Telangiectasia in the Edinburgh Vein Study: Epidemiology and Association with Trunk Varices and Symptoms

C.V. Ruckley a,*, C.J. Evans b, P.L. Allan c, A.J. Lee d, F.G.R. Fowkes e

a Wolfson Unit for Prevention of Peripheral Vascular Diseases, University of Edinburgh, Teviot Place, Edinburgh, EH8 9AG, UK
b Department of Public Health, Lothian Health, Edinburgh, UK
c Department of Radiology, University of Edinburgh, Edinburgh, UK
d Department of Medical Statistics, University of Aberdeen, Aberdeen, UK
e Department of Public Health Sciences, University of Edinburgh, Edinburgh, UK

Submitted 14 March 2008; accepted 10 August 2008
Available online 9 October 2008

KEYWORDS
Telangiectasia; Epidemiology; Symptoms

Abstract
Objective: Little research has been devoted to telangiectasia. The purpose of this study was to analyse the data in the Edinburgh Vein Study to determine the prevalence of telangiectasia in the general population, to analyse the demographic characteristics and association with symptoms and to compare the findings to those relating to varices of the saphenous systems.

Design: Cross-sectional population study.

Setting: Twelve general practices with catchment areas geographically and socioeconomically distributed throughout Edinburgh.

Participants: An age stratified random sample of 1566 people (699 men and 867 women) aged 16–64 selected from computerised age-sex registers of participating practices.

Methods: Included in the population screening was a clinical examination, photography and duplex ultrasonography of the superficial veins and the deep veins down to popliteal level. Telangiectases and varicose veins were graded 1–3 according to severity.

Results: A total of 1322 (84%) of the population were classified as having telangiectasias in their right legs; 555 (79%) of men and 767 (88%) of women; 1226 (92%) as grade 1 and 96 (8%) as grades 2 and 3. There were no significant differences between left and right legs (p = 0.144). The commonest locations for telangiectases were the postero-medial aspects of the thigh, popliteal fossa and upper one third of calf. There was a highly significant association between the degree of severity of varicose veins and the grade of telangiectasia (p < 0.001). Less than 1% of subjects with grades 2–3 trunk varices were free of telangiectasia,

* Corresponding author. Tel.: +44 131 650 3220; fax: +44 131 650 6904.
E-mail address: vaughan.ruckley@btinternet.com (C.V. Ruckley).

1078-5884/$34 © 2008 European Society for Vascular Surgery. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.ejvs.2008.08.012
Introduction

The CEAP classification for chronic venous disorders defines telangiectasia as a confluence of dilated intradermal venules less than 1 mm in calibre.¹ Synonyms include spider veins, hyphen webs, thread veins, sunburst veins, stellate veins and venous flares. The C classification of CEAP grades venous conditions in order of increasing severity.¹ The location of telangiectasia in the least severe category (C1) reflects the indifference with which the condition is viewed by most doctors. That indifference is generally not shared by patients who view their blemishes at the very least with cosmetic distaste and often with concern that they may be a manifestation of serious underlying vascular disease. There has been a considerable growth in treatment of the condition in recent years using laser or sclerotherapy.

Frequently there is a positive family history. Telangiectasia are reported to be more common in women and the onset is commonly associated with the hormonal changes of menarche and pregnancy. The most common age for presentation is between 30 and 50 years.² It is reported in the literature that the symptoms can be troublesome. Around 50% of patients presenting for treatment have localised pain or burning associated with their telangiectases.³ There is an association with reticular veins or varicose veins.² In a study of 9100 volunteers Kroger et al reported a higher frequency of leg swelling, night cramps, restless legs and itching in subjects with telangiectasia compared with those with no venous abnormality (CEAP 0).⁴ However, the prevalence of varicose veins in the symptomatic group was not reported.

While techniques of treating telangiectasia have received considerable attention in the literature, relatively little has been written concerning their demography, natural history and pathology. The aims of the Edinburgh Vein Study were to determine the prevalence of venous insufficiency of the legs in the general population and to investigate associations with certain genetic and lifestyle factors. During the course of the study clinical, photographic and ultrasound data were gathered on a broad cross-section of the population. To date we have reported on various aspects of CEAP categories 2–6, ranging from varicose veins to active venous ulceration.⁵–⁹ In this study, we focus on CEAP 1 and analyse the prevalence and patterns of telangiectases, their demography and their associations with clinically diagnosed varicose veins.

