SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY.

February 7, 1930.

President—W. M. MOLLISON, M.Ch.

Abscess of the Brain—Professor HEINRICH VON NEUMANN.—The paper is published in the *Journal of Laryngology and Otology*, Vol. xlv., p. 377, June 1930.

Abscess of the Brain—HUGH CAIRNS.—The paper is published in the *Journal of Laryngology and Otology*, Vol. xlv., p. 385, June 1930.

Temporal Lobe Abscess. (Notes on seventeen consecutive cases operated upon at the Royal Infirmary, Edinburgh, from 1908 to 1929)—J. S. FRASER, F.R.C.S.Ed., and B. B. BLOMFIELD, F.R.C.S.Ed.—In the first case, that of a female child, aged 5 years, suffering from chronic middle-ear suppuration on the left side, the temporal lobe abscess was complicated by a perisinus abscess, labyrinthitis and meningitis, which were all present on admission. The patient recovered.

The second case was a male, aged 17 years, suffering from chronic middle-ear suppuration on both sides. The symptoms of brain abscess only came on after the radical mastoid operation had been performed on the left side—a skin graft has been applied. It is noteworthy that the posterior wound healed well and that the radical mastoid cavity and skin graft appeared satisfactory. Elevated temperature, headache and vomiting were followed by subnormal temperature and dilatation of the pupil on the same side and twitchings of the opposite side of the body. After drainage there was retention of pus in the abscess. This was relieved by improving the drainage. The patient's mental condition changed with the development of the abscess—from a shy, quiet youth he became violent and maniacal. The patient recovered.

In the third case, that of a female, aged 11 years, suffering from chronic suppurative otitis media on both sides, with temporal lobe abscess on the left side, the drainage of the abscess was evidently insufficient, although a piece of brain was removed at the time of operation. Leakage occurred into the lateral ventricle and thereafter meningitis developed. Death occurred only seventeen days after the onset of discharge of purulent cerebrospinal fluid from the abscess.

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In the fourth case, in a male, aged 29 years, with chronic suppurative otitis media on the right side, there was some doubt as to whether the abscess was present on admission. There had been a rigor before admission but no headache. Operation showed an extradural abscess on the right side. There was no dilatation of the pupil on this side to guide one. When the brain abscess was opened, cerebrospinal fluid escaped along with the pus, so that it was practically certain that the abscess had already ruptured into the lateral ventricle. The patient died.

The fifth case was in a male, aged 23 years, suffering from chronic suppurative otitis media (bilateral), with temporal lobe access on the right side. Owing to the presence of meningitis and of repeated rigors, and the fact that the lesion was on the right side, the abscess was not diagnosed. The patient had been treated by his own doctor as a case of biliousness! Autopsy showed that the abscess had ruptured into the lateral ventricle, and it is probable that leakage into the lateral ventricle was present on admission. The patient died. It is interesting that an uncle of this patient had also died of brain abscess.

The sixth case, in a male aged 27 years, was one of *acute* suppurative otitis media on the right side. Before admission there had been sudden stoppage of the discharge, followed by severe headache and vomiting, with irritability and also sudden loss of speech. The lesion was on the right side and the patient was right-handed. There was no dilatation of the pupil but there was tenderness on tapping over the temporal lobe. At the operation it is interesting to note that though the case was an acute one, the mastoid was dense and an extradural abscess was present in the middle fossa. The temporal lobe was not investigated at this stage. The patient did well till he was allowed to get up ten days after the first operation. Immediately after this there appears to have been a rupture of the abscess into the lateral ventricle, because when the abscess was opened pus and cerebrospinal fluid at once escaped. The patient died.

The seventh case, in a female aged 43 years, was again an acute case (left side). Owing to the intense frontal headache the patient was sent in by her doctor as a case of acute frontal sinus suppuration. There was, however, no pus in the nose. The first operation was performed by another surgeon, but, unfortunately, though the sinus was exposed, the dura of the middle fossa was not uncovered. The frontal pain persisted and a herpetic eruption appeared on the left side of the face. The onset of drowsiness, subnormal temperature and optic aphasia, with weakness of the grasp on the contralateral side, led to the diagnosis of temporal lobe abscess. Drainage in this case was insufficient until a comparatively large piece of dura and brain were cut away. After that the patient did well.

