Audit

Sub-specialisation in neurosurgery: perspective from a small specialty

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Background: There is an increasing tendency towards sub-specialisation in the larger surgical specialties. The feasibility and effectiveness of this is less clear in the smaller specialties with limited manpower such as neurosurgery.

Patients and Methods: To evaluate this, we carried out an audit comparing the throughput and outcome of patients treated for intracranial aneurysms in our unit before and after a period of neurovascular sub-specialisation.

Results: In the period before sub-specialisation, 68 aneurysms were treated compared to 69 after sub-specialisation. The epidemiological profile of patients, their clinical condition at presentation and the location of aneurysms were not significantly different in the two periods. There was less morbidity and mortality and better long-term functional outcome ($P = 0.05$) following sub-specialisation. More investigations including cerebral angiograms were performed after sub-specialisation. The added cost, however, was offset against savings made by the shorter length of patient's hospital stay ($P = 0.002$).

Conclusions: Sub-specialisation appears to confer benefits both in terms of patient outcome and socio-economic gain.

Key words: Sub-specialisation – Neurosurgery – Audit – Outcome

Sub-specialisation is increasingly emerging as the inevitable fact of surgical practise in the 21st century. Within larger specialties such as general surgery, there are now many studies indicating both the feasibility and the benefits of sub-specialisation.^{1–3} The situation is, however, less clear in the smaller disciplines. Neurosurgery is one such an example. There are currently 166 full-time equivalent consultant neurosurgeons working in 36 units in the UK and Republic of Ireland. In 56% of the cases, the units are staffed by 4 or fewer full-time equivalent consultants, serving a population ranging from 0.6 to 2.4 million.⁴ The questions we pose are whether sub-specialisation is feasible

within a small neurosurgical unit and, if so, whether it is worthwhile. To answer these questions, a retrospective audit was performed in our unit comparing the data from the periods before and after neurovascular sub-specialisation, particularly analysing the case-loads, complication rates and the outcomes.

Patients and Methods

All patients treated for intracranial aneurysms in the period November 1996 to May 2000 were audited. In the first half of this period, all consultant neurosurgeons in the

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Figure 1 Case mix of patients.

unit treated patients with intracranial aneurysms. In the second half, two sub-specialised in managing all patients with neurovascular disease. The data were obtained from patients' medical records and were double checked against the hospitals' computerised log. The number of patients treated, type of aneurysms, clinical condition of patients at presentation, methods of treatment and associated complications

were recorded. Follow-ups were through out-patient clinics. The Karnofsky performance scale was used to assess outcome.

Results

Hurstwood Park Neurological Centre is a regional neurosurgical unit in the South East of England, staffed by four

Figure 2 Type of aneurysms. Acom, anterior communicating artery; Pcom, posterior communicating artery; MCA, middle cerebral artery; Perical, pericallosal artery; SCA, superior cerebellar artery; Ant choroid, anterior choroidal artery.

Figure 3 Subarachnoid grade at presentation. Grade 1, GCS 15, no focal deficits; grade 2, GCS 13–14, no focal deficits; grade 3, GCS 13–14 with focal deficits; grade 4, GCS 7–12; grade 5, GCS 3–6.

consultant neurosurgeons and serving a population of 1.25 million. Before sub-specialisation (period A), 68 aneurysms in 65 patients were treated, compared with 69 aneurysms in 58 patients following sub-specialisation (period B). There were considerably more patients operated on electively for unruptured aneurysms in period B than period A (Fig. 1). The median age of patients, 55 years (range, 29–81 years) in period A and 50 years (range, 26–76 years) in period B, were not significantly different ($P = 0.07$). The range of aneurysms treated in the two periods was similar as summarised in Figure 2.

In patients with subarachnoid haemorrhage, there was no significant difference ($P = 0.28$) in the clinical conditions at

presentation between the two periods (Fig. 3). In terms of treatment, more aneurysms were managed surgically in period B (89%) than period A (74%; Fig. 4).

