INVESTMENTS IN EDUCATION DEVELOPMENT

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COMPARISON OF HUMAN MOVEMENT IN GAIT AND IN RIDING IN HIPPOTHERAPY

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Introduction

Hippotherapy can be defined as a method of treatment for patients with movement dysfunctions and/or neurological disorders used by physical and occupational therapists trained in using horses as treatment tools (Engel, 2001). It involves four general principles of facilitation: integration of motor afference, activation of one muscle facilitating other muscles in a given locomotion chain, activation of the lumbar system as a fundamental exercise in its own right, and activation of the responsible muscle groups on the contralateral side of the body.

The rhythmically oscillating back of a walking horse mainly stimulates a rider's postural reflex mechanisms, resulting in training of balance and coordination (Künzle, 2000). The locomotor impulses from the horse's back are transferred to the rider at a frequency of 90–110 impulses per minute (1.5–1.8 Hz) in three movement planes (Tauffkirchen, 2000).

Aim

The aim of this study was to compare the movement of selected human body segments in gait and in riding during a hippotherapy session.

Materials and Methods

Observed groups

- 6 healthy children (5 girls, 1 boy, mean age 11.5 years, body weight 39.2 kg, body height 153.5 cm) without any previous horse riding experience.
- 3 horses (thoroughbred, Czech warmblood, Silesian norik). They were prepared in a long and systematic manner for handling unusual situations and tolerating strangers and unusual objects.

Experimental set-up and data collection

- Hippotherapy sessions were done in over-ground conditions.
- The horses were led in hand for 15 minutes before the start of the experiment.
- 11 contrast hemispheric markers (1.5 cm in diameter) were attached on the projection of selected anatomical points on the skin (Figure 1).
- The sitting posture of the riders was being corrected by a physiotherapist.
- 12 trials (4 stride cycles for 3 horses) were evaluated for each rider.
- Gait was recorded in laboratory conditions.
- 3 strides were evaluated for each child.
- 4 cameras (frequency 50 Hz) were used for movement recording.

Data analysis

- APAS software was used for processing kinematic variables.
- Pelvis rotation [º], pelvis obliquity [º], pelvis tilting [º], shoulder rotation [º] and shoulder obliquity [º] were evaluated.
- Statistical processing (Mann Whitney U test) was done using Statistica programme (version 8.0).

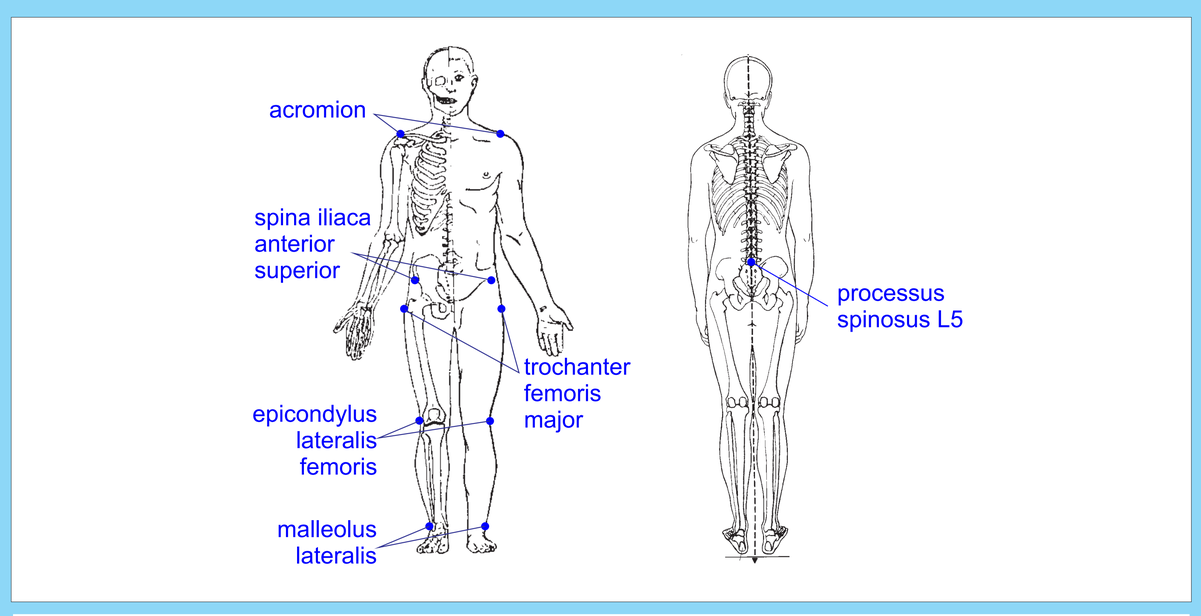
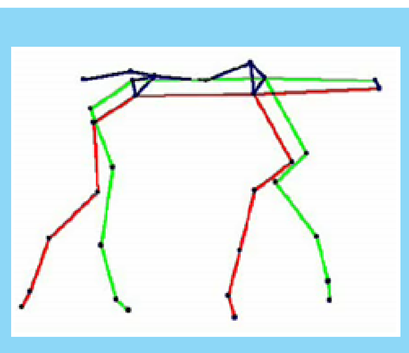


Figure 1 Location of markers on the skin



Results

Statistically significant differences were found in movement of the pelvis in the sagittal plane as well as the shoulder in the frontal plane (Figure 2). The range of movement for both parameters was larger during riding. The position of the pelvis in the sagittal plane during gait (anteversion) differed from the positions of the pelvis during riding (retroversion) (Figure 3). The rotation of the pelvis during gait was almost two times larger than the rotation of the shoulder. During riding the range of both rotations was similar.

