


REVIEW OF CAROTID ANGIOGRAPHY  
AT  
KENYATTA NATIONAL HOSPITAL, NAIROBI  
FROM  
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A DISSERTATION SUBMITTED IN PART-FULFILMENT  
FOR THE DEGREE OF MASTER OF MEDICINE  
(RADIO DIAGNOSIS)  
IN THE UNIVERSITY OF NAIROBI, KENYA.

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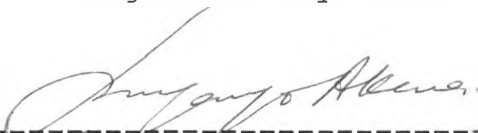
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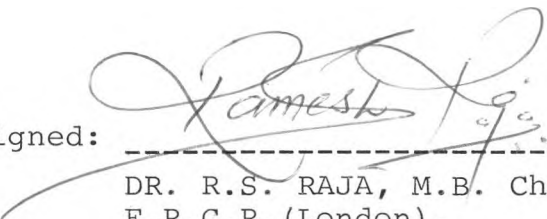
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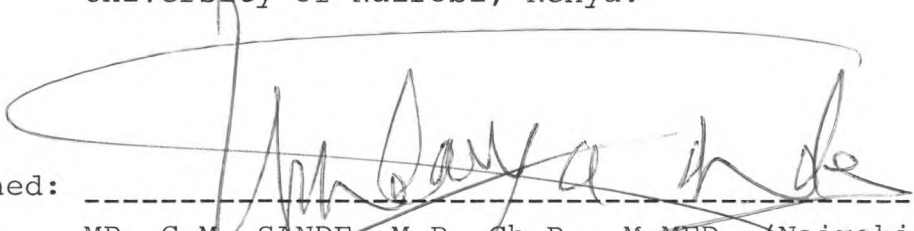
This dissertation is my original work and has not been presented for a degree in any other University.

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## CONTENTS

	<u>PAGE</u>
SUMMARY	1
INTRODUCTION	2
METHODS AND MATERIALS	4
FINDINGS	22
DISCUSSION	27
MANAGEMENT	36
REFERENCES	39

S U M M A R Y

A review of 185 patients referred for cerebral angiography in Kenya and from neighbouring countries has been presented. Angiographic findings have been enumerated, discussed and compared with similar series from here in Kenya in 1963 at King George VI Jubilee Hospital, from Uganda, Mulago Hospital and from non-African countries.

The commonest indication for the investigation was head injury. The most common angiographic abnormality was haematoma formation, no doubt due to the high incidence of trauma amongst the population. A high percentage (34.6%) of patients where this diagnosis was made recovered after surgical evacuation of the haematoma. Arterial diseases and tumour formation are not rare amongst the African population.

I N T R O D U C T I O N

The introduction of computerised tomography has greatly reduced the need for contrast radiology, except for vascular lesions such as aneurysms and arterio venous malformations<sup>(5)</sup>. However there are many centres without access to the scanner. Carotid arteriography is so routine a procedure that it is becoming available outside special centres. But the interpretation of the film is not always straightforward or easy. Patients may not always benefit from the availability of angiography in isolation from the other techniques of neuroradiology, and without surgical facilities at hand.

Only the closest co-operation between the Surgeon and the Radiologist will lead to conspicuous success in this neurological investigation; without it inappropriate or unnecessary investigation may be carried out, adding only information which is unhelpful and at the same price to the patient of added discomfort and possibly of increased risk. Problems of the particular patient should be kept in mind during the performance of each test, because with critically ill patients a decision may have to be made whether to persist with or abandon an examination at a certain stage. For example, a patient with very high

blood pressure of 240/180 mmHg with clinical diagnosis of cerebrovascular accident. The right course can be followed only if the radiologist has a clear idea of what information is required and what can be dispensed with if circumstances are difficult.

Carotid injection displays the vessels in the territories of the anterior and middle cerebral arteries, and sometimes of the posterior cerebral artery also. Supratentorial masses can be expected to produce abnormalities, particularly if situated in the anterior two thirds of the posterior fossa and transterritorial lesions do not usually disclose their presence except indirectly by the findings of secondary hydrocephalus. The reason is that while stretching of the pericallosal artery is a finding in hydrocephalus it is by no means the only finding detectable in the arterial and venous phases of the internal carotid angiogram<sup>(2)</sup>.

Carotid angiography has become a well established and valuable diagnostic aid in Kenyatta National Hospital. This study reviews the findings of 185 patients referred for investigation to the Radiology Department at Kenyatta National Hospital over a period of one year.

