Thesis on intra-cranial tumours & their treatment
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Intracranial Tumours and their Treatment.

§1. Probable cause.

The cause of intracranial tumours cannot be definitely assigned. The fact that they occur in males with far greater frequency than in females, probably in the proportion of three to one, justifies the view ordinarily accepted that injury to the head, to which men are obviously more liable than women, is the initiative cause. Evidence in favour of this view is given by Dr. Hale White (B.M., F.R.C.S., March 14, 1896), Dr. Sin (B.M., F.R.C.S., Nov. 1895), Dr. Ballance (B.M., March 14, 1907).

It is maintained by Dr. Ferrier (B.M., March 14, 1907) that in many cases trauma is the only cause, with this view however, Dr. Hale White & others are unable to concur. My own reading & experience would seem to justify the belief that in many cases injury is the only direct cognisable cause.

Further, it may be safely affirmed that any kind of psychic strain may excite its growth, in as much as...
This would involve a disturbance of the circulation & nutrition of the cerebral regions.

11. Character of Growth

An examination of statistics proves that tumours are in the main of a tubercular character. It was found that out of a hundred successive cases of intracranial tumour examined in the post-mortem theatre of Guy's Hospital nearly one half were tubercular. The following analysis of the cases shows the varied character of the growth & the comparative frequency with which each type occurs:

Subcercular 45
Glioma 24
Sarcoma 10
Carcinoma 5
Gliosarcoma 2
Cyst 4
Gumma 5
Lymphoma 1
Phycom 1
doubtful in 3 cases.
The most noticeable feature in the above list is the predominance of tubercular tumour. It is rarely however that tubercular intra-cranial tumours are primary. They are mostly secondary either to pulmonary tuberculosis or to tubercular affection in some other organs, consistently with this fact it was found that of the above 45 cases of tubercular tumour 24, that is more than half, occurred in children under ten years of age. According to Souques & Chazelot the most frequent seat of tubercular disease is the lower Rolandic area & its partiality for this region is probably due to its relative richness of circulation consequently upon its deriving blood from the Sylvian & anterior cerebral arteries. It is interesting to note that the proportion of syphilitic tumours shown in the above analysis agrees with the result of an examination of 500 cases collected by
Surgical treatment.

There are, doubtless, cases on record in which surgical operation has achieved brilliant results in the successful and complete removal of intracranial tumours. The number of such cases is unfortunately very small. They contribute so small a proportion of the total number of cases that one is almost justified in treating them as surgical curiosities.

Of 46 cases of intracranial tumours collected in five years by Dr. Byron Bramwell, thirteen were subjected to trephining, but in no single instance was the tumour successfully removed.

A study of the conditions necessary to a successful surgical interference will account for the extreme rarity with which such treatment is successfully performed.
**Conditions of successful surgical treatment**

Tumours, in order to be amenable to successful surgical treatment must satisfy the following conditions:

1. They must give rise to definite localising symptoms indicative of their exact position.
2. They must be accessible.
3. They must be one of such pathological character as to permit of complete removal. Experience shows that these conditions are present only in a comparatively small proportion of cases. We shall first consider to what extent tumours are found to satisfy the first of these conditions.

**Tumours which afford no localising symptoms.**

The presence of tumour is often detected by the help of general symptoms such as headache, vomiting, giddiness, double optic neuritis. In the absence of meningitis, albuminuria,
ear disease, lead poisoning &c. The symptoms mentioned distinctly show that an intracranial tumour is present. Even though there are no localising symptoms.

Indeed, when tumours occur in the lateral lobe of cerebellum or in the frontal lobes it is generally the case that the symptoms they show are general and have no localising value. An account of a few notable cases of this kind is subjoined.

Case (a) Prof. Allbutt narrates a case of glioma of the piri of a large pigeon egg in the left frontal lobe of a middle aged woman. Such a tumour must have been one of long growth; but until a few days before death it gave rise to no symptoms.

Case (b) The case known as Dr. Aucrust's. A woman admitted to Guy's complained only of slight headache on examination optic neuritis was found & cerebral tumour was diagnosed. On admission she was perfectly
intelligent. Her eyesight was found to be affected after admission. She was able to assist the nurses in their work. On a certain day, however, she dropped down dead. On post-mortem examination a large glioma was found in the left frontal lobe.

Case C. Itun reports a case of one and a half years duration which gave no symptoms; post-mortem examination revealed a tumour of the size of a small hen's egg in the lower part of the frontal lobe.

Case D. A case of a large tumour of cerebellum which caused no localising symptoms came under the notice of Dr. Walter White. The case proved fatal at Guy's Hospital on January 21, 1894.

It is unnecessary to multiply cases of this kind, in such cases the existence of the tumour produces no impairment of motion or sensation, general or special, no specific mental symptoms.
In some instances the absence of localising symptoms has been attributed to the setting in of atrophy. Thus a tumour in the occipital lobe or in the path of visual impulses might yield no localising symptoms owing to the presence of optic atrophy which would render it impossible to detect the Amblyopia or Hemianopia that should result when a new growth occurs, room for it can be found only in two ways, either by compensatory expression of blood or by atrophy. If a tumour grows slowly brain atrophy may take place as fast as the new growth. The result is that intracraniad tension may not be raised. This would be likely to happen in the case of a slowly growing tumour of Centrum ovale. The simultaneous onset of setting in of atrophy would prevent intracraniad pressure in such cases the Cardinal symptoms are either absent or are
so insignificant as to be overlooked.
A case of this kind, which occurred in Guy's Report for 1893, deserves mention. The patient who was operated on for carcinoma of breast, did not for some unexplained reason recover. After lingering for several months without showing any definite symptoms she died. It was then remembered that previous to admission she had been subject to slight headache which was not deemed serious enough to call for treatment. An examination of her brain was then made and an encapsulated glioma was found. This was easily shelled out in the right occipital lobe, not projecting from the brain, but replacing and absorbimg its substance.

vi. Probable cause of absence of symptoms in tumour as specified. The frontal lobes and lateral cerebellar lobes are the portion of the brain most closely
connected with intellectual operations. Their functions are on this account less fixed to definite parts of the brain. For it is known that, whereas the intellectual functions are developed late both in the evolution of the species & the life of the individual, localisation of function in definite parts is associated with a long period of evolution & increasing age of individual.

The function of the frontal & lateral cerebellum lobes being feebly fixed, the destruction of these parts may give rise to that most striking fact connected with cortical injury known as vicarious action, neighbouring parts or possibly the corresponding part of the opposite side of the brain will probably take on the function of the parts destroyed. This is well illustrated in the following instances.

Case (a) Known as the American crow. In one case, a young man aged 25 was struck by a bar propelled with its point, which first entered the left
angle of the jaw, & emerged anterior to the coronal suture, the patient was momentarily stunned & recovered without any defect of motion or sensation except ptosis & loss of vision of left eye, due to the local injury of optic & ocular motor nerves.

Case (B) Dr. Walker of Peterborough reports of a similar case.

