112 - ANALYSIS OF THE PRESSURE TO PLANT OF INDIVIDUALS HEMIPARETICS AFTER MOBILIZATION OF THE NERVOUS SYSTEM

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Introduction

The Vascular Cerebral Accident, VCA, also called as Vascular Encephalic Accident, VEA, according to Worldwide Organization of Health, is defined as a clinical signal of fast development of focal disturbance of the cerebral function with more than 24 hours of duration. It is the second cause of death in the world and the first one of functional incapacity. In Brazil, the last statistical data divulged by the Health Department indicate that 90,930 people had died in 2004 due to the cerebral vascular illnesses, the state of São Paulo had the biggest parcel, with 21.139 deaths and the state of Paraná presented the 5ª bigger mortality with 6.317 deaths. In the three first months of 2006 they had been registered 30,392 internments for VEA through SUS, being 2,149 of these, in Paraná (Rowland, 1997; Stokes, 2000; Teixeira et al., 2004; Datasus, 2006).

The main presented characteristic is the hemiplegia, which is the muscles paralysis of a side of the body, what difficulties making many activities of the daily life such as, to get dressed, to feed, to make the personal hygiene and to move. It is common happening riots of sensitivity, spasticity, riots of the balance and problems of cognition, among others. Many times, these characteristics lead to the complications, as cardiopulmonary problems, ulcers of decubitus, retractions and muscular shortenings (Stokes, 2000; Lianza, 2002; The' Sullivan & Schimitz, 2004).

The hemiplegia can be limp or spastic. Initially, the voluntary consequences and movements are gotten depressed and the limp muscles had to the cerebral shock, with consequent loss of the normal descending facilitation, the medullar consequences do not have enough excitatory stimulations to depolarize the alpha motoneuron. The consequences start to return in days or weeks, and then, they become hyperactive in a period of three to six months. The hyperactivity diminishes the measure that recoups the voluntary movements, being that such recovery can stop at any time, leaving weakness and residual hyper-reflexive. A study carried through for Diza verified that with three months of injury only 19% of the individuals presented spasticity, while in another study carried through for Leathley, 39% of the individuals presented spasticity with 12 months after the accident (Delisa 2002, Watkins et al. 2002, Diza et al. 2004).

The neurodynamic test, or test of neural tension is also called of neural stretching test. It constitutes in a sequence of made movements to evaluate the mechanics and the physiology of a part of the nervous system, NS. The test is considered positive if painful symptoms and deep enlargement will be reproduced (Butler, 2003; Butler, 2000 apud Coppieters et al., 2005).

The ULNT1 involves a combination of movements carried through passively for the therapist. These movements provoke the stretching of the medium nerve throughout the way for the superior member, being used, therefore, to evaluate restrictions in this nerve (Butler, 2003).

In 2005, a study of the London University used of diagnostics images of US to observe the longitudinal landslide of the medium nerve in reply to a maximum inspiration. In the study, three groups of patients had been boarded, one with Whiplash, the other presented NSAP, non-specific arm pain, caused for repetitive movements and the group-control. In the patients with whip injury a reduction of 71% of the longitudinal landslide in the symptomatic member can be noticed, comparing with the group-control, and in the patients with NSAP a reduction of 68% can be noticed (Greeninga et al. 2005).

After a nervous injury, an adverse tension in all the nervous system happens, what limits the movement and intervenes in the capacity of adaptation in all the body and not only in the place of the injury. The standards of movement limitation are resembled with the caused for the muscular tension or the muscular hypertonia increase. Patients with central injury are more susceptible to the neural adverse tension from the nervous system, what can be aggravated by the common immobility in these injuries. With the nervous tension increase, the members and the trunk are taken to keep similar positions of the spasticity, being that this adverse tension seems, therefore, not only provoke loss of the movement amplitude, but also to increase the tonus muscular, to provoke paresthesia or anesthesia, pain and circulatory upheavals for the SNA as hyperidrosis. From this, the mobilization of the nervous system, restoring mobility and elasticity, becoming integrant part of the central nervous injuries treatment, and having to be enclosed since the beginning (Davies 1997, Butler 2003).