The small intradermal and subdermal distended venules which constitute corona phlebectatica may be of the size to qualify as telangiectasia. However, we have considered this to be an early stage of chronic venous insufficiency which is consistently associated with truncal varices and frequently also with deep vein incompetence and have dealt with these in previous publications.⁶,⁷ We have therefore excluded corona phlebectatica from the present analysis.

Subjects and methods

This was a cross-sectional survey of a random sample of the general population of Edinburgh. The study was designed to provide a comprehensive range of clinical, ultrasonic and laboratory data as a baseline for later cohort follow up. The methods and classifications have been described previously in detail⁵ and will only be summarised here.

The target population comprised men and women aged between 18 and 64 years. An age stratified random sample was selected from the computerised age-sex registers of 12 general practices, whose catchment areas were geographically and socioeconomically distributed throughout the city. It was calculated that 1500 participants would be required to detect a significant difference in prevalence between groups and to enable a subsequent follow up study to be conducted.

Subjects attended a special clinic where they completed a self administered questionnaire and were examined, photographed, duplex scanned and had blood taken by a research team comprising a nurse, a technician and a clinical research fellow. The same three researchers were employed for the entire study. Observer variations were minimised by use of standardised simultaneous training and regular correlations of duplicate measurements between observers throughout the study.

Telangiectasia was defined, as in the Basle study,¹⁰ as intradermal varices. These, in practice, corresponded with the CEAP 1 definition as venules <1 mm diameter. Red thread veins were not included. Telangiectasia (CEAP 1) and varicose veins (CEAP 2) were graded for severity, with the help of photographs from the Basle study, into three grades according to degree and extent of tortuosity and
prominence of the veins. Because of the small numbers in grades 2 and 3 these have been grouped together for statistical analysis.

In line with the Basle classification we would define chronic venous insufficiency (CVI) as the sequelae in the skin and subcutaneous tissues of chronic ambulatory venous hypertension. CVI and varicose veins were divided into three grades with the assistance of photographs from the Basle study. Grade 1 CVI was defined as "dilated subcutaneous veins/corona phlebectatica". CEAP does not include a corresponding category. Grade 2 CVI was "hyper- or depigmented areas, with or without corona phlebectatica (CEAP 4) and grade 3 CVI was "open or healed ulcer" (CEAP 5 and 6). Varicose veins were divided into three grades of severity according to the "degree and extent and tortuosity and prominence of the veins."10

Information from recording forms and questionnaires was entered into a dBase IV database (dBase Inc, Vestal, NY) and analysed on the Edinburgh University main frame computer using SPSS-X (SPSS, Chicago, IL) and SAS (SAS Institute Inc, Cary, NC) packages. Student’s t-test and analysis of variance was used to compare continuous parametric data between groups. Fisher’s exact test and the chi-square test (overall and the test for linear trend) were used to compare categorical data. For the linear trend test, if more than 20% of the expected frequencies were below 5, categories were combined and the test repeated to ensure validity. Age adjusted prevalences were calculated using an SAS macro (GLIMMIX), which fitted generalised mixed models.

**Results**

**Demographics**

The study population comprised 1566 subjects (699 males and 867 females). The mean age was 44.8 years (standard error (SE) 0.43) for women and 45.8 (SE = 0.48) for men. The cohort comprised 98.9% white Caucasians, reflecting the ethnic mix of the city.

The age adjusted prevalence of subjects diagnosed as having trunk varicose veins was 39.7% ($n = 284$) in men and 32.2% ($n = 274$) in women ($p < 0.01$). A total of 124 subjects were diagnosed as having CVI: 95 grade 1; 19 grade 2; and 6 grade 3.

**Table 1** Risk factor profile of subjects with various combinations of grades 2 and 3 telangiectasia and grades 1–3 varicose veins