Case (C) St. Charlton Baslau reports two cases in Germans who after an attack of right hemiplegia & aphasia each of them was for a long time unable to speak English, while they began to speak they used German, probably the uneducated right third frontal convolution took up the work. Prof. Durante insisted on the importance of anterior frontal lobes in morale of patients & explained the fact of the improvement even after complete extirpation of the affected lobe, as a function of compensation which could not have occurred before owing to presence
of tumour, the auditory centre being bilateral the function could readily be compensated the right temporal lobe being wounded the patient lost his hearing on the opposite side, but in a short time he reacqured it almost completely.

vii  Exceptional cases.
Cases are known where tumours in the frontal & in the cerebellum have yielded symptoms. There is an instance described by Prof. Durante in (Brain, Nov. 17th, 1900). A youth 20 years of age, in whom disturbances had existed for a year under the form of convulsions, which occurred three or four times without loss of consciousness & then ceased. The patient came to clinic with right frontal headache, choked disc, vision much reduced, diminution of smell & taste & psychic disturb-ances. Diagnosis of tumour of right frontal lobe was made,
patient was operated on by osteoperiosteal flap. A tumour which com-
plicated the anterior section of lobe in anterior cerebral fossa was re-
moved, & patient rapidly recovered from operation. All symptoms
were cured except the defect of sight which gradually became worse to
total blindness. The symptoms recurred, & a second operation was
made & the tumour was found larger than before. It was removed in
pieces, but the operation had to be suspended owing to severe haem
orrhage. After three days the
 tumour was extripated as far as
middle fossa, the left ventricle
being opened & anterior portion of
temporal lobe attacked; there was
a free discharge of cerebral spinal
fluid. Healing took place by
secondary intention, but recur-
rence occurred in eight months
with identical symptoms & death
ensued from coma.
Other difficulties in the way of successful surgical treatment. Besides the absence of localising symptoms the operator has to contend with other difficulties. To begin with, localising symptoms may be present but may give an erroneous indication of the position of the tumour & so render diagnosis difficult & uncertain. This is illustrated by a case operated on in 1895 at Gwyd Hospital. The patient was admitted for loss of sight, severe headache, especially in right occipital region, 9 numbness of left arm, 9 palsy of trunk. There were also occasional twitchings of left arm 9 leg, 9 sweating of left side at night. There was blueness of skull in right occipital region 9 double optic atrophy was present; no vomiting. Skull was biphonied in right occipital parietal region at site of tenderness, there was no evidence of increased intra-
cranial tension, but the bone was not replaced the wound was closed. It is stated that the headache was relieved, but two years later the patient was admitted with well-marked sensory and motor ataxia. In the above case phthisis was taken localized tenderness as a valuable guide in diagnosis. (Bull. Feb. 2, 1879) A very interesting article is written by Ernest Stephens Reynolds on some uncertainties in diagnosis of cerebral tumour. In the next place, exact position of the tumour may be clearly demonstrated by definite and distinct localising symptoms, yet the tumour may defy surgical treatment for one or other of the following obvious reasons:—

(a) It may be situated in an inaccessible position. This is the case with tumours situated in the base of brain & with those which affect the medulla oblongata, bulbar
Color of cerebellum, Pons, Basal ganglia, the deep part of thalamus, and the corpus callosum.

B. It may extend to widely and infiltrate so large an area of brain tissue that complete removal is impossible.

C. It may be malignant or a secondary deposit of carcinoma or sarcoma in brain.

D. It may either be multiple or complicated with other tumours in other organs as tubercular intracranial tumour, which is secondary to pulmonary tuberculosis, or syphilitic intracranial tumours. The disease in other organs may contra indicate operation.

IX. Classification of Symptoms:
The symptoms of intracranial tumour are divisible into three groups. The first group contain symptoms due to mere pressure of foreign body within the cranial cavity, second group are symptoms due
to position of tumour localising symptoms, that is, if the tumour is situated in some part of brain which will give rise to localising symptoms.

Third group contain those symptoms which are due to the particular variety of tumour that is present. Rapidly growing malignant tumours produce different symptoms from a slowly growing innocent tumour.

First Group of Symptoms

A right understanding of the symptoms which are due to the presence of a foreign body in the intracranial cavity requires a study of the nature of this cavity. The cranium is practically a closed cavity with rigid walls. The result is that the presence of a tumour would press against & disturb the other structures contained within, especially those with which it is in immediate contact. A general disturbance of function would result both from pressure effects.
from the spread of the diffuse irritative wave over the whole nervous tissue. The accompanying symptoms as one would expect are not entirely confined to those of a general character; that is, those that indicate that there is a tumour somewhere. Symptoms of a more special localising character are also produced owing to the effect of the pressure on the parts with which the tumour is in immediate contact. Further, the distribution of pressure is determined in part by the fact that a firm membrane known as tentorium cerebelli divides the cavity into two parts; tumours would therefore exert pressure chiefly on the structures which are situated in the same sub-cavity, as they. A similar inference follows from the division of the upper cranial cavity into two parts by the falx cerebri.

It must, however, be borne in mind
in spite of what has been said that tumours in one sub-eavity are able by indirect means to increase the intracranial pressure generally. The intimate connection between intracranial pressure & the symptoms attending cerebral tumour is shown by the relief afforded by trephining, & also by experiments on animals in which somewhat similar symptoms may be produced by increasing the intracranial pressure. The pressure may be conceived as arising thus in one class of case, where the tumour occludes the channels of communication between the ventricular system & the sub-arachnoid space, it produces a distension of the ventricles by the cerebro-spinal fluid secreted by the choroid plexuses, & since it is probable that the capillary pressure in the choroid plexuses is higher than elsewhere in the
brain, it is clear that the secretion of cerebrospinal fluid may go on until compression of the other cerebrospinal capillaries is produced, which results inevitably in cerebral anaemia and atrophy.

The more important of the general symptoms deserve individual notice. 

**Headache.**—This is mentioned first because it is the most frequent of all the symptoms. It is due to pressure exerted on the meninges and on the nerves with which it is supplied, it is a symptom that is seldom absent though its severity is very variable. The pain is often paroxysmal. With the progress of the disease the paroxysms become more frequent and at last tend to become constant. The pain is felt during the night or at waking in the morning. In the latter case if it occurs at waking in the morning it is
often accompanied by vomiting.

The pressure of a tumour on the fifth nerve may also produce neuralgic pains. It is interesting to note that if the headache is confined to a localized area the symptoms come to have a localising value — showing that the difference between general and localising symptoms is not absolute. Headache is one of the earliest symptoms produced by experimental increase of pressure & it often appears to be so in cases of intracranial tumour.

The headache may be most intense over the tumour, but this is exceptional for the headache is usually of a diffuse character owing to the increased intracranial pressure which produces it being broadly distributed. In cerebellar tumours the headache may be localized over the tumour because being situated in this case in the
cavity below the tentorium, which is small in size, it becomes directly subjected to any increase of pressure within. Sometimes when the tumour is near the surface of the brain there may be a tender spot on the surface of the skull which may be the source of headache.

(b) Optic neuritis. This is the most important symptom of intracranial tumour from a diagnostic point of view. So frequent is it found in intracranial tumours that if it is well marked, its presence should in the absence of any other cause to which it may be assigned lead us to infer the presence of a tumour. Primarily optic neuritis is very rare. The size, locality and nature of the tumour and the degree or variety of optic neuritis are not known to induce any relation or influence one on the other. The
only fact in this connection known is that of optic neuritis from cerebral tumour exist in one eye only, it will probably lie on the opposite side of tumour. There are only a few cases on record in which optic neuritis was absent in cerebral tumour vide. Clinical Lecture of Hale White. According to Byron Bramwell optic neuritis is present in 80 per cent of cases.

In the great majority of cases it is double & it may be present in a strong degree without diminishing the acuity or range of field of vision. In just one third of cases operated on in Guy's Hospital during the past ten years no complaint of failing sight was made although definite optic neuritis existed.

There are many theories as to the cause of optic neuritis that exist Sturgeons Jackson's, Leber & c.
It has been suggested that it is part of a general sclerosis starting in other parts of the brain. The view which appears most satisfactory is that it is due directly to increased intracranial pressure; this is borne out by the fact that the optic disc clears almost immediately the increased tension is relieved. If optic atrophy has set in, it is questionable whether this condition is capable of improvement. Dr. Hallpike says: "If optic atrophy is absolute trephining will not restore the sight" but optic atrophy may appear absolute when it is not really so.
(c) Vomiting. This is the next most common symptom. It bears no relation to food, is usually unattended with nausea and the tongue is clean. It may be paroxysmal. This symptom is also due to increased intracranial pressure affecting the central vomiting mechanism. But when the tumour is in the posterior fossa, it is due to direct pressure on the medulla oblongata. Of the vomiting is very frequent and severe one may infer the presence of a subtentorial tumour or great meningeal irritation.

