Changes in the provision of vascular surgery in a single health region over 10 years

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ABSTRACT

INTRODUCTION This study examines changes in vascular service provision and activity in a single UK health region over 10 years.

PATIENTS AND METHODS A questionnaire on involvement in vascular surgery was sent to all general surgeons in the Oxford region in 1992, 1997 and 2001. Data on involvement in vascular surgery were obtained from the Department of Health.

RESULTS Over 10 years the number of general surgeons not performing any emergency vascular (arterial) surgery rose from 33% to 65% ($P = 0.002$). There was also a fall in the number of general surgeons performing only emergency vascular surgery ($P = 0.009$). Trends were observed towards more vascular emergencies being transferred to another hospital ($P = 0.068$) and proportionally fewer general surgeons undertaking recurrent varicose vein surgery ($P = 0.09$). The number of vascular reconstructions was 20.8 per 100,000 population in 1990–1991, rising to 32.3 per 100,000 in 1997–1998 but falling to 27.2 per 100,000 by 1999–2000, the greatest increase in activity was seen in the regional centre. Endovascular procedures increased from 8.2 per 100,000 in 1990–1991 to 21.27 in 1995–1996 falling to 17.4 by 1999–2000. In the regional centre there was a fall of 57% in such procedures from 1996–1997 to 1999–2000. Over 10 years, the overall major amputation rate remained between 10–12 per 100,000.

CONCLUSIONS The changes reflect the gradual separation of vascular surgery from general surgery occurring nationally. They also suggest a more conservative approach in the management of certain vascular conditions.

KEYWORDS

Vascular surgery – Arterial reconstruction – Workload – Subspecialisation

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The last decade has seen a gradual but noticeable move towards the subspecialisation of vascular surgery in Great Britain. The main pressures appear to be progress towards a dedicated 24-h vascular service, as outlined by the Vascular Surgical Society of Great Britain and Ireland (VSSGBI)¹ and increases in both vascular and endovascular reconstruction.^{2,5} The latter, along with treatment of resultant complications, have led to a documented rise in vascular admissions both elective and emergency.⁴ These factors reduce the amount of time that general surgeons with an interest in vascular surgery have for treating general surgical patients, and probably make subspecialisation inevitable.¹

In spite of the shift towards subspecialisation, variations in vascular surgical activity have been noted between, and within, regions^{3,5} which may be related to demographic characteristics of the populations served.⁶

The Oxford regional health authority population, of about 2.5 million people, is served by seven district general hospitals (DGHs) and one teaching hospital. The variation in vascular provision and workload in this region were reported in 1994 and 1998.^{5,6} We present further data and describe changes in vascular service provision over the last 10 years.

Patients and Methods

Questionnaires on the provision of vascular surgical services were sent to all regional general surgeons in 1992, 1997 and 2001 and data compared. Hospital Episode Statistics (HES) data were used to count the number of vascular procedures (L18–20, L29, L34, L37, L41, L45, L48–52, L56–59, and L65), endovascular procedures (L54.1 and L63.1) and amputations (X09) performed in each district every year from 1990 to 2000. The number of procedures was calculated per 100,000 population in each district. Data for repair of abdominal aortic aneurysm were then validated against prospectively collected data for the West Berkshire district.

Results

Response rates for each of the three sets of questionnaires were high: 40 of 45 (89%) in 1992, 45 of 47 (96%) in 1997 and 52 of 60 (87%) in 2001. The numbers of consultants with an interest in vascular surgery (those performing elective and emergency arterial surgery) were 16, 18 and 18 respectively. There was a sharp rise in the number of

Figure 1 Trend lines of arterial reconstructions per 100,000 of the population from 1990 to 2000, for each of the districts performing significant amounts of vascular surgery. DGH 1 appointed a new consultant with an interest in vascular surgery where previously there was none.