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The eighth case, in a female aged 55 years, was also an acute one (left side), but it is interesting to note that the patient had had previous attacks of acute middle-ear suppuration in 1917 and 1921 before the last attack in 1922. Further, the perforation of the drumhead was an anterior one. Radiograms showed a dense mastoid on the left (diseased) side and a cellular mastoid on the right. In addition to the general symptoms of brain abscess the patient had an epileptiform attack. There was no paresis of the third nerve and no dilatation of the pupil. A large extradural abscess was opened at the first operation. In spite of the opening of this abscess vomiting continued, with subnormal temperature and sensory aphasia. A second operation was performed, evacuating the temporal lobe abscess. The patient recovered.

In the ninth case a male, aged 21 years, suffered from chronic suppurative otitis media on the right side. He had been operated upon by one of us (J. S. F.) for septic thrombosis of the lateral sinus on the right side, with a metastatic abscess in the ilium five years before his second admission. Though the patient was left-handed, the grasp of his right hand was stronger than that of the left. A temporal lobe abscess on the right side and purulent meningitis were diagnosed. The abscess was opened, but later ruptured into the lateral ventricle. The patient died.

The tenth case, in a male aged 19 years, was one of bilateral chronic suppurative otitis media, with abscess of right temporal lobe. Most of the general symptoms of brain abscess except vomiting were present. The patient constantly clawed the right side of his head. During the operation the respiration stopped for a time. An extradural abscess was present in the middle fossa. The patient recovered.

The eleventh case, in a female aged 9 years, was also due to chronic middle-ear suppuration (right). A perisinus abscess was present. The temporal lobe abscess was opened at the first operation, but a hernia cerebri formed. Rigors and hectic temperature developed after operation, and therefore the sigmoid sinus was opened, but no clot was found. The patient died. Autopsy revealed meningitis, with pus in the lateral ventricle.

The twelfth case was in a female, aged 3 years, with chronic suppurative otitis media (left). There were right-sided convulsions and the right pupil was large. Later there was paralysis of the right side. A temporal lobe abscess was evacuated at the first operation. Later cerebrospinal fluid came away from the brain abscess and death followed from meningitis.

In the thirteenth case the patient, a male, aged 23 years, had chronic suppurative otitis media (left). He had headache and pain in the back, but no vomiting and no optic aphasia. The dura of the middle

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fossa was greyish-green in colour. The abscess was not opened at the first operation. Later optic aphasia was noted and nystagmus to both sides. The brain abscess was then opened and the patient recovered.

The fourteenth case, in a male patient aged 54 years, was one of chronic suppurative otitis media (right). There was severe pain in the right side of the head. A radical mastoid operation was performed and a skin graft applied. Later the patient had temporal headache and vomiting. The temporal lobe was explored with a negative result. Meningitis developed. At the second operation an acute temporal lobe abscess, situated higher up and further forward than usual, was evacuated. The patient died. It is probable that the abscess had only supervened after the radical operation.

In the fifteenth case the patient, a male aged 28 years, suffered from chronic middle-ear suppuration (left), with giddiness. He refused operation. Seven years later he was admitted as an urgent case, with mastoid tenderness and a history of vomiting, headache, rigor and drowsiness. At operation an extradural abscess was found in the middle fossa. The temporal lobe abscess was opened at the first operation. Lumbar puncture evacuated purulent cerebrospinal fluid. The drainage of the abscess was not sufficient till a large piece of dura mater and brain had been removed. After that the patient did well and recovered.

In the sixteenth case a male patient, aged 21 years, with chronic suppurative otitis media (right), was admitted in a moribund condition. The temperature was 103°; Kernig's sign was present; the neck was stiff and the right pupil dilated. There was paresis of the left arm. At operation a perisinus abscess was found. The cerebellum was therefore investigated, but with negative result. At the same operation a large temporal lobe abscess was evacuated. Later rigors occurred, and therefore the lateral sinus was investigated, but no clot was found. The patient died, and at the autopsy numerous abscesses were noted in the brain. Meningitis was also present.