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Neither telangiectasia nor varicose veins ($n = 122$)</th>
<th>Only telangiectasia ($n = 29$)</th>
<th>Only varicose veins ($n = 403$)</th>
<th>Both telangiectasia and varicose veins ($n = 64$)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>34.4 (1.0)</td>
<td>56.6 (1.7)</td>
<td>49.4 (1.0)</td>
<td>55.5 (0.5)</td>
<td>&lt;0.001a</td>
</tr>
<tr>
<td>Male</td>
<td>63.1 (77)</td>
<td>10.3 (3)</td>
<td>54.6 (220)</td>
<td>43.8 (28)</td>
<td>&lt;0.001a</td>
</tr>
<tr>
<td>Social class I, II, IIINM</td>
<td>73.4 (80)</td>
<td>79.0 (15)</td>
<td>69.3 (244)</td>
<td>64.5 (40)</td>
<td>0.516a 0.610b 0.239c</td>
</tr>
<tr>
<td>Family history of varicose veins</td>
<td>31.9 (36)</td>
<td>53.6 (15)</td>
<td>56.0 (207)</td>
<td>44.3 (27)</td>
<td>&lt;0.001a 0.032b 0.414c 0.004a 0.001b 0.294c</td>
</tr>
<tr>
<td>Body mass index</td>
<td>24.8 (0.3)</td>
<td>27.7 (0.9)</td>
<td>26.0 (0.2)</td>
<td>26.5 (0.6)</td>
<td>&lt;0.001a 0.001b 0.002c</td>
</tr>
<tr>
<td>Women only:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contraceptive pill (ever)</td>
<td>84.4 (38)</td>
<td>44.0 (11)</td>
<td>67.4 (122)</td>
<td>44.1 (15)</td>
<td>&lt;0.001a 0.001b 0.993c 0.041d 0.008b 0.002b 0.887c</td>
</tr>
<tr>
<td>Pregnancy (ever)</td>
<td>40.5 (17)</td>
<td>100.0 (23)</td>
<td>79.1 (144)</td>
<td>77.4 (27)</td>
<td>&lt;0.001a 0.001b 0.002b 0.887c</td>
</tr>
<tr>
<td>Hormone replacement therapy (ever)</td>
<td>2.2 (1)</td>
<td>26.9 (7)</td>
<td>18.2 (33)</td>
<td>28.6 (10)</td>
<td>&lt;0.001a 0.001b 0.002b 0.887c</td>
</tr>
</tbody>
</table>

Figures are % (n) or mean (SE). Note: All subjects who have had previous varicose vein surgery have been excluded.

a From chi-square test or analysis of variance across all four groups.
b From chi-square test or t-test across groups 1 and 2.
c From chi-square test or t-test across groups 2 and 4.
The age adjusted prevalence of CVI was 9.4% (95% confidence interval (CI) 7.2–11.6) in men and 6.6% in women (95% CI 4.9–8.3).

There was no obvious difference between the results for telangiectasia obtained in the right and left legs; data are therefore given for the right leg only from this point onwards (with the exception of Table 1).

Telangiectases were observed in the right legs of 1322 subjects (84%) and none in 244 (16%). Among the men, telangiectases were observed in 555 (79%) and none in 144 (21%) and, among the women, the figures were 767 (88%) and 100 (12%) respectively. Due to small numbers, for the purposes of the current analyses, grades 2 and 3 have been grouped together and are the principal focus of this analysis.

**Risk factors**

Table 1 compares the demographic characteristics for telangiectasia grades 2 and 3 and varicose veins grades 1–3. In 29 subjects with telangiectasia grades 2 and 3 and no varicose veins, 122 subjects having neither varicose veins or telangiectasia, 403 subjects with varicose veins grades 1–3 but no telangiectasia and 64 subjects with telangiectasia grades 2 and 3. Due to small numbers, for the purposes of the current analyses, grades 2 and 3 have been grouped together and are the principal focus of this analysis.

**Location**

There was no significant overall difference in the distribution of grades of telangiectasia between the left and right legs \( (p = 0.144) \). To identify actual locations, the photographic slides of 93 subjects with grades 2–3 telangiectasia and no previous vein surgery were examined. Fig. 1 shows the detailed locations of telangiectasia in the right legs of these 93 subjects.

**Association between prevalence of telangiectasia and varicose veins**

There was a significant linear trend in the grade of telangiectasia and the degree of severity of trunk varicose veins (Table 2). Among subjects with no telangiectasia, 85.2% of them had no trunk varices, whilst this figure dropped to 51.4% among subjects with grades 2/3 telangiectasia. However, only two subjects with grades 2–3 trunk varices were free of telangiectasia \( (p\text{-value for linear trend } < 0.001) \). In general, the higher the grade of telangiectasia, the greater the frequency and the higher the grade of varicose veins and these linear relationships were similar for both men and women.

