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RELATO DE CASO

O efeito da técnica de reeducação postural global em um paciente com hemiparesia após acidente vascular encefálico

The effect of global postural reeducation technique in a hemiparetic stroke patient

Bruna Moreira Gomes[1], Grace Cristina Gomes Nardoni[2] , Priscila Garcia Lopes[3], Ewerson de Godoy[4]

RESUMO

A disfunção motora mais evidente do acidente vascular encefálico (AVE) é a hemiparesia. Os pacientes hemiparéticos apresentam uma tendência em manter-se em uma posição de assimetria postural. O objetivo deste trabalho foi avaliar e tratar as alterações posturais em um paciente portador de hemiparesia após um acidente vascular encefálico utilizando a técnica de Reeducação Postural Global (RPG). O participante foi um paciente hemiparético à direita, devido a um AVE há cinco anos, com boa cognição segundo o Mini Exame do Estado Mental e comprometimento motor moderado. Para avaliação postural foi utilizado o software Fisiologic. Foram aplicadas dez sessões com a técnica de RPG durante oito semanas. Embora o tratamento tenha sido enfatizado na inclinação pélvica e posicionamento da escápula os resultados apresentaram evoluções também quanto à base de apoio e segundo o relato do paciente, melhora no equilíbrio e na marcha. Concluiu-se que a técnica de RPG proporcionou resultados positivos em relação ao padrão postural do paciente hemiparético.

PALAVRAS-CHAVE

Avaliação da postura, acidente cerebrovascular, hemiplegia, imagem corporal, reabilitação

ABSTRACT

The most evident motor dysfunction in the Cerebrovascular Accident (CVA) is hemiparesis. Hemiparetic patients have a tendency to maintain an asymmetric posture. The aim of this study was to evaluate the posture in a hemiparetic stroke patient using the Global Postural Reeducation (GPR) technique. The participant was a right hemiparetic patient due to a CVA that had taken place 5 years before; his cognitive state was good, according to the Mini-Mental State Examination test and he presented moderate motor impairment. The postural evaluation was performed by a computer program, called FisioLogic. The patient underwent a treatment plan comprising ten sessions of GPR technique during eight weeks. Although the treatment was carried out with emphasis on the pelvic inclination and the scapula positioning, the results also showed improvement regarding the support base and, according to the patient, it also improved his balance and gait. We conclude that the GPR technique yielded positive results regarding the posture pattern of the hemiparetic patient.

KEY-WORDS

postural evaluation, cerebrovascular accident, hemiplegia, body image, rehabilitation

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Introduction

The cerebrovascular accident (CVA) or stroke results from a restriction in the blood flow to the brain, causing cellular lesion and damage to the neurological functions. Clinically, several deficiencies are possible, including damage to motor, sensitive, mental, perceptive and language functions[1].

The most evident motor dysfunction in stroke is hemiparesis; whatever the cause of the stroke is, it is characterized by the loss of motor control in one side of the body[2].

Hemiparesis results in an extremely important loss of the selective activity of the muscles that control the trunk, particularly the muscles responsible for flexion, rotation and lateral flexion[3].

The most evident impairment is the tendency to maintain oneself in a position of postural asymmetry, with a lower distribution of weight on the paretic hemibody. This asymmetry and the difficulty to transfer the weight to the affected side interfere with the individual's capacity to maintain postural control, preventing orientation and stability to perform movements with the trunk and limbs, which can result in falls[4,5].

In hemiparesis, the abdominal muscles show a remarkable loss of activity and tonus. The umbilical scar is pulled onto the non-affected side. The entire abdominal wall has a hypotonic appearance. In the sitting position, the lateral wall is projected with laxity above the pelvis in the affected side. In both postures, sitting and standing, when viewed from behind, the distance from the vertebral column to the lateral border of the trunk is longer in the affected when compared to the non-affected side[3].

In normal postural alignment there is a slight protrusion of the head with level shoulders, and the vertebral column has a series of counterbalanced anteroposterior curves, such as cervical and lumbar lordosis and thoracic and sacral kyphosis. The pelvis must be in a neutral position, defined by the alignment in a transversal plane, of the anterosuperior with the posterosuperior iliac spine. The weight load on the lower limbs must be equally distributed, a characteristic obtained through the harmony among the antigravitational muscles[6,7].