A treatment based on the mobilization of the nervous system is being developed with clinical comments and experimental research. Compromises in the mechanics and physiology of the SN such as the movement, elasticity, conduction and axoplasmatic flow can result in more dysfunctions in the nervous system or in the muscle-skeleton structures that receives its innervations. The neural mobilization searches to restore the movement and the elasticity of the nervous system, what promotes, therefore, the return to the normal functions (Marinzeck, 2003).

The present study it has for objective to analyze the effect of the mobilization of the nervous system, through test ULNT1, in the adequacy of tonus muscular of hemiplegics individuals with Encephalic Vascular Accident by means of the pressure peaks plantar, observing the bipodal distribution of the weight of the body and evaluating the position, through the baropodometry.

Materials and Methods

This study is characterized for a non-parametric study, prospective of transversal cut. It was carried through in Physiotherapy Clinic School at UNICENTRO - Universidade Estadual do Centro-Oeste in CEDETEG *Campus*, Guarapuava-Pr. The studied sample was composed for 12 individuals of both sorts, being 7 of them hemiplegics to left and 5 to the right. The averages of age, weight and height of the individuals had been respectively of 59 years and 8 months, 72,42Kg and 163,83cm. All the individuals had suffered AVE, with sequel of hemiplegia or hemiparesis in any of the hemi corps, with spasticity presence degree 1 or 2, according to modified Ashworth scale, MAS. All the individuals had passed the same evaluation procedures, collecting of data for electronic baropodometer, nervous system mobilization and new collection of data, respectively.

As inclusion criteria the following characteristics had been observed: presence of AVE with hemiplegia or hemiparesis, presence of tonus muscular spastic degree 1 or 2. The patient must have a cognition level that allowed the agreement of simple verbal commands as: to seat, to get up and to tell painful sensitivity, being able to be capable or not to carry through independently deambulation, but that was capable to remain in foot without assist.

For the exclusion criteria we had as reference the existence of associate pathologies in infectious states or capsize acute, presence of articulate deformities, such a way in superior members as for in inferior members and the incapacity to remain in foot without aid.

The present study was duly approved by the ethic committee and research institution for the resolution nº 046/2006, respecting the research experimental norms with human. The individuals had signed the term of free and clarified assent, contend information that had left them aware of the objective, of the procedures and risks of the study.

The study occurred in a room where the researcher was, the orienting professor of the study, the operator of the evaluation device was present, baropodometer, and a companion of the individual that composes the sample. The environment presented adjusted luminosity, absence of noises or any another type of stimulation that could modify the attention and tonus muscular. All the individuals had passed for an evaluation in order to characterize its degree of spasticity, as well as confirming its inclusion in the established criteria and already cited and still to guide as for the procedures carried through during the same.

Initially was realized data collects by the baropodometer, that is constituted of a coated plate of polycarbonate, with dimensions 645 x 520 x 25 mm, active surface of 400x400mm, 5mm of thickness and 3kg, as it can be seen in figure 5. In the surface of the plate meet 2704 calibrated capacitive captor that support a maximum pressure of 100 N/cm2 each and identify, in the feet, in which region of the biggest discharge of weight. It uses a frequency of 150 Hz and an analogical converter of 16bits. The plate is connected to a microcomputer through a handle USB, and the gotten data are interpreted by the program *FootWork*® (Available em www.arkipelago.com.br).

The individual remained in foot on the baropodometric plate per 30 seconds, as suggested for Rose et al. (2002) and Vieira et al. (2003), until they were registered the data. This information had been reposted to the microcomputer that sketched a colorful image of the plantar surface, in the screen.

It was oriented the individual that remained bare-footed, therefore as described for Foti et al. (1992), it could have intercurrences recurrent of the different types of footwear, since the distribution of the peak in accordance with varies the material that composes the base. The position adopted for the individuals was erect unrestricted on the platform in normal and more comfortable position for the same, as well as carried through for Santana (1999). The arms had remained lined up throughout the body, with the head in neutral position and the look in a fixed point in the wall with a meter of distance.