**Table 2**

<table>
<thead>
<tr>
<th>Grade of telangiectasia</th>
<th>None ( (n = 237) )</th>
<th>Grade 1 ( (n = 1139) )</th>
<th>Grades 2/3 ( (n = 74) )</th>
<th>( p\text{-value}^a )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trunk varicose veins</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both sexes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>85.2 (202)</td>
<td>75.7 (862)</td>
<td>51.4 (38)</td>
<td>( &lt; 0.001 )</td>
</tr>
<tr>
<td>Grade 1</td>
<td>13.9 (33)</td>
<td>22.0 (250)</td>
<td>33.8 (25)</td>
<td></td>
</tr>
<tr>
<td>Grades 2/3</td>
<td>0.8 (2)</td>
<td>2.4 (27)</td>
<td>14.9 (11)</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>( (n = 140) )</td>
<td>( (n = 494) )</td>
<td>( (n = 25) )</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>82.1 (115)</td>
<td>69.8 (345)</td>
<td>36.0 (9)</td>
<td>( &lt; 0.001 )</td>
</tr>
<tr>
<td>Grade 1</td>
<td>17.9 (25)</td>
<td>27.1 (134)</td>
<td>44.0 (11)</td>
<td></td>
</tr>
<tr>
<td>Grades 2/3</td>
<td>0</td>
<td>3.0 (15)</td>
<td>20.0 (5)</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>( (n = 97) )</td>
<td>( (n = 645) )</td>
<td>( (n = 49) )</td>
<td>( &lt; 0.001 )</td>
</tr>
<tr>
<td>None</td>
<td>86.7 (87)</td>
<td>80.2 (517)</td>
<td>59.2 (29)</td>
<td></td>
</tr>
<tr>
<td>Grade 1</td>
<td>8.3 (8)</td>
<td>18.0 (116)</td>
<td>28.6 (14)</td>
<td></td>
</tr>
<tr>
<td>Grades 2/3</td>
<td>2.1 (2)</td>
<td>1.9 (12)</td>
<td>12.2 (6)</td>
<td></td>
</tr>
</tbody>
</table>

Figures are column % \( (n) \). Note: All subjects who have had previous varicose vein surgery have been excluded.

\( ^a \) From chi-square test for linear trend across the three groups.
Symptoms

The linear trend in the proportion with each symptom across the four combination groups of, telangiectasia and varicose veins is shown in Table 3. A substantial proportion of the 202 subjects without either telangiectasia or varicose veins exhibited classic ‘venous’ leg symptoms. Subjects with telangiectasia, but without varicose veins, reported all symptoms more frequently compared to subjects with neither telangiectasia nor varicose veins. In subjects with varicose veins but no telangiectasia the prevalence of all symptoms was higher than in those with neither telangiectasia nor varicose veins. The highest prevalence of heaviness, aching, restless legs, cramps and itching was found when varicose veins and telangiectasia were both present. Overall, there were significant linear trends in the prevalence of heaviness, swelling, aching and cramps across the four groups (all p < 0.05).

Discussion

As defined at the outset, this study reports only on intra-dermal telangiectatic clusters of purple thread veins. Corona phlebectatica was not included. Telangiectasia of the legs is remarkably common, being observed in 84% of the right legs of subjects examined in this study. However, in the great majority (93%) the condition was present in only a minor degree (grade 1) while 7% were grades 2 or 3. For purposes of comparison with the population of patients without any venous abnormality and those with varicose veins we have limited analysis to grades 2 and 3 telangiectasia. Whereas in the overall study, trunk varicose veins were commoner in males we have confirmed that telangiectases are more common in women (88%) than in men (79%) and that two thirds of the subjects with grades 2 and 3 were women. There was no significant association with social class.

There were significant differences between the risk factor profiles when comparing the grades 2 and 3 telangiectasia with no trunk varices group with subjects with grades 1–3 varicose veins and no telangiectasia. The telangiectasia only group were older. Almost 90% of the telangiectasia only group were female, whereas 45% of the varicose vein only group were female. A history of contraceptive usage was recorded in 44% of the telangiectasia only group versus 67% of the varicose vein only group. All women in the telangiectasia only group had had at least one pregnancy versus 79% in the varicose vein only group.

These data confirm that between 3% and 29% of the population have one of the common ‘venous’ symptoms despite having no evidence of either telangiectasia or varicose veins. With the exception of swelling, the prevalence of symptoms was highest in those subjects manifesting both telangiectasia and varicose veins. There were higher rates of heaviness, swelling, aching, restless legs, cramps, itching and tingling in subjects with telangiectasia and no varicose veins than in subjects with neither telangiectasia nor varicose veins.

