some with large haematoma had some neurological
deficit. He stressed that these good results had been
achieved using simple and easily available methods.

BIOCHEMICAL ASPECTS OF RUPTURED ANEURYSMS

M. Buckell (London) outlined research in progress at
Atkinson Morley's Hospital on three biochemical aspects:
examined by local changes in haematoma and cerebro-
spinal fluid, biochemical profile at stages of illness, and
investigation of general metabolism by means of balance
studies.

Reappearance of oxyhaemoglobin in cerebrospinal
fluid absorption spectrum was helpful as evidence of
re-bleed. Enzyme measurements were disappointing.
Cerebrospinal fluid GOT exceeded plasma when there was
obvious infarction. 5 HT-like activity was found in three
of four haematomas from patients with spasm and not
in five comparable specimens from cases without spasm;
all nine contained a polypeptide active on smooth muscle
and present in greater amount in spasm cases. Dr. Anne
Uttley had found a prolonged thromboplastin generation
time in 10 of 50 patients.

On admission cases of unexplained subarachnoid
haemorrhage had little biochemical disturbance. Patients
with aneurysms, angiomas, and primary intracerebral
haemorrhage showed increased osmolality, urea, protein,
haematocrit, haemoglobin, and whole blood specific
gravity with less frequent, mild rises in transaminase and
transient elevation of blood sugar. All these changes were
more marked in comatose cases. Reduced bicarbonate
concentration was often found in patients with demon-
strable lesions, regardless of conscious level. Reduced
arterial PCO₂ and raised pH were confirmed in another
group of patients. Investigation of hypothalamic damage
after ruptured aneurysm, with Dr. J. S. Jenkins, revealed
a reversed diurnal cortisol rhythm in 21 of 60 cases.

Results of nitrogen, sodium, potassium, and fluid
balance, with calorie intake, steroid excretion, and blood
chemistry were presented for four patients.

EXPERIENCE WITH TWO CASES OF MUSCLE EMBOLIZATION
OF CAROTICO-CAVERNOUS FISTULA

C. B. Sedzimir and J. Occleshaw (Liverpool) described
two cases of carotid-cavernous fistula which had been
treated with muscle embolization. The first case, a man
of 19, had probably developed a carotid-cavernous
fistula after an extensive gunshot wound of the left side
of the head and face two years before admission though
the diagnosis had not been made at the time. At present
admission he had sustained a subarachnoid haemorrhage
and angiography demonstrated the fistula. A muscle strip
was inserted into the internal carotid artery in the neck
via the common carotid and allowed to embolize into the
cavernous sinus with cessation of the intracranial
bruit. A faint bruit returned 10 days later and radio-
graphs showed that the muscle had moved on from the
cavernous sinus to a cerebral vein.

The second patient, a woman of 44, was admitted with
signs and symptoms of a fistula five days after a road
accident. Angiography demonstrated the fistula. On this
occasion a muscle embolus was inserted in the neck after
the intracranial internal carotid had been occluded with
a clip above the cavernous sinus. Control of the fistula
with complete regression of abnormal physical signs was
achieved by this procedure.

DURAL SINUS THROMBOSIS

R. M. Kalbag (Newcastle) discussed the problem of dural
sinus thrombosis. He noted that only 217 cases had been
recorded in the Registrar General's returns for the period
1952-61 and he felt that many cases were probably
unrecognized during life and at necropsy. Even when a
clinical diagnosis had been made this was seldom
confirmed by angiography. He said that the angiographic
findings included extreme slowing of the cerebral
circulation and deep venous filling in the arterial phase
but that final diagnosis depended on the persistent failure
to fill of all or part of one of the dural venous sinuses.
The presence of small anastomotic venous channels,
usually in the region of the superior and inferior
anastomotic veins, indicated a favourable prognosis,
whilst failure to fill the Galenic venous system usually
implied a fatal outcome.

He noted that opinions on prognosis had varied
considerably but it seemed certain that the slower the
evolution the greater the chance of recovery. The use of
anticoagulants to limit the area of thrombosis could be
dangerous and should probably be applied before there
was spread to cortical veins, if at all.

SUBTRACTION TECHNIQUE FOR CEREBRAL ANGIOGRAPHY

G. Sullivan (Preston) described subtraction radiography
as a technique of after treatment of radiographs taken
during contrast medium injection. He said that it was
used to reveal the shadows of the contrast medium
which were apparently invisible, being hidden by the
shadows of the radiopaque parts of the patient.

The method of obtaining a subtraction radiograph was
demonstrated. This was followed by an illustration of
the way in which subtraction radiography helped in
obtaining diagnostic information from films taken of
four patients who were investigated by arteriograms of the
head and neck during injection by catheter of contrast
medium into the aortic arch and main arteries arising
from the arch.

He concluded that subtraction radiography was not
only useful in improving poor radiographs but could
show structures which, due to their position, were
normally hidden by radiopaque parts of the body.

VARIATIONS OF INTRACRANIAL PRESSURE RECORDED
DURING EXTENDED OBSERVATIONS

J. C. M. Currie (London) reported a study of intracranial
pressure using a radio-pressure transducer. The method
was described and illustrated in clinical use. Pressures
were recorded in patients over several weeks. Observed
changes in pressure were then shown due to the pulse,
respiration, jugular compression, and posture in patients
with normal and raised intracranial pressure.