After that, the neurodynamic test was applied ULNT 1, with the patient in neutral dorsal decubitus, next to the lateral edge to the stretcher of the hemiplegic side, the therapist located on the side for the patient while carried through in the hemiplegic superior member the movements of depression of the waist to scapular, abductor of the arm approximately 110º, forearm supination, extension of fist and fingers following with extension of elbow. These movements had been carried through, consecutively without leaving that the previous segment returned the origin, until the limit of discomfort told for the individual was reached. Kept this position, the individual was oriented that actively carried through a cervical lateral flexion for the opposing side, and then the therapist made consecutive oscillations of flexion and extension during the first one minute. A rest of 3 minutes was allowed, and then, the procedure happened again more twice.

At this moment, after made the test, it had a new collection of data through baropodometer, with the same described procedures already above. The collections had been transformed into graphs and compared for the same individual before and after the test, being the results compared with the ones of the individuals of the sample studied.

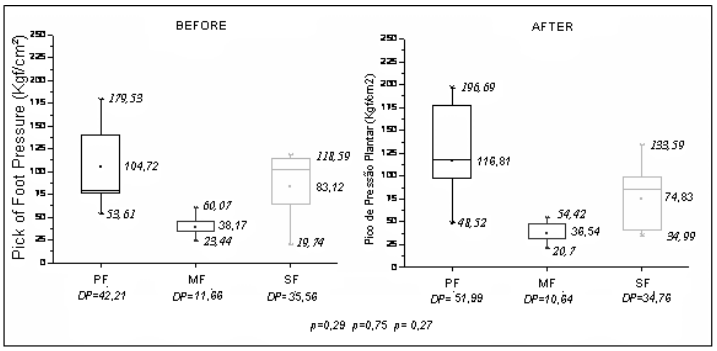
The collection, organization and description of the data had been in charge of the descriptive statistics, Software Excel 97, while the analysis and interpretation of the inferential statistics data for the Software Microcal Origin 6.0.

The Software Microcal 6.0 was used in the inferential statistics, to carry through the comparative analysis through the *t-student* test, with significance index p<0,05 in the Plantar Pressure Peaks, as well as in the creation of the graphs with the reached results.

Results

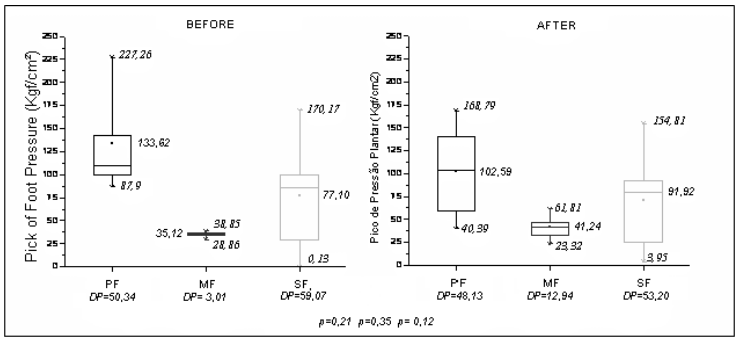
It was compared the following possible combinations between the collected values after and before the applications of the ULNT 1, the pressures of all before feet, medium feet and backward feet of the hemiplegic member of the individuals with hemiplegia to the left and all before feet, medium feet and backward feet of the hemiplegic member of the individuals with hemiplegia to the right. The comparison of the plantar pressures of all the hemiplegics members, of all the individuals, with the non-hemiplegic member were registered.

The corresponding values with the hemiplegic member of the individuals that presented hemiplegia to the left, being found the values sketched in graph 1. For before feet notices that it had increases of the PPmax and the p.m., however a reduction of the PPmin, being that some individuals had started to step on more in before foot, while others had started to step less. In average foot had a reduction of all the values, showing that the individuals had started to step less in medium hemiplegic left foot after the test. In backward foot had an increase of the PPmax and PPmin, however a reduction in the p.m.



