SHORT REPORT

Epidemiological study of primary intracranial tumours in elderly people

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Abstract

The incidence of primary intracranial tumours in a well defined population of persons older than 70 years (elderly) who resided in Kumamoto prefecture was examined. During the period from 1989 to 1995, primary intracranial tumours were diagnosed in 271 elderly people; of these, 155 (57.2%) tumours were confirmed microscopically. In a mean population of 216 000 people over the age of 70 years, this yields an average annual incidence rate of 18.1 cases/100 000 population/year. The incidence was lower in men (15.2/100 000 population) than women (20.3/100 000 population). The age specific incidence/ 100 000/year was 23.2 for the 70–74 year age group, 18.1 for the 75–79 year age group, 15.1 for the 80–84 year age group, and 7.6 for persons older than 85 years. The most common tumours were meningiomas (50.6%), followed by malignant gliomas (13.3%), pituitary adenomas (12.9%), schwannomas (6.6%), malignant lymphomas (3.7%), and benign astrocytomas (3.7%).

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Brain tumours are second only to stroke as the leading cause of death from neurological disease. The frequency of malignant brain tumours has reportedly increased rapidly over the past two decades in elderly people in the United States and elsewhere.[1 2] However, in Denmark, no significant increase in the incidence rate for brain tumours, even in the older age group, was found.[3] Radhakrishnan *et al*[4] claim that the reported increase in brain tumours in elderly people is largely artifactual, resulting from the combined effect of the availability of complex diagnostic technology, a change in the definition of an elderly person, a greater willingness to examine these people with less invasive diagnostic procedures, and the availability of Medicare, which increases access to medical care in the United States.

The exact incidence and distribution of primary intracranial tumours in elderly people remains unknown in the era when CT and MRI are widely used for diagnostic purposes. We set out to investigate the incidence of intracranial tumours in elderly Japanese people living in Kumamoto Prefecture using CT and MRI.

Method

BACKGROUND POPULATION

Kumamoto Prefecture (population around 1 850 000) is located in the centre of Kyushu island, in the southern part of Japan. Neurological surgery is performed at 27 hospitals, all of which have professional expertise and modern medical facilities equipped to perform CT or MRI to diagnose and care for patients with intracranial tumours.

SUMMARY OF REGISTERED PATIENTS

Records on the age, sex, address, date of diagnosis, and pathological diagnosis are available for all patients with primary intracranial tumours diagnosed at the 27 hospitals between 1989 and 1995. The histories of all registered patients were double checked to eliminate double registration. We estimate that our survey includes almost all primary intracranial tumours diagnosed during the seven year period between 1989 and 1995. A resident was defined as any person who had lived within the physical boundaries of Kumamoto Prefecture for at least one year before the diagnosis of the disease. The incidence date is the first day of the hospital stay during which the diagnosis was made for inpatients, or the date on which the diagnostic CT or MRI was performed for outpatients. We included all tumours covered by the new World Health Organisation (WHO) classification[5] except angioma. Histological confirmation was obtained in 57.2% of the patients. Tumours discovered at necropsy were not included. Tumours unverified histologically were diagnosed from the neuroimaging and the clinical records. However, because it is difficult to differentiate anaplastic astrocytoma from glioblastoma exactly without histological confirmation, we defined anaplastic astrocytoma and glioblastoma as malignant glioma.

Table 1 Distribution and age adjusted incidence of primary intracranial tumours in elderly Japanese people

Tumour	Cases (n (%))			Incidence/100 000/y			Histological confirmation rate (%)
	Total	Men	Women	Total	Men	Women	
Meningioma	137 (50.6)	28 (32.9)	109 (58.6)	9.13	5.02	11.6	54.7
Malignant glioma*	36 (13.3)	16 (18.8)	20 (10.7)	2.40	2.84	2.13	69.4
Pituitary adenoma	35 (12.9)	17 (20.0)	18 (9.7)	2.36	3.04	1.96	57.1
Schwannoma	18 (6.6)	4 (4.7)	14 (7.5)	1.21	0.70	1.51	66.7
Astrocytoma	10 (3.7)	5 (5.9)	5 (2.7)	0.58	0.88	0.42	40.0
Malignant lymphoma	10 (3.7)	4 (4.7)	6 (3.2)	0.66	0.73	0.62	80.0
Others	25 (9.2)	11 (12.9)	14 (7.5)	—	—	—	20.0
Total	271 (100)	85 (100)	186 (100)	18.1	15.2	20.3	57.2

*Includes anaplastic astrocytoma and glioblastoma.

