Factors Determining Seasonal Variations in Varicose Vein Surgery

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Objectives: Varicose vein operations are traditionally performed during the winter season because of supposed advantages during post-operative care. This prospective study aimed to investigate how, and on what grounds, patients and physicians time varicose vein surgery.

Methods: Unselected patients attending a consultation for varicose vein surgery at a Regional Hospital in Thun, Switzerland were asked to fill out an anonymous and standardised questionnaire to register the C of CEAP, age, and gender and to understand the drivers behind the timing of the actual intervention. The five main criteria were: job, workplace; symptoms, prevention; family, leisure, sports; season; and other.

Results: Between May 2015 and April 2017 (a 24 month period spanning two full seasonal cycles) 153 consecutive patients were included and returned 153 questionnaires for analysis. The actual timing of varicose vein surgery correlated inversely with the average temperatures measured in Thun. Among men ($n = 65, 43\%$ of the study population), job requirements were the most frequent determinant ($41\%$ of cases) of the operating day. Among women, by contrast, symptoms and prevention were named most often ($32\%$ of cases) as the leading motivation for surgical timing. Although for both men and women job and workplace was a leading factor over all CEAP classes ($28.6\%$), the importance of symptoms and prevention increased with the CEAP class: from $26.3\%$ in classes 2–4 to $51.8\%$ in classes 5–6.

Conclusions: Although inversely correlated with outside temperature, the concentration of varicose vein surgery to the winter months seems to be coincidental. The patient’s job situation represents overall the most important determinant of surgical planning. Symptoms and prevention are more important in certain subgroups than in others, that is among women and among patients with high CEAP classes.

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INTRODUCTION

A varicose vein operation is a classic example of elective surgery with, theoretically, unrestricted temporal flexibility. Traditionally, such procedures have been performed predominantly during the colder months of the year; however, the current literature shows very little evidence of the reasons for this.1–3 This study investigated the distribution of varicose vein interventions around the year and the criteria that were important to patients with varicose veins when timing their treatment.

PATIENTS AND METHODS

The study was designed as a single centre prospective observational study between May 2015 and April 2017 (spanning two full seasonal cycles to avoid any seasonal bias). Every patient aged $\geq 18$ years attending a consultation for varicose veins during the study period with one of the vascular surgeons at the Regional Hospital in Thun was eligible for this study. The survey and its analysis was approved by the local Cantonal Ethics committee (Kantonsale Ethikkommission des Kantons Bern KEK, Nr. 4-5-2015), and because of the voluntary participation no formal informed patient consent was requested.

Participating patients were either referred by a doctor or presented themselves directly for specialist consultation. At this hospital varicose vein surgery is provided by two vascular surgeons, and therefore is available throughout the year. The operating capacity allows for interventions to take place usually within two to three weeks after consultation, and patients do not wait longer than three weeks to see the vascular surgeon in the outpatient clinic.

Along with a short verbal explanation, every patient was provided with a questionnaire. Ten options could be scored within the following five main criteria: 1. job, workplace; 2. symptoms, prevention of possible complications; 3. family, leisure, sports; 4. season; and 5. other.
There were no limitations placed on the number of criteria that could be chosen. There was an option to add free text criteria given by “5. other.” Patients were informed that participation and completion of the questionnaire was entirely voluntary and had no influence on further treatment. The surgeon assessing demographic baseline information (age and gender) and the clinical class “C” according to the CEAP classification was blind to the completed form, and the date of the actual intervention was determined and recorded independently, also in a blinded fashion. Patients who did not undergo a surgical intervention were excluded for the post hoc analysis.

During the consultation prior to the planned intervention, the details of the surgical procedure, consisting of high ligation and stripping and not of thermal ablation, and the date of the actual intervention was determined and recorded independently, also in a blinded fashion. Patients who did not undergo a surgical intervention were excluded for the post hoc analysis.

The observed seasonal distribution of surgery (n = 153) showed an almost identical pattern over the two years of the study with a maximum number of operations in winter and a minimum during the summer (Fig. 1). The frequency of varicose vein surgery was almost inverse to the average temperatures measured in Thun (www.thunerwetter.ch/archiv.html).

The mean number of criteria selected in the questionnaire was 1.82 (SD = 1.064, median = 1, minimum = 1, maximum = 6). Free text criteria could be allocated to predefined groups.

The five main criteria groups are illustrated in Fig. 2, and seasonal distribution by criteria is shown in Fig. 3. Job and workplace is generally an important factor over all CEAP classes (28.6%) (Table 1). Although symptoms and prevention showed overall the same significance, they had less importance to patients in lower CEAP classes 2–4 (26.3%), but were by far the most important criteria for high CEAP classes 5–6 (51.8%) (Table 1). Job and workplace (22.8%), as well as family, leisure, and sports (12.3%), were clearly less important, and season (2.6%) of only a minor relevance for high CEAP classes 5–6. For low and medium CEAP classes, job and workplace (29.4%) was the most important factor, followed by symptoms and prevention (26.3%), and family, leisure, and sports (23.4%) (Table 1). Also for this group, the season (12.5%) played only a minor role. In five cases each the health insurance franchise and the combination of the vein surgery with another surgical intervention were stated as relevant factors. For three patients it was a medical condition that