Other symptoms of a general character but of a less importance kind than those hitherto mentioned are: Vertigo, a common symptom due to tumour affecting middle lobe of cerebellum or disturbances of cerebral circulation causing increased intracranial pressure.
disturbances of the mental functions and apoplectic attacks.

15. The pulse characteristic of intracranial tumours should be slow owing to the increased pressure affecting the intracranial cardiac mechanism.

18. Secondary group of symptoms. Localizing symptoms. The best instances of symptoms of this class occur when the tumour is situated either in the Rolandic areas, the speech centres or in the occipital lobes. Such tumours yield symptoms which are of great value in localizing the tumour. Their cause depends on a complex of conditions generally speaking they may be paid to result either from pressure exerted by the tumour on the nerve tissue in its neighbourhood or on their complete destruction. The intimate way
in which cortical centres of nerves are connected to gather the symptoms existing between them often renders it difficult to trust to the suggestions of even the so-called localising symptoms.

In some cases the symptoms present are chiefly, if not exclusively, of a localising character.

(From H. J. Dec 22. 1900) Dr. Byron Bramwell reports a case of a sailor aged 24, unmarried, just admitted to R. I. E. on Feb. 1899 suffering from localised epileptiform attacks, these were for most part Jacksonian in character, the spasms commenced either on left side of face or left hand. Patient was discharged in March & re-admitted on Sept 26.

1899. much in status quo, no decided improvement occurred under sodi di of potassium & bromide of potassium, the patient was trephined by Dr. Cooperell
The condition having been diagnosed by Byron Bramwell as glioma of brain. Nothing was found on operation which was performed on Dec 12, 1899. The patient made a good recovery, but the fits continued. He was discharged from hospital on Jan 10, 1900. He again presented himself on Oct 9, 1900. For a month headache and vomiting were severe, double optic neuritis was not present and the cerebral hernia of bone size projected at seat of operation.

The patient died suddenly in a fit a few days after admission. On post-mortem examination an extensive glioma was found infiltrating the cortex & subcortical tissue. The case was an illustration of one of those cases of intracranial tumours in which there are well marked localizing symptoms without any general symptoms. Until a
mouth before death the patient complained of no headache or vomiting. And during the first year there was no optic neuritis. Dr. Byron Bramwell also in the same number refers to another case of glioma, which was found on first postmortem examination one and a half inches from surface, immediately below the seat of operation over the right motor area, arm centre. This case gave no general symptoms, only localizing symptoms. In this connection some reference should be made to a somewhat notable case described by Dr. Elder 9 Miles in a recent number of the Lancet (Feb. 8, 1902). They maintain on the ground of a case of tumour of the left prefrontal lobe which they successfully diagnosed, localized and removed by operation that the time has come when we should discard the idea that
the prefrontal lobes are silent regions "that is" regions of the brain wherein the presence of tumour give rise to no symptoms. The seat of the tumour in the case referred to by them was indicated by two classes of symptoms.

1) The slight paralysis of the right arm and the more distinct paresis of the right side of the body part of the face with dysphasia in speaking, but no aphasia, pointed to a lesion of the left side of the brain. One other symptom gave the same indication—the presence of a swelling over the left frontal region.

2) In addition to the above symptoms there was present a group of mental symptoms which were significant enough to constitute in themselves a sufficient ground for an operation over the left frontal lobe. These were the result of the loss of the power of inhibition—a loss
of self control & will power. As a consequence the man's character or ego was changed. He could not exercise control over certain organic functions, e.g., those of the bladder & rectum. The loss of all sense of shame & modesty, of all power of persistent attention, comparison & judgement was gone. This absence of the power of inhibition or control pointed to a tumour in the frontal lobes, which are generally regarded as the physical basis of the processes of voluntary inhibition. Moreover, since it is held that the left prefrontal lobe takes a more prominent part in higher cerebration than the right prefrontal, there seemed to be a wonderful concurrence of symptoms pointing to a tumour in the left prefrontal lobe. The operation, which followed, was successful & fully justified.
placed on the symptoms specified. This case, it is alleged proves that we have no right to treat the prefrontal lobes as "silent regions."

Third group of symptoms
They consist of symptoms which depend upon the rate of growth of the tumour. Tumours which grow slowly are generally innocent, while rapidly growing ones are more likely to be of a malignant character. A large tumour growing rapidly must by its mere bulk lead to compression of capillaries with anemia and consequent symptoms of pressure, whereas in the case of small slowly growing tumours the pressure may lead to gradual atrophy of brain matter instead of compression of vessels. Symptomatic may be absent. Pressure of a small tumour may give rise to general sclerosis of one hemisphere causing a consider-
increase in its size. Such cases are however very rare.

Treatment:
There are two different kinds of treatment to which intracranial tumours may be subjected.

(a) Drug treatment. The aim here is either the complete removal or absorption of the tumour by means of drugs, or failing this the relief of some of the attendant symptoms.

(b) Operative treatment. In this case too either of two objects is aimed at: when the conditions are favourable, the operation may attempt to effect a complete removal of the growth. In the majority of cases however, owing to circumstances already mentioned, this cannot be attempted. Under such circumstances palliative treatment only is adopted. It is found that where drugs are of no avail a complete surgical removal...
al is out of question, palliative treatment is attended with marked relief of some of the more distressing symptoms.

**Drug treatment.**

The value of drug treatment is much limited by the fact that it seems to affect beneficially only a few varieties of tumour. Syphilitic tumour & in a much less degree tuberculous tumours are the only species which experience has shown to be with certainty amenable to drugs. A case of tuberculous tumour may become quiescent under the administration of St. Mortuaries etc., but according to Forsley such treatment should not be continued beyond four months, unless there are signs of improvement (B. M. J. Dec 23, 1893). In other cases iodides will probably be given a trial & the test is
put by Dr. Allan Starr at three months for this treatment, and by Victor Horstley at six weeks, Gower supports Horstley's opinion in referring to drug treatment vide (Blut. Dec 23 1893).

In the case of syphilis the cure is effected by Pot. Soda. The following cases may be cited as instances of cure effected by means of drugs. Dr. James Taylor in (Blut. Jan. 13, 1900) reports two cases of cerebral syphilis which caused symptoms of tumour to be present. They responded to anti-syphilotic treatment.

Dr. Althaus in (Blut. Nov. 16, 1896) refers to a case of cerebral tumour in a lady, aged 38, which responded to Hydrag., perchlor. & Pot. Soda. with complete recovery. He supposed it to be a glioma, but more probably it was specific. In connection with the successful action of drugs in the case
of syphilitic tumours two circumstances pointed out by Byron Braune well should be noted as limiting considerations (1) Drug treatment is seldom effective unless applied at an early stage of the disease. It may be attended by after results which entail the complete insanity of the patient. If therefore a syphilitic tumour can be localised and removed, it is very advisable that an operation should be performed, that is if the patient's general constitution is not affected by the disease. If there is not grave syphilitic lesions elsewhere. Glioma are sometimes temporarily benefited bylodide. There are on record several cases but in more did the improvement last for more than a few weeks. Scarcorna has also been temporarily relieved by arsenic.
Operative treatment:

When drug treatment has failed to yield satisfactory results, the patient is distressed by the presence of urgent symptoms it may be found necessary to resort to operative treatment. The form of operation to be undertaken will be determined in part by the presence or absence of localising symptoms and in part by the accessibility of the tumour. Fortunately, tumours which are most easily removed are also the ones most easily localised.