The seventeenth case, in a female aged 56 years, was one of chronic suppurative otitis media (left). The left Gasserian ganglion had been removed by a general surgeon, on account of trigeminal neuralgia, three years before the patient's admission to the Ear and Throat Department. The case record stated that the wound became infected, but the patient recovered. On admission to our department the patient had pain in the left mastoid and occipital regions. The left ear was quite deaf. At the operation a cavity was found above the cochlea leading to the dura mater of the middle fossa (this was, of course, due to the previous Gasserian ganglion operation). Later there was severe pain in the left temporal region and epileptiform

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fits occurred, followed by coma and neck stiffness. The cerebrospinal fluid was cloudy and contained streptococci. Translabyrinthine drainage was performed and the left temporal lobe investigated, but with negative result. Two days later a large temporal lobe abscess was opened, but the patient died. Post-mortem examination showed purulent meningitis.

Summary.

Of the seventeen patients, ten were males and seven females.

Age.—Thirteen were under 30 years of age. The youngest was 3 years of age and the oldest 55. *Size.*—The right side was affected in nine and the left side in eight cases. In only three cases was the otitis media acute, whereas in fourteen it was chronic.

Examination of the Inner Ear.—The labyrinth was found to be functionating in thirteen cases and inactive in two. In the remaining two the inner ear could not be tested.

General Symptoms.—Headache was a marked feature in fifteen and vomiting in thirteen cases. The temperature on admission is interesting. For while only seven cases showed subnormal temperature, fever was present in eight and in two the temperature was normal. The pulse was slow in five cases and rapid in eight. In the remaining four it was normal. Ten of the patients were drowsy or even comatose on admission, making neurological examination difficult and in some impossible. In four slight delirium alternated with drowsiness.

Localising Symptoms.—As is well known, the localising symptoms in cases of temporal lobe abscess are often far from definite, but tenderness on percussion of the temporal region was noted in four, dilatation of the pupil on the affected side in three, and sensory aphasia in only four of the eight patients with left-sided abscess. One patient with a right-sided temporal lobe abscess suffered from sudden loss of speech. In two cases there was twitching of limbs or paresis on the opposite side; one case had slight paresis of the opposite side of the face; three showed contraction of the face on the same side; three patients had epileptiform or convulsive attacks. Of the eight cases in which the eyes were examined by an ophthalmologist, double optic neuritis was noted in two, congestion and swelling of the disc on the affected side in one, and slight œdema of both discs, but most marked on the diseased side in one.

Findings at Operation.—An extradural abscess was found in the middle cranial fossa in six; the dura mater showed granulations in one; the dura mater of the middle fossa was tense and bulging in six; the dura mater was greyish-green and necrotic in two.

Drainage.—A cigarette drain was first employed in five cases; iodoform gauze drainage in six; tubes were employed in two cases. In one case the iodoform gauze drainage was found to be unsatisfactory till a fairly large piece of dura and brain was removed.

Complications.—In six cases meningitis was present on admission, and of these one patient recovered and five died. In other six cases meningitis developed after the first operation and all these patients died. In the remaining five cases there was no meningitis and all recovered.

Total.—Six patients recovered and eleven died.

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Societies' Proceedings

Pathology of Adjacent Brain Abscess—E. MILES ATKINSON, F.R.C.S.—I propose to confine my attention entirely to adjacent brain abscess of aural origin. The essential point at issue is the route of passage of infection into the brain tissue. In order to get a clear conception of how a brain abscess originates, it is necessary to bear in mind certain points of anatomy and physiology:—

(1) In the first place, the vascular supply of the brain. This comes from two sources, central and cortical vessels, branches of the circle of Willis. The central vessels pass at the base of the brain directly into its substance and then outwards through the white matter towards, but not as far as, the cortex. The cortical vessels supply the grey matter of the cortex by means of a large number of small vessels, and also a layer of white matter immediately subjacent to the cortex by a smaller number of larger vessels, these latter in the white matter passing towards, but not anastomosing with, the terminal branches of the central vessels—not anastomosing with them because the cerebral arteries are end-arteries. Therefore between these two groups of vessels is a zone of white matter with a poor blood supply which we may call the avascular zone. In the cerebrum this zone is situated just below the grey matter of the cortex, but in the cerebellum, by reason of the greater convolution, it likewise becomes folded and is found, therefore, to lie down the centre of each folium. I will return to this point later in speaking of the direction of spread of these abscesses.

