrocih s cerebralno paralizo je selektivna dorzalna rizotomija, pri kateri se z delno prekinitvijo dorzalnih živčnih korenin od prve ledvene do druge križnične korenine zmanjša senzorni priliv s teh delov in s tem spastičnost (1). Namen: Želeli smo oceniti funkcijski izid gibanja pri deklici po selektivni dorzalni rizotomiji in intenzivnem programu fizioterapije. **Metode:** Deklica s spastično diparetično obliko cerebralne paralize, z večjo okvaro na levi strani, ki je bila rojena z gestacijsko starostjo 33 tednov, porodno težo 2270 g in oceno po Apgarjevi 8/8/8. Gibalni razvoj je potekal upočasnjeno, vključena je bila v program fizioterapije. Po lestvici GMFCS je bila razvrščena v II. stopnjo. Pri starosti dveh let in sedem mesecev je bila operirana v ZDA, kjer so naredili rizotomijo. Za spremljanje funkcijskega izida je isti tim strokovnih sodelavcev opravil oceno grobih gibalnih veščin s testom GMFM-88 (2) pred operacijo, nato pa še en mesec, štiri mesece, osem in osemnajst mesecev po operaciji. Deklica je bila eno leto in pol vključena v program individualne vadbe od 4- do 5-krat na mesec v prvih šestih mesecih, naslednje tri mesece od 3- do 4-krat na teden, nato devet mesecev od 2 do 3-krat na teden. Fizioterapija je bila usmerjena v učenje in izboljšanje funkcionalnih veščin gibanja (izboljšanje selektivnosti gibanja, dinamične stabilnosti, ravnotežja), vaje za raztezanje mehkih tkiv in krepitev mišic. Vključena je bila tudi v vadbo hoje na tekočem traku, ki so jo izvajali večinoma doma. Pri hoji je uporabljala nizke opornice za gleženj in stopalo. Ponoči je imela nameščene opornice za kolena. **Rezultati:** Ocena z GMFM-88 je pred rizotomijo znašala 70,8 %. Takoj po operaciji se je ocena poslabšala (70,0 %), nato pa izboljševala, najbolj v prvih štirih mesecih. Po štirih mesecih se je ocena zvišala za 9,8 %, po osmih mesecih za 12,4 %, po letu in pol pa za 18,7 % glede na izhodiščno vrednost. Analiza rezultatov posameznih podlestvic je pokazala največje izboljšanje veščin pri hoji, pri kateri se je rezultat štiri mesece po rizotomiji izboljšal za 25,0 %, ter veščin pri stoji, pri kateri se je rezultat v istem obdobju izboljšal za 20,5 % glede na izhodiščno vrednost. **Zaključek:** Deklica je napredovala v gibanju skozi vse ocenjevalno obdobje enega leta in pol. Grobe motorične veščine so se po selektivni dorzalni rizotomiji prehodno nekoliko poslabšale, nato pa po intenzivnem programu fizioterapije izboljšale, še najbolj v prvih štirih mesecih po operaciji. Podobno izboljšanje grobih gibalnih funkcij po rizotomiji in programu fizioterapije sta pokazali tudi analiza treh randomiziranih kontroliranih študij (3) ter študija s kontrolno skupino (1). Pridobivanje funkcijskih veščin pri deklici je bilo postopno, kar kaže na pomen dolgotrajne vadbe in učenja gibalnih veščin. Glede na rezultate lahko predvidevamo, da se bodo dekličine grobe gibalne funkcije še izboljševale, vendar trenutno ne moremo predvideti, do kdaj.

Ključne besede: cerebralna paraliza, rizotomija, funkcionalna sprememba, izid intervencije, spastičnost.

Functional outcome following dorsal rhizotomy and physiotherapy in a girl with cerebral palsy – single case study

Introduction: Selective dorsal rhizotomy is one of the possible therapeutic approaches for treating spasticity in children with cerebral palsy (CP), where sensory inflows on level L1-S2 of nerve roots are partially interrupted and spasticity is reduced (1). Purpose: We wanted to assess the functional outcome in movement for a girl with CP following a selective dorsal rhizotomy and intensive physiotherapy.

Methods: A girl with diparetic spastic CP, with greater disability on her left side. The girl was born in 33rd week of gestation, her birth weight was 2270 g and Apgar score was 8/8/8. Her movement development was delayed so she attended a physiotherapy program. According to the GMFCS classification, she is categorised into level II. At the age of 2 years and 7 months, she was operated in the USA, where rhizotomy was performed. In order to assess the functional outcome one team of colleagues performed assessment of gross motor function measure (GMFM-88) (2) before the surgery and one, four, eight and 18 months after the surgery. The girl attended an individual training program for a year and half, 4-5 sessions per week in the first six months after surgery, 3-4 sessions per week for the next three months and 2-3 sessions per week in the last nine months. Physiotherapy focused on learning and improving functional skills (improvement of movement selectivity, dynamic stability and balance), on stretching exercises for soft tissue and muscle strengthening. In addition, she was walking on treadmill, mostly at home. When walking she used low ankle and foot orthoses. At night she wore knee orthoses.

Results: The value of GMFM before the surgery was 70.8%, after surgery this value deteriorated (70.0%), afterwards improved, fastest in the first four months. Four months after surgery the value increased by 9.8%, eight months after by 12.4% and after 18 months by 18.7% in comparison to the baseline. The analysis of results for each subgroup showed greatest improvement in walking skills, where the result improved by 25.0%, and in standing skills, where the result improved by 20.5% compared to the baseline, four months after rhizotomy. **Conclusion:** The girl's movement abilities improved throughout the whole assessment period of 18 months. Gross motor functions slightly deteriorated in transition after selective dorsal rhizotomy, but after the physiotherapy program, they improved, the most in the first four months after the surgery. The analysis of three randomised controlled trials (3) and the controlled research (1) showed similar improvement of gross motor skills after rhizotomy and physiotherapy. Improvement in functional skills in the girl's case occurred gradually, which shows the importance of long-term therapy and learning functional skills. According to the results, we can assume that the girl's gross motor functions will continue to improve, however we cannot foresee for how long.

Key words: cerebral palsy, rhizotomy, functional change, intervention outcome, spasticity.

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