(a) Radical treatment: that is, an attempt at the complete removal of the tumour by surgical interference. Only a comparatively small number of cases fall under this category. This is borne out by the statement already quoted of Byron Bramwell, that of 45 cases of intracranial tumour which came under his notice...
either in hospital or in private practice for a period of five years. On 13 of which the operation of trephining had been most poul factorly performed, there was not a single instance in which the tumour was successfully removed.

That tumours may be successfully removed from the brain has been shown not infrequently, that the operation might more often have been successfully performed would appear from post-mortem reports and the average from pathological reports gives 7 per cent at Guy's post mortem, 40 per cent as a proportion of operable tumours. Dr. Allan STERR thinks it should be as high as 10 per cent. Dr. Stail white in reports for 1885 published an account of 100 cases of central tumours which were presented at Guy's hospital and among these only 8 per cent.
could be removed. But the proportion of tumours both operable and localisable is of course considerably smaller. Among 83 cases examined post mortem at Guy's during 1885 to 1898, five cases of tumour could probably have been successfully removed, but in only one of these could it have been localised as well. These figures indicate roughly 10 p.c. of cases to be operable, that is, of such a nature that the tumour could be removed, or only 2 p.c. both operable and localisable. To get the true proportion of cases both operable and localisable, it is necessary to add to the above cases any successful cases of removal during the same period. In the case we are considering, there was only one such case, consequently about 4 p.c. of cases would be both operable and localisable. Again Dr. Allan Starr
published in 1894, an account of 100 cases which came under his observation, of these 18 were considered for operation; 15 were operated on; 9 the tumour was found & 8 successfully removed. According to this calculation there are 10 per cent of cases in which the tumour can be localized & removed.

The tumours most frequently got rid of are most curable to removal are sarcoma & glioma (encapsulated). Tuberculous tumour may also be successfully removed as in the case mentioned in (Blunt Dec 23 1893) in which Horsley operated. In this case it was found that six years later the brain was free from tubercle. Horsley is of opinion that if a tubercular tunicum can be localized in an accessible position & there is no evidence of others being present, removal
should certainly be attempted vide (BLMT Dec 23 1873)

Macewan reports removal of several tuberculous tumours from the cerebellum, the operation consisting of two stages, and although the patient died suddenly 10 months afterwards from oedema of brain. The fact that he lived so long with the relief of all his symptoms is an encouragement to operate for tuberculous tumours. Forsky is of opinion that syphilitic tumours are only curable by removal, being accompanied by Pachymeningitis which is necessarily progressive (BLMT Dec 23 1873)

Haensel removed a syphilitic tumour successfully from motor area. The wound healed by primary union but the patient sank from exhaustion. The one successful case according Guy's reports in which a tubercule of dura mater motor area was removed from
a woman aged 40 years, who
suffered from Jacksonian epilepsy,
was syphilitic in nature. When time-
our removal is out of the question,
the wisest and often only possible
course to adopt is to seek by means
of palliative trephining to relieve
the weight of intracranial pressure.

xvi
Palliative trephining.
The results of an operation which
is merely palliative in purpose &
which stops short of complete cure
& removal are often so much productive
of such signal benefit & relief to
the patient, that one has ground
for claiming a somewhat unique
position for palliative treatment in
the case of intracranial tumours.
There are however two principal
objections to trephining which
must always be taken into con-
sideration. Firstly, there is some-
times after operation a trouble-
some hernia cerebri, but often
even when intracranial pressure is very great the cerebral protrusion gives rise to no difficulty. Dr. Kel. White, who has conducted many cases of trephining, says that in only one case was the degree of hermia cerebri so great as to cause him to regret the operation. Secondly. Paralysis has occasionally followed operation, the explanation is that the removal of bone causes the brain swelling to great intracranial pressure to be jammed against the edges of the wound in the bone. Belonging to these contingencies it is only right that the patient should be warned that though trephining will relieve his headache & avert blindness, there is a possibility which is somewhat remote of a hermia cerebri or paralysis setting in.
XVII. Classifications of operations:—

Palliative operations may be of various kinds. The most important of the ones most frequently performed are the following:

I. In cases where the tumour is diagnosed, but not localisable or diagnosed in an inaccessible position, the trephining aims merely at relieving tension, the dura mater being left intact.

II. Cases of trephining where the bone is removed & dura mater incised.

III. Cases where the tumour is partially removed.

IV. Cases where the cavity of a cyst or abscess is drained.

V. Cases where the Ventricles of the brain are drained, when hydrocephalus due to tumour is present.

XVIII. Detailed consideration of the first class of palliative operations. The distinctive feature of this class
is that the bone is cuphined, whilst the dura mater is left intact. The object is to relieve tension and avoid the most distressing of the attendant symptoms. Brucker & Ballance are of opinion that it is an useless proceeding, & quote in support of their view experiments performed by them on dead dogs, in which only 5-4 c.c. of oil was made to enter the dural cavity through the occipito-atlanto-axial ligament, the oil standing at 1000 m.m. in a capillary tube. Experience, however, seems to show that in some cases benefit may be derived from this proceeding. In a case reported by Mitchell Clarke Atkinson the patient suffered from severe head Pachee, confusion, deterioration, memory, failing sight due to double optic neuritis & vomiting irrespective of food. There was no localising symptoms & there-
A palliative operation was performed; a circle of bone 2 ½ inches in diameter was removed from the parietal region. The dura matter bulging was not incised, and the scalp flap was sewn over it. Headache was immediately relieved, sleep returned, and six months later the only complaint was deterioration in vision.

Caton and Paul reported a case 2 ½ years after onset of symptoms of acromegaly. There were present acute pain in the left side of the face and headache together with frequent vomiting, right optic atrophy, and left optic neuritis. It was decided to perform a palliative operation for the relief of the intense headache and progressive loss of vision. 3 ½ square inches of bone was removed, dura mater was exposed in right temporal region, the membrane protruded but was
not incised. The wound never completely healed, but the patient lived comfortably, and after the lapse of three months an improvement of vision set in.

The following case illustrates the great benefit often derived from palliative operation of this kind for headache, vomiting & optic neuritis. The patient was admitted into Guy's Hospital under the care of Mr. F. E. Blake. The headache began in August 1872, first of all in the following September, at first, both symptoms fluctuated, but in Jan. 1873, the headache was very severe & constant. She could only differentiate light from darkness & optic atrophy secondary to optic neuritis was observed to be setting in. The headache remained very severe & persistent, & the almost total blindness continued for 21 months. The discs in the
mean time were slowly becoming atrophied. On August 31, 1874, one bone, but no dura mater was removed, 9 the pieces of bone were replaced. She improved so rapidly that in three days she had quite gone. 9 in three weeks she could distinguish fingers held up at a distance of five feet. Rather more than three months after operation the sight again failed. 9 rather less than four months the headache returned. These cases show that this form of operation has its uses, may 9 in some cases be fairly tried before the further step of incising dura mater is resorted to.

Apart from the relief of urgent symptoms for which the operation is primarily performed, Horner is of opinion that the mere opening of the skull may lead to such alteration in the condition of nutrition of the growth...
as to cause quiescence or retrogression in it, the growth in two cases in which at the time of operation were found undoubtedly to be rapidly growing malignant tumours which after death were found to have undergone destruction.