M E T H O D   A N D   M A T E R I A L

Initial premedication consisting of atropine alone 0.6 mg. for adults and 0.3 mg. for children was given in all 185 cases. Pethidine was omitted because most of these patients who came for carotid angiogram were considered as neurosurgical patients with clots and space occupying lesions without or with increased intracranial pressure. Pethidine is also known to cause a hypotensive reaction particularly if arterial stenosis is suspected.

All patients except three were investigated under general anaesthesia. Three patients had local anaesthetic injection around a common carotid artery or of the internal carotid artery with a short bevelled Lindigren No. 16 needle for adult and No. 18 or No. 21 needle for children depending on how small the child was. The contrast media used in most investigations was Urografin 60 per cent (Schering) and in others Conray 280 (M and B), 10 mls. of opaque medium was used routinely for each projection for the adult patients. Physiological saline was perfused through the connection tube and needle between injections to prevent clotting in the system and care being taken to exclude air. The radiologist performed and controlled the investigation.



A standard Schonander skull table with serial hand changers was used. Two anteroposterior views and three lateral views were taken in each instance. Apart from these two views, where aneurysm was suspected a third oblique view was taken to localise the aneurysm and demonstrate the neck.

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CONTRAST MEDIA USEDTable 1

REGISTERED NAME	GENERIC NAME		IODINE CONTENT mg/ml	VISCUS at 37°C
Urografin 60%	Sodium Diatrizoate Meglumine Diatrizoate	8% WV 52% WV	290	cps. 4
Conray 280	Meglumine Iothalamate	60% WV	280	4

Both Conray 280 and Urografin 60% have almost the same iodine content of mg/ml. They are water soluble, they have approximately equal toxicity but much less than previous contrast media used, such as acetrizoate and diodone.

REACTIONS TO CONTRAST MEDIA DURING AND AFTERTHE INVESTIGATION

As this was a retrospective study and most of the investigations were done under general anaesthesia it was difficult to assess reactions. No skin reactions were noticed on the table. Cough, difficulty in breathing and movements during injections were

noticed in several patients. It could not be confirmed that these were due to contrast reactions or to anaesthetic complications. There were some patients who died soon after the investigation ranging from 2-24 hours post carotid angiography without surgery having been undertaken. These were:-

1. A 33 year old female patient from another hospital with positive angiographic findings died after the investigation an hour later. This patient was conscious before the investigation with chronic symptoms.
2. A male patient of 30 years old, died soon after angiographic investigation. The patient had a normal temperature recorded before the procedure, but after the angiography his temperature went up to 40°C and he died three hours after the investigation.
3. A female adult patient who was conscious before the investigation with a suspected chronic subdural haematoma as a clinical diagnosis. The doctor who performed the examination reported a midline shift suggestive of space/occupying lesion on the left side. But at the neuroradiology conference it was passed as a normal angiogram. The patient died an hour after the carotid angiogram, no surgery having been performed.

It could not be confirmed that these were due to contrast reactions or due to anaesthetic complications. But I have to draw attention to these possibilities. Following the postmortem results, only major pathology was reported such as clots, fractures and tumours. No contrast media reactions were reported.

In a study on contrast media reactions during intravenous pyelography examination of 200 adult patients at Kenyatta National Hospital<sup>(6)</sup>. It was found that 14% of the 200 adult patients showed signs of reaction. The incidence of reaction was greater with Urografin 60% than with Urografin 30%. The study excluded children, very ill patients and those with uncontrolled high blood pressure. In a study carried out in Kampala at Mulago Hospital by Murphy (1967) no major reactions were recorded.

#### GENERAL COMPLICATIONS OF CEREBRAL ANGIOGRAPHY

The major causes of complications in the past have been either excessive doses of contrast media, local trauma to the artery resulting in thrombosis giving rise to hemiplegia (temporary or permanent), acute cerebral infarction and deaths.

Other complications included:-

1. General
  - minor allergic reactions such as cough, sneezing urticaria.
  - septicaemia.
  - air embolism.
  - cotton fibre embolism
  - acute anaphylaxis.
  - severe hypotension.
  
2. Local
  - haemorrhage at the site of puncture causing haematoma.
  - pseudo-aneurysm formation at the puncture site.
  - perivascular contrast injection.
  - local embolism due to subintimal injection.
  - severe trauma to arterial wall.
  - arteriovenous fistula formation at the site of puncture.
  - local infection.

The use of short bevelled needles together with skill and experience, avoiding unnecessary carotid angiographic requests and co-operation between the neurosurgeon, neurophysician and radiologist are the major means of preventing these complications<sup>(8)</sup>.