The locations of the telangiectasias are shown in Fig. 1. The highest proportion was in the thigh and at knee level, the least in the lower one third of the calf. This centripetal distribution is the reverse of the centrifugal distribution of the skin changes, lipodermatosclerosis and ulceration, found in chronic venous insufficiency. It is also in contrast to the distribution of corona phlebectatica which is a manifestation of chronic ambulatory venous hypertension. Thus, the locations of telangiectasia do not correlate with the locations of the highest known levels of ambulatory venous hypertension, at least as it relates to the saphenous systems.

A number of authors have demonstrated a relationship between telangiectasia and reticular veins in which Doppler reflux can be demonstrated. It appears, as these authors have suggested, that the anatomical connections of telangiectasia to a superficial venous reticular network which drains into the deep system through a system of small perforators in the region of the knee may be separate from the saphenous system. Thus, pathophysiological mechanisms that produce the clinical manifestations of incompetence in the saphenous system appear to be different from the causes of telangiectasia.

There was a correlation between the severity of trunk varicose veins and the percentage frequency of telangiectasia. Nevertheless, it is noteworthy that around 51% of subjects with grades 2/3 telangiectasia had no clinical evidence of varicose veins, which is consistent with the view that the pathophysiological mechanisms which

---

Table 3  Symptoms among subjects with various combinations of grades 2 and 3 telangiectasia and grades 1–3 varicose veins (right leg data shown)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Neither telangiectasia nor varicose veins (n = 202)</th>
<th>Telangiectasia and no varicose veins (n = 38)</th>
<th>Varicose veins and no telangiectasia (n = 312)</th>
<th>Telangiectasia and varicose veins (n = 36)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heaviness</td>
<td>12.9 (26)</td>
<td>13.2 (5)</td>
<td>20.9 (65)</td>
<td>38.9 (14)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Swelling</td>
<td>3.0 (6)</td>
<td>21.1 (8)</td>
<td>14.8 (46)</td>
<td>13.9 (5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Aching</td>
<td>32.8 (66)</td>
<td>42.1 (16)</td>
<td>39.4 (122)</td>
<td>50.0 (18)</td>
<td>0.040</td>
</tr>
<tr>
<td>Restless legs</td>
<td>20.8 (42)</td>
<td>29.0 (11)</td>
<td>25.4 (79)</td>
<td>42.9 (15)</td>
<td>0.092</td>
</tr>
<tr>
<td>Cramps</td>
<td>28.9 (58)</td>
<td>42.1 (16)</td>
<td>38.8 (121)</td>
<td>47.2 (17)</td>
<td>0.042</td>
</tr>
<tr>
<td>Itching</td>
<td>19.4 (39)</td>
<td>21.1 (8)</td>
<td>23.6 (73)</td>
<td>36.1 (13)</td>
<td>0.245</td>
</tr>
<tr>
<td>Tingling</td>
<td>12.4 (25)</td>
<td>21.1 (8)</td>
<td>16.5 (51)</td>
<td>8.3 (3)</td>
<td>0.453</td>
</tr>
</tbody>
</table>

Figures are % having symptom (n). Note: All subjects who have had previous varicose vein surgery have been excluded.

* From chi-square test for linear trend across the four groups.
produce varicose veins are different from those which produce telangiectasia.

Our data appear to confirm, both in terms of anatomical distribution and symptoms, that there is no intimate connection between the saphenous system and the reticular network which feeds telangiectatic veins. Varicose veins and telangiectases commonly co-exist and are associated with similar symptoms. We are aware of no scientific studies on the impact of treating one system upon the other, nor of any evidence base as to which system should be treated first. The latter would seem to be a worthy topic for a randomised clinical trial. Analysis of the duplex scan findings in the Edinburgh Veins Study and their correlation with telangiectasia will be the subject of a separate analysis.

Conflict of Interest Statement

The authors have no conflict of interest regarding this manuscript.

Acknowledgements

Information was kindly provided by Professor LK Widmer and Dr M-T Widmer. We thank the following staff for their work on the study: M Carson, E Kerracher, L Haggerty, G Didcock and T Blake, and also the general practitioners, practice managers and patients from the general practices participating in the Edinburgh Vein Study.

Financial support for the study was provided by the Wellcome Trust.

References