Multiple cerebral aneurysms – a reappraisal

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Summary. 254 consecutive cases of angiographically demonstrated intracranial cerebral aneurysms occurring over a three year period were reviewed with specific reference to aneurysm multiplicity, site, patient age and the presence of infundibular abnormalities. The overall incidence of multiple aneurysms was 44.9%. Female patients accounted for 66.5% of all aneurysm cases. The incidence of multiplicity was higher in women (51.5%) than men (31.7%) and overall was higher in patients over 40 years of age (52.8%) compared to those under this age (26.3%). Infundibula occurred in 27.2% of all patients and 9.45% of all patients demonstrated infundibular dilatation of the origin of the posterior communicating artery.

Key words: Angiography – Intracranial aneurysms – Multiplicity – Infundibular abnormalities

There have been numerous studies of the incidence and radiological features of cerebral aneurysms over the past 30 years, the incidence of multiplicity being variably assessed at between 5 to 33% for large series [1–6]. We undertook this study following a subjective impression of a higher incidence of multiplicity in our subject population. In addition the age/sex pattern and relationship to posterior communicating artery infundibular abnormalities were assessed and the attendant implications discussed.

Patients and methods

During the period from January 1985 to March 1988 inclusive all patients admitted to the neurosciences unit following a suspected subarachnoid haemorrhage underwent lumbar puncture cranial computerized tomography (CT) examination on a Picker 1200SX scanner. Cerebral angiography was undertaken on a Siemens Angioscope unit by transfemoral selective catheterization. The examinations were performed under general anaesthesia with close pCO₂ monitoring throughout the procedure, the pCO₂ being kept between 3.2 and 3.8 KPa. Four vessel studies were performed in most cases although in 21 patients (8.26% of all cases) vertebral injections were not made due to the presence of atherosclerotic disease at the origins of the vertebral arteries. Internal carotid artery injections were performed in those patients under 50 years of age and without radiological evidence of atherosclerotic disease at the common carotid bifurcation. Common carotid injections were

Fig. 1. Age and sex distribution of all patients
performed in the remainder. Standard projections for the carotid arteries (PA, PA 20°, PA oblique and lateral) and vertebral arteries (Townes and lateral) were used in all patients with appropriate modifications where felt necessary. All angiograms were performed within 2 weeks of the subarachnoid haemorrhage, and were assessed independently (IMH and TJ).

**Results**

**Age and sex**

Of the 254 patients examined 169 were females (66.5%) with an age range of 15 to 76 years and a mean age of 49.1 years. There were 85 males (33.5%) with an age range of 19 to 67 years and a mean age of 43.5 years. The mean age for the combined group was 47.2 years. Figure 1 shows the age and sex distribution of all the patients and demonstrates an increasing frequency of aneurysms with advancing age, maximal in the fourth to sixth decades.

The average age of females with a single aneurysm was 46.8 years rising to 50.9 years for patients with two aneurysms, 51.7 years for three aneurysms and 53.6 years for those with four or more lesions. The overall average age for females with multiple aneurysms was 51.2 years. For the men the average age for single aneurysms was 41.8 years and for multiple aneurysms 47.1 years. For the whole group the average age of patients with a single aneurysm was 44.7 years and for those with multiple aneurysms 50.2 years. The incidence of multiplicity in patients over 40 years of age was 52.8% compared to 26.3% in patients aged under 40 years.

**Site of aneurysm**

The sites of aneurysm formation are shown in Table 1.

The most frequent sites were the middle cerebral artery (24.1%), the posterior communicating (22.5%) and anterior communicating artery (18.6%) origins. A total of 414 aneurysms were demonstrated in the 254 patients examined. Of these, 43 aneurysms (10.4%) were in the vertebrobasilar territory. Posterior circulation aneurysms occurred in 28/169 (16.6%) of the female and 12/85 (14.1%) of the male patients, the incidence for the combined group being 40/254 (15.7%). In those patients with a single aneurysm 11/140 (7.9%) had a posterior circulation aneurysm whereas they occurred in 29/114 (25.4%) of those patients with multiple aneurysms. Mirror aneurysms (at an equivalent site on the contralateral side) occurred in 4/27 (14.8%) of the men and 28/87 (32.2%) of the females with multiple lesions giving a total incidence of 32/114 (28%). Figure 2 displays the angiogram of a 50 year old woman which illustrates symmetrically distributed posterior communicating artery and middle cerebral artery primary division aneurysms. Multiple aneurysms occurred on the same side in 13/27 (48.1%) of the males and 45/87 (51.7%) of the female patients, with a total incidence 58/114 (50.9%) in all the cases.

**Multiplicity**

One hundred and fourteen out of the 254 (44.9%) patients studied were shown to have multiple aneurysms of which 87 were females (76.3%) and 27 were males (23.7%). 78 (68.4%) of these multiple cases had two aneurysms, 27 (23.7%) had three aneurysms, 8 (7.8%) had four aneurysms and one case had five aneurysms. Figure 3 shows the age distribution of patients with multiple aneurysms alongside the distribution for all patients. The graph shows an increasing incidence with advanc-