

Adequate Vascular Training Opportunities can be Provided Without Compromising Patient Care

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Objectives: to review the results of index operations in vascular surgery and to evaluate the impact of a specialist vascular training programme on patient outcome.

Methods: we undertook a 5-year (January 1995–December 1999) review of the weekly-collected mortality and morbidity data. The total number, 30-day mortality and stroke rate of all index operations i.e. AAA repairs (ruptured and elective), carotid operations and infra-inguinal bypasses (above and below knee, elective and emergency) was recorded. The number of operations performed by trainees under supervision was recorded.

Results: in the 5-year period 991 index operation were done of which 738 (74%) were done by trainees. Operations done by trainees were supervised by a consultant in 82% of cases with no significant effect on death or stroke rates. Overall vascular trainees performed 75% of the index operations of which 82% were supervised.

Conclusions: trainees under supervision performed three out of four index operations. The mortality and morbidity of index operations in our unit compared well with accepted best mortality and morbidity figures. Our unit provides good training opportunities for vascular trainees whilst maintaining satisfactory standards of patient care.

Key Words: Vascular surgical training; Operative mortality and morbidity.

Introduction

Operative experience in vascular surgery has always been a bone of contention between trainees and consultants. A substandard operation in vascular surgery can result in limb loss, stroke or death of the patient. Hence vascular consultants must exercise caution in letting a trainee operate. On the other hand the trainee with inadequate operative experience cannot learn the nuances of the operation and acquire reasonable skill in it before becoming a consultant.

This paper addresses the question of whether it is possible to maintain a balance between trainee operative experience and surgical outcome. We reviewed the results of the of index operations in our vascular surgical unit and evaluated the impact of a specialist vascular training programme on patient outcome.

Methods

We undertook a 5-year review of the weekly prospectively collated mortality and morbidity (M&M) data of

the Nuffield Dept of Surgery, University of Oxford for the period 1st January 1995 to 31st December 1999. The index operations, abdominal aortic aneurysm (AAA) repair, ruptured and elective, carotid endarterectomy (CEA) and infra-inguinal bypass were reviewed.

The numbers of each operation, the 30-day in-hospital mortality and, for CEAs, stroke rate were recorded. For each operation we recorded the status (Higher Surgical Trainees (HST) or Consultant) of the operating surgeon and if a trainee, whether they were assisted by a consultant.

In lower limb bypass operations the surgeon doing the distal anastomosis was considered the principal operator.

Results

A total of 991 index operations were carried out during the 5-year period of which 738 (75%) were done by trainee vascular surgeons. The 20 posts, each of one year, spanning this 5 year period, were filled by senior trainees in 13 (years 4–6) and by junior trainees (year 1–3) in 7 posts (Fig. 1). All index operation done by junior trainees were consultant supervised. Of these

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607 (82%) were directly supervised and assisted by a consultant. There were 455 AAA repairs of which 241 were elective and 214 were for ruptured aneurysms. Of the ruptured AAA repairs 186 (87%) were done by trainees of which 107 (58%) were assisted by a consultant. Senior trainees did all the cases that were done unsupervised by trainees. The operative mortality for all ruptured AAA was 52% (112 deaths). Of the elective AAA repairs 189 (78%) were done by trainees,

159 (84%) assisted by a consultant. The operative mortality for elective AAA repairs was 3.3% (8 deaths).

There were 240 CEA of which 140 (58%) were done by vascular trainees, in every case with consultant assistance. The operative mortality for CEA was 1.7% (4 deaths) and 14 (5.8%) patients had a major or minor peri-operative stroke following this operation. There were 296 infra-inguinal arterial bypasses operations. At least one vascular anastomosis was done by a trainee in 223 (75%) patients. The consultant was scrubbed up in 201 (90%) cases. The operative mortality was 8% (25 deaths). Table 1 shows Operations performed by Consultants and trainees over 5-year period 1995–1999. Figure 2 shows the ratio of operations by HST and consultants. Table 2 shows the outcomes overall and for each category of operator.

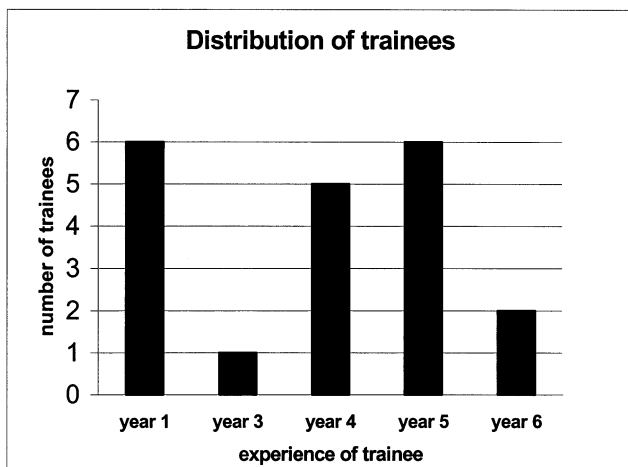


Fig. 1. Of the 20 posts each of 1-year duration, 7 were filled with junior trainees (years 1–3) and 13 were filled with senior trainees (years 4–6).

Table 1. Operations performed by consultants and trainees over 5-year period 1995–1999.

