

Prosthetic Observational Gait Scale (POGS)

Outcomes Committee Resource created by the Team at Barber Prosthetics Clinic: Malena Rapaport (BKin, MSc) Rachel Bader (BSc) and Sydney Stokoe (BKin)

Introduction

The Prosthetic Observational Gait Scale (POGS) is a standardized set of 16 criteria for determining efficient gait in lower limb amputees. This scale was developed to be used with the naked eye; however, use with video is recommended since reliability and accuracy of gait assessment is greater when clinicians may slow or replay the video¹⁻⁵. Several different scales for video based visual gait analysis exist and have been tested on a variety of populations^{2-3,6}. The POGS is the first gait scale designed specifically for a lower limb amputee population, recognizing that the gait of amputees is different than that of other pathological populations⁷. The use of frontal and sagittal view cameras, preferable viewed synchronously⁸ allows the viewer to pause, slow, or review gait abnormalities on a more detailed level, thus making the scale results more reliable.

Establishing author: Hillman 2010⁷

Data Type: Ordinal

Measurement Type: performance based

Assessment Type: Observer

Required Resources

Time: 1-5 mins for video capture, 5-10 mins for analysis

Personnel: practitioner skilled in observational gait analysis

Equipment: video recording set up to capture coronal and sagittal video⁷

Space: 5-10 m straight walkway

Cost: Free, additional cost for video capture equipment and software for viewing

Test Administration

1. Set up cameras for video capture in frontal plane, and in sagittal plane. 2-3 steps at a constant walking speed are required for analysis. Cameras should be positioned at hip height, in the centre of the walkway in both the frontal and sagittal plane. This allows the subject to reach a constant velocity when directly in front of the camera⁸. Ask patient walk at a comfortable pace from one end of the walkway, turn around and walk back.

2. Assess patient gait for each of the 16 parameters on the assessment sheet. Score is based on the description that best matches the patient's observed gait.
 - a. If video is being used, you may pause, or replay the video as needed.
 - b. If video is not being used, assessment must be done from both frontal and sagittal planes in turn.
3. Sum score from each of the 16 items to determine total score.
 - a. Lower scores indicate fewer gait deviations.
 - b. Scores may be used individually to determine areas of deviation, or summative, to determine overall gait deviation.

Psychometric Properties

The POGS, and other Visual Gait analysis scales have evidence of psychometric testing in several populations including unilateral lower limb amputees⁷ Cerebral Palsy^{6,9-11} and general orthopedic impairment of the lower limb¹².

Reliability

Overall, visual gait analysis scales show similar trends regarding their reliability. Reliability varies greatly between individual phases of gait. Furthermore, consensus from several studies indicates that measures of the foot, ankle, and knee are on average more reliable than measures of the hip^{6,11-12}.

When using video, both inter- and intra-rater reliability are stronger in experienced observers or experts in gait assessment^{6,10,12}. With the exception of one study¹¹, intra-rater reliability has been shown to be higher than inter-rater reliability^{6-7,9-10,13-14}. Inter-rater reliability has been shown to improve when scored based on video as opposed to the naked eye¹⁴. It has been suggested that the use of reflective markers on anatomical landmarks may improve measurement quality by providing repeatable reference points⁸.

Validity

Several visual gait analysis scales have been validated against 3-dimensional gait analysis (3DGA), which is held as the gold standard for gait assessment⁹⁻¹¹. The Edinburgh Visual Gait Scale (EVGS), a gait score commonly used to evaluate orthotic populations, showed a correlation with the 3DGA of 52-64% total agreement varying with the experience of the tester, showing limited accuracy when compared to the gold standard⁶. A strong correlation was shown with the Gillette Gait Index ($r=8.89$)⁹. The EVGS also showed a 64% agreement with the VICON system, with individual assessment points varying in agreement from 47-83%¹⁵.

Table 1: Psychometric properties for several visual gait analysis scales

Outcome Measure	Reliability 95% CI for all values			Validity		
	Test/retest	Inter-rater	Intra-rater	Face	Concurrent	Content
POGS ⁷	N/A	Poor to moderate (kappa:-0.03 to 0.60,	Good (mean CoR = 3) ⁷	Yes	N/A	Yes

		depending on parameter assessed) ⁷				
GAIT/EVGS ^{6,9,15}	N/A	Poor to substantial (Kappa:-0.08 to 0.69 depending on parameter assessed) ⁶	Excellent (mean CoR 5.15) ⁶	Yes	Yes	Yes
PRS ¹³	N/A	Poor	Excellent	Yes	N/A	Yes
VGAS ¹⁰⁻¹¹	N/A	Poor to excellent (Kappa: -0.04 to 0.86 depending on parameter assessed) ¹¹	Poor to moderate (60.7% to 71.4 % agreement) ¹⁰	Yes	Yes	Yes
Royal Dutch College ¹²	N/A	Poor to moderate (ICC:0.40 to 0.54) ¹²	Moderate to good (ICC:0.57 to 0.63) ¹²	Yes	N/A	Yes

Responsiveness

The minimal detectable change, minimal clinically important difference, and responsiveness have not been established for the POGS specifically. However, the Edinburgh Visual Gait Scale (EVGS), which is similar in its rating scale to the POGS, has been shown to have a minimal detectable change of 3 ¹⁶.

Interpretation

POGS is an observational measure targeted at a lower limb amputee population. Previous gait scores have been tested using other populations, including cerebral palsy, and general orthopedic dysfunction. As a relatively new measure, the POGS specifically has not been the subject of extensive research, but it shares many similarities to other gait assessment tools.

Scores may be interpreted individually based on the joint in question, or as an additive score. Higher scores indicate increasingly marked gait deviations. High scores on specific items are indicators of need for alignment changes in prostheses ⁷. For evaluation of unilateral amputees, only the prosthetic side is scored ⁷. For bilateral amputees, each leg should be scored individually, rather than summed together ⁷.

Limitations

Research comparing the reliability of experienced versus inexperienced observers show a training effect on the part of the observer for several different observational gait scales ^{6,10-11}. Competency with observational gait analysis improves both the intra- and inter-rater reliability ^{6,10-11}.

Reliability studies have shown higher agreement in areas related to the knee and ankle, and lower agreement in measures related to the hip⁶.

At the time of writing, little to no research has been done to show minimal detectable change or minimal clinically important difference. Available research on reliability and validity has been done using small sample groups which may limit the strength of the statistical analysis.

Visual Gait analysis was found to not be a reliable tool for assessing hip motion in the sagittal plane when compared to 3DGA¹⁰⁻¹¹.

Documentation in Clinical Notes

Example: Patients total score was 3 as there was vaulting on the contralateral side (+2) and moderate step length asymmetry (+1). This score along with findings from clinical evaluation indicated that height of the prosthesis needed to be adjusted. After making the necessary adjustments, patient no longer vaulted on contralateral side and subsequently, the POGS score was reduced to 1.

Acknowledgement: This document format was adapted from material published by The Australian Orthotic and Prosthetic Association, Inc.

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