interference with, and the wholesale removal of, this important structure as is still practised, and even illustrated in the latest surgical text-books on rhinology.

Discussion.

Dr. J. S. Fraser asked Dr. Gogarty whether he meant that turbinotomy is never to be performed? The great point of radical operation on the maxillary antrum is the removal of the anterior end of the inferior turbinal and the ventilation and free drainage of the cavity. Mr. Tilley has recorded several cases in which the radical operation failed till he removed a piece of the anterior end of the inferior turbinal. The speaker's experience coincided with that of Mr. Tilley and he had never seen rhinitis and pharyngitis sicca following a moderate removal of the inferior turbinal. He was not referring to cases in which the spokeshave had been used.

Dr. J. W. Killen agreed that removal of the inferior turbinal bone was unnecessary if the antro-nasal septum was cut away low enough to ensure efficient drainage.

Dr. Watson Williams considered that the communication from Dr. Gogarty was of great value in directing attention to a group of nasal affections that had hitherto frequently escaped detection.

OTOGENIC PHARYNGEAL ABSCESS.

By Dan McKenzie.

Otogenic pharyngeal abscess is a rarity. In 1906, Holmes, reporting a case which appeared later in the *Annals of Otology*, stated that he had been told by no fewer than 147 of his colleagues that they had never seen a case, and most otologists of the present day would, I imagine, reply very much to the same effect. For, although it is true that when knowledge of a new disease becomes general its rarity often disappears; still, in the present instance, as I hope to show later on, the probability is that with our modern methods of rapid diagnosis and early intervention, otogenic pharyngeal abscess must be rarer to-day than it used to be twenty or even ten years ago.

Before proceeding to discuss the types of otogenic pharyngeal abscess with which this paper deals, we must first of all clear the way by alluding to pharyngeal adenitis and gland abscess secondary to aural sepsis.

Everyone is acquainted with the retro-pharyngeal lymphatic nodes, but the occurrence of septic infection of these masses of gland-tissue in association with suppuration of the ear seems to have escaped general attention. Yet, in infants particularly, the

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combination is by no means uncommon, and even in adults unilateral swelling of the posterior pharyngeal wall, probably adenitis which has not come to abscess, is not uncommon in suppuration of the middle ear. I have on several occasions remarked its presence after a mastoid operation, and Weil has reported a case in which the condition was confirmed by a *post-mortem*.

Septic adenitis in this situation, however, may plausibly be ascribed not to infection from the middle ear, but to infection from the nose or naso-pharynx. That is to say, the retro-pharyngeal adenitis and the otitis may be looked upon as independent of each other save in the sense that they both arise from one common cause. Nevertheless, it is, on the other hand, highly probable that the infection of the pharyngeal gland is sometimes transmitted to it from the middle-ear cavities, or at least from the Eustachian tube, since, as Golgi's researches and the clinical course of cancerous growths in the middle ear alike show, there is lymphatic connection between the middle ear and the lymph-nodes in the pharynx.

But pharyngeal abscess of this kind, if due to infection from the middle ear, is a metastatic infection, and what the present paper particularly deals with is the occurrence of pharyngeal abscess in obvious communication with the middle ear by pus tracks traceable with the naked eye.

In gathering together the material for this article I have to express my indebtedness to Dr. M. Guillemin, who has made this topic the subject of a *Thèse* (*de Nancy*), published in 1913, and to Prof. Jacques, of Nancy, through whose personal kindness I was enabled to obtain a copy of Dr. Guillemin's thesis. In this work, forty-seven cases of otogenic pharyngeal abscess have been collected from the literature and from the Nancy clinic, and to that number I am able to add thirteen further cases, including two reported by Mr. A. Cheatle and one by myself.

Pathogenesis.

For many illuminating suggestions upon the pathogenesis of the condition I am to a great extent beholden to Dr. Guillemin, but I have also taken the liberty of handling the facts after my own fashion.

The first thought that strikes one after running over the narratives of the cases in the literature is surprise that this complication of middle-ear suppuration should be so rare as it undoubtedly is.

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And then additional surprise is felt when we discover that what would seem *à priori* to be the most likely and direct route for the pus from the ear to follow, that, namely, through the petrous bone, is, in reality, selected much less frequently than an indirect route through one or other of a number of tortuous channels, natural and pathological, which we shall examine in detail later on.

