CASE REPORT

Abstract: Various walk supporting systems have been devised and developed. However, they have not been designed for supporting or evaluating the gait of parkinsonian patients, and not much consideration has been given to gait disturbances of parkinsonian patients. In this study: (a) We prepared a tentative model of walk supporting and monitoring system in consideration of typical symptoms of parkinsonism. (b) We conducted gait rehabilitation in a parkinsonian patient using the walk supporting and monitoring system and confirmed (i) the occurrence of frozen gait during walking, (ii) brachybasia, (iii) the absence of anterior tilting of the posture, pulsion symptom, and festination, and (iv) occurrence of hesitation to start walking. Therefore, typical symptoms of parkinsonism can be detected by the use of this system. (c) The medical staff can evaluate the state of recovery of patients on the basis of the data obtained from this system and use them for purposes such as guidance of rehabilitation. J. Med. Invest. 51: 117-124, February, 2004

Keywords: sensor-controlled walker, walking support/evaluation machine, parkinsonism
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1) Measures against the anterior tilting of the posture

2) Detection of the patient's will to move
3) Measures against festination and pulsion symptom

4) Prevention of falling and detection of anterior tilting of the posture and brachybasia

\[ F_p > F_a : \text{Forward, } F_p < F_b : \text{Backward} \]
\[ v_a : \text{Constant Speed} \]
5) Detection of frozen gait and hesitation to start walking

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1) Experimental procedures
The straight lines, which have the slope of 20 [cm/sec], show the trajectories of objects at rest seen from the machine.
1) Frozen gait during walking

Frozen gait during walking refers to a condition where patients exhibit a prolonged and rigid gait pattern, characterized by minimal or absent limb movements during the swing phase of walking. This condition is often observed in conditions such as Parkinson's disease and amyotrophic lateral sclerosis. The hallmark of frozen gait is the inability to initiate walking or continue walking despite the desire to do so. Patients may experience a 'freezing' sensation in their legs, which can lead to a sudden and involuntary halt in gait, making it challenging to continue walking or turn around.

2) Brachybasia

Brachybasia is a term used in gait analysis to describe a condition where the distance between the heel and the toe remains relatively constant throughout the gait cycle. This can lead to a reduced stride length and a characteristic flat-footed gait. Brachybasia is often observed in conditions such as cerebral palsy and spina bifida, where patients may have limited foot movement or control.

3) Anterior tilting, pulsion symptom, and festination

Anterior tilting refers to a forward lean of the body during walking, which can be associated with a variety of neurological conditions. Pulsion symptom is characterized by an involuntary pushing movement at the affected joint, often seen in patients with Parkinson's disease. Festination is a term used to describe an irregular and jerky gait pattern, often accompanied by a reduced sense of balance and coordination. These symptoms are often managed through a combination of medical interventions, physical therapy, and lifestyle modifications.

Walk supporting and monitoring system

The use of walk supporting and monitoring systems can help in the early detection and management of gait disorders. These systems utilize sensors and advanced algorithms to track and analyze gait patterns, providing valuable insights into the effectiveness of interventions and the progression of neurological conditions. By continuously monitoring gait parameters, healthcare providers can make informed decisions regarding treatment options, ensuring the best possible outcomes for patients.
4) Hesitation to start walking

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