Assessment of Minimum Important Difference and Substantial Clinical Benefit with the Vascular Quality of Life Questionnaire-6 when Evaluating Revascularisation Procedures in Peripheral Arterial Disease

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WHAT THIS PAPER ADDS

This paper explores the minimum important difference of the VascuQoL-6 (VQ-6), a disease specific health related quality of life instrument, following revascularisation for PAD. Numerical VQ-6 thresholds for a minimum important change and a substantial clinical benefit after revascularisation in intermittent claudication and critical limb ischaemia are presented, which could be used when evaluating outcomes following different interventions in PAD and in the design of clinical trials.

Objectives: Patient reported outcomes are increasingly used to assess outcomes after peripheral arterial disease (PAD) interventions. VascuQoL-6 (VQ-6) is a PAD specific health-related quality of life (HRQoL) instrument for routine clinical practice and clinical research. This study assessed the minimum important difference for the VQ-6 and determined thresholds for the minimum important difference and substantial clinical benefit following PAD revascularisation.

Materials and methods: This was a population-based observational cohort study. VQ-6 data from the Swedvasc Registry (January 2014 to September 2016) was analysed for revascularised PAD patients. The minimum important difference was determined using a combination of a distribution based and an anchor-based method, while receiver operating characteristic curve analysis (ROC) was used to determine optimal thresholds for a substantial clinical benefit following revascularisation.

Results: A total of 3194 revascularised PAD patients with complete VQ-6 baseline recordings (intermittent claudication (IC) $n = 1622$ and critical limb ischaemia (CLI) $n = 1572$) were studied, of which 2996 had complete VQ-6 recordings 30 days and 1092 a year after the vascular intervention. The minimum important difference 1 year after revascularisation for IC patients ranged from 1.7 to 2.2 scale steps, depending on the method of analysis. Among CLI patients, the minimum important difference after 1 year was 1.9 scale steps. ROC analyses demonstrated that the VQ-6 discriminative properties for a substantial clinical benefit was excellent for IC patients (area under curve (AUC) 0.87, sensitivity 0.81, specificity 0.76) and acceptable in CLI (AUC 0.736, sensitivity 0.63, specificity 0.72). An optimal VQ-6 threshold for a substantial clinical benefit was determined at 3.5 scale steps among IC patients and 4.5 in CLI patients.

Conclusions: The suggested thresholds for minimum important difference and substantial clinical benefit could be used when evaluating VQ-6 outcomes following different interventions in PAD and in the design of clinical trials.

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INTRODUCTION

Peripheral arterial disease (PAD) is a major and increasing health problem throughout the world.[1] Aside from amputation free survival following revascularisation for critical limb ischaemia (CLI), outcomes frequently rely on surrogate markers of clinical success, such as patency of the

revascularised segment, occurrence of restenosis and/or absence from re-intervention.[2–4] These surrogate markers carry limited information about the impact of revascularisation on patients as individuals. Although prevention of amputation is of obvious importance to PAD patients with critical ischaemia, measures of physical limitation, PAD symptom status, pain severity, and social or emotional status associated with PAD are also important outcomes following revascularisation. Therefore, health related quality of life (HRQoL) instruments are increasingly used to assess outcomes in PAD patients.[5–7] HRQoL instruments should be valid and responsive to clinical change, allow easy completion by the patient, and also be easy for health professionals to administer, score, and analyse. The VascuQoL-6 (VQ-6) is a brief, PAD specific HRQoL instrument developed to fulfill these needs that is used as an outcome measure following revascularisation for PAD in the Swedish National Quality Registry for Vascular Surgery (Swedvasc).[8] From a clinical standpoint, and for planning of prospective trials, it is important to know how change in patient reported HRQoL scores equate with satisfactory treatment results. The minimum important difference (MID) is the smallest change in HRQoL score considered relevant to patients.[9] The MID can be calculated using different methods and experts advise that multiple methods should be used to determine MID.[10,11] However, from both the patient's and the surgeon's perspective, in clinical decision-making the MID may be considered as the lowest acceptable rather than the optimal threshold to define clinical success. The concept of substantial clinical benefit (SCB) has been introduced as a complementary measure in order to establish numerical cutoff values in terms of HRQoL improvement that translate to a SCB for the individual patient.[12] Here estimates of both MID and SCB for the VQ-6 in a "real world" setting are reported using population based HRQoL data retrieved from the Swedvasc Registry.

METHODS

In this observational cohort study, prospectively collected data from the Swedish Vascular Surgery Registry (Swedvasc) were retrieved and analysed. The main aim was to calculate the MID and the SCB for the VQ-6 questionnaire following PAD revascularisation by using all available VQ-6 observations in a Swedvasc data set ranging from January 2014 - September 2016.

Study population, data source and data extraction

The Swedvasc[13,14] is the world's oldest national vascular registry and has full coverage of all vascular surgical procedures in Sweden since 1994. The registry collects basic characteristics, peri-procedural and follow-up data and validation studies have repeatedly demonstrated high data accuracy.[15,16] In 2014, the registration module for PAD patients was updated, and the VQ-6 was introduced as a complementary outcome measure for revascularised PAD patients. The VQ-6 sum score is recorded pre-operatively and at 30 days and 1 year following the procedure.

All patients revascularised for symptomatic lower limb PAD between January 2014 and September 2016 (either for intermittent claudication [IC] or CLI) with complete baseline VQ-6 data and at least one follow-up recording of the VQ-6 were included in the analysis. Patients were revascularised by either endovascular or open surgical techniques and treatment vessel segments included aorto-iliac, femoropopliteal and/or infrapopliteal arteries.

The VascuQoL-6

The VQ-6[8] is a short version of the original 25 item VascuQoL questionnaire,[17] aiming to assess HRQoL in symptomatic PAD regardless of disease severity (i.e., both in IC and in CLI). The questionnaire comprises six items covering different HRQoL aspects (2 activities items and 1 item for each of PAD symptoms, pain, emotional, and social functioning). Every item refers to lower limb circulatory problems using a 2 week recall period and has a four point response scale. Item responses are summarized to generate an overall score ranging from 6 (worst HRQoL) to 24 (best HRQoL).[8] As only the overall score is recorded in the Swedvasc registry this data set does not allow for analysis of the separate VQ-6 HRQoL items.

Data analysis

Statistical analysis was performed using SPSS version 24.0 (SPSS Inc. Chicago, IL, USA).

Descriptive statistics are presented for demographic and baseline variables as mean $\pm$ standard deviation (SD) and absolute and relative frequencies. A p value $<$ .05 was considered as significant.

Minimum important difference

The MID could be calculated using distribution based and anchor based methods. Distribution based methods estimate the MID indirectly, based on the distribution of observed scores in a relevant patient sample. Thus, these techniques rely on statistical measures of average change in health status in combination with the spread of data within the studied population.[10] In one widely used distribution based method, the MID is determined based on the statistical distributional characteristics of the studied sample and, as described by Norman et al.,[19,20] the suggested threshold of discrimination for changes in HRQoL is around half a standard deviation. Thus, a change of ±0.5 SD from the baseline HRQoL score was considered as the distribution based MID threshold.

Anchor based methods determine the MID by relating the observed numerical HRQoL change to another relevant clinical measure used as "anchor." Such clinical anchors could be provided by patients (e.g., anchoring transitions questions) or could be clinician based assessments of clinically significant change. In this study, the change in the clinician reported Rutherford[21] classification, readily available in the Swedvasc data set, from baseline to 1 month and 1 year following revascularisation respectively was used to define the anchor based MID. The Rutherford classes are