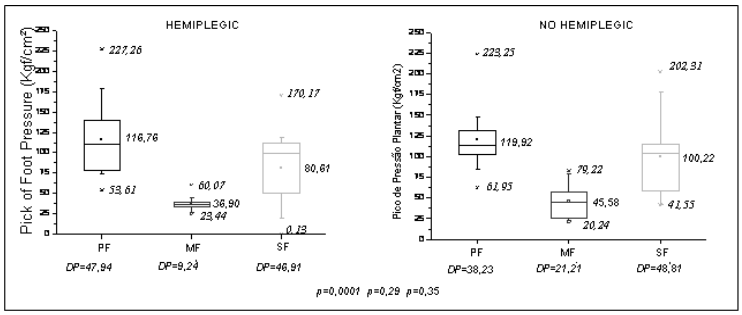
Graphic 1: hemiplegic member of the individuals that presented hemiplegia to the left.

In graph 2 the values of the pressures are displayed to before feet, medium feet and backward right hemiplegic feet, before and after the ULNT1. An increase in all the values for before foot was observed, showing that some individuals had started to step on more in before right hemiplegic foot after the test. In medium foot happened an increase in the variation of the pressures between the individuals that increased the PPmax and diminished the PPmin. In backward foot, the PPmax and minimum had increased, however the p.m. diminished.



Graphic 2: hemiplegic member of the individuals that presented hemiplegia to the right.

The last combination of the results consists in the comparison between all the hemiplegic members with the non-hemiplegic ones of the distribution of the plantar pressure. They can be noticed in graph 3. The before hemiplegic foot possess a bigger PPmax than the before non-hemiplegic foot, however a smaller p.m. and PPmin, showing that it has a bigger variation in the plantar distribution in before hemiplegic foot. In medium foot there is one little variation in the distribution of the pressure in this segment in the hemiplegic foot, once that the PPmax revealed to be less and the PPmin revealed to be bigger than non-hemiplegic member. The values of backward foot indicate that hemiplegic members deposit less weight of the body in backward foot, once that all the values had shown inferiors to the non-hemiplegic backward foot.



Graphic 3: comparison between all the hemiplegic members with the non-hemiplegic.

Discussion

Assorted authors as well as Mattos (2004) had told the dependence of the positin control for the visual systems and vestibular, with the touchable and proprioceptives information of the feet. The sample of the present study composes individuals that do not present compromise of these systems. The boarded hemiplegic individuals present motor compromise, with degree of spasticity 1 or 2, what leads to a podal asymmetry and consequently corporal demanding for the body, as described for Bricot (1998) apud Mattos (2004), an adaptation of all the individual postural system.

Manfio et al. (2001) apud Adami e Santos (2005), observed that approximately 60% of the corporal weight of a individual characterized as normal is deposited on the backward foot, while 52% in medium foot and of 31 to 38% in before foot. For the values of figure 14 can be observed, in this study, that the pressure in the hemiplegic foot is bigger in before foot of than the backward foot, and, bigger when also compared with the before non-hemiplegic foot. The values of medium foot and backward feet are bigger in the non-hemiplegic foot, comparing with the hemiplegic, agreeing to the study of Manfio, therefore, it perceives greater transference of pressure for backward foot in the non-hemiplegic member.

According to Lopez (2001), Gagey and Weber (2000), apud Adami and Santos (2005), tonus muscular is the one that determines the bone position and that the articulated surfaces, with its proper mechanical axles define the amplitude of the articulated movement, therefore, any change in the tonus modifies the articulated position articulate. The biggest pressure in before foot can be justified in this way when compared the medium foot and backward foot in the hemiplegic member with spasticity degree 1 or 2, therefore, is known, predominating in the flexor muscles of the superior members and extensor of the inferior members, favoring in the foot the flexion plantar.

The study made for Bankoff (2004), determined that the difference of pressure plantar in backward foot, in the static and dynamic position, with and without footwear, does not present significant difference. Agreeing with Bankoff, this study also presents a little variation in the pressures of backward foot when compared pre and after-test.

Before this Lebiedowska (2000) and Cechini (2004) apud Adami and Santos (2005), had left know that with the increase of the age is observed reduction in the corporal oscillation what is explained by the Influence of the adaptive changes of the postural control. As the studied sample composed individuals of advanced age, it gives credit that the age has exerted influence on low difference in the distribution of the plantar pressures before and after the test application.

