GAIT ANALYSIS OF A CHILD WITH FEMORAL NERVE INJURY

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INTRODUCTION

The femoral nerve innervates the quadriceps muscles and its dermatome supplies anteromedial thigh and medial foot. Paralysis of the quadriceps muscles due to the injury of the femoral nerve results in disability of the knee joint extension and loss of sensory of the thigh. A child could walk independently even though he had injured his femoral nerve severely due to the penetrating wound in medial thigh. We measured and analyzed his gait performance in order to find the mechanisms that enabled him to walk independently.

METHODS

The patient was an eleven-year-old boy who had an accident that a broken branch of a tree penetrated his right thigh. He had a foreign body removal management at the emergency room in hospital right after the accident. Without that he had no neurosurgery. He had edema and pain on right thigh for a couple of days. After a month, his score of manual muscle test(MMT) was zero on knee extensors, fair plus on knee flexors and the strength of hip and ankle joint muscles were good on injured side. Although he could not stand up from squatting position independently and could not extend his right knee joint at all from chair sitting, he could walk without any assistance.

The Vicon motion capture system(VICON 612, Oxford,UK) with six cameras synchronized with four force-plate forms(2 KISTLER, 2 AMTI) and one electromyography(EMG) system(Motion lab system, US) was used to collect and analyze the three dimensional motion data. The EMG signals were collected from tibialis anterior(TA), gastrocnemius(GCM), rectus femoris(RF), and biceps femoris(BF). The child’s gait analyses were performed once a month for sixteen months from one month after the injury. In this study, we described five results(GA1~GA5) among them.

RESULTS AND DISCUSSION

Temporal-spatial parameters were not different significantly after the GA2 or GA3 test and asymmetry was not significant either without the single support time in GA1 results(Figure 1).

SUMMARY

This is a case study that the gait of a child who could walk independently in spite of the paralysis of right knee extensors due to femoral nerve injury was observed for sixteen months. Through the results of this study, we could verify that the function of knee extensor muscles in stance phase as a shock absorber is most important during gait.

CONCLUSIONS

Through this gait analysis a child who had selective injury on knee extensor muscle, we could verify that it is possible to walk independently without the concentric contraction of knee extensors. It could be also said that their eccentric contraction in stance phase is major function during gait because the knee joint can be extend passively by action of hip motion in swing phase. And we also could observe the patient’s recovery and asymmetry with quantitative data during his rehabilitation.

ACKNOWLEDGEMENTS

This research was financially supported by the Ministry of Knowledge Economy(MKE) and Korea Institute for Advancement of Technology(KIAT) through the Research and Development for Regional Industry, and also supported by the Ministry of Education, Science Technology (MEST) and National Research Foundation of Korea(NRF) through the Human Resource Training Project for Regional Innovation.

REFERENCES


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<th>Table 1: Height and weight change information.</th>
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<td>GA1</td>
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<td>Mass(kg)</td>
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<td>Height(cm)</td>
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<td>Leg length(cm)</td>
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**Figure 1:** Mean values of temporal-spatial parameters.

**Figure 2:** Mean values of lower limb joint angles in sagittal plane of affected side.

**Figure 3:** Mean values of ground reaction force in vertical direction of affected side.

**Figure 4:** Mean values of lower limb joint moments in sagittal plane of affected side.