

A new approach to determine the hip rotation profile from clinical gait analysis data

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Abstract

Conventional models for determining joint rotation angles from marker positions as part of three-dimensional clinical gait analysis are susceptible to errors arising from mis-placement of the thigh markers. An analysis of idealised data reveals how the measured variables are affected by different angular offsets of the thigh marker from its true position. An artefact on the varus–valgus signal arising from the projection of true knee flexion onto a mal-aligned thigh segment axis is the most characteristic feature of this problem. If this is observed then the hip rotation profiles are also erroneous.

A technique is proposed to determine a correction factor which can be applied to gait data to correct for this mal-alignment. Its use is demonstrated on a single case study and a subjective assessment of its use on a cohort of 40 patients is reported. A detailed discussion of the assumptions on which the method is founded is included as well as guidelines as to when the technique is likely to be successful.

It is recommended that the technique is used as an aid to training staff in marker placement rather than as a routine retrospective correction of data for erroneously placed markers. © 1999 Elsevier Science B.V. All rights reserved.

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6. Conclusion

A technique has been proposed to determine a thigh correction factor to compensate for mis-alignment of thigh markers. A theoretical justification for the method has been presented and various predictions of this model are borne out by analysis of real data. Use of this technique appears to give gait data which are more consistent with clinical observations than standard models. Low values of residual variance obtained suggest that this is a valid approach to determine hip internal/external rotation profile.

The technique remains a correction for mis-placed thigh markers. A better solution to the problem is to ensure more accurate placement in the first place. The technique can serve as a check on marker placement and may well have a more important role in the training of gait analysis staff in marker placement and in assuring the quality of gait analysis data than in routine correction of clinical data.

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