Saad et al. (1997) apud Bankoff et al. (2004), notify that from a reprogramming of the sensitive receivers, using techniques of corporal manipulation is possible to place them in sequence to restore the global corporal balance of the neuromuscular systems, and thus, to improve the corporal position.

Butler (2003) mentions the use of the neural mobilization in the precocious treatment of patients after AVE and the influence on the flexor spasticity overlapped to the ulnar nerve. Davies (1997) already emphasizes the importance of the neural mobilization for these patients, emphasizing the precocious attendance and the prevention of adaptive injuries of the peripheral nervous system in these individuals. More recently Silva and Salgado (2003) had told in their study that with the use of the neurodynamic tests, including the ULNT 1, improvement of the axoplasmatic flow is obtained, mainly retrograde, to alleviate the nervous tensions. Authors evidence the coherence of the present study in approaching the neural mobilization with the application of ULNT 1 for hemiplegic individual after the AVE.

In Coppierters et al. (2001), is described the symptoms to be monitored during the application of ULNT 1, they include the reduction of the amplitude of movement and sensitive presence of pain or symptoms in the nervous passage. In all the individuals of the sample in study, these criteria had been observed and these characteristics had shown in attendance, confirming the positive results of the test. To each application of the mobilization, the reduction of the symptoms with the increase of the amplitude of movement in the third application can be observed together, however this comment has been subjective, and,

therefore, it was made by the therapist during the application of the test. The Coppierters` study realized that in normal individuals occurs a sensitization of the medium nerve in the application of ULNT 1 and suggests that the appearance of these symptoms does not have to be considered abnormal, being the appraiser will to perceive the aggravation of these symptoms.

Conclusion

Through the development of this study was perceived the existence of variations in the plantar pressures between the hemiplegic members and the non-hemiplegic members. It could be evidenced despite these pressures get changed in inconstant form after the application of the test of neural mobilization for superior member, ULNT 1, being that some individuals had transferred the plantar pressure to the opposing member, whereas others had redistributed the pressure between the same the plantar regions of member, also occurring in the hemiplegic member.

Even though these changes have been observed, the statistical value of the same was not statistically significant, once that the value found for p> 0, 05.

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ANALYSIS OF THE PRESSURE TO PLANT OF INDIVIDUALS HEMIPARETICS AFTER MOBILIZATION OF THE NERVOUS SYSTEM

ABSTRACT

The Encephalic Vascular Accident is about a neurological affection that sometimes incapacitates the person, and can cause innumerable complications in the patient life. The therapeutics techniques are always improved and renewed, in order to prevent such complications and to maximize the independence of these patients in their daily life activities. The neural mobilization is a relatively new technique that looks to keep or to restore the movement and the elasticity of the nervous system. The proposal of this study is based on mobilizing the nervous system of the hemiplegic superior member of individuals that had suffered VEA, through the ULNT 1 test, and evaluating the immediate influence in the plantar pressure distribution through the electronic baropodometry, analyzing the plantar pressures before and after the test. The present study had utilized 12 individuals who were arbitrarily selected, with average equal 59±72. The gotten results had presented variations in the plantar pressures between the hemiplegics members and the non-hemiplegics members, changing theirself in an unpredictable way after the test application of neural mobilization for superior member ULNT 1, being that some individuals had transfered pressure to the opposing member, whereas others had redistributed the pressure in the plantar regions of the same member, also happening in the hemiplegic member. Although, these changes have been observed, they had not been statistically significant with p>0,05.

KEY-WORDS: mobilization of the nervous system, plant pressure, spasticity.