Table 1 summarises the complications in patients treated surgically or by the endovascular approach. There were higher rates of morbidity and mortality in period A compared to period B. The median length of hospital stay for patients presenting with subarachnoid haemorrhage was 17 days (range, 6–57 days) in period A compared to 13 days (range, 5–30 days) in period B ($P = 0.002$).

The outcome of patients at 18-months' follow-up was assessed with the Karnofsky performance scale. For

Figure 4 Treatment of aneurysms.

Table 1 Type and number of complications following surgical or endovascular treatment

Complication	No. of patients	
	Period A	Period B
Surgically treated		
Failure to clip aneurysm	4	1
Intra-operative aneurysmal rupture	6	1
	(2 died)	(died)
Re-bleed while awaiting treatment	1	0
Cerebral infarct	13	5
	(1 died)	(1 died)
Postoperative haematoma	2	1
Brain abscess	0	1
Epilepsy	1	1
DVT/PE	6	0
Sunken bone flap requiring treatment	1	0
Following endovascular treatment		
Failure to coil	4	1
Intra-procedure aneurysmal rupture	1	1
Re-bleed while awaiting treatment	0	1
Cerebral infarct	1 (died)	0
DVT/PE	0	1
Pseudo-aneurysm at femoral puncture site	1	0
Aneurysm recurrence following treatment:		
• anterior communicating artery aneurysm	2	2
• middle cerebral artery aneurysm	1	0
• posterior communicating artery aneurysm	1	2

patients presenting with subarachnoid haemorrhage, the outcome was better in period B than period A ($P = 0.05$; Fig. 5). All patients treated for unruptured aneurysms had favourable outcomes.

Discussion

Rapid advances in biomedical sciences together with increased knowledge and expectation of patients make it unlikely for a single surgeon to be able to master all the aspects of his/her specialty. Sub-specialisation allows optimum qualification in any one area both in terms of surgical skills and research.⁵⁻⁷

Within neurosurgery, neurovascular, paediatric and functional surgery represent potential areas for sub-specialisation.⁸ Manpower limitations inherent in a small specialty, however, raise concern about the feasibility and effectiveness of this.

Since August 1998, all patients with neurovascular disease have been treated by two sub-specialist neurosurgeons in our unit run by 4 consultants. This required drawing up of a separate 'vascular' rota, on a flexible 'one-week-on, one-week-off' basis. Logistically, this has worked well, keeping the unit covered at all times. In terms of effectiveness, the results of this audit suggest that sub-specialisation improves patient outcome. There were fewer complications and deaths and better long-term patient performance status following sub-specialisation.

Another impact of sub-specialisation was upon workload of the unit. There was a rise in both the number of elective unruptured aneurysms treated and the proportion of total aneurysms managed surgically. There were also more investigative procedures carried out. For example, the number of cerebral angiograms performed following sub-specialisation increased from 95 to 129. This was partly because of a lower threshold to investigate patients and partly due to increased tendency to perform

Figure 5 Karnofsky performance status. Normal, KS 100; minor symptoms, KS 80–90; mild disability, KS 60–70; moderate disability, KS 40–50; severe disability, KS 10–30; dead, KS 0.

postoperative angiograms. In socio-economic terms, and at £700 per angiogram, this translated into an extra cost of £23,800. In the short term, however, this was readily offset against a saving of £46,400 arising because of the overall reduced length of hospital stay, at £200 per day per patient following the sub-specialisation period. In the long term, the better outcome of patients is likely to provide further economic justification for sub-specialisation.

Conclusions

Within limitations of a single retrospective audit with relatively small numbers and the accepted learning curve of surgeons, our findings indicate that sub-specialisation within a small specialty such as neurosurgery is both feasible and effective. There are benefits in terms of patient outcome as well as socio-economic gains.

In the face of shorter Calman training periods and the progressive reduction of junior doctors' hours, sub-specialisation appears as an essential component of the

health service response to the public's ever increasing demand for the highest quality care.

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