INCIDENCE RATE

Age adjusted incidence rates were calculated by the direct method using five year age groupings with the total Japanese population in 1992 as the standard. Population figures were obtained from published decennial tabulations for Kumamoto Prefecture and Japan. The adjusted rates allow an overall comparison among different populations because the rates are standardised for dissimilarities in the age and sex distribution. Age specific incidence rates were calculated for all intracranial tumours and for each type of intracranial tumour.[6]

Results

During the seven year period from 1989 to 1995, 1354 new cases of primary intracranial tumours were diagnosed in Kumamoto Prefecture. Of the 1354 primary intracranial tumours, 271 (20%) were in people over the age of 70. These cases occurred among an average population of 216 000 elderly people during a seven year period, yielding an annual age adjusted incidence rate of 18.1 cases/100 000 population (men 15.2, women 20.3; table 1).

The age specific incidence was 23.2/100 000/year for the 70-74 year age group, 18.1 for the 75-79 year age group, 15.1 for the 80-84 year age group, and 7.6 for those over 85 years. However, whereas the incidence in men remained relatively constant, in women it sharply decreased after the age of 85. The highest incidence rate was seen in 70-74 year old women (28.3/100 000), the lowest in women over 85 years old (3.3/100 000). Although there was female predominance in the 70-74, 75-79, and 80-84 year age groups, among those older than 85 years the incidence was much higher in men (17.3/100 000/year) than in women (3.3/1000 000/year).

Of the 271 primary intracranial tumours in elderly people, 155 (57.2%) were confirmed microscopically. The histological confirmation rate was 54.7% for meningiomas, 69.4% for malignant gliomas, 57.1% for pituitary adenomas, 66.7% for schwannomas, 40% for astrocytomas, and 80% for malignant lymphomas (table 1).

Table 1 shows the general distribution of intracranial tumours in elderly people by histological type. Meningioma was the most common tumour type, followed, in order, by malignant gliomas. In women, meningioma represented about 60% of all tumours followed by malignant glioma and pituitary adenoma. In men the most common tumour type was also meningioma. However, it represented only about one third of all tumours, followed by pituitary adenoma and malignant glioma. Among age groups, there were no significant differences in tumour distribution.

Table 2 Age adjusted incidence of primary intracranial tumours in Japanese people less than 70 years old

Tumour	Incidence/100 000/y			Histological confirmation rate (%)
	Total	Men	Women	
Meningioma	2.53	1.41	3.47	95.5
Malignant glioma*	1.42	1.74	1.13	79.7
Pituitary adenoma	1.91	1.44	2.34	81.4
Schwannoma	0.86	0.99	0.73	90.0
Astrocytoma	0.58	0.50	0.62	73.5
Malignant lymphoma	0.20	0.18	0.22	88.5
Total	8.7	7.6	9.0	77.4

*Includes anaplastic astrocytoma and glioblastoma.

Tables 1 and 2 show the the age adjusted annual incidence for each tumour in people over 70 and in those under 70. Meningioma was the tumour type with the highest incidence in both age groups. Overall, the incidence of all tumour types except benign astrocytoma increased in those over 70. Notably, the incidence of meningioma in people over 70 was 3.5 times higher than in those under 70 in both sexes. The incidence of meningioma in women was about twofold higher than in men. Among those younger than 70 meningioma and pituitary adenoma occurred at a higher rate in women, whereas malignant glioma and schwannoma occurred at a higher rate in men. Conversely, in those over the age of 70, pituitary adenoma occurred at a higher rate in men and schwannoma at a higher rate in women.

Discussion

Our survey indicated that the age adjusted annual incidence rate of primary intracranial tumours among those older than 70 was 18.1/100 000/year in Kumamoto Prefecture. During the same period, the incidence of primary intracranial tumours at all ages was 9.6/100 000 and the incidence rate in those younger than 70 was 8.7/100 000. In children under 15 years it was 3.4 /100 000.

In this survey, the histological confirmation rate was low (57.2%) probably due to the low confirmation rate for meningioma (54.2%). The tumours unverified histologically were diagnosed from the neuroimaging and the clinical records, and we think that the diagnosis for meningioma from the neuroimaging was accurate.

Histologically, the most common tumour in this elderly population was meningioma; it comprised almost half of all the primary intracranial tumours. According to previous reports, the most common tumour type in elderly people was malignant glioma.[2 4 7 8] In our survey, malignant glioma presented only 13.3% of all tumours; the age adjusted incidence rate in elderly people was 9.1 for meningioma and 2.4 for malignant glioma.

Among previous reports, there are large differences in the incidence rate of primary intracranial tumours in elderly people. This may be attributable to the few registered elderly patients in these reports, and to differences in the availability or use of diagnostic facilities, the complexity of registries for data collection, and medical services available to elderly people. We think that our population based survey identifying 271 elderly people with tumours reflects the correct incidence of intracranial tumours in Japanese elderly people living in the era when CT and MRI are widely used for diagnostic purposes.

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