| Table 1. Criteria by C classes. | n   | %     | Mean age, y | CEAP class |
|-------------------------------|-----|-------|-------------|------------|
|                               |     |       | 2           | 3          | 4          | 5          | 6          |
| Patients                      | 153 | 52.6  | 47          | 36         | 51         | 7          | 12         |
|                               | ♀   | 88    | 54.4        | 26         | 20         | 4          | 5          |
|                               | ♂   | 65    | 50.1        | 14         | 10         | 31         | 3          |
| Job, situation at workplace   |     |       | 43.8        | 28.6       | 47.8       | 16.3       |
|                               | ♀   | 17.3  | 48.5        | 9.9        | 30.1%      | 5.2        | 19.9%      | 2.2        |
|                               | ♂   | 26.5  | 47.3        | 6.4        | 45.8%      | 1.4        | 14.2%      | 14.3       |
| Symptoms, prevention          |     |       | 45.0        | 29.4       | 54.7       | 10         |
|                               | ♀   | 28.4  | 57.1        | 5.4        | 16.5%      | 9.5        | 36.5%      | 7.0        |
|                               | ♂   | 16.6  | 50.5        | 4.6        | 32.7%      | 4.1        | 40.8%      | 4.6        |
| Family, leisure, sports       |     |       | 33.7        | 22.0       | 51.7       | 9.0        |
|                               | ♀   | 25.8  | 53.2        | 8.5        | 25.9%      | 9.5        |
|                               | ♂   | 7.9   | 48.1        | 0.4        | 3.0%       | 2.2        | 21.7%      | 4.0        |
| Season                        |     |       | 17.2        | 11.2       | 52.6       | 6.4        |
|                               | ♀   | 8.7   | 54.2        | 4.8        | 14.5%      | 1.8        | 7.1%       | 2.1        |
|                               | ♂   | 8.5   | 50.6        | 1.6        | 11.3%      | 1.8        | 18.3%      | 4.6        |
| Other                         |     |       | 13.3        | 8.7        | 49.6       | 5.3        |
|                               | ♀   | 7.8   | 50.1        | 4.3        | 13.1%      | 0.0        | 2.0        |
|                               | ♂   | 5.5   | 49.0        | 1.0        |

CEAP classification: description of the clinical class (C), the aetiology (E), the anatomical (A), and the underlying pathophysiology (P).

RESULTS

A total of 173 consecutive patients participated and returned their questionnaires during the 24 month period. Twenty questionnaires (11.56%) were excluded because they were either incomplete or described a treatment other than surgery, meaning that 153 questionnaires were analysed.

The mean patient age was 52.6 years (SD ± 14.97), and 88 were female (57.5%). The CEAP classification is shown in Table 1.
influenced the timing of the intervention. Two patients indicated the waxing or waning moon as the reason for the timing of operation.

An obvious gender difference can be observed in Table 1. In 32.3% of women, symptoms and prevention were the most important factors; whereas for male patients, 40.8% considered job and workplace to be the most important factor.

At the time of the operation 67% of women had a lower CEAP class of 2–3, whereas men tended to get operated on later in the course of the disease with CEAP class of 4–6 (63.1%), with a peak in CEAP class 4 (47.7%).

Patients indicating job and workplace as a criterion were considerably younger (mean age 47.8 years) compared with patients indicating symptoms and prevention of complications (mean age 54.7 years) \( (p < .05) \) (Table 1). Male patients stating symptoms and prevention were younger (mean age 50.5 years) compared with females (mean age 57.1 years) \( (p < .05) \).

**DISCUSSION**

The present data show the typical seasonal variability in varicose vein surgery, with a peak during the winter. However, despite this obvious inverse relationship to the climate (temperature), the data do not suggest any causal correlation between climate and the chosen operation date.

For male patients, their jobs seem to be by far the most important factor in determining the date of the operation. Symptoms and prevention are the main motivation for women and patients in higher CEAP classes. Because of the obvious correlation, the climate is thought to have an indirect influence: professional activities and holidays are commonly linked to the temperatures and the weather. Most people take their longest holidays during summer-time. This may explain in part, the small number of vein operations performed during the warm or hot summer months.

In the study area ski holidays are important to many residents and the preferred time for skiing is February and March. It should be noted that all Swiss hospitals have air conditioning in theatres and intensive care units, but not all of them, including Thun, on the patient wards.

The health insurance franchise was mentioned several times and seems to be another important factor. The Swiss Public Health Insurance system includes a limited annual patient contribution. It can therefore be financially advantageous for a patient to plan various elective medical treatments within a single year.

Insight into the motivations of patients and how they choose their day of operation are not only of significance for vascular surgery.\(^1-3\) It is assumed that other surgical disciplines show a comparable seasonal distribution for their elective procedures. Altogether this leads to very heavy use of operating theatres and clinical capacities during the cold winter half year and less workload during the warm or hot summer. As the set up and running of operating theatres is very costly and expenses are steady over the year, it would be economically rational for hospitals to strive for a constant workload throughout the year.\(^1-3\)

**Limitations**

As the present results show, symptoms play an important role for certain patients. However, the study does not provide any data to imply further investigation of the course and extent of these symptoms (e.g. acuteness) as a driver
for the patient’s decision. It was not possible to further differentiate the role of the job, whether the date chosen was to suit the employer or the employee. The extent and type of employment was not registered. The study also lacks information on the role of the referring doctor, who might have influenced certain patient decisions. The patient’s satisfaction with the timing of the operation and the satisfaction with the post-operative treatment would also have been an interesting question for investigation.

Conclusions
Overall, the patient’s job situation is the most important determinant in surgical planning. In general, symptoms and the prevention of potential complications are important for female patients. Symptoms and the prevention of complications are particularly important for patients with more advanced disease (C5-6), and then for female and male patients.

CONFLICTS OF INTEREST
None.

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