(2) The second point to be borne in mind is that whenever a cortical vessel passes from the surface down into a fissure, it takes with it a prolongation of the subarachnoid space in which the cerebrospinal fluid circulates, so that both arteries and veins, as they lie together in a fissure, are surrounded by the perivascular or Virchow-Robin space.

(3) The third point to note is that the cerebrospinal fluid normally flows outwards to the surface in these perivascular spaces, but Weed has shown that any increase in pressure in the subarachnoid space will cause a cessation and then a reversal of the flow.

Now we are in a position to sketch briefly the mode of onset of a brain abscess. The infection in the ear passes through the bone of the skull and reaches the dura. If the organism is of high virulence, the dura fails to withstand the passage, an area of necrosis appears, and the subarachnoid space is infected before there is time for adhesions to form—a generalised meningitis has resulted. If, however, the degree of virulence is less and the tissue resistance greater, an area of localised meningitis occurs, and subjacent to the point of attack adhesions form to wall off the main part of the subarachnoid space from infection, just as adhesions form round

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an area of infection in the peritoneal cavity. This area of localised meningitis—the point of entry of the infection—is signalised by a thickening of the dura mater, more or less obvious according to the extent and nature of the adhesions beneath. Such an area of thickened dura is to be found in the vast majority of cases. In those I have been able to examine it was found in eight out of fourteen (57 per cent.) at operation and in thirteen out of fifteen (87 per cent.) museum or post-mortem specimens. Most authorities are agreed on this. It is therefore worth while at operation to make an adequate exposure of the dura and to hunt carefully for such a point of thickening, for if found it will not only lead one straight to the underlying abscess, but drainage through such an area surrounded by adhesions is more free from risk.

This area of localised meningitis involves an interference with the cerebrospinal fluid circulation in its neighbourhood—a stoppage or reversal of flow—and the infecting organisms are thus provided with an easy passage along the perivascular sheaths into the brain substance. This is the first, and in my experience the most common, of the three possible routes of entry. It occurs in 80 per cent. of cases.

The organisms having reached the brain by way of the perivascular space, proceed with their pus-forming activities at the point of least resistance—that is, in the avascular zone beneath the cortex. This slide [shown], from a cerebellar case, illustrates some of the points, the extremely localised nature of the attack upon the brain (one lobule) and the intense perivasculitis. The next one [slide shown], from the same case, shows a small abscess situated accurately in the centre of the white core of a lobule, in the position which we have been led to expect. It is next to impossible to obtain a similar specimen from a temporal lobe case, because the abscess in extending does so circumferentially and destroys the site of origin, but by analogy one may presume, without undue stretching of the imagination, that an exactly similar process occurs there also.

The venous route is much less common (12 per cent.), although Eagleton claims that it is the usual one. It arises by the coincidence of a pial vein happening to lie across the point of infection, when thrombosis occurs which spreads backwards into the brain substance. It is most liable to happen in connection with a lateral sinus thrombosis. The histological appearances are quite distinct. Here we see a vein filled with breaking-down clot [slide shown], the accompanying artery being patent, and the vessels in the fissure, which we cannot see here, show similar appearances. The degree of surrounding perivasculitis is slight, due merely to the infected thrombus. The area of brain drained by this vessel commences to degenerate from interference with its blood supply, and again the part least able to stand up to this is

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that in which the blood supply is least good, *i.e.* the avascular zone. Another slide from the same case shows an abscess again occupying the position of the white core of a folium, with several thrombosed veins on the surface. The cases in this group are more likely to show multiple abscesses and to cause death by meningitis, as they tend to spread towards the surface along the course of the thrombosis and to rupture into the subarachnoid space.