XIX The op Second class of operation:
The operation here involves trephining; removal of bone & incision of dura mater. It is generally undertaken with a view to permanent cure & removal of tumour, but that it may be also employed as a palliative treatment is seen from the case previously referred to operated on by Dr. Itali White, at Guy's Hospital in Aug 31, 1894. The symptoms having recurred with such severity the patient decided to operate again on Jan 13th 1895. A considerable area of bone & dura mater was re-
moved. The headache at once dis-
appeared, the sight again improved
greatly. In two months however
the headache returned, & the sight
again failed. On April 23, 1895
more bone & dura mater was re-
moved & again the headache dis-
appeared & vision improved, but
the improvement in both respects
lasted only a fortnight. On May
22, 1895, more bone & dura mater
was removed with the result that
headache disappeared, & sight
improved, this time lasting longer
although some headache returned
& the improvement in sight was
not permanent, for the patient be-
came blind. She was quite certain
that until a year before her death
in 1900, the headache was much
less than before the skull was
opened. This case illustrates
admirably the benefit which
may follow trephining for relief of
headache & blindness. It is un-

usual in the fact that the operation was performed four times. The best
evidence that it was beneficial is the fact that after the first operation
the patient returned to hospital of her own accord with the request
that she might be trephined, as she had felt much relief from the
first operation. That this palliative operation was justifiable is
doubt: for it relieved the agonising headache, restored the
patient's sight, and in all probability prolonged her life. He told what
the referring to the above case says that he believes it is usual in
intra-cranial operations to open
the dura mater, but in the first
operation on this patient this was
not done; and yet there was consider-
able relief. No doubt, generally
speaking it is much better to open
the dura mater, but this case ap-
pears to show that if in any
patient there is very great intra
cranial pressure, it might be worth while to try the effect of not opening the dura mater, for that can al-
ways be done at a subsequent operation. It also avoids hernia cerebri.

The post mortem examination which was made by Dr. Bryant revealed a tumour, which was found to be a spindle cell sarcoma of the left caudate nucleus measuring 20 m. m. in transverse and 25 m. m. in longitudinal diameter.

A case which suggests at least a quiescence of the tumour after operation was operated on at Guy's early part of 1898. Patient was a girl of 16 years of age, admitted for blindness & headache.

A month before admission she was seized by a fit, in which the left angle of her mouth was drawn down. This was followed by paresis of left arm & leg, sickness, headache and aching
of eyes. Four days before admission the patient stated that she was quite blind in the left eye and that since then she became gradually blind in the right eye. On admission she was very apathetic and almost blind, distinguishing only between darkness and light. There was well marked double optic neuritis and no atrophy. After a month of treatment by drugs during which there was no improvement in the symptoms, an area of bone about 2 1/2 square inches was removed from the right parietal region, the dura mater bulged, a was opened, brain tissue bulged into the wound but appeared to be normal a was not explored. The dura mater was not entered, the bone was not replaced and the flap of soft parts were stitched up over the wound. Headache and vomiting were immediately relieved. A week after the operation the pat.
int could read & the inflammation of the disc's was seen to be subsiding. In a fortnight the wound was quite healed. Patient was discharged feeling quite well. There was some bulging at the site of operation. In 1900 the patient walked well in every way, there was no hernia cerebri, the sight was good, & there was no sign of increased intracranial pressure. There is therefore every hope that the tumour was become quiescent.

Of 14 cases in which this operation was performed at Guy's during the last 10 years, seven cases died within a month. In six cases there was marked improvement, which in three of these lasted for two years. In one case there was only slight improvement.

Analysis of the cases which died will show these figures to be more favourable than at first sight appears. In 3 cases
The tumour was tuberculous in nature; of these, one died of general tuberculosis, having been previously completely relieved of headache. Another died of tubercular meningitis. In the third case in which there was a caseous tubercular tumour of the size of a cricket ball, operation had been unduly postponed. Had it been performed earlier, or not in 19 months after the first symptoms, it might have secured relief, if not a cure. In the fourth of the cases that proved fatal, there was profuse haemorrhage from the excess of veins at the time of operation. The patient died exhausted on the same evening.

The fifth case was one of secondary carcinomata. A month after the operation which had caused an improvement in the general condition, the patient died of Pneumonia.
In the sixth case although the patient died comatose a month after operation, headache had been completely relieved & in the first fortnight his mental condition was improved.

The seventh case seems the only one in which the operation completely failed. It was performed for the relief of blindness due to tumour of the meninges pressing upon the brain in the temporo-sphenoidal region. Although optic atrophy was not present, the operation not only failed to produce improvement of vision but the patient's general condition rapidly deteriorated & death occurred within a month.

The above cases would seem to justify the view that the great benefit after often received by the patient far outweighs the possible harm done in a few unsuccessful cases.
The third classification:

This consists of operations which involve in addition to trephining a removal of a portion of the tumour.

It is sometimes found that only a partial removal of the growth is possible so that the removal of a part may act beneficially on the remainder.

Victor Horsley, vide (Clifford Allbutt Vol vii. p. 665), is of opinion that the removal of a portion of a tumour often produced a retarding influence upon the growth & development of the portion of the tumour that remains.

In (B.M.J. Dec 23, 1893) we find that Horsley removed part of a tuberculous tumour from the brain, on post-mortem examination six years later the brain showed no trace of tubercle.

Among the cases at Guy's during the last 10 years there was one case in which a firm
vascular tumour was shelled out from post-frontal & parietal region of the brain, the tumour being attached to the dura mater externly & medially abutting upon the Falx cerebri. The patient recovered from the immediate effects of the operation, but died 7 days later, having developed facial crepulias.

The brain had begun to expand but for the supercurrence of crepulias, the patient might have lived for some time relieved from his distressing symptoms, which comprised, severe headach, vomiting, impairment of sight, smell & parasthesia. That the case would probably not have been a cure was evident on post mortem examination by the fact that portions of the growth were found adherent to Falx cerebri.

Mr. J.M. Caird showed a case of a woman after partial removal
of an intra-cranial tumour at
the Edinburgh Medical-Chirurgical
Society (Vide, Lancet, March 15, 1882)

xxi. The fourth classification:
These are operations which consist
in draining an abscess or the cavity
of a cyst. Maclean reports the
case of a blow to the forehead by
a stone, purpura occurred in
the wound, followed by headache,
drowsiness, vomiting, occasional
rigor and double optic neuritis.
Apart from these general symptoms,
there was affection of motion or
sensation. The patient was tre-
phined and an abscess was evacuated
in the left frontal lobe. Symptoms
were relieved and patient recovered.

In (B. Int. March 14, 1896)
Mr. Charles A. Ballance relates
the case of a boy eleven years of
age admitted to the National
Hospital for paralysis and epilepsy
under Dr. Fowlers in Oct. 1870.
Six months before he had had a severe blow on the head. Since the injury he had suffered successively from following symptoms. Irritable temper, fits commencing with twitching of right angle of mouth & followed by paralysis of lower side of right face, gradual extension of paralysis to right upper & lower extremities, slurred speech, severe frontal headache and purposeless vomiting. After admission to Hospital these symptoms increased in severity. A double optic neuritis was observed. In Nov. 1900 a portion of bone was removed by me, and of trephining from over region of lower part of left motor cortex. A sub-cortical cyst was found & evacuated. The symptoms disappeared. In Feb. 1901 as the symptoms recurred a tube was passed into the cyst in order to drain it.
Continuously. The symptoms then in most part disappeared & the boy remained in fairly good health.

In Feb. 1893 when the condition became exceedingly grave, another operation was performed and a tumour three ounces in weight was removed from between the dura mater & left motor cortex, the boy left hospital quite well except for very slight hemiplegia.

In September 1893, he was readmitted in an almost moribund condition, I died in a few hours after another attempt was made to relieve the symptoms of pressure by operation. In post-mortem an enormous tumour was found situated in the right cerebral hemisphere.