There is a prevalence of postural deficits in patients with left hemiparesis in opposition to patients with right hemiparesis, as demonstrated by clinical and instrumental studies that have shown that left hemiparetic patients have less postural balance in sitting and standing positions in comparison to right hemiparetic patients, and that there is a high degree of postural abnormalities in hemiparetic patients with neglect[8].

Umphred[2] describes the perceptive deficits of right and left hemiparesis. In left hemiparesis, general global spatial deficits are common, such as the visual-perceptive, behavioral and intellectual ones. The patient can present a disorder in self/body image, impairment of self-correction, difficulty to retain information, irritability and confusion, among others. In right hemiparesis, one can observe language deficits and apraxia, whereas regarding behavior and intellectual deficits, one can observe mainly the difficulty to start tasks and deficits in giving sequence to and the rapid performance of movements or activities.

Many brain structures are involved in postural recovery after a stroke: the cerebellum, especially the vestibulocerebellum (floculonodular lobe) and the paleocerebellum, basal ganglia and the cortex, mainly the posterior parietal region in both sides. The right posterior parietal cortex seems to be predominantly involved with spatial integration, as shown by the prevalence of visual-spatial deficits in lesions occurring on this side. The visual-spatial information is crucial for posture recovery[9].

For patients who suffered a stroke, the recovery of the ability to stand and walk is critical, as it requires a complex mechanism of postural control, which has yet to be completely understood. Several strategies are suggested for maintaining postural control[10].

For the treatment of postural deficits, Physical therapy has a technique called Global Postural Reeducation (GPR). GPR is a technique that considers the muscular, sensory and skeletal systems as a whole and tries to treat muscles individually[11,12].

GPR is basically a proprioceptive method of inhibition. The proprioceptive stimulus deals with the reeducation of the postural balance, promoting stability, reeducation of the vestibular and visual apparatus and perfecting the reactions of straightening and balance.

The treatment consists of decubitus and load postures. These comprehend the GPR "exercises", stretching together with breathing exercises[12].

These postures simultaneously perform isometric work, that of the static muscles and the dynamic work, always with a progressive joint decoaptation, which becomes increasingly more global[13].

The aims of the study were to evaluated and treat the postural alterations in a patient with hemiparesis due to a stroke, using the GPR technique and emphasize the treatment in two variables: pelvic inclination and scapular positioning.

Case Report

M. S., a 40-yr-old male patient, with a diagnosis of right hemiparesis after a ischemic stroke, with a 5-year history of lesion, good cognition according to the Mini-Mental State Examination test[14] with a score of 23, stage 4 of Brunnstrom rehabilitation, was undergoing treatment at the Physical Therapy Clinic of Mogi das Cruzes University (Universidade de Mogi das Cruzes - UMC).

Regarding the motor capacity, the patient presented spastic hypertonia, according to the modified Ashworth Scale[15]: grade one (1) in shoulder extensors, grade 1+ in shoulder abductors and grade 2 in adductors; grade 2 in elbow extensors and grade 2 in hip extensors, grade 1+ in knee flexors and grade 1 in plantar flexors. Regarding the transpostural changes, he presented a deficit of balance at the cat posture with decrease of weight unload on the affected hemibody. As for the posture in the orthostatic position, he presented head anteriorization, thoracic hyperkiphosis, lumbar hyperlordosis, slightly anteverted hips, varus knees with internal rotation of the femur and pronated feet, and in an anteroposterior view, he presented trunk inclination to the left.

The postural assessment was performed through the postural analysis software – FisioLogic[16], which has been validated in some

studies[17,18]. This program allows the professional to obtain the coordinates x and y of the body markers in pixels; these coordinates are used to later calculate the values of body segments.

For the photographic analysis it is necessary to define the protocol of the program evaluation. The points to be studied in the patient are defined, and the segments of interest must be determined based on such points.