The third route requires but brief mention. If an artery is caught in the area of infection, it may become partially or completely occluded by a thrombus, and from this thrombus a small embolus can be shot off. This slide shows a thrombosed artery in the wall of an abscess which was probably occasioned by the thrombosis [slide shown]. The onset of such abscesses due to embolism is typically apoplectiform, and their situation is not necessarily adjacent to the focus of infection.

Spread.—Once an abscess has started in the brain substance it tends to increase in size in a fairly constant manner. The grey matter of the cortex is more resistant, by reason of its better blood supply, than the central white matter, and extension therefore occurs at the expense of the latter. In the cerebrum the abscess tends to spread along the course of the vessels towards the lateral ventricle, perforation into which is a not unusual terminal event. Exploration, therefore, should be towards the ventricle, and the operator must have a very clear conception of the position of this structure inside the brain.

In the cerebellum extension occurs again at the expense of the white matter, but, in this case, of the white matter forming the centre of a lobule. This central core is gradually destroyed, inwards as far as the central mass of white matter and backwards through the lobule. The central white mass is respected until quite late in the course of the disease. In other words the ordinary cerebellar abscess, as distinct from the multiple abscesses commonly secondary to a sinus thrombosis, is a single abscess and is nearly always confined to one lobule. That lobule is usually the one immediately below, and sometimes the one immediately above, the great horizontal fissure, which is covered by the horizontal part of the lateral sinus. One of these two lobules is the most likely place in which to find a cerebellar abscess in default of any guiding sign, such as a patch of aural thickening. It is, moreover, quite frequently a smooth-walled regular cavity, and not, as often stated, full of nooks and crannies and hence difficult to drain.

Capsule.—A few words about the capsule of the abscess. I use the word because it is part of the usual brain abscess jargon, but it is a complete misnomer. All we mean by it is the wall of the abscess cavity, and it differs in no essential respect from the wall of an abscess in any other part of the body—it is simply the expression of the attempt on the part of the body to wall off and limit the speed of an

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infection. It occurs more slowly and with more difficulty in the brain, because the neuroglia, being a specialised connective tissue, does not enter into reparative and protective processes with the same zeal as connective tissue in other parts. Thus we have, with a very virulent infection, no evidence of a protective mechanism, but simply an acute spreading encephalitis similar to an acute spreading cellulitis in the arm. At the other end of the scale we have a very chronic abscess with a thick wall, and between the two all possible gradations. The point of practical importance is that the greater the resistance the more obvious the so-called capsule will be, the greater will be the chance of recovery from operation, but the fewer and more equivocal are the signs. The cases prolific of signs, general and localising, are those which approach nearest to the acute spreading encephalitis and are the ones of worst prognosis. I believe that if we are to diminish the mortality of this condition we must be prepared to explore the brain on much less evidence than we usually demand at present, bearing in mind that brain exploration involves little risk, while the failure to find an abscess present in the brain of necessity involves the death of the patient.

Cases.

Actinomycosis of Brain—W. H. JEWELL, O.B.E., M.D.—E. M., spinster, clerk, aged 29 years.

History.—Onset: sore throat and stiffness of jaw five weeks before admission to hospital. Several carious teeth extracted three weeks previously. Owing to the patient becoming collapsed remainder of teeth could not be removed. Vomiting lasting three days fourteen days before admission. Frontal and occipital headache ten days. Photophobia and pain in eyes seven days. So severe and fixed was the brow pain that the case was sent to hospital as one of frontal sinus trouble.

On Admission.—Patient apathetic and cerebration slow. Complaining chiefly of brow pain. Pupils unequal; active to light, the left dilating more than right. No evidence of any infiltration in mouth, jaws or neck. Temperature 100·6°; pulse 88; respiration 24.

Ten days later anæsthesia of left side supervened, followed by paresis of leg, arm and lower half of face, the orbicularis palpebrarum escaping. Babinski left.

Lumbar Puncture.—Small excess of cells, some of these being polymorphonuclears. No organisms; no excess of globulin; glucose content slightly subnormal; chlorides 0·78 per cent.

The skull was trephined over the right Rolandic area and an extradural abscess, and also a larger subdural abscess, were evacuated and drained with split rubber tubes.

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Dr Southgate examined the pus and reported the presence of the ray fungus.

