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Histopathology of Brain Tumours in the African in Kenya

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Summary. This is a histopathological review of ninety-seven brain tumours from ninety-seven Africans seen over the last 4 years (1968–71). Sixty-nine came from the Neurosurgical Unit of the Kenyatta National Hospital, through the routine surgical service and nine from H. H. Aga Khan Hospital, Nairobi. Ten were autopsy cases. Eighty-seven were primary intracranial neoplasms, the majority of which were gliomas (thirty-nine) followed by meningiomas (twenty-four). Sella turcica tumours formed a substantial group of six craniopharyngiomas, seven pituitary adenomas and one metastatic nasopharyngeal carcinoma. Four of the ten metastatic tumours arose from tissues in the neighbourhood of the skull and locally infiltrated the brain.

Astrocytic and meningeal tumours occurred almost equally frequently in females and males. The other, including the metastatic ones, showed a conspicuous male predilection. Age distribution varied markedly in different tumours.

This study confirms the observation by Odeku & Janota (1967) that 'primary intracranial neoplasms are not so rare in Africans', and further illustrates the similarity, in pattern, to series reported from non-Africans.

Résumé. Il s'agit d'une revue histopathologique de 97 tumeurs du Cerveau chez 97 Africains examinés au cours des 4 dernières années (1968–71). 69 sont venus du Service de Neurochirurgie du Kenyatta National Hospital par la voie normale et 9 de l'H. H. Aga Khan Hospital de Nairobi. 10 étaient des autopsies. 87 étaient des néoplasmes intracrâniens primaires, la majorité des gliomes (39), suivie par les méningiomes (24). Les tumeurs de la selle turcique constituaient un groupe substantiel de 6 crâniopharyngiomes, 7 adénomes pituitaires et 1 carcinome nasopharingé métastatique. 4 des 10 tumeurs métastiques provenaient de tissus voisins du crâne et s'étaient infiltrées dans le cerveau.

Les tumeurs des astrocytes et des méninges étaient réparties presque également entre hommes et femmes. Les autres, y compris les métastases, montraient une prédilection marquée pour les hommes. La répartition d'âge variait notablement avec les tumeurs.

Cette étude confirme l'observation d'Odeku et Janota (1967), selon laquelle 'les néoplasmes intracrâniens primaires ne sont pas si rares chez les Africains' et

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illustre à nouveau la ressemblance du modèle avec ceux qui concernent les non-Africains.

Neoplastic disease, once considered rare in the African, is now one of the common histological diagnoses. Intracranial neoplasms are no exception although comprehensive reports are obviously required in order to establish their frequency and pattern. This is a difficult task that needs the concerted efforts of the neurosurgeon and the pathologist for accurate diagnosis and classification.

The present exercise is mainly retrospective. It is an attempt to analyse the pattern, nature and distribution of brain tumours in the Kenyan African as seen in our diagnostic service. Our laboratory receives surgical material from Government and Mission hospitals all over Kenya and the neighbouring parts of Tanzania (mainland). An average of 7700 specimens are dealt with every year. They mainly come from Africans although a few are from Europeans, Asians and Arabs. However, all the material presented in this paper is solely from Africans.

MATERIALS AND METHODS

This study covers a period of 4 years (1968–71) in which the daily records for routine surgical specimens were scrutinized for all the specimens sent in as brain or spinal tumours; 103 clinically suspected central nervous neoplasms were received. Thirteen additional cases were obtained from autopsy records at the Kenyatta National Hospital and a further eleven biopsied cases from the H. H. Aga Khan Hospital.

All the available sections, stained with haematoxylin and eosin were reviewed and when necessary special stains, such as PTAH, Van Gieson and reticulin were done. Twelve cases were sent to Professor Hume Adams of Glasgow for a second opinion. Diagnoses were based on the classification of the nervous system tumours by Russell & Rubinstein (1971) and Kernohan's classification of astrocytomas (Kernohan *et al.*, 1949).

Fifteen cases were excluded from the study because they were either inflammatory lesions, scars or were not confirmed histologically. The series contained fifteen spinal tumours which will not be discussed further. Burkitt's lymphoma as a mass rarely affects the brain, and was therefore not included in the study.

RESULTS

Yearly occurrence

Ninety-seven histologically confirmed intracranial neoplasms were analysed. The annual occurrence was: 1968, twenty-two cases; 1969, thirty-three cases; 1970, twenty cases; 1971, twenty-two cases; Of these, sixty-nine originated from the Neurosurgical Unit (K.N.H.), nine from peripheral hospitals, nine from H. H. Aga Khan Hospital and ten from autopsy material. There is an unexplained peak in 1969.