The material used was a Neurological and Postural Assessment File, styrofoam markers (2.5 cm of diameter), dotted board, digital camera (Olympus, model D560), specific table for GPR, bench (for sitting), supports, Velcro straps and the Mini-Mental State Examination test[14].

Procedure

The research was approved by the Ethics and Research Committee of Universidade de Mogi das Cruzes (process #154-2005; CAAE 0118.0.237.000-05). After informed consent, the patient was assessed through a neurological and postural evaluation as well as with the Mini-Mental State Examination test14, followed by the digital photographic recording before and after treatment.

The photographic recording was carried out in the anterior, posterior and right and left lateral views, at a distance of 2 meters, after the fixation of styrofoam markers on the anatomic points on the patient's skin (occipital fossa, spinous process C7, acromiums, lower and upper scapular angles, ulnar styloid processes, upper anterior and posterior iliac spines, spinous process L5, fibular heads and lateral malleolus).

It was suggested to the patient to maintain the lower limbs close to each other during the evaluation, as long as possible.

After the initial evaluation, 10 sessions were scheduled, divided in 8 weeks with a mean duration of one hour each.

Treatment

The postures chosen for the treatment were: the dorsal decubitus posture, the frog-like posture (opening of the coxofemoral angle) (Figure 1), sitting (closure of the coxofemoral angle) and standing against the wall (opening of the coxofemoral angle).

In the frog-like posture (Figure 1), the patient remains in dorsal decubitus, with upper limbs in abduction and the palms of the hands turned upward, retroverted hips, lower limbs in flexion with abduction and external rotation of the hip, flexed knees, and foot plantar areas in contact. The progression of postures in coxofemoral angle opening consists in the extension and adduction of the lower limbs and closure of the upper limbs.

In the sitting position, the patient remains sitting on a bench, looking into the horizon, pelvis supported on the ischial tuberosities, keeping the lumbar region erect, upper limbs along the body, with palms turned upward, lower limbs in flexion with abduction and external rotation of the hip, flexed knees and foot plantar regions in contact. The progression of this posture also consists in the extension of the lower limbs and the physical therapist can request the forward inclination of the trunk.

The standing posture against the wall starts with the patient standing, with the dorsum of the hands in contact with the wall (the ideal situation is when the calcaneous, trunk and occipital region are in contact with the wall; however, if the patient cannot accomplish that, the calcaneous can be moved away from the wall, as a facilitating mechanism), upper limbs along the body in slight abduction, looking into the horizon, lower limbs in semi-flexion of hip and knee, in abduction and external rotation, and feet in abduction of 15o with calcaneous contact.

If necessary, pads can be utilized in the occipital region to allow a cervical lordosis.

Firstly, the GPR procedure was explained to the patient. The supports and the restraining Velcro straps were used as facilitating mechanisms for the positioning of the limbs during the postures.

The patient remained in the frog-like posture on the ground for 20 to 30 minutes, in the sitting posture for 15 minutes, on average, and standing against the wall for 10 minutes (with three repetitions within this period). The postures sitting and standing against the wall were interrupted if the patient presented signs of muscular fatigue.

Figure 1
Frog-like posture

Evolution

According to the Table 1, the anterior view photographic analysis, we observed that the most evident alteration was the distance measured between the points of the right and left malleoli, going from 39.2 to 18.5 cm with a decrease of 20.7 cm, which is the size of the static support base. The decrease of the support base was also demonstrated by the measurement between the right and left fibula heads, which showed a reduction of 9.6 cm of distance; before treatment, this distance was 36.4 cm and decreased to 26.8 cm.

In the upper limb, the distance between the right and left ulnar styloid processes before and after the technique was applied, was 53.9 cm and 63.2 cm, respectively, with a gain of 9.3 cm; the less evident alteration was the distance between the right and the left acromiums, which decreased 0.7 cm.

Taking the vertical line of the dotted chart as reference in order to assess the positioning of the trunk, we observed the difference in

the line from the right acromium to the right iliac spine, which was 49.5 cm and increased to 55.8 cm, with a gain of 6.3 cm, and the distance between the left acromium and the left iliac spine, which went from 52.7 to 57.9 cm, with a gain of 5.2 cm.

