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ORIGINAL RESEARCH

Vascular Surgery Fellowships: Comparison of Two Programmes in Canada and the UK

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The last decade witnessed the birth of vascular surgery as a standalone specialty. This was accompanied by the rapid development of endovascular techniques, which revolutionised the way vascular diseases are treated. This change in the practice of vascular surgery has had a great impact at all levels, but perhaps none greater than in the training of future vascular surgeons. Hence, there is an increasing demand for a generation of vascular surgeons who are versatile in performing the breadth of vascular and endovascular procedures.[1,2] The structure of the training programme in vascular surgery has adapted to such a paradigm shift. For example, in 2012 Canada approved the establishment of the "0+5" direct entry integrated vascular residency.[3] Similarly, the first generation of run through vascular trainees was recruited in 2013 in the UK, following the approval of the Vascular Curriculum by the General Medical Council (GMC). However, achieving competence in the full range of vascular procedures within a particular programme remains a challenge, and pursuing a fellowship in vascular and endovascular surgery is becoming increasingly popular. Seeking a national or international fellowship is a dilemma that vascular trainees in the UK frequently face. This report presents a comparison between a UK and a Canadian vascular fellowship conducted by a single trainee.

A single vascular trainee completed both a nine and 12 month fellowship in vascular and endovascular surgery at the Freeman Hospital, Newcastle, UK, in 2015 ("fellowship UK") and at the University of Toronto Hospitals, Toronto, Canada, in 2016 ("fellowship C"). Fellowship UK was at the level of specialty training year 7 (ST7) and fellowship C was at the level specialty training year 8 (ST8); hence, both fellowships were incorporated within the trainee's training programme and prospectively approved by the GMC. While fellowship UK was conducted at a single centre, fellowship C consisted of four month placements at three different centres: Toronto General Hospital, Sunnybrook Health Science Centre, and St Michael's Hospital. Acceptance in each programme was through a formal application and competitive interview process. Data regarding job specifications, clinical and academic achievements, on call commitments, clinics, and case logs were collected prospectively. Case logs were further partitioned into open and endovascular categories. In addition, operative participation was documented in each procedure. Participation was labelled "A" for assisted when the trainee's primary role was assisting a trainer, whereas a procedure was considered to be "P" when the trainee either performed the procedure under supervision, without supervision, or trained another trainee. A chi-square test was used to compare the proportions of open vs. endovascular procedures and performed vs. assisted cases, whereas a *t* test was used to compare the monthly numbers of on call days, clinics, and case logs.

The average number per month of on call days, clinics, and operative procedures were 7.6, 8, and 24.3, and 6.1, 5.7, and 23.2 in fellowship UK and fellowship C, respectively ($p = .02$, .005, and .75, respectively). A breakdown of the surgical procedures is summarised in Table 1. The average number of cases per month and the proportion of endovascular cases were similar between the two fellowships, but significant differences existed at the level of trainee participation and in case distribution. Of all surgical procedures, the proportion of endovascular therapies was 42% ($n = 93/219$) in fellowship UK and 45% ($n = 126/278$) in fellowship C ($p = .53$). However, the trainee was the primary operator in 40% of the endovascular procedures in fellowship UK vs. 79% in fellowship C ($p < .001$). Endovascular trainers were primarily radiologists in fellowship UK, whereas fellowship C trainers were vascular surgeons. However, the proportion of performed open vascular procedures was higher during fellowship UK (93%) than in fellowship C (80%) ($p = .002$). Breakdown of the surgical cases also revealed a significant difference in exposure to aortic procedures. The average number per month of open and endovascular aortic procedures was 3.9 in fellowship UK vs. 7.8 in fellowship C ($p = .006$). However, fellowship UK provided exposure to endovenous thermal ablation ($n = 35$), which is currently not offered in the Toronto public health service.

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Table 1. A breakdown of the variety of procedures performed in the UK and Canadian fellowships.

Variable	UK (average/mo) or [%]	Canada (average/mo) or [%]	*p*
Pre-tax detection salary (€) per annum (per month)	69,830 (5,819)	44,210 (3,684)	NA
On call days	68 (7.6)	73 (6.1)	.02
Total clinics	72 (8)	68 (5.7)	.005
Total operations	219 (24.3)	278 (23.2)	.75
Open procedure	126 [58%]	152 [55%)	.53
Performed/supervised/trained others	117 [93%]	121 [80%]	.002
Assisted	9 [7%]	31 [20%]	.001
Aortic procedures	7 (0.8)	28 (2.3)	.001
Carotid cases (carotid endarterectomy, carotid body tumour, carotid subclavian bypass) and thoracic outlet syndrome procedure	18 (2)	25 (2.1)	.89
Peripheral revascularisation and femoral pseudoaneurym repair	40 (4.4)	45 (3.8)	.57
Renal access procedures	0 (0)	22 (1.8)	.04
Amputations	18 (2)	17 (1.4)	.26
Venous procedures	36 (4)	9 (0.75)	.001
others	7 (0.8)	6 (0.5)	-
Endovascular procedures	93 [42%]	126 [45%]	.53
performed/supervised/trained others	37 [40%]	99 [79%]	<.001
Assisted	56 [60%]	27 [21%]	-
Endovascular aneurysm repair (EVAR/TEVAR, FEVAR, BEVAR)	28 (3.1)	65 (5.4)	.008
peripheral angiograms/iliac/femoral/tibial plasty +/- stenting	65 (7.2)	61 (5.1)	.4
All aortic procedures	35 (3.9)	93 (7.8)	.006

Note. Data are *n* (%) unless otherwise indicated.