Histological typing and age distribution

Gliomas (thirty-nine) formed 45% of the primary intracranial tumours. The astrocytic group was by far the most common (Table 1); the majority of astrocytomas (twenty-one) being well differentiated (grade 1–2) and ten anaplastic (grade 3–4); only one could be called

a glioblastoma multiforme; two presented the typical features of astroblastoma (Fig. 1). The morphological types of fibrillary, protoplasmic and gemistocytic astrocytomas (Fig. 2)

TABLE 1. Tumour break down by type and age distribution

Type of tumour		Age distribution by decades							
		0–9	10–19	20–29	30–39	40–49	50–59	60+	Unknown
Astrocytic tumours	33	10	2	4	4	4	5	1	3
Meningioma	24	3	2	4	3	7	3	1	1
Ependymoma	5	2	2	1	—	—	—	—	—
Medulloblastoma	4	3	1	—	—	—	—	—	—
Craniopharyngioma	6	3	1	1	1	—	—	—	—
Pituitary adenoma	7	—	—	—	3	3	1	—	—
Neurilemmoma	3	—	—	—	2	—	—	—	1
Secondary tumours	10	—	2	1	1	2	2	1	1
Pinealoblastoma	1	—	1	—	—	—	—	—	—
Papilloma of choroid plexus	1	—	—	—	—	—	1	—	—
Vascular tumours	3	—	2	1	—	—	—	—	—
Totals	97	21	13	12	14	16	12	3	6

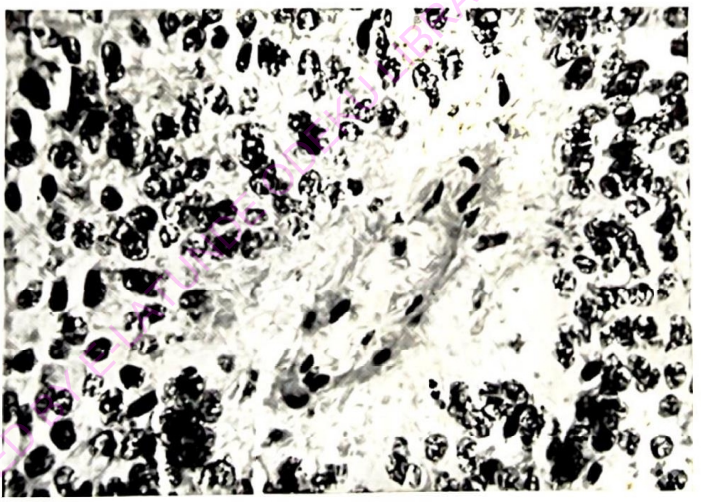

FIG. 1. Astroblastoma. The blood vessel in the centre of the field has a clear halo of homogeneous material around it. This is a characteristic feature of this group of astrocytic tumours. H & E, × 600.

were all well represented in the differentiated group. Oligodendrogliomas were conspicuous by their absence. The six ependymal gliomas were five ependymomas and one choroid plexus papilloma. Three ependymomas were anaplastic with scanty features of differentia-

tion. This proportion of anaplastic ependymomas appears to be unusually high as compared with series referred to by Russell & Rubinstein (1971). Similarly, astrocytomas show a contrasting behaviour, the wild-looking ones being in the minority.

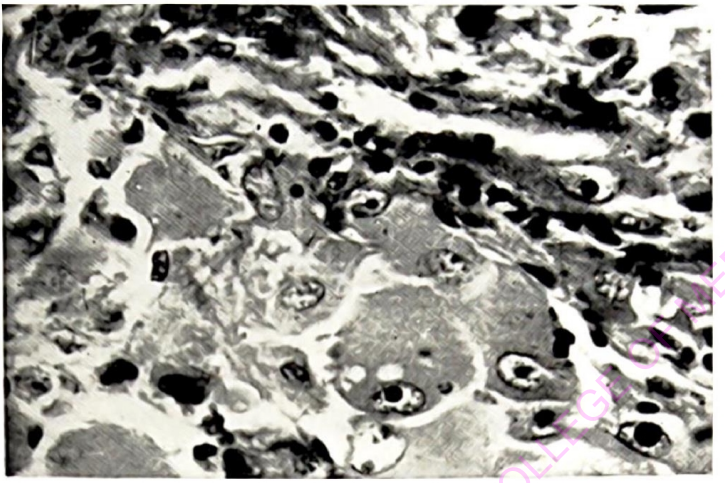

FIG. 2. Gemistocytic astrocytoma. Note the 'gemastete', with abundant cytoplasm and eccentric small nuclei. H & E, ×600.