As shown in Table 2, the photographic analysis of the right lateral view, there was an alignment of the posture, improving the position of the head in relation to the midline. There was a relative decrease in the head anteriorization demonstrated by the alteration of the angle of the occipto-C7 segment to the vertical line, which decreased 2.9º.

Figure 2
Anterior view before and after treatment.

Table 1
Photographic postural evaluation of the anterior view.

Name	Measurement 1 06/07/05	Measurement 2 30/09/05	Ideal	Description
Iliac spine	2,8 °	0,9 °	0,0 °	Angle of the segment of the iliac spine in relation to horizontal line
Fibular head	0,5 °	-1,1 °	0,0 °	Angle of the segment of the fibular heads in relation to horizontal line
Acromiums	34,9 cm	34,2 cm		Distance of the point of Right acromium to the Left acromium
Styloid process	53,9 cm	63,2 cm		Distance of the point of R styloid process to L styloid process
Malleolus	39,2 cm	18,5 cm		Distance of the point of R malleolus to L malleolus
Fibula	36,4 cm	26,8 cm		Distance of the point of R fibula to L fibula
Acromium/R spine	49,5 cm	55,8 cm		Distance of the point of R acromium to R iliac spine
Acromium/L spine	52,7 cm	57,9 cm		Distance of the point of L acromium to L iliac spine

Therefore, an increase of 0.2 cm in the distance of the occipital segment to C7 was also shown, as well as in the distance of the segment C7-L5 segment, which increased 7.3 cm. In the upper limbs, the segment of the right acromium to the styloid process of the right ulna had an increase of 11.3 cm.

The angle of the segment corresponding to the posterosuperior iliac spine in relation to the horizontal line decreased 2.1º.

The angulation of the point of the right fibula to the right malleolus in relation to the vertical decreased 0.5º, approximating it to the vertical line.

The improvement in the positioning of the shoulders can also be observed in the posterior view, through the improvement in the alignment of the acromial and scapular line. The acromial line presented a 2.0º inclination before, and after treatment, this angle was reduced to 0.0º; the same occurred with the scapular line, measured through the inferior angle of the scapulae, which presented an inclination of 1.4ᵛᵛ and was also reduced to 0.0º after treatment.

Discussão

Postural alterations are frequent in patients with hemiplegia, and limit or impair the recovery of gait and functional independence. This fact makes postural control a rehabilitation priority after a stroke[8].

The correction postures employed in the Global Postural Reeducation technique are the result of the joint decoaptation through the therapist's manual action and the stretching of shortened muscle tissues[12].

Figura 3
Vista lateral direita antes (esquerda) e após o tratamento.

The shoulder asymmetry observed in hemiplegia is caused by the decrease of shoulder movement, which results in rhomboid, trapezius, and scalene muscle weakness, and consequently, the shortening of the anterior chain, i.e., the major and minor pectoral muscles and the anterior serratus, among others, and by the spas-

Table 2
Photographic postural assessment from the right lateral view

Name	Measurement 1 06/07/05	Measurement 2 30/09/05	Ideal	Description
C7/ L5	5,5º	2,9º	0,0º	Angle of C7/L5 segment in relation to vertical
Post. Iliac spine/ Ant. Iliac spine	171,3º	169,2º	0,0º	Angle of the iliac spine segment – Post. iliac spine/ ant. Iliac spine in relation to horizontal
Occipto/ C7	17,9º	15,3º	0,0º	Angle of the occipto/C7 segment in relation to vertical
Ant. iliac spine/ fibula	-16,5°	-15,8°	0,0°	Angle of the ant. iliac spine/ fibula segment in relation to vertical
Fibula/ malleolus	-1,7°	-1,2°	0,0°	Angle of the fibula/ malleolus segment in relation to vertical
Occipto/ C7	6,5 cm	6,7 cm		Distance from the occipital point to C7
C7/ L5	50,4 cm	57,7 cm		Distance from C7 to L5
Acromium/styloid process of the ulna	59,7 cm	71,0 cm		Distance from Acromium to Styloid process of the ulna

ticity, resulting in protrusion and lowering of the scapula in the affected hemibody[6].