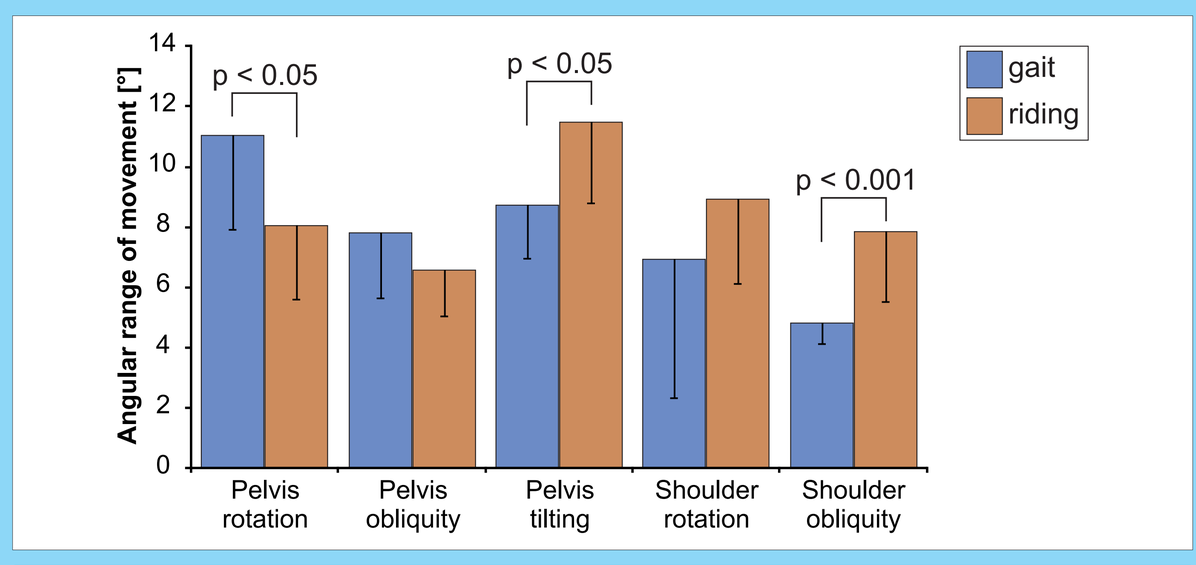


Figure 2 Angular range of movement (mean±SD) of the pelvis and the shoulder

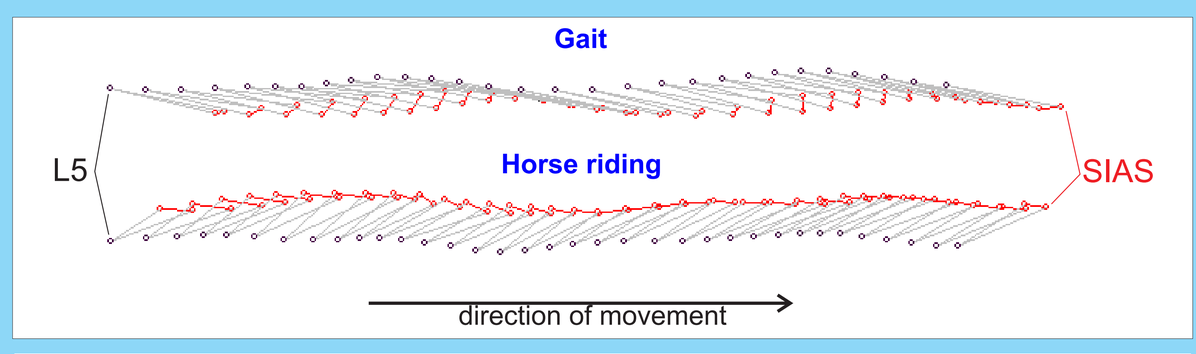


Figure 3 Time lapsed of the pelvis during gait and horse riding in the sagittal plane

Discussion

Gait is an active process during whichthe body assumes the attitude for the next movement. Rotation and contra-rotation of the pelvis and the shoulders take place dynamically. The seat of the patient in hippotherapy is passive. The impulses from the horse's back “move” with the pelvis of the patient. The contra-rotation of the shoulder results due to inertia with some delay in the comparison with gait.

The position of the pelvis in hippotherapy differs from the position in horse riding. The relaxed passive seat on the no saddle horse (without stirrups) allows assuming of the retroversion of the pelvis.

Conclusions

The changes in crossed body pattern during the gait and during the ride on the horse in hippotherapy are similar. The position of the pelvis during this pattern is different.

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