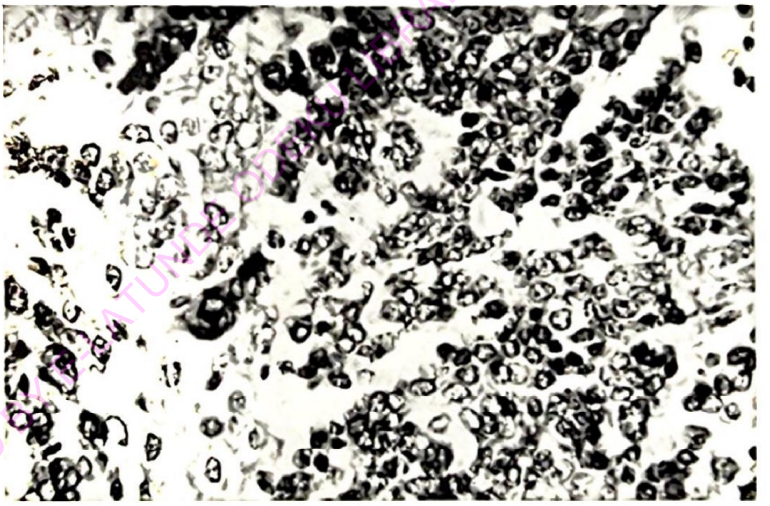

FIG. 3. A malignant meningioma. Note the degree of dedifferentiation exhibited in the picture. H & E, ×600.

Meningiomas constituted 28% of primary brain tumours; twenty were simple and consisted of the following morphological variants: syncytial—four; transitional—ten; fibroblastic—three; and angioblastic—two. There were four malignant meningiomas, 'meningeal sarcoma', some of which showed marked dedifferentiation (Fig. 3); one had curious cystic

areas which looked ependymomatous. Three of the malignant forms occurred in the first decade of life. The features exhibited by all meningiomas contrast with the established facts only so far as the proportion to other brain tumours is concerned, the usual being 13–18%.

For tumours of the neurone series, only four medulloblastomas were documented. Retinoblastomas were excluded because they are not truly intracranial, and no authentic cases of brain neuroblastomas were recorded. Three of the medulloblastomas were classical histologically. The fourth was highly cellular, composed of plump and rather spindly cells with marked pleomorphism. Differentiating it from an anaplastic ependymoma was difficult.

One tumour of the pineal parenchyma (pinealoblastoma) was recorded. It was histologically impossible to completely exclude a neuroblastoma, but the clinical findings of a calcified tumour in the site of the pineal body favoured the diagnosis of a pinealoblastoma. Sella turcica tumours consistuted a significant group of six craniopharyngiomas and seven pituitary adenomas, forming in all 15% of primary intracranial neoplasms. There were six chromophobe adenomas and one of eosinophilic type; a number of them, clinically, had presented with endocrine effects. Craniopharyngiomas (tumours of remnants of Rathke's pouch) presented as the classical supraseller cyst with spotty calcification and typical histological appearances. Unlike Billinghurst's series (1966) the ratio of pituitary tumours in this study does not differ from those reported in large series (Cushing, 1932; Grant, 1956). The distribution of various types is also in conformity.

Three neurilemmomas were all acoustic nerve tumours and had characteristic histological appearances. Vascular tumours and hamartomas consisted of one haemangioblastoma and two capillary angiomas respectively. These again showed no unusual features or behaviour.

There were ten metastatic tumour deposists in this survey. These were five adenocarcinomas; one choriocarcinoma; two carcinomas from the nasopharynx, a tumour which is particularly common in Kenya; one epidermoid carcinoma from the scalp and one rhabdomyosarcoma from the temporal area. The last four tumours infiltrated locally into the skull. The primary origin of four adenocarcinomas was unknown, but the fifth was a hepatoma in a patient who had generalized metastatic liver cancer. The whole group formed about 10% of all intracranial tumours, a figure which is in keeping with other series (Billinghurst, 1966; Collomb *et al.*, 1963; Carmichael, 1928.)