The postures used during treatment such as the frog-like posture on the ground and standing against the wall, allowed the therapist to give emphasis to the cervical area, the thorax and the shoulders, as well as the hips, knees and ankles[12]. The muscles cited by Kisner6, which influence shoulder asymmetry in hemiplegia such as the scalene and minor pectoral muscles, are part of the inspiratory muscle chain, according to Souchard[17]. The fact that this musculature is exercised during the performance of the postures can justify the improvement in shoulder alignment observed as treatment result.

For Souchard[19], all maneuvers of correction of the cervical area, shoulders or lumbar area apply traction to the inspiratory chain, being necessary for the patient to breathe freely during the posture performance, so that these muscles can be stretched.

After the treatment with the GPR technique, an improvement in the patient's postural pattern was observed. These data show a decrease in the shoulder asymmetry through the alignment of the acromiums and scapulae. The increase of the C7-L5 distance at the lateral view showed an improvement in the dorsal kyphosis. There was also a decrease in the support base, measured through the decrease of the distance between the lateral malleoli and the reference points identified on the fibula heads.

Castro and Lopes performed a study in which they applied the same postural reeducation technique and the same method of computed assessment through digital photography, although it was carried out in a patient with no neurological alterations and they also observed positive results regarding the patient's postural pattern, such as a better head positioning and improvement in the dorsal kyphosis[17].

In this study, the stretching of the anterior chain muscles can justify the improvement in the positioning of the right upper limb. Comparing the results of the treatment, it can be observed that the patient presented shoulder adduction with elbow, wrist and finger flexion in the affected hemibody, and after the therapeutic intervention, the patient maintained the upper limb was kept aligned in neutral position with reduction of the elbow flexion.

According to Umphred[2], the hemiparetic patients present spasticity of the trunk musculature, especially in the shoulder and the pelvic girdle, resulting in a pattern of downward rotation of the scapulae and upward inclination of the pelvis, which can cause the trunk in the affected side to appear laterally flexed.

With the development of the postures used in the treatment, an improvement in trunk alignment could be observed, demonstrated by the increased distance between the right acromium and the right iliac spine, and by the increased distance from the scapula to the posteroanterior iliac spine, which resulted in an improvement of the lateral flexion of the trunk in the hemiparetic side.

Paillex & So[20] in their study, evaluated a heterogeneous group of hemiplegic individuals and showed improvement in the standing posture through the decrease of the lateral displacement of the center of pressure after the rehabilitation period. The authors hypothesized that the main component of this result was the decrease of tension in hip adductors and abductors.

During the performance of the standing against the wall posture, the patient was induced to concentrate the body weight on the right lower limb, as it was necessary to maintain a central body alignment. The patient performed the posture with the therapist's help. Pai et al.[21] state that the methods used to improve posture, balance and gait in hemiparetic adults have typically emphasized activities that facilitate support and weight transference in the affected lower limb.

According to the results of the present study, it was observed that, even after treatment, the patient still maintained trunk alignment that was concentrated on the healthy hemibody, which meant that the weight transference was still more significant for the left hemibody.

According to the patient's report, he attained balance and consequently, gait improvement, and when inquired about trunk positioning before and after treatment, the patient had the body perception to realign it in front of the mirror, which can mean body awareness improvement. The fact that he was a right hemiparetic patient might have influenced these results. According to Chagas and Tavares[4] right hemiparetic patients present better functional capacity, especially in activities that involve orthostatism, balance and gait. In the left hemiparetic, the areas involved in the body system that are related to the function of spatial perception are affected, and that can lead to a neglect condition of the impaired hemibody.

The data obtained on body awareness, balance and gait were based entirely on the patient's report.

Conclusion

The Global Postural Reeducation (GPR) technique presented positive results in this patient who became hemiparetic after a stroke. Na improvement in the patient's postural pattern was observed, as well as alignment of the acromiums and scapulae, indicating a decrease in shoulder asymmetry, improvement of the dorsal kyphosis and decrease of support base.