In (Bluef 1896) Dr. Colman & Mr. Ballance report a case of cyst in a lady 52 years of age who had previous
he had excellent health. Symptoms commenced in an isolated fit, followed in 5 months by vomiting, some agraphia, alexia, aphasia with weakness of right hand and latter by optic neuritis of known agonizing headache. Some relief was temporarily obtained from administration of strychnine, & it was decided to relieve pressure by operation in two stages. For right subcortical tumour of Angular Gyrus had been diagnosed. At the first operation 3 in square of bone was removed & dura mater bulged. At this stage the headache & other symptoms were relieved for a week. The dura mater was then incised & cyst containing coaguable plasma was exposed & drained. The symptoms cleared up, yet two months later drainage being imperfect the symptoms re-
tumed and the patient died from pneumonia. There is a deep
good case of Actinomyotic abscess of brain upon which Beger
operated. The patient had two
years previously been operated
upon for an actinomyotic abscess
of the chest, which had prac-
tically healed up. An actinomy-
otic lesion of brain was diagnosed
from gradual increased weakness
of left arm. So this in time were
added paresis of left leg & left
side of face, headache, vomit-
ing & coma, and by the time
permission to operate was granted
the patient was apparently com-
atosed. By trephining & drain-
ing the abscess, life was pro-
longed for eight months with
gradual improvement till
the symptoms, & post mortem
examination another actinomy-
otic mass was found beneath
right frontal & parietal con-

solutions. It is therefore possible that had permission been given sooner to operate, complete removal of the tumour might have been effected.

A third case recently operated on at Guy's deserves mention. The chief symptom was the recurrence at decreasing intervals of epileptiform convulsions, beginning with twitchings of mouth. Six months after the first of these the lower part of the Rolandic area of right side was exposed by trephining and a thin-walled superficial cyst was found compressing the motor cortex. This was drained and the convulsions ceased. The patient died in four days from purulent meningitis, although undoubted relief was accorded in the first two cases. The prospect of recovery were still more favourable.
in the case of the last, had not cephalis unfortunately supervened in (Blunt Oct 28, 1890). There is recorded a case of a bullet in the brain producing in 9 months' time an abscess. Victor Norton, operated and there was recovery. The case was reported by Dr. A. St. Bampton, Islington. In (Blunt, March 21, 1891). Beevor and Norton report a case of an abscess in angular gyrus developing as the result of a kick in a boy. Skull was trephined & dura mater incised to relieve pressure. In (Blunt March 1, 1894) in C. Mansell Moulin's report a case of a boy aged 14 who received a blow on his head & subsequently developed the symptoms of tumour. On trephining an abscess superficial to periosteum was found & drained. Some days later symptoms of optic neuritis & increased intra-
cranial pressure developed. The skull was trephined over the temporoparietal lobes, the dura mater was found to be healthy but bulged. Trocar and cannula were inserted without success. They then trephined over the cerebellum, I again exploded without success. They then drained a few dramis of fluid from the descending cornu of lateral ventricle. Patient died in 24 hours after the operation, comatose. Post mortem examination showed an old encapsulated abscess in the left temporoparietal lobe. The abscess had probably been roused to activity by the blow. Had this abscess been successfully explored and drained, the symptoms would probably have been relieved, the patient's life prolonged, if not cured.
The fifth class of operation:—
This class consists in draining the ventricles in a case of hydrocephalus due to tumour pressing on the roof of the fourth ventricle or occcluding the foramen of Monro, or encroaching the liquor or obstructing the return of blood by the veins of Galen. These cases are by no means rare. Among 33 cases of cerebral tumour which died at Guy's from 1885 to 1895 inclusive, there were 9 such cases of these tumours. Three were tuberculous, two were glioma, two of unspecified nature, one a large cyst having a small tumour projecting from its posterior wall, one a mixed cell sarcoma, one a granulomatous tumour. In 5 of these cases the tumour was situated in the cerebellum, in 3 it involved the wall of the lter & in the other the tumour was situated in the interpeduncular space & pushed the floor of third ventricle upward. In only one of these cases was an
operation performed. The occipital region was trephined, but there was no relief and the patient died in eleven days. In such cases the cerebrospinal fluid secreted by the choroid plexuses is unable to make its way from the ventricular system into the subarachnoid space, then escape by the various channels, the lymphatics, nerve sheaths & pacchionian bodies into the general circulation. In the choroid plexuses the resistance to blood flow is probably less & capillary pressure higher than elsewhere in the brain. It is highly probable that much of the cerebrospinal fluid is secreted from these vascular fringes passing into the general meningeal spaces is absorbed by veins. Should the Sylvian aqueduct or foramen of Monro be blocked ventricular hydrocephalus may result, owing to the fact that the secretion takes place faster than absorption, it is at a higher pressure
than that of cerebral veins. If the veins of Galen are blocked, the pressure in the choroidal fringes will rise almost to that of the arteries owing to a deficiency of anastomoses with these veins. In such cases secretion is faster than absorption the hydrocephalus results. A local collection of fluid in the ventricles at a higher pressure than cerebral capillary pressure must lead to cerebral anaemia and atrophy.

The rational treatment for such cases would seem to establish a communication between the ventricular system and the subarachnoid space to take the place of the normal paths of communication. In (BL. J. Dec 23. 1893) Prof. Sahli of Berne suggests in 1890, the permanent drainage of the lateral ventricles. The operation has since been performed by Prof. Kocker, in a few cases with favourable results.

In a case of acute hydrocephalus
Mr. Watson Cheyne erected a catgut drain leading from lateral ventricle to subdural space and closed the cranial opening. Under this treatment the head rapidly diminished in size and symptoms disappeared. Drainage of ventricle into the tissues of the scalp appears not to be feasible proceeding.

Lucas. In several instances tried this method for meningocoele, but the fluid did not drain away and addition perispi was superved.

An interesting case was presented at Guy's in Jan. 1848. The patient who had spent some years abroad, due to his pulmonary condition, suffered from rapid loss of vision. There was also headache, vomiting, and rapidly progressing double optic neuritis. These symptoms steadily increased in intensity, and then were added staggering gait, mental deterioration, thoracic menstruation. Treatment by solides
was commenced, but the symptoms progressed so rapidly, especially optic neuritis, which was going on to atrophy; that in three weeks after admission it was decided to operate.

The left occipital region was trephined, and a piece of bone 2½ in. by 3½ in. was removed. The dura mater was incised, and the brain bulged very greatly; it was explored in several directions with a needle, but without result; the scalp flap was then drawn up. After the operation the patient was much collapsed, and right hemiplegia and aphasia were present. After a few days, one end of the flap incision opened, and clear fluid escaped probably making its way from the ventricle by one of the needle punctures. In this way, for a time, one or two pints of fluid would escape daily, after which the sinus would heal up, until
The accumulated fluid had to be released; this was done at first at intervals of two days a week, but the necessity gradually became less frequent until finally the patient went for several months without drainage. When the accumulation of fluid became excessive, the patient became greatly excited, saw flashes of light, goblins, heard noises; then the breathing and pulse began to fail and she became cyanosed. Relief was immediately obtained by passing a needle and establishing the flow.

The patient is now free from headache and her vision has improved, but the mental condition is childish. There is a hemia cerebri as big as a cocoa-nut and the fluid has still occasionally to be drained away. The freedom from cephalalgia in this case is remarkable and may be explained by the fluid tend-
mng to wash away all organisms. Batty Luke suggested lumbar lamineectomy, & the insertion of a horse hair drain within the skull case in order to relieve the intraocular pressure which he supposed to be the prime factor in cerebral paralysis.

Such an operation was subsequently performed by Duncan for traumatic injury to the spine. The patient recovered. But the suggestion of such an operation to relieve intraocular pressure seems to be based upon a false assumption for according to Hill at any pressure above the cerebral venous pressure the cerebrospinal fluid rapidly leaks away from the cranial cavity.

In all cases of trephining for tumor that I have seen I have not found it mentioned that there was ever any excess of fluid.
in the subarachnoid space
But even supposing that such
excess of fluid be present still
states that under this condition
the great brain is driven down
blocks the isthmus tentori
cerebelli, while at the same
time the cerebellum & bulb
descend & completely block
the foramen magnum so that
there is complete pressure con-
tinuity between the cranial &
vertebral cavities. For these
reasons it would seem that such
an operation directed towards reliev-
ing intracranial pressure by drain-
ing the vertebral canal would
be useless. The severe symptoms
the almost certain fatal results of
the increased intracranial ventric-
ular pressure of the brain renders any
operation which offers a reasonable
promise of relief deserving of careful consider-
ation. A few years ago it was shown that in
many of these cases the excessive pressure could be relieved
by puncture with a probe of the roof of the
fourth ventricle. Three striking examples
of the value of this basal drainage
have been recorded by Dr. S. F. Bradly
in all three cases very great improvement
followed. vide (Sancet Nov 23 1907).