The age incidence for all the intracranial neoplasms (Table 1) has a peak in the first decade of life with a fairly even distribution until the seventh decade when it suddenly drops. It is however a challenging observation that in spite of a childhood peak, gliomas occur throughout the spectrum of adult and early old age. The meningiomas on the other hand come to a peak in the fifth decade, and those appearing in the first decade all exhibit malignant changes. Nevertheless, the other tumour groups show orthodox age distribution.

Sex incidence

There is a marked male predominance for all the tumours (Table 2), giving a male to female ratio of 5:3. This is well expected except for the meningiomas which appear to diverge from their known trend of female preponderance. Sella turcica tumours, on the other hand, show an exaggerated bias for males (11:2), and so do metastatic deposits (4:1).

Tribal incidence

The incidence of brain tumours by tribes was documented in ninety-four cases and the distribution was as outlined in Table 3.

TABLE 2. Sex distribution

Type of tumour	M	F
Astrocytic tumours	19	14
Meningioma	13	11
Ependymoma	4	1
Medulloblastoma	2	2
Craniopharyngioma	5	1
Pituitary adenoma	6	1
Neurilemmoma	2	1
Secondary tumours	8	2
Pinealoblastoma	1	—
Papilloma of choroid plexus	—	1
Vascular tumours	1	2
Total	61	36

TABLE 3.

Tribe	Number of tumours	Hospital admission ratios
Kikuyu	40	30
Luo	11	9
Luyia	6	5
Kamba	13	8
Kalenjin	5	1
Meru	4	1
Other	15	4

TABLE 4. Location of primary brain tumours

	Gliomas	Meningeal	Total
Parietal	3	3	6
Frontal	8	4	12
Temporal	5	—	5
Cerebellum	4	—	4
Ventricular	5	—	5
Brainstem	3	—	3
Occipital	1	—	1
Diffuse cerebral (parieto-frontal)	8	13	21
Other	—	3	3

The high frequency in the Kikuyu is not explicable purely on the the K.N.H. admissions or population basis. It may be that the occurrence is genuinely high in this tribe. But multiple factors such as the density of doctors in the population; the ease of communication with hospitals, and in particular the K.N.H.; the standard of medical care in the community; and the index of the awareness of the usefulness of scientific medicine, have all to be considered in explaining the uneven tribal occurrence of not only brain tumours but many other diseases. Biopsies from the Kalenjin and the Meru mainly come from upcountry hospitals and so falsely give a high frequency of tumours when considered alongside the K.N.H. admission ratios.

Regional location of primary brain tumours

Table 4 summarizes the location of forty-eight tumours out of eighty-two in which the sites were given. The majority (fifty-two)—excluding the sella turcica tumours (eleven)—arose in the supratentorial portion of the brain and nineteen infratentorially. In sixty cases, there was almost equal frequency of occurrence on both the right (twenty-six) and left (thirty) sides. There were four midline neoplasms. On a regional basis, a large proportion of the tumours involved more than one area although the frontoparietal was the most favoured.

DISCUSSION

'While it cannot be denied irrevocably that primary brain neoplasms are rare in Africans, they are present, found and the numbers known are growing' (Odeku & Janota, 1967). The only fair test of a hypothesis, dogma or theory is time and the above statement cannot be disputed. Thus, the present series, although small, indicates that primary brain tumours in the African are not only there when looked for, but their incidence, pattern of distribution and behaviour are comparable to the established facts from European or American patients. Hence, beliefs held more than a decade ago that 'brain tumours are uncommon in the native' (Gelfand, 1957; Edington, 1956) no longer hold true. This point is further brought out when the brain tumours under study are considered along side some of Kenya's common cancers. From 1967–1970, there were 5943 cancers diagnosed, of which there were 551 (9·3%) squamous cell carcinomas of the skin, 336 (5·7%) oesophageal carcinomas and 227 (3·8%) melanomas. Eighty-seven primary brain neoplasms in the present series would therefore form about 1·3% of all malignancies in Kenya. This figure is definitely not low even if a correction is made for the bias of a neurosurgical unit.

Compared with other African series (Collomb *et al*, 1963; Odeku & Janota, 1967) the distribution of various types of intracranial tumours is fairly similar after allowing for minor differences. Striking however, is the age incidence of meningiomas and astrocytomas already referred to above. This may just be a unique local variation of brain tumours in the African or else age assessment, which is very often subjective, may be misleading.

However, more time and studies are needed to accumulate accurate and useful data, by which we shall be able to back our preliminary observations that primary brain tumours are not as rare in the African as has been previously contended. And that they present features similar to those reported from non-Africans.

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