There have been no reports in literature regarding the use of GPR technique in patients with hemiparesis; however, for this right hemiparetic patient who presented good cognition and moderate motor impairment, this showed to be a promising therapy.

Although the study disclosed good results regarding the posture of the hemiparetic patient, it would be necessary to carry out further studies to correlate the posture treatment with some type of functional activity, with a larger number of sessions and participants.

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References

1. O'Sullivan SB, Schmitz TJ. Acidente vascular encefálico. In: O'Sullivan SB, Schmitz TJ. Fisioterapia: avaliação e tratamento. 4 ed. São Paulo: Manole; 2004. p.531-49.
2. Umphred DA. Fisioterapia neurológica. 2 ed. São Paulo: Manole; 1994.
3. Davies PM. Exatamente no Centro. São Paulo: Manole; 1996.
4. Chagas EF, Tavares MA. A simetria e a transferência de peso do hemiplégico: relação dessa condição com o desempenho de suas atividades funcionais. Rev Fisioter Univ Sao Paulo. 2001;(8)1: 40-50.
5. Ikai T, Kamikubo T, Takehara I, Nishi M, Miyano S. Dynamic postural control in patients with hemiparesis.Am J Phys Med Rehabil. 2003;82(6):463-9; quiz 470-2, 484.
6. Kisner C, Colby LA. Exercícios terapêuticos: fundamentos e técnicas, 4 ed. São Paulo: Manole; 2005.
7. Lippert LS. Cinesiologia clínica para Fisioterapeutas. 3 ed. Rio de Janeiro: Guanabara Koogan; 2003.
8. de Seze M, Wiart L, Bon-Saint-Come A, Debelleix X, de Seze M, Joseph PA, et al. Rehabilitation of postural disturbances of hemiplegic patients by using trunk control retraining during exploratory exercises. Arch Phys Med Rehabil. 2001;82(6):793-800.
9. Rode G, Tiliket C, Boisson D.Predominance of postural imbalance in left hemiparetic patients. Scand J Rehabil Med. 1997;29(1):11-6.
10. Garland SJ, Willems DA, Ivanova TD, Miller KJ. Recovery of standing balance and functional mobility after stroke. Arch Phys Med Rehabil. 2003;84(12):1753-9.
11. sbrpg.com.br [homepage na internet]. São Paulo: Sociedade Brasileira de Reeducação Postural Global; c2005 [citado em 2005 abr 05]. Disponível em: http://www.sbrpg.com.br
12. Souchard PE. RPG: fundamentos da reeducação postural global. São Paulo: E Realizações; 2003.
13. Beresford H, Habib ALCMC. Para uma interpretação da reeducação postural global: RPG no contexto da ciência da motricidade humana. Fisioter mov. 2003;16(1):17-24.
14. Folstein MF, Folstein SE, McHugh PR."Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189-98.
15. Pandyan AD, Johnson GR, Price CI, Curless RH, Barnes MP, Rodgers H. A review of the properties and limitations of the Ashworth and modified Ashworth Scales as measures of spasticity. Clin Rehabil. 1999;13(5):373-83.
16. Fisiologic. Software de analise postural [programa de computador]. Versão 1.7. 2002 [citado 2005 abr 05]. Disponível em: http://www.fisiologic.com.br
17. Castro PCG, Lopes JAF. Avaliação computadorizada por fotografia digital, como recurso de avaliação da reeducação postural global. Acta Fisiatr. 2003;10(2):83-88.
18. Kavamoto CA, Vasconcelos JCP, Lopes JAF, Battistella LR. Avaliação computadorizada por fotografia digital do tratamento de crianças com alterações posturais: resultados preliminares. Acta Fisiatr. 2002; 9(1): 27.
19. Souchard PE. Reeducação postural global: método do campo fechado. 4 ed. São Paulo: Ícone; 2001.
20. Paillex R, So A. Changes in the standing posture of stroke patients during rehabilitation. Gait Posture. 2005;21(4):403-9.
21. Pai YC, Rogers MW, Hedman LD, Hanke TA. Alterations in weight-transfer capabilities in adults with hemiparesis. Phys Ther. 1994;74(7):647-57.