All patients referred for investigations were in-patients. Of 305 patients on whom arteriography was undertaken between September 1978 to August 1979, only 185 case notes and X-rays were available for this study. The

other 120 patients case notes or X-rays could not be traced. The number of male and female patients and their approximate age distribution is given in Table 2.

Table 2

PATIENTS	ADULTS	CHILDREN	TOTAL
MALE	142	9	151
FEMALE	26	8	34
TOTAL	168	17	185

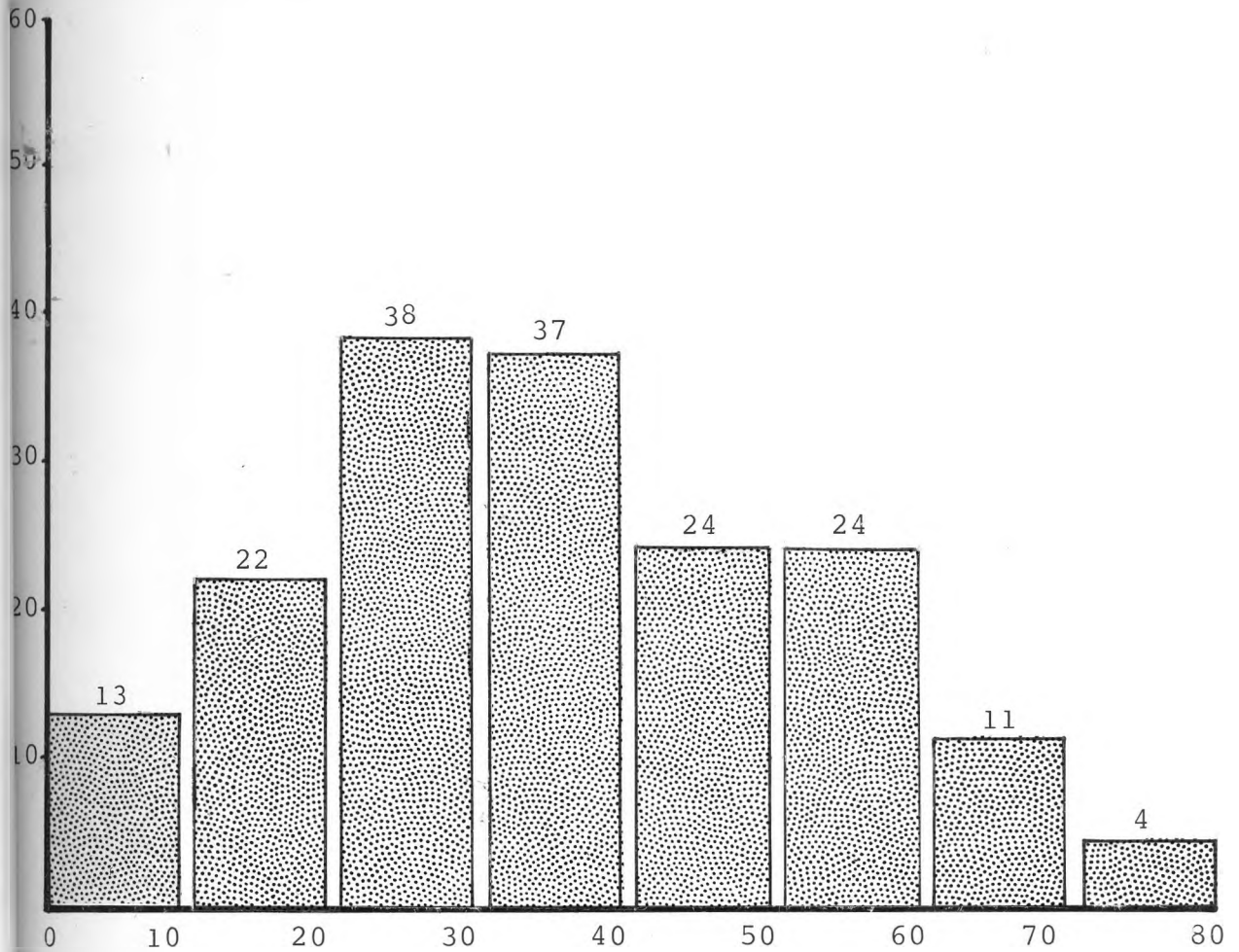
There were 151 male patients and 34 female patients of whom 17 were children. The ages of the patients ranged to 80 years of age (Table 3). The average age was 36 years.