While both fellowships were clinically oriented, successful completion of fellowship C required conducting and publishing at least one original research project within 12 months. In total, two national presentations and one publication were achieved in fellowship UK vs. one national presentation, two regional presentations, and five publications in fellowship C. Two courses were attended in fellowship UK, whereas fellowship C offered four fully funded advanced endovascular courses in Canada and the USA.

The annual salary for fellowship UK was €69,830, funded by The Newcastle upon Tyne Hospitals NHS Foundation Trust, vs. €44,210 in fellowship C, paid by the University of Toronto. Expenses incurred during the fellowships included renting single room accommodation at a monthly rate of €402, in addition to the annual professional fees (Table 2) for fellowship UK, whereas moving to Toronto was associated with greater expenses, including accommodation, flights, professional registrations, and memberships (Table 3), in addition to higher living costs.

This report presents a single trainee's experience of two consecutive fellowships within the UK and Canada. A survey of vascular trainees in the UK revealed that half of them were in posts that do not offer endovascular training, 88% performed <10 peripheral angiograms, and 67% performed <10 endovascular aneurysm repairs over a 12 month period.[4] Concerns are also raised regarding the exposure to sufficient open surgical procedures during training due to the increased prevalence of endovascular procedures. Such exposure remains vital not only for achieving the required level of competence, but also for maintenance of independent future surgical practice amongst the vascular trainees. For example, Tu et al. found that annual surgeon volume significantly influenced mortality after elective open abdominal aortic aneurysm (AAA) repair.[5] Hence, seeking

Table 2. Expenses incurred during a vascular surgery fellowship in the UK (9 months).

Expense	Amount (€)	Rationale
General Medical Council registration	482	Clinical practice requirement
Royal College of Surgeons of England annual membership	608	Professional fees
Intercollegiate Surgical Curriculum Programme annual fees	293	Postgraduate training requirement
Medical Defence Union	134	Indemnity fees
Room rental in Newcastle	3,618	Monthly rent £402
Home base rent	7,749	Family accommodation in a different city; monthly rent £861
Utility bills	1,344	—
Total	14,228	—
Average/month	1,581	—

Table 3. Expenses incurred during a vascular surgery fellowship in Canada (12 months).

Expense	Amount (€)	Rationale
Canadian Embassy work permit application	86	Temporary resident visa
PGME visa processing fee	86	Requirement for temporary resident visa
Visa medical assessment	339	Requirement for temporary resident visa
Return flight to Canada	782	Manchester—Toronto—Manchester, booked through Canadian Affairs
College of Physicians and Surgeons of Ontario (CPSO) fees	273	Non-refundable application fee (€93), membership fee (€180)
Canadian Police Information Centre criminal record check	11	CPSO requirement
Source verification of medical degree (physician apply)	232	CPSO requirement; document fee (€82 for each medical credential document submitted for source verification)
Canadian Medical Protective Association annual premium	1,332	Clinical fellow monthly rate €111
University Health Insurance Plan	280	Family three month rate until Ontario Health Insurance Plan commences
PGME registration fee	465	Postgraduate training requirement
Rent for a one bedroom furnished apartment, including utility bills	15,960	Monthly rent €1,330
Total	18,846	—
Average/month	1,654	—

Note. CPSO, College of Physicians and Surgeons of Ontario; PGME, Postgraduate Medical Education.

fellowships after completion of surgical training remains a vital route to achieving such standards. Several factors influence trainees' decisions to pursue such fellowships. The results here demonstrate increased expenses with a fellowship within Canada combined with a reduction in income. This represents a significant disadvantage for the Canadian fellowship, particularly for fellows who have dependents to support. Other popular destinations amongst UK fellows include the USA, Australia, and New Zealand, and comparison of incomes and expenses required for pursuing fellowships in these countries would be useful to develop a full insight into the financial aspects of the popular international fellowships. However, the Canadian fellowship offered better hands on exposure to endovascular therapies, a finding that is probably multifactorial. Firstly, the experience of the trainee in endovascular procedures would have naturally developed more when he moved from fellowship UK to fellowship C, which could have resulted in more substantial participation than what would have been offered at a more junior level. Also, the trainee was trained directly by his clinical supervisors (vascular surgeons) in fellowship C vs. trainers from a different specialty (radiologists) in fellowship UK. Conversely, the proportion of open vascular procedures that were performed by the trainee was higher in the UK than Canada. This could be explained by the exposure to complex open thoracic and thoraco-abdominal aortic procedures in Canada, which are more often performed by a senior multidisciplinary team of surgeons. Using operative case numbers as a surrogate for operative experience, there was no significant difference in this domain between the two fellowships; however, there was significantly higher exposure to open and endovascular aortic surgery in fellowship C, which is probably reflective of the practice patterns at individual institutions. This is important as the complexity of the open infrarenal AAA repair has changed in recent years. A steady increase in the percentage of suprarenal aortic clamping needed in open infrarenal AAA repair is being seen. This phenomenon is not unexpected as a short length of proximal aortic neck is a contraindication for standard infrarenal endovascular repair. Additionally, exposure to endovenous treatment of varicose veins was lacking in fellowship C. These differences highlight the individuality of fellowships and the importance of identifying clear fellowship goals and objectives before selecting a specific post. Other non-clinical advantages of an overseas fellowship include exposure to a different healthcare system, exploring a different culture, and building personal and professional relationships with colleagues at an international level.

The presented comparative report is not without limitations. Firstly, this was a single trainee experience and the results cannot be generalised. Secondly, achievements obtained from a training programme can vary among different trainees due to variations in personal abilities to learn. Thirdly, the fellowships were conducted in specific centres and different vascular units might offer different exposure within each country. Finally, case logs provide uniform, trackable, and objective means of measuring operative experience; however, they might not be the best surrogate for accurately assessing technical skills gained or clinical experience in general.

CONFLICT OF INTEREST

None.

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