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ORIGINAL ARTICLE

Tibial Torsion in Cerebral Palsy

Validity and Reliability of Measurement

Sang Hyeong Lee MD, Chin Youb Chung MD, Moon Seok Park MD, In Ho Choi MD, Tae-Joon Cho MD

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Abstract Physical examinations of tibial torsion are used for preoperative planning and to assess outcomes of tibial osteomy in patients with cerebral palsy (CP). The thigh-foot angle (TFA) and transmalleolar axis (TMA) are commonly used, and the second toe test recently was introduced. However, the validity and reliability of the three methods have not been clarified. This study was performed to evaluate the validity and reliability of these physical measures. We recruited 18 patients (36 limbs) with CP. During reliability sessions, three raters with various levels of orthopaedic experience independently measured tibial torsion using the three different methods during one day before surgery. Validity was assessed by performing a correlation study between physical examination and two-dimensional computed tomographic (CT) findings. Interobserver reliability was greatest for the TMA followed by TFA and then by the second toe test with intraclass correlation coefficients of 0.92, 0.74, and 0.57, respectively. In terms of the concurrent validity, the correlation coefficients (r) for the CT measurements were 0.62, 0.52, and 0.55. When depicting tibial torsion by physical examination, all three methods had substantial validity, but test reliability and validity were highest for TMA measurements.
Level of Evidence: Level I, diagnostic study. See the Guidelines for Authors for a complete description of levels of evidence.

Introduction

Since Staheli et al. described rotational profile, TFA and TMA have been used predominantly to measure tibial torsion [20, 21]. In patients with CP and myelomeningocele, to eliminate external tibial torsion, tibial derotation osteotomy frequently is performed [4–6, 19, 22]. Because physical measurements are obtained easily in outpatient, preoperative, and intraoperative settings, many surgeons rely on physical examinations. Furthermore, a new technique called the second toe test was proposed to measure tibial torsion [9]. Although physical examination has advantages, physical measurements have disadvantages such as lack of reproducibility.

Therefore, it is important to confirm a physical examination is as valid and reliable as an imaging study and which test is superior in determining tibial torsion.

The aim of this study was to determine the validity and reliability of physical measures of tibial torsion, namely, TFA, TMA, and the second toe test.

Materials and Methods

We enrolled 18 consecutive patients with CP meeting the following criteria: unilateral or bilateral involvement

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Each author certifies that his or her institution has approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

S. H. Lee, C. Y. Chung, M. S. Park (✉)
Department of Orthopedic Surgery, Seoul National University Bundang Hospital, 300 Gumi-Dong, Bundang-Gu, Sungnam, Kyungki 463-707, Korea
e-mail: pmsmed@hanafos.com

I. H. Choi, T.-J. Cho
Department of Orthopedic Surgery, Seoul National University Children's Hospital, Seoul, Korea

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