Table 3

AGE IN YEARS	TOTAL
0 - 10	13
11 - 20	22
21 - 30	38
31 - 40	37
41 - 50	24
51 - 60	24
61 - 70	11
71 - 80	4
AGE NOT KNOWN	
MALE	9
FEMALE	3
TOTAL	185

HISTOGRAMFREQUENCY DISTRIBUTION

NUMBER OF PATIENTS



AGE OF PATIENTS



The patients reviewed were divided into two groups. Primary admissions were those who came to hospital on their own. The second group were those referred from other hospitals or from other countries like Zambia, Tanzania, Ethiopia and Botswana.

Table 4

REFERRALS

PRIMARY ADMISSIONS	114
REFERRALS FROM OTHER HOSPITALS	67
REFERRALS FROM OTHER COUNTRIES	4
TOTAL	185

PRIMARY ADMISSIONS

These were patients who were brought to hospital by police or relatives or who came on their own. Some were brought by unknown persons and in some instances nobody knew how they came to hospital. In this last group histories were not available. After discharge they could not go home or pay their hospital fee and they were referred to social workers.

Table 5

PRIMARY ADMISSIONS	114
RELATIVES	33
SELF (ADMITTED THROUGH THE CLINICS)	30
POLICE	24
NOT KNOWN	20
BY OTHER (PICKED UP BY THE ROAD SIDE OR FOUND IN THE HOUSE UNCONSCIOUS)	7

Following admissions the patients were divided into two groups of trauma and non-trauma.

Table 6

TRAUMA	81
NON-TRAUMA	104
TOTAL	185

The time interval between the onset of symptoms or the trauma and admission to hospital is shown in Table 7 and 8.

Table 7

TRAUMA PATIENTS

INJURY TO HOSPITAL ADMISSION TIME

HOURS	35
DAYS	20
WEEKS	14
MONTHS	8
YEARS	4

Table 8NON-TRAUMA PATIENTS

## ON-SET OF DISEASE TO HOSPITAL ADMISSION TIME

HOURS	7
DAYS	9
WEEKS	10
MONTHS	40
YEARS	38

Of the 185 patients preliminary plain skull films were done only in 123. 62 patients were brought for angiographic investigation without preliminary plain skull films having been taken.

Table 9

## TRAUMA PATIENTS - PLAIN SKULL FILM FINDINGS

FRACTURE OF THE SKULL VAULT	20
FRACTURE BASE OF SKULL	3
FRACTURE NOT PRESENT	45
PLAIN SKULL X-RAY NOT DONE	13
TOTAL	81

Table 10

## NON-TRAUMA PATIENTS - PLAIN SKULL FILM FINDINGS

ABNORMALITY SEEN	15
NO ABNORMALITY SEEN	40
PLAIN SKULL X-RAY NOT DONE	49
TOTAL	104

Table 11

## PRESENTING SYMPTOMS

HEADACHE NO HISTORY OF HEAD INJURY	HEADACHE ALONE	36
HEMIPLEGIA		28
DROWZINESS AND INABILITY TO WALK		22
CONFUSION		20
EPILEPSY		18
BLURRED VISION		9
BLINDNESS		7
HYPERACTIVITY AND AGRESSIVENESS		7
UNCONSCIOUSNESS		5
HISTORY OF HEAD INJURY	UNCONSCIOUS	24
	CONFUSED	23
	HEMIPLEGIA	6
	HEADACHE AND VOMITING	11

Table 12

## PRESENTING SIGNS

HEMIPARESIS	32
PAPILLOEDEMA	15
UPPER MOTOR NEURONE SIGNS	11
BLEEDING FROM THE EARS	9
UNCONSCIOUSNESS	7
FACIAL PALSY	5
GENERALIZED EPILEPSY	4
MENTAL RETARDATION	3
ATAXIA	3

Table 13

## WORKING DIAGNOSIS ON THE REQUEST FORM

INTRACRANIAL SPACE OCCUPYING LESION	58
ACUTE SUBDURAL CLOT	47
CHRONIC SUBDURAL CLOT	25
DIAGNOSIS NOT INDICATED	20
CEREBRO VASCULAR ACCIDENT	12
SUBARACHNOID HAEMORRHAGE + ANEURYSMS	8
PRIMARY BRAIN DAMAGE	7
BRAIN ABSCESS	6
EXTRADURAL CLOT	1
INTRACEREBRAL CLOT	1
TOTAL	185

On the request forms it was also indicated whether the investigation was an emergency, urgent or planned. The urgency of the request form was further divided into trauma patients and non-trauma patients.



The following criteria were used:-

- (a) Planned: to be done when convenient.
- (b) Urgent: to be done at 8.30 a.m. the next day.
- (c) Emergency: to be done immediately.