Operation	Total number	Trainee (%)	Consultant supervision (%)	Death (%)	Stroke rate (%)
AAA – ruptured	214	186 (87)	107 (58)	112 (52)	N/A
AAA – elective	241	189 (78)	159 (84)	8 (3)	N/A
CEA	240	140 (58)	140 (100)	4 (1.7)	14 (6)
Infra-inguinal bypass	296	223 (76)	201 (90)	25 (8)	N/A

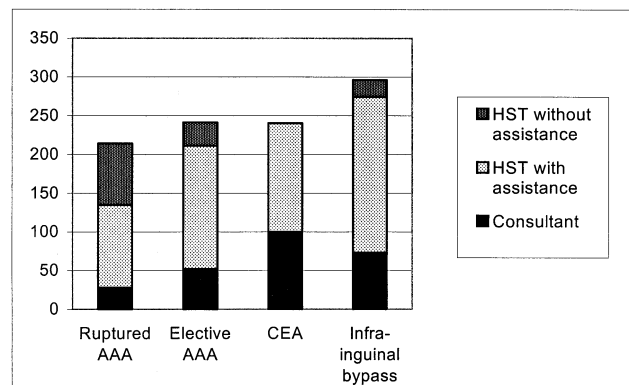


Fig. 2. The ratio of operations by higher surgical trainee (HST) and consultants.

Table 2. The outcomes overall and for each category of operator.

	Death				Stroke following CEA (%)
	Ruptured aneurysm (%)	Elective aneurysm (%)	CEA (%)	Infra-inguinal bypass (%)	
Overall	112/214 (52)	8/241 (3)	4/240 (2)	25/296 (8)	14/296 (6)
Performed by consultant	13/28 (46%) (95% CI: 33–71)	1/52 (2%) (95% CI: 0–7)	2/100 (2%) (95% CI: 1–4)	5/73 (7%) (95% CI: 1–4)	8/100 (8%) (95% CI: 3–11)
Trainee consultant assisted	59/107 (55%) (95% CI: 55–62)*	5/159 (3%) (95% CI: 1–6)*	2/140 (1.7%) (95% CI: 1–4)*	18/201 (8%) (95% CI: 5–21)*	6/140 (4%) (95% CI: 2–9)*
Trainee not assisted by consultant	40/79 (51%) (95% CI: 41–63)*	2/30 (7%) (95% CI: 6–12)*		2/22 (9%) (95% CI: 3–20)*	

* Not significant compared to consultant results.

comparable to the best in the world. On the other hand, however, it has always been a learning ground for the next generation of doctors. In an increasingly litigious society it is extremely important to show that the latter does not compromise the former.

As a teaching hospital our commitment towards both goals is even more important. Hence we feel that it is an important to find out whether both goals can be achieved without compromise.

The other study of its kind was published by Evans *et al.*¹ from Edinburgh in 1999 using the Lothian Surgical Audit database. Seventy eight per cent of elective AAA repairs were done by trainees in our institute compared to 46% in the Edinburgh study for the period 1st January 1992 to 31st December 1997. Although they have presented data over 2 time periods – 1987–1991 and 1992–1997, we looked at data only from 1992 to 1997 in their study because it corresponded with our time period and overlapped the period when the Calman system was introduced. Similarly while only 43% of the ruptured AAAs were done by trainees in the Edinburgh study, 87% were done by trainees at our institute. While their mortality for elective repair was 8% ours was 3% and the corresponding figures for ruptures was 34% and 52%. We also had the advantage of better consultant supervision 58% versus 46% for ruptures and 84% versus 68% for elective aortic aneurysm repairs. Our mortality rates for both ruptured and elective AAA repair compare favourably with published mortality rates. The U.K. small aneurysm trial² reported an operative mortality of 6% for elective repair. Aune *et al.* had an operative mortality of 5%³ and Akkersdijk *et al.*⁴ recorded one of 7%. Similarly for ruptured aneurysms Meesters *et al.*⁵ had an operative mortality of 49%. The Finnvasc study group reported an operative mortality between 49% and 54%⁶ while Samy *et al.*⁷ from Aberdeen reported a 10% mortality for elective and a 55% mortality for ruptured aneurysms done in the whole of Scotland.

Similar standards have been maintained in the other index operations as well. For CEAs the NASCET⁸ and ECST⁹ showed an operative mortality between 1–3% and a stroke rate of 5–8%. Our data compares very favourably with this.

Similarly for infra-inguinal bypasses the hospital mortality for all patients presenting with chronic critical leg ischaemia (CCLI) published by the VSS of GB and Ireland¹⁰ was 13% while mortality after surgical intervention was 10%. Bertele *et al.*¹¹ recorded a 20% one-year mortality for CCLI. Our data includes acute limb ischaemia (ALI), which has a much higher operative mortality along with claudicants and CCLI. In spite of this our operative mortality compares favourably with the quoted mortality rates.

Our unit consists of 4 consultants and 4 vascular HST. For the majority of the index operations there would be 2 trainees scrubbed up, usually a senior and a junior trainee. Hence, on an average each trainee would be exposed to at least 100 index operations. The Joint Committee on Higher Surgical Training (JCHST) recommends that each vascular trainee should get exposure to at least 100 arterial reconstructions (index and other operations) per year and our average is well over that with adequate exposure to both elective and emergency work.¹² The exposure to each individual index operation is also more than recommended by the JCHST.

From the above data it can be concluded that in our centre vascular trainees get an adequate operative experience in the index vascular operations. Three-quarters of these operations are supervised by the consultant scrubbed up for the case, thus providing an excellent teaching environment. Only senior trainees who had had experience in vascular surgery were allowed to perform operations independently. This was at the discretion of the consultant and provided good progression in training. Our results are comparable to the best results for all of these operations so there is no question of compromise in the quality of patient care.

In conclusion, we suggest that given the right environment, it is possible to provide both excellent training opportunities and patient care of a high standard. We do however stress that all operations performed by trainees should have an appropriate level of supervision.

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