ANALYSE DE LA PRESSION À L'USINE DES INDIVIDUS HEMIPARETICS APRÈS LA MOBILISATION DU SYSTÈME NERVEUX

RESUME

L' Accidente vasculaire encephalique c'est une affecton neurologique parfois mauvaise et peut avoir aussi des sequelles pedant la vie du indivdu. Dans le but d'eviter ces sequelles et donner plus d'independence au malade dans les activites courantes de la vie , nous cherchons toujours evoluer et perfectionner les techniques terapeutiques.La mobilization du systeme nerveux c'est une technique recente qui a pour but mantenir ou restaurer le mouvement e l'elasticité du systeme nerveux. Le but de cet etude basée dans la mobilization du systeme nerveux du membre superior du hemiplegique des individus que ont eu troubles vasculaires cerebraux, a partir du teste ULNT1, et evaluer la distribuition imediate des pressions plantaire avant et aprés le test. Cet etude a éte fait avec 12 individus selectionées au hasard , avec l'age moyenne de 59 ans.Les resultats obtenus ont montré des variations des presions plantaires entre les membres hemiplegiques et non plegiques, selon quelques individus ont transferé leur poids pour le meme coté et d'autres pour le coté opposé. Avec ces données ont a pu analisé que 'ont pas atteint le seuil de signification stastistique avec le P> 0,05 .

MOTS CLES: Mobilization du systeme nerveux, presions plantaires e spasticité .

ANALISIS DE LA PRESION PLANTAR DE INDIVIDUOS HEMIPARETICOS DESPUES DE LA MOVILIZACION DEL SISTEMA NERVIOSO

RESUMEN

El Accidente Vascular Encefálico se trata de una afección neurológica, por veces dificultosa y sujeto a complicaciones innumerables en la vida del paciente. Se busca siempre perfeccionar y renovar las técnicas terapéuticas para evitar complicaciones y de llevar al máximo la independencia de esos pacientes en sus actividades de la vida cotidiana. La movilización neural es una técnica relativamente nueva que procura mantener o restaurar el movimiento y la elasticidad del sistema nervioso. La propuesta de este estudio basase en movilizar el sistema nervioso del miembro superior del individuos hemipléjicos que sufrieron AVE, por el teste ULNT 1, y evaluar la influencia inmediata en la distribución de la presión plantar por baropodometria electrónica analizando las presiones plantares antes y después del teste. El presente que estudio contó con 12 individuos escogidos al azar, con el medio igual de 59 años. Los resultados presentaron variaciones en las presiones plantares entre los miembros hemipléjicos de y los miembros no hemipléjicos, alterándose de forma cambiable después de la aplicación de la prueba de la movilización neural para el miembro superior ULNT 1, es que algunos individuos transfirieron la presión para el miembro opuesto mientras que los otros redistribuyeron la presión entre las regiones plantares del mismo miembro, ocurriendo aún en el miembro hemipléjico. Aunque esos cambios hayan sido observados, no presentaron estadísticas significativas con p>0,05.

PALABRAS-CLAVE: movilización Del sistema nervioso, presión plantar, espasticidad.

ANáLISE DA PRESSãO PLANTAR DE INDIVíDUOS HEMIPARéTICOS APóS MOBILIZAçãO DO SISTEMA NERVOSO

RESUMO

O Acidente Vascular Encefálico trata-se de uma afecção neurológica por vezes incapacitante e passível de inúmeras complicações no decorrer da vida do paciente. Busca-se sempre aprimorar e renovar as técnicas terapêuticas a fim de evitar complicações e de maximizar a independência desses pacientes em suas atividades de vida diária. A mobilização neural é uma técnica relativamente nova que procura manter ou restaurar o movimento e a elasticidade do sistema nervoso. A proposta deste estudo baseia-se em mobilizar o sistema nervoso do membro superior hemiplégico de indivíduos que sofreram AVE, através do teste ULNT 1, e avaliar a influência imediata na distribuição de pressão plantar através da baropodometria eletrônica analisando as pressões plantares antes e após o teste. O presente estudo contou com 12 indivíduos selecionados aleatoriamente, com idade média igual 59 anos. Os resultados obtidos apresentaram variações nas pressões plantares entre os membros hemiplégicos e os membros não hemiplégicos, alterando-se de forma inconstante depois da aplicação do teste de mobilização neural para membro superior ULNT 1, sendo que alguns indivíduos transferiram pressão para o membro oposto enquanto que outros redistribuíram a pressão entre as regiões plantares do mesmo membro, ocorrendo inclusive no membro hemiplégico. Embora essas mudanças tenham sido observadas, não foram estatisticamente significativas com p>0,05.

PALAVRAS-CHAVE: mobilização do sistema nervoso, pressão plantar, espasticidade.