Emergency and urgent requests depended on how serious the patient's clinical condition was. These included patients post-trauma and with sudden on-set of illness such as unconsciousness or confusion or patients who had been admitted in the wards for sometime, but whose clinical condition had deteriorated.

Table 14

	TRAUMA	NON-TRAUMA
EMERGENCY REQUESTS	41	6
URGENT REQUESTS	33	28
PLANNED	7	70

Planned carotid angiography requests were of patients whose clinical conditions was not rapidly progressive or those who presented with long standing history of illness such as hemiparesis, mental retardation and epileptic fits. Some had swellings on the skull for many years found to be meningiomas and osteomas.

CAROTID ANGIOGRAPHIC FINDINGS

A total of 185 carotid arteriograms was reviewed. The relatively high percentage of negative findings is firstly related to the indication for which the procedure was done. Secondly in 31 patients no plain X-ray of the skull was done which would have served as a first line screening procedure. Thirdly the criteria for diagnosing abnormalities were not strict. For example some of the patients who were unconscious without history of trauma were brought for carotid angiogram as the first investigation, not considering other causes of coma such as metastases, poisoning or diabetes mellitus and uremia.

According to the clinicians, carotid angiography requests were based on:-

1. Unconscious patients.
2. Patients without lateralizing signs but confused.
3. Patients with fracture skull and clinical signs of confusion with lateralizing signs.
4. Patients who had a clear history of trauma with fixed dilated pupils not reacting to light.
5. Patients who presented with no other signs apart from papilloedema either on one side or bilaterally.

In the first two groups and the fifth group of patients, clinical assessment was rather difficult and bilateral

carotid angiograms were requested. Otherwise in patients who had clear neurological lateralizing signs such as fixed, dilated pupil, not reacting to light on one side, hemiparesis, a unilateral carotid angiogram was requested for the appropriate side.

The 185 patients were divided into two groups of trauma and non-trauma.

Trauma Patients:-

For those patients who were admitted unconscious with history of trauma and where there were difficulties in assessing the neurological signs a bilateral carotid angiogram was requested. For the patients who had lateralizing signs a unilateral carotid angiogram was requested.

Table 15

UNILATERAL RIGHT OR LEFT	126
BILATERAL	59
TOTAL	185

There were occasions when a left carotid angiogram was requested and the abnormality was found on the right side. This indicated that sometimes the lateralising signs could be confusing or exaggerated or reflected inadequate clinical examination. Of 81 trauma patients that underwent the investigation only 34.6% had positive findings. The rest 65.4% were negative.

Table 16

POSITIVE AND NEGATIVE FINDINGS

	TRAUMA	%	NON-TRAUMA	%
POSITIVE	28	34.6%	38	36.5%
NEGATIVE	53	65.4%	66	63.5%
TOTAL	81	100%	104	100%

The commonest indication for performing cerebral angiography was head injury. Twenty eight patients had abnormal angiographic findings and all these patients were found to have haematomas. 17 were unilateral subdural haematomas, 5 were bilateral subdural haematomas, 4 were intracerebral haematomas and 2 were extradural haematomas as seen in Table 17.

Table 17

SUBDURAL HAEMATOMA UNILATERAL	17
BILATERAL SUBDURAL HAEMATOMA	5
INTRACEREBRAL HAEMATOMA	4
EXTRADURAL HAEMATOMA	2
TOTAL	28

Non-Trauma Patients:-

These were patients who had no history of trauma and had either long standing history of illness or as in a few cases a history of a sudden on-set of illness. Angiographic investigations on 104 patients showed 38 positive findings (36.5%) and 66 negative findings (63.5%). The positive findings were as follows:-

Table 18

## NON-SPACE OCCUPYING LESIONS

BLOCKED MIDDLE CEREBRAL ARTERY	6
NARROW SPASTIC VESSELS	3
BLOCKED ANTERIOR CEREBRAL ARTERY	2
BEADED CAROTID ARTERY-VASCULITIS	1
TOTAL	13

Table 19

## TUMOURS AND SPACE OCCUPYING LESIONS

ABSCCESS	
MENINGIOMAS	
ANEURYSMS WITH CLOTS	
PITUITARY TUMOURS-ACIDOPHILIC AND PAPILLARY TUMOUR OF THE GLAND	
CRANIOPHARYNGIOMA	
EPENDYMOMA	
ASTROCYTOMA-GLIOMA	
GLOMUS JUGULARE TUMOUR-CHEMODECTOMA	
DEEP RIGHT PARIETAL S.O.L. WITH OEDEMA-THALAMIC MASS	
MULTIPLE VASCULAR TUMOUR	
ARTERIO VENOURS MALFORMATION	
TOTAL	2

In two patients a histological confirmation was not obtained. At angiography one of these had a right parietal lobe tumour and the other a suprasella tumour.