general surgeons not performing any emergency vascular surgery, from 13/40 in 1992 to 34/52 in 2001 ($\chi^2 = 9.78$, 1 degree of freedom (d.f.); $P = 0.002$). There was also a reduction in the number of non-vascular surgeons performing only emergency vascular surgery (11 in 1991 and 4 in 2001; $\chi^2 = 6.81$, 1 d.f.; $P = 0.009$). The number of consultants who transferred arterial emergencies to another centre or consultant rose from 38% to 68% (5 of 13 doing so in 1991 and 23 of 34 in 2001; $\chi^2 = 3.33$, 1 d.f.; $P = 0.068$). There was also a significant fall in the proportion of general surgeons operating on recurrent varicose veins (15 of 19 general surgeons in 1997 to 19 of 34 general surgeons in 2001; $\chi^2 = 2.82$, 1 d.f.; $P = 0.095$).

Provision of out-of-hours services changed during the period studied. In 1992, none of the hospitals had, or took part in, emergency vascular rotas. By 1997, one trust with four sites had an emergency rota and by 2001 a further two trusts took part in another separate vascular rota. Of the surgeons covering these rotas, all but four covered emergency general surgery.

Across the region, the number of reconstructions (aortic aneurysm repair, arterial bypass and carotid endarterectomy) was 20.8 per 100,000 population in 1990–1991 rising to 32.3 per 100,000 in 1997–1998 but fell to 27.2 per 100,000 by 1999–2000. Excluding those units performing very few reconstructions, the range in the remaining seven was 9.2 to 34.9 per 100,000 in 1990–1991, 13.9 to 62.2 per 100,000 in 1997–1998 and 14.4 to 54.1 per 100,000 in 1999–2000. The greatest increases in activity were observed in the regional centre (Fig. 1) and districts where new appointments had been made, especially when replacement was of a single-handed consultant (DGH 1; Fig. 1). However, there was a clear fall in the total number of arterial and lower limb arterial reconstructions regionally towards the end of the

Figure 2 Number of emergency and elective abdominal aortic aneurysm repairs performed in West Berkshire district – Office of National Statistics (ONS) HES data compared to prospective hospital audit from 1995 to 2000.

1990s. We observed a substantial rise in the number of iliac and superficial femoral angioplasties performed in the study period, rising from 8.0 per 100,000 in 1990–1991 to 22.19 per 100,000 in 1994–1995. This fell to 17.35 per 100,000 in 1999–2000. Across the region, increases of up to 300% were seen in hospitals with newly appointed consultants from 1996–1997. In contrast, over the last 3 years of the study period, the number of angioplasties performed in the teaching hospital fell dramatically from 35.4 to 20.1 per 100,000.

Although there was good correlation between HES data and prospective data on abdominal aortic aneurysm (AAA) repair, HES data tended to under-report the number of ruptured aneurysms (Fig. 2). There was a marked rise in number of aneurysms repaired at the teaching hospital while it remained relatively stable in other districts (Fig. 3).

Although there were significant increases in the number of reconstructions and endovascular interventions during the

Figure 3 Trend lines for aortic aneurysm repair per 100,000 of the population from 1990 to 2000, for each of the districts performing significant amounts of vascular surgery.

early 1990s, the rate per 100,000 of major lower limb amputations remained relatively constant (Fig. 4). However, in the district with a newly appointed single-handed vascular surgeon, the resultant 2.5-fold increase in reconstructions (from 11 to 25 per 100,000) was balanced by a reduction in major amputation by 36% (11 to 7 per 100,000).

Discussion

This paper provides an update of two previous analyses of the provision of vascular services in Oxfordshire.^{5,6} The most striking change noted on this occasion was the increase in the number of general surgeons no longer performing any emergency vascular surgery. This corresponded with trends showing more general surgeons transferring arterial emergencies to other consultants in their, or other, regional hospitals. The latter is reflected by HES data showing an increase in the number of aortic aneurysm repairs carried out in the teaching hospital (12.3 per 100,000 in 1990 and 25–30 per 100,000 at the end of the decade). This probably represents a large number of transfers from peripheral to teaching hospitals when there is no vascular surgeon on-call, and will undoubtedly impact upon the training of middle-grade surgeons. This increased workload has been accompanied by an expansion in the number of consultant vascular surgeons in the regional centre from 2.5 in 1990, to 4 full-time equivalent vascular surgeons by the end of the study period.