Case 1 A boy age 14 years was admitted into
the Wolverhampton & Stafford General Hospital under
the care of Dr. J. A. Codd on March 9th 1900.
Complaining of severe headache. He had
measles two years previously & after had a slight
discharge of matter from both ears this left
him a little deaf on the right side. About the
beginning of February 1900 he was taken ill
with pain in the head & back of the neck. He
was ill at home for 3 weeks, with pain & sickness & was treated for influenza. In March
he was seen by Dr. Codd who found intense
double optic neuritis. Vision however was not
noticeably impaired; there was no ataxia
traumatic palsy or any local symptoms. There
was still a little purulent discharge in the
left meatus. He was admitted & treated
with large doses of Potassium iodide.
The headache improved & the vomiting
which had never been particularly "central" ceased. He was sent home to attend as an outpatient. The headache responded as badly as ever. On May 31 he was re-admitted to the surgical ward. He was a bright little gent lad with prominent eyes. The optic oedema was still intense, but there were no localizing symptoms of any kind. The pulse was not abnormally slow. Beyond a small perforation in the left Charcot's membrane there was no sign of old or recent oedema. He was however slightly deaf in the right ear. In the absence of localizing symptoms a provisional diagnosis of cerebellar tumour was made and it was decided to trephine the posterior fossa in order to examine the cerebellum to relieve the intracranial tension and prevent the danger of optic atrophy or blindness. The possibility of cerebellar abscess from oedema, although improbable, together with the complete absence of localizing symptoms led to the selection of the left side for trephining because the traces of past otitis seemed more evident on that side. A curvilinear flap was turned down a 3 in trephine
opening was made, a little to the left of the middle line immediately below the bital
planes. Suspecting the dura mater the cerebell
un bulged through & pulsedated very faintly
no sign of abscess or tumour was detected.
A curved director was passed beneath
the cerebellum in the direction of the fourth
ventricle for over an inch but no fluid
escaped. Two silk drains were then passed
some distance beneath the cerebellum & brought
out one at each angle of the scalp wound which
was closed without displacing the bone or
perturbing the dura mater. Headache was
at once relieved by the operation. A little
purulent discharge escaped from the one angle
of the wound when dressed on the eight
day. The following day both drains were
removed & the wound had healed. On
the twelfth day the patient got up but
vomited on returning to bed. On that
date the anurriia was already observed to
let less. 22 days after the operation it had
almost cleared up. But the upper outer
quadrants were still indistinct. There
formed some 4 weeks after operation
Headache soon returned, but now in severe paroxysms not continuously as before. The slight bulging through the trephine opening present when the patient was discharged increased till it projected nearly an inch above the galeal surface of the scalp. This swelling was partly reducible and felt like fluid. The paroxysms of headache were relieved by dipheneine and gradually ceased. Four months after the operation the swelling had almost gone and the lad returned to work as an errand boy. On Dec 12, 1900 the boy was again examined there was no sign of past neuritis in either eye or ear atrophy, but he thought the right was not as good as formerly. It was well and free from symptoms. The swelling over the trephine opening was variable at this date it was about 1½ in. in diameter and ½ in. high. At present (Sept 1901) he continues well at work.

Case 11 A man aged 30 years was admitted to hospital on April 16, 07. He had suffered for past 9 months from pains in the head & partial deafness in the left ear. There was a possible history of syphilis 3 or 4 years
before he had been treated for headache with antisyphilitic remedies without any effect. On admission he was strong and healthy. Head somewhat large with prominent overhanging forehead. The pain in head was chiefly frontal, worse on left side. Stares made worse by use of eyes. He complained that his eyes were somewhat indistinct. There was marked mydriasis of both eyes on looking to right or left, but no afferent, ocular or pupillary paralysis or inequality of pupils. There was intense double optic scotoma, but no swelling of discs. He complained of numbness brought under cheek over an area which was marked out, including nearly the whole cheek, no facial paralysis, jaws, tongue or larynx. He had staggering gait on walking, but could stand with his eyes closed. Giddiness at times. He was not intelligent enough to give a clear account of his sensations, marked incoordination of both hands. Throat jerks exaggerated, urine normal, also the thoracic and abdominal viscera. Pulse was not abnormally slow. Temperature varied between 97.0°F and 98.4°F. It was clear that there was increased intracranial tension and that the morbid process involved cranial nerves.
Diagnosis: Most probable cause is the tumour of cerebellum involving the middle lobe and microcysting on the pons.

Operation: Replied 1 inch in Post fora on right side. Haemorrhage from the veins was profuse and difficult to check. After incising the dura matter the cerebellum bulged into the aperture with pulsation. There was no sign of tumour visible. The bony opening was enlarged as much as possible in all directions in order to relief tension permanently. A curved blunt elevator was passed inwards beneath the cerebellum towards the fourth ventricle but no fluid was reached. A silk drain was inserted in the same position. The wound was closed without entering the dura matter. On the same evening the temperature rose to 99° the pulse to 96. Postoperatively in the following day he vomited persistently. The speech simulated steeple paralysis. The silk drain was removed on second day, but on the day after there was a profuse discharge of cerebro spinal fluid from the wound which continued for 4 weeks. At first sufficient to soak through the dressing & saturate
pillage case, after wound's diminishing, finally closing. The wound was healed the
scalp sutures were removed at the end of a week, but the cerebro-spinal fluid continued to drain
from a small point left after the suture. This finally closed on May 31. On 10th day the
temperature rose from the previous level of 97°
10° 9° to 10° 3° & then gradually subsided
towards normal. This corresponded to a temporary
partial cessation of flow of cerebro-spinal fluid
and the fall in temperature was accompanied
by a reduction of profuse flow. The patient was
at once relieved of headache & numbness of
face by operation, but in other respects his con-
dition was distinctly worse. His speech was
slow & indistinct. He was for a long time so
weak in the trunk's limbs that he was unable
to sit up in bed or to feed himself without assist-
dance. This condition slowly improved. Weeks
after operation, he was able to stand with a little
help. He was allowed to go home. The mental
state entirely subsided. At the time of writing
(4 months) after operation. He is in good gen-
eral health free from pain. His speech is
slow jerry & indistinct but less so than
it was. Light rather dim, orange, and has disappeared. He is able to stand while holding a table & thinks he is getting stronger. He walks, when supported, with an extremely spastic gait, lifting the feet very high at each step. The knees, jerks, are still most exaggerated. There is no sign of bulging over the spine, opening only unusual pulsation.

Case III. A lad aged 18 yrs. was admitted to the hospital since 26. 1907. For some 3 months his parents had noticed that his gait was peculiar & that he sometimes complained of headache & giddiness. He was constant at work & had had no serious illness. On June 14 at 5:45 p.m. he was suddenly seized with acute pain in the head, he left his work and went home. He vomited. On next day the pain continued & he vomited again. He was then seen by a medical man who found him in bed with a temperature of 102.4° F. marked retraction of the head, stiffness of the neck & a pulse which was slow in proportion to the temperature. There was much photophobia & the bowels were constipated. Other signs were negative. He remained for
10 days much in this condition. The pain been unrelieved by purgation, the chief skeye, on admission he was curled up in bed, lying differently on either side. He was quiet, conscious & intelligent as he had been through out. The pain was continuous, with paroxysmal exacerbation's, it began in the occipital region & worked round to the left mastoid region. There was no sign of other presence or past on either side. The temperature was 102.8, pulse 60. The head was retracted a very stiff. He was held in sitting posture with difficulty in order to examine the eyes. Marked double optic neuritis was found, but no tubercles were seen in the choroid. There was no papint, inequality of pupils or ocular paralysis; but marked photophobia was present. The cranial nerves were unaffected. There had been no local spasm or general convulsion. Both knee jerks were exaggerated but there was no loss of power in either limb, the thoracic & abdominal visera appeared to be normal. The urine contained no albumen, the red blood corpuscles, haemoglobin
were normal, the temperature rose number 18.400.