D I S C U S S I O N

The incidence of violence or traumatic death in Kenya is very high. According to the author's experience in the small department of radiodiagnosis at the Kenyatta National Hospital for the last three years, the majority of carotid angiographic requests come from surgical wards with the diagnosis of head injury or subdural haematoma.

In this review 305 carotid angiograms were performed in the year from September 1978 through August 1979. Unfortunately only 185 patients' case notes and X-rays were available for this study. The rest, 120 patients, were not included because either their X-rays were missing or their case notes could not be traced. This explains why in this review, there were more non-traumatic patients than trauma patients, as shown in Table 6.

The commonest indication for cerebral angiography was head injury. Twenty patients had fracture of the skull vault, three patients had fracture of the base of the skull. Forty five patients had no fracture of the skull. The rest, thirteen patients, were sent for carotid angiography as the first investigation without a plain X-ray of the skull, as shown in Table 9.

This study was divided into two groups and they were reviewed separately. The first group being of traumatic patients and the second of non-traumatic patients.

Traumatic: Patients with Trauma.

It will be seen from Table 17 that subdural haematomas were seen in seventeen Africans as compared to Mohan Desai's observations in Kenya in 1962 where only nine subdural haematomas were found in African patients. Murphy in Uganda in 1967<sup>(7)</sup> found a higher percentage of subdural haematoma among the African patients. In both studies, all races, Europeans, Asians and Africans were included. In this review only African patients were investigated.

Subdural haematomas showed a typical "bare area" in the anteroposterior view. Unilateral subdural haematomas exhibited shift of the anterior cerebral vessels to the opposite side.

Bilateral subdural haematomas. These were five in number and showed the anterior cerebral group in the midline. Temporal subdural haematomas showed deviation medially of the angle of the middle cerebral vessels as they curved around the uncus.



Intracerebral haematomas, were either deep or superficial. They showed a shift of the anterior cerebral artery without a "bare area".

Extradural haematoma. Two cases of extradural haematoma were diagnosed. The displacement of the middle meningeal artery due to extradural haematoma was identified.

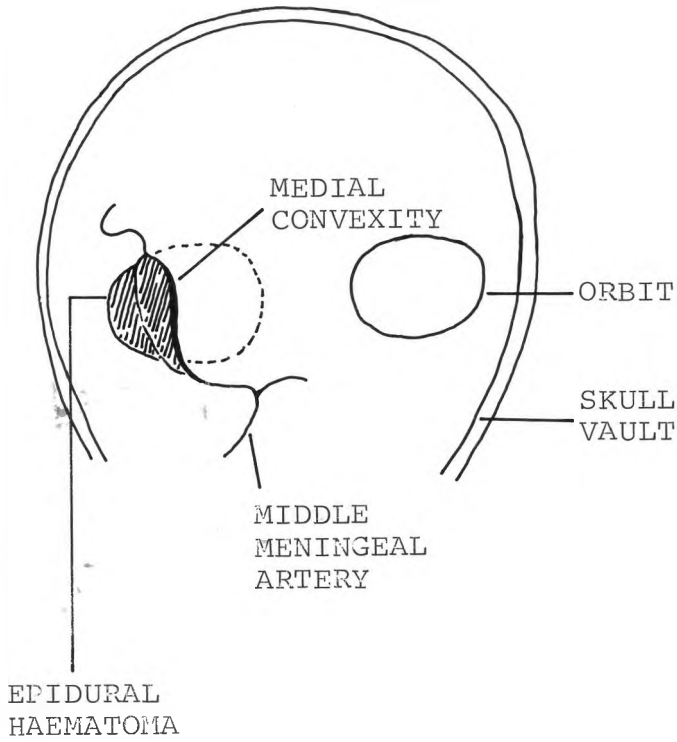
The haematoma can be shown on carotid angiography by medial convexity of temporal portion of the middle meningeal artery. This medial convexity of this artery is frequently a normal finding.

In the majority, the middle meningeal artery appeared to be bowed medially. The medial displacement ranged from 0.3-1.7 cm. from the inner table of the skull.