Following the operation the patient's condition greatly improved. The headache disappeared, temperature became normal, and the mentality almost natural, but the paralysis had only slightly diminished. Fourteen days afterwards the patient began to go downhill, and she died seventeen days after the operation.

[Slide and brain shown.]

Ossiculectomy for Vertigo, due to Attic Cholesteatoma. Recovery. (Previously shown 5th November 1927.*)—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—First seen 15th September 1926. Suppuration in the ear since childhood. Headache and especially giddiness (had been in bed for six weeks with vomiting and vertigo). Cholesteatomatous masses pent up by ossicles. Ossiculectomy, May 1927. Free from vertigo ever since. Hearing better than before.

A Mastoid shown by X-rays to be Abnormal, but not found to be so clinically—C. HAMBLEN THOMAS, F.R.C.S.—M. A., a girl aged 11 years.

History.—Earache in both ears for two years intermittently, but no aural discharge and no headache, giddiness or vomiting. When examined she complained of pain in mastoid regions, especially on left side.

Condition on Admission.—Pale-faced, but nothing found wrong in general condition or in eyes. Teeth in order, but in pharynx, from which tonsils and adenoids had been removed at two operations, were a remnant of right tonsil and an adenoid tag.

Examination of Ear.—Apart from some tenderness on deep pressure, over the left mastoid especially, and inability to inflate the ear, nothing abnormal could be found either in appearance of ears or in the response to usual tests. A skiagram showed a right mastoid which was acellular and a left which was highly cellular. The frontal sinuses were unusually large.

After the patient had had a week's rest in hospital and treatment with antiphlogistine the pain left the ears and was referred to the frontal region, with headache and nausea. Temperature and pulse remained normal. Three weeks later patient was discharged from hospital, having no frontal headache or other symptoms.

I brought this case because the skiagrams showed a difference between the two mastoids. A physician has seen the patient and suggested the presence of a chronic infection, for which operation should be performed. On testing the child I could find no clinical evidence of disease. The point of interest is the warning it affords

* See *Proceedings*, xxi., 1928, 392 (Sect. Otol., 6).

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that one must not be entirely guided by X-ray appearances. There is a large frontal sinus.

Mr O. POPPER suggested that because one mastoid was acellular it did not necessarily constitute clinical abnormality. It merely meant that that side had not pneumatised in the ordinary way. He did not know why it was spoken of as an abnormality, by Mr Hamblen Thomas, which should have produced clinical signs. Only the skiagrams, whose value he (Mr Hamblen Thomas) deprecated, would give this information—apart from bilateral operation.

Mr HAMBLEN THOMAS, in reply, said that the skiagrams had appeared to show an abnormality, and in so calling it he (the speaker) had been guided by the X-ray specialist.

VIENNA LARYNGO-RHINOLOGICAL SOCIETY.

MEETING OF 5TH NOVEMBER 1929.

(*Monatsschrift für Ohrenheilkunde*, February 1930.)

Abstracted by ALEX. R. TWEEDIE, F.R.C.S.

Pulsion Diverticulum of the Hypopharynx. Radical operation fourteen days previously; now convalescent—Dr MARSCHIK.—The case was that of a man aged 48 who for 1½ years had suffered with the typical disabilities of such patients. X-ray examination showed that a diverticulum, only the size of a cherry, was lying considerably to the right side. The exhibitor, in accordance with the practice which he had adopted exclusively for the last ten years, had performed the radical operation with the removal of the sac and complete primary suture—the sac being first freely exposed and after removal sewn up with tiers of Lembert's sutures. The dressing was completed with strips of gauze laid into the wound towards the mediastinum with a view to prevention of complications—the gauze being removed in some six to eight days. In this case the healing was per primam and there was no sign at present of any fistula.

In emphasising the superiority of this method of operation the author referred to the other methods of Goldman and of Glück, and also to his own method of prophylactic mediastinotomy, as a means of guarding against the subsequent mediastinitis.

Carcinoma of the Œsophagus—simulating Perichondritis of the Thyroid Cartilage — Dr HAJEK. — A man, aged 50 years, reported on the 25th March 1929, complaining of difficulty in

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