On the day after admission, the left occipital bone was exposed below the lateral sinus as close to the middle line as possible and opening into the posterior fossa made with a gouge; after wards enlarged with a forceps to the diameter of half an inch. The dura mater was incised and a curved elevator passed beneath the cerebellum into the fourth ventricle. There was a rush of about one ounce of clear fluid from the cerebellum which was previous protruded and then immediately sucked within the skull unexpanded normally. The pulse momentarily slowed down but after
rose again to 72. Respiration was unaffected, a drain of silk wound gut pliable was passed into the arachnoid space for about one inch brought out at the angle of the wound which was otherwise completely closed. Two and a half hours later, the boy was free from headache but the head was still retracted. Convulsion was rapid, but the temperature varied daily between 98° and 100°.
for four days and did not reach the normal level until the 9th day. It then continued normal. The pulse frequency remained sub-normal for over a fortnight, but the other symptoms gradually subsided. The wound healed by primary union, and the drain was removed at the end of a week. The fluid appeared to have drained by it after the first 24 hours. The optic neuritis subsided slowly. A month after the operation the discs were still swollen and indistinct, but by a fortnight later they had somewhat improved. He had got up at the end of 2 weeks and returned home a few days later. When last seen a month later he was apparently in good health and free from all sequelae of his illness except the scar on the head, the still present but subsiding optic neuritis. The cerebral spinal fluid removed at the operation was rendered by the clinical research association for the diploceccus intracellularis with negative result.
Conclusion:

In the foregoing sections an attempt has been made to give a brief conspectus of the most important facts relating to intracranial tumours. Though the subject has, of recent years made remarkable advance, there is yet connected with it much obscurity of many disputable points. Progress must necessarily be slow. For although much valuable information and suggestions have been derived from experiments conducted on the lower animals such as dogs, monkeys, etc. Our chief source of information is observation post mortem of tumours produced by accident or disease in the human brain.

In dealing with a case of intracranial tumour it is obvious from what has been said that a surgeon has to face two different sets of difficulties—Theoretical difficulties and Practical difficulties. The first set consists of those which
errors arise from inadequate knowledge of the symptoms whereby the disease may be diagnosed & localized, either in absence of symptoms or perhaps in the fact that the symptoms have never been discovered, tumours often defy localization & consequently removal. It must be borne in mind also that the localization of functions in different parts of the brain area - upon which the localization of tumour is partly based is itself in the present condition of knowledge largely controversial. Perhaps it may be said that the one thing perfectly well established is that the central convolutions on either side of the fissure of Rolando form a kind of motor zone - a region by which all the motor impulses which leave the cortex pass out. There is too, a consensus of opinion in favour of regarding the occipital lobes as an indispensable part for vision in man. Hence spinae, disturbance in
both eyes comes from lesion of either one of them, a total blindness from destruction of both. As to hearing, the temporal lobe is undoubtedly the seat of the hearing function as is borne out by the phenomena. These kindred positions may be regarded as established.

It is however a mistake to think that the cortex can be mapped out into absolute areas, within which only one movement or sensation is represented. The views of two eminent writers may be quoted on this point. Dr. Wm. James writes: "The truth seems to be rather that although there is a correspondence of certain regions of the brain to certain regions of the body, yet the several parts within each bodily region are represented throughout the whole of the corresponding brain region. This however does not prevent each part from having its focus at one spot within the brain region. The various brain regions merge into each other in the
same mixed way." In a similar strain Dr. Horsley writes: "There are border centres; the area of representation of the face merges into that for the representation of the upper limb. If there was a focal lesion at that point you would have the movements of these two parts starting together." The above statements which tend to show that localising symptoms have to be treated with caution and care are in full agreement with the following statement of Dr. Byron Brown well in Clifford Allbutt's Medicine page 645. "It is important to remember that the different cortical centres run one into another, and that they are intimately connected by association fibres and commissural tracts with other parts of the brain tissue, more particularly with the other centres of motion of grey matter with which they are intimately functional relationship. Consequently, destruction or irritation of one centre may produce functional disturbances elsewhere, as the
result either of inhibition or of irritation in other, and it may be distant centres."

The second class of difficulties which the operator has to face may be called practical difficulties. Assuming the most favourable conditions in respect of localisation, that is, that in addition to the general symptoms, well marked localising symptoms indicating more or less clearly the exact position of the tumour are present, there still remain one or two questions which are all important — is the position of the tumour accessible? If so is the tumour itself of such a character as to allow of complete excision? Difficulties which arise from the inaccessibility of the tumour or from its unassuageable nature may be called practical difficulties, as distinguished from those already considered which were due to want of such definite knowledge as would necessarily lead to its localisation.

The above considerations would seem to point to drug treat
ment of palliative trephining as the proper method to adopt in the great majority of cases of intra-cranial tumour. It is a curious fact that those very cases in which personal interference with a view to complete removal may be most safely attempted are also the cases most amenable to drug treatment. Tumours are most easily localized & most safely reached when they are situated in the motor area of the brain. But the majority of such tumours are syphilitic & respond to treatment by Pot. soda.

Where the tumour is situated in other parts of the brain there may be no localising symptoms present, the tumour having its seat in one of the so called "silent regions of the brain" or the symptoms that are present may be misleading, or the tumour itself may possess such pathological characters vide section viii page 16 of this thesis. As to make successful
operative interference impossible.

As the majority of tumours seem to fall under one of these descriptions, it is extremely rare that one can hope to remove them surgically.

On the other hand experience has shown that palliative treatment, though not always unattended with danger, has resulted in innumerable cases of which some examples have been described, in the prolongation of the life of the patient & in a substantial addition to his comfort. In this connection the opinion of Dr. Byron Bramwell based on a wide range of experience may be quoted. Vide Clifford Allbutt Medicine page 665. "But notwithstanding these risks I am of opinion from the observation of a considerable number of cases in which the operation had actually been performed, that on the whole the disadvantages to be gained by the operation as a palliative measure
are greater than the disadvantages, and that in those cases, at all events, in which the suffering of the patient are intense, and in which all other means have failed to give relief, the operation should be performed."

The progress of our knowledge of the localization of function in the brain may lead to the correlation of definite symptoms with tumors situated in definite parts of the brain. This may help to locate tumors. It is more difficult to see how increased knowledge can help to reduce the difficulties due to the inaccessibility or pathological character of the tumor.

In the present position of our knowledge, it would seem from the study of the main facts relating to tumors, that the normal method of treatment should be, as follows:

Firstly: - An attempt should be made to cure or alleviate by means of drug treatment, concomitantly
with this the various palliative means known to medicine should be used.

Secondly: If the above treatment fails to give relief, palliative

theplumous should be resorted to this is known to have put an end to the

intense agonising headache —

headache as intense agonising that

its continuance would involve the

patient's death. It also removes

optic neuritis may prevent post

neurotic optic atrophy & permanent

blindness.

Thirdly: If the condition of the tum-

our both local & intrinsic are

favourable to a complete removal, which is seldom the case, the

tumour should be removed by a subsequent of surgical opera-

tion. It should however be noted that in almost all cases

in which the symptoms are

not relieved by large doses of

20 drachm. perchlor the disease

potassium...
proves fatal & often rapidly fatal.

(signed) M. F. James, M. B. R. C. M.