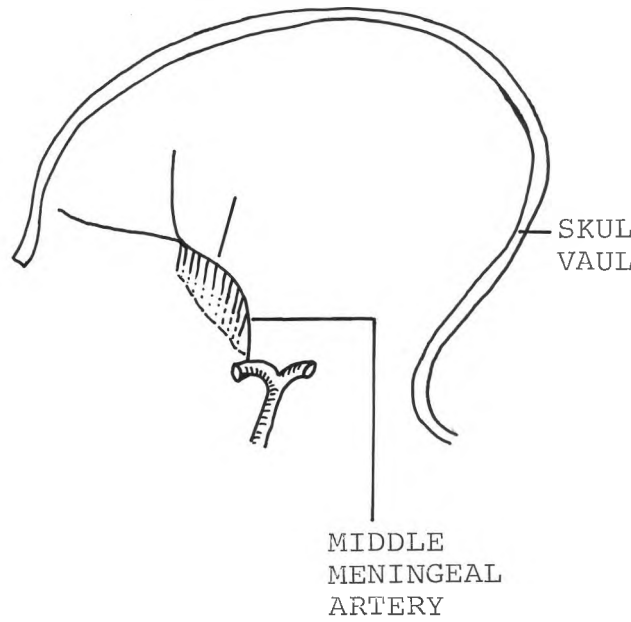
An anteroposterior projection with head oblique ten degrees to the side of the suspected extradural collection is described. With this view extradural haematoma can be differentiated from other clots, because this displacement is primarily related to anterior tapering of the skull<sup>(9)</sup>.

HOW RELIABLE IS THE MIDDLE MENINGEAL ARTERY  
IN THE DIAGNOSIS OF SMALL EPIDURAL HAEMATOMAS

POSTEROANTERIOR VIEW



LATERAL VIEW



The ages of the patients with haematomas varied from a few months to 80 years with an average of 36.5 years. This figure is more or less the same as that of Murphy (1967) <sup>(7)</sup> and considerably lower than that of Dyke and Davidoff (1938) which was 44.5 years. All patients, who had haematomas underwent surgery apart from those who died soon after cerebral angiography.

#### Non-Trauma Patients.

The second most common angiographic abnormality found in the series was brain tumours. There were sixteen patients with brain tumours, in fourteen of which the diagnosis were confirmed either by biopsy or by post-mortem examination, the other two were not confirmed. Biopsy results or post-mortem results could not be traced.

There were five patients with proven meningiomas. Three of these were in the parietal region and two in the frontal region. This figure is high compared to Murphy (1976) <sup>(7)</sup> who found only two patients with meningioma of Asian origin. Desai (1962) found three patients with meningioma, in an African, an Asian, and in a European. In the European community as reported by Cushing and Eisenhardt (1938) meningiomas showed a very high figure among the intracranial tumours.

Other intracranial tumours as shown in Table 19 were craniopharyngioma, glomus jugulare chemodectoma, astrocytoma-glioma, supratentorial ependymoma, papillary tumour of pituitary gland, a pituitary tumour-acidophillic type, thalamic mass tumour deep in the parietal region, arterio venous malformation and multiple vascular abnormality seen in the parietal region.

Cranio-pharyngioma. This is a disease of children and the youngest patient ever reported was a neonate presenting with obstructive hydrocephalus. In adults it can occur after the age of 40 years<sup>(1)</sup>. A high percentage of this study showed cystic tumours and only a few were solid tumours, the remaining were partly cystic and partly solid.

Only one case of arterio venous malformation was found in this series.

Non-space occupying abnormalities seen on carotid angiographic films were as shown in Table 19. Narrow spastic vessels were seen in three patients. An atheromatous anterior cerebral artery was seen in one patient. Beading of the carotid artery diagnosed as vasculitis was also seen in one patient. Blocked anterior cerebral arteries were found in two patients and blocked middle cerebral arteries were found in

six patients. The narrow spastic vessels could be due to post aneurysmal bleeding, meningitis, and vasculitis but these were not confirmed as there was no demonstration of aneurysms and the laboratory reports of CSF could not be traced. In others no other investigation was carried out apart from a carotid angiogram.

Cerebro-vascular occlusive disease is a common condition that is frequently investigated by cerebral angiography both in patients with symptoms referable to the central nervous system and in patients with known degenerative neurological abnormality. It is important to demonstrate the site of occlusion and clearly identify the superficial and occipital arteries with the origin of the external carotid artery<sup>(3)</sup>.

Aneurysms. There were four patients with aneurysms in this study. Out of these, two were aneurysm in the posterior communicating artery, one was in the frontal branch of the superficial temporal artery and the last one was in the anterior communicating artery. These aneurysms were well demonstrated in all the views, anteroposterior, lateral and oblique.