These data support earlier observations of a gradual separation of vascular from general surgery.^{2,7} Previous studies showing improved outcomes in reconstructive vascular surgery in high-volume units,^{1,3,8,9} coupled with recommendations that all patients should have equal access to a specialist

Figure 4 Numbers of major amputations performed per 100,000 of the population from 1990 to 2000.

vascular surgeon,^{1,8} justify the reluctance of non-vascular surgeons to undertake arterial emergencies. Increased patient expectation and litigation may reinforce this reluctance. Eventually, the diminishing general surgical component of the vascular surgeon's workload^{2,7} may urge more surgeons to take on purely vascular practice. Still unanswered is how best to cover out-of-hours vascular emergencies, since the possible solutions all have their disadvantages.¹⁰ Centralisation of all vascular surgery into large regional units concentrates anaesthetic, radiological and surgical expertise and allows separation of on-call cover from general surgery. The downside is that smaller hospitals with no vascular surgeons will have no on-site cover. The 'hub-and-spoke' model combines the above with minor and intermediate (usually venous) surgery, being performed in smaller hospitals. Any vascular problems can be seen by the visiting vascular surgeon – this requires the surgeons involved to work on more than one site and for on-call emergencies to be transferred. Lastly, collaboration between units and a shared vascular rota may provide a compromise. It seems sensible that, in the case of a critically ischaemic limb and ruptured AAA, the patient is transferred to where the surgeon is located. This would, however, require allied vascular services (radiologist, vascular laboratory, intensive care and high dependency units) to be able to support the on-call vascular team. The Oxford region has not identified a solution, with some hospitals forming a combined vascular rota, others operating a 'hub-and-spoke' model and others relying upon *ad hoc* arrangements within the hospital. We do conclude, however, that the latter is the least satisfactory. It is interesting to note that although most general surgeons are now unwilling to tackle emergency arterial surgery, a number still carry out primary and recurrent varicose vein surgery, although proportionally fewer than in the early 1990s.

HES data have previously been judged to be a reasonable indicator of trends in the numbers of coded procedures and have been validated against prospectively collected data.^{3,6,12} There are, however, limitations to calculating vascular workload based on the number of procedures when patient transfers or and those undergoing a sequence of procedures (e.g. angioplasty, leading to surgical bypass) are not taken into account.

This study used the numbers of procedures rather than in-patient episodes. Validating the HES data against prospective AAA data showed good correlation but confirmed that under-reporting of emergency AAA repair remains a problem.

Increases in vascular activity over the last 10 years have been well-documented^{2,4,6} and are cited as one of the driving forces towards subspecialisation. This study, however, reveals that vascular reconstructions and endovascular interventions rose to a peak in most of the region's districts in 1997 and have fallen subsequently. The regional centre was the only exception and the continued rise in total procedures was predominantly due to increasing numbers of aortic aneurysm repairs. This reduction in both lower limb reconstruction and angioplasty is likely to represent the adoption of a more conservative approach in

treating occlusive arterial disease and is supported by evidence of the short-term benefits of angioplasty and the relatively benign nature of intermittent claudication. Interestingly, the changing numbers of performed interventions has not significantly affected the rate of limb amputation. The relationship between reconstruction and amputation has previously been documented^{13,14} and these data confirm its effect upon limb salvage.

Conclusions

Examination of the region's vascular services reveals a gradual and sustained separation of vascular surgery from general surgery but solutions to the emergency vascular cover are imperfect. Variation in surgical activity supports a more measured use of radiological and surgical interventions but with no apparent effect on major amputation.

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