Angiography has been the most reliable means of establishing the site of haemorrhage as well as showing

the detailed anatomy and frequently, therefore it was the first study and was only supplemented by other investigations where there was still doubt as to which of multiple lesion had bled<sup>(5)</sup>.

The danger of performing an angiogram in aneurysms, is in case the aneurysm ruptures during angiography although this is rare. Demonstration of extravasation from an aneurysm suggests very poor prognosis. This complication has not been observed in our Department. Allan D. et al found five cases of intracranial extravasation of contrast media during angiography.

There were five patients of brain abscess in this study. Two of the patients developed abscess following pyogenic meningitis and lumbar puncture showed thick pus. At carotid arteriography there were features of temporo-parietal space occupying lesions. A third patient was a fifteen years old boy who had a mastoidectomy operation. A carotid angiogram was done and showed a left temporal lobe space occupying lesion. A burr hole was made and yellow pus drained out. The fourth patient developed a brain abscess after evacuation of a subdural haematoma, and the last patient developed a brain abscess after elevation of a depressed fracture of the skull.

According to Desai<sup>(4)</sup>, there was a high

incidence of tuberculoma in the African series. He investigated four hundred patients of whom three hundred and seventy eight were from Kenya. The rest, were from other countries in East Africa. His series included Africans, Asians and Europeans.

In this series only African patients were investigated and in this year from September 1978 to August 1979 of 185 patients, there was no case of tuberculoma reported. Professor Dar of Neurosurgical Department at the Kenyatta National Hospital gives the figure of 6% tuberculoma patients found in this hospital.

The incidence of brain neoplasm in the African population is quite high (Table 19). Desai<sup>(4)</sup> also found a high incidence of tumour formation in the African population.

The author disagrees with Murphy<sup>(7)</sup>, who investigated 100 cases and revealed that intracranial arterial diseases and tumour formation appeared to be rare amongst the African population. All races were included in his study, Africans, Asians and Europeans, the reason for his findings could be that he had a small number of African patients in his series.

POST CAROTID ANGIOGRAPHY PATIENTS MANAGEMENT

Management of patients following angiography was divided into:-

1. Diagnostic surgery.
2. Therapeutic 
 ↗ curative surgery.  
 ↘ palliative surgery.
3. Not operated.

Diagnostic Surgery. Tumours which were found to be inoperable at surgery, only biopsy could be taken to confirm the diagnosis and if possible they were referred for radiotherapy.

The survivors were difficult to follow up because some of them were transferred back to the nearest hospital from their homes. Those who were followed up at the neurosurgical clinic, the follow up notes were not adequate nor were there patients progressive notes.

Therapeutic-Curative Surgery. In this group all the haematomas, abscesses and operable tumours were included. Patients with haematomas underwent surgery and these were evacuated with subsequent recovery of the patients. Abscesses were drained, a patient with bilateral abscesses died two days after drainage



Another patient with brain abscess also died after drainage and at post mortem, generalized pyaemia was found including a lung abscess, streak ovaries, subphrenic abscess and a left perinephric abscess.

In case of meningiomas, excision of the tumour was carried out and the gross histology used to confirm the clinical as well as angiographic diagnosis. A thirteen years old girl formerly thought to be having craniopharyngioma on angiographic film, turned out to be osteoblastic meningioma at histology. Another sixty year old female patient whose angiographic findings resembled a glioblastoma turned out to be a meningioma on gross histology. Aneurysms were ligated.

A supratentorial tumour was excised and shown to be an ependymoma.

Patients in this group made good recovery. Some of their neurological signs disappeared and most of them were referred for physiotherapy and to be followed up at the neuroclinic.

Therapeutic-Palliative Surgery. Symptoms of raised intracranial pressure such as hydrocephalus can be relieved by a shunt. Local brain dysfunction recovery depends on how long standing the defect in function is, and how advanced damage is either to the

brain itself or to its blood supply is inflicted during operation.

Vision recovers well when chiasmal compression is relieved. Involvement of the brain is usually at least partially improved when tumours or cysts are evacuated.

Epilepsy may undergo temporary or permanent remission following surgery though many recur again

Patients not operated with positive angiographic findings. Most of patients in this group had non-space occupying lesions mainly affecting the vascular systems. The lesions seen on angiographic films were:-

1. Blocked middle cerebral arteries.
2. Beading of the internal carotid artery.
3. Narrow spastic vessels.
4. A patient with arterio-venous malformation also did not undergo surgery.
5. Patients with metastases.

Other patients who were not operated but had positive angiographic findings of tumours. The reason for withholding operation was not indicated in the patient's case notes.

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