In treating of the pathogenesis it must be remembered that the *post-mortem* evidence at our disposal is not too plentiful, and our conclusions, therefore, though highly probable, are not entirely dependable and will doubtless undergo modification and alteration as fresh facts come to light.

There are four different ways in which otogenic pharyngeal abscess may be produced. First of all, as we have already hinted, by direct extension of the purulent disease from the middle ear through the petrous bone to the pharynx; secondly, by the wandering of an extra-dural abscess of the middle cranial fossa to the tip of the petrous, and thence by the foramen lacerum anticum or otherwise to the extra-cranial inferior surface of that bone; thirdly, by the direct extension of purulent disease from the pneumatic cells in the tympano-mastoid osseous structure to the under surface of the occiput and thence to the pharynx in a manner we shall examine in detail later on; and fourthly, by the wandering of an extra-dural abscess of the posterior cranial fossa to the same sub-occipital region.

These four methods may be conveniently described in pairs, the first two together, since in both of them the pus reaches the pharynx from the region of the tip or under surface of the petrous bone—we may term this the *sub-petrous variety*—and the last two together, since in them the pus reaches the pharynx from the under surface of the occiput—the *sub-occipital variety*.

I. The Sub-Petrous Variety.

We begin with the first group, that in which the pus reaches the pharynx from the tip or under-surface of the petrous bone, and we shall describe, first of all, the direct route through the petrous bone itself, and secondly the indirect route by way of the floor of the middle cranial fossa.

The Direct Route from the Middle Ear through the Petrous Bone.—The apex of the petrous lies, of course, in close anatomical relationship with the pharynx. Near by is the orifice of the bony portion of the Eustachian tube, the walls of which may contain

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aberrant air-cells in direct communication with the middle ear. Further, as Cheatle and Mouret have pointed out, the apex of the petrous may contain cellular extensions from the mastoid which pass between the cortex of the petrous and the upper limits of the labyrinth capsule—the supra-labyrinth cells—above the internal auditory meatus. And, again, cells may extend inwards from the floor of the tympanum between the labyrinth capsule and the jugular bulb—the sub-labyrinth cells—to the apex of the petrous below the internal auditory meatus and in relation to the carotid canal. Finally, a number of writers have drawn attention to the canal for the tensor tympani as a likely route by which pus may reach the pharynx.

The tensor tympani, it will be remembered, which is from 10 to 15 *mm.* in length, occupies a canal in the roof of the Eustachian tube and passes as far forward as the spine of the sphenoid and the adjacent part of the greater wing of that bone, so that pus following its fibres would certainly arrive at a position commanding an extension to the pharynx. Guillemin, however, is inclined to criticise this view. He points out that the muscle would be more likely to obstruct than to favour the propagation of the disease unless the infection is so virulent as to destroy its fibres. His criticism is supported by *à priori* reasoning. If this channel were a likely route one would expect pharyngeal abscess to be much more frequent than it is, since the canal is a constant structure. But, on the other hand, we have to record the fact that in a fatal case reported by Knapp the *post-mortem* findings showed that the pus did actually take this route to reach the pharynx.

Before leaving this division of the subject mention may be made of a curious case described by Haug in which a piece of cotton wool inserted into the ear by the patient himself led to the formation of a pharyngeal abscess. When the abscess was opened, through the mouth, the foreign body was recovered. Haug supposes that the patient had contrived to push the cotton wool through the floor of the tympanum, and that it then moved along towards the pharynx outside the Eustachian tube. But the simpler explanation that the plug had ulcerated its way through the walls of the tube is perhaps more acceptable.

Another possible route for the pus to follow is that by way of the carotid canal, the walls of which are occasionally occupied by pneumatic spaces, as we have already seen. A considerable number of cases are on record in which pus found its way into this channel with varying results, as we shall see.

Such, then, are the routes through the petrous by which pus from the middle ear may make its way to the apex or under surface

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of the bone and so to the pharynx. But in spite of these numerous possibilities this (after the variety next to be described) is the rarest mode of production of a rare condition, and one naturally looks around for an explanation of this fact. I suppose it is to be found in the infrequency of aberrant air-cells in the petrous. At all events I can suggest no other explanation.

The Indirect Route from the Middle Ear by way of the Middle Cranial Fossa.—We now proceed to examine the methods by which extra-dural pus in the middle cranial fossa may find its way to the sub-petrous region. As is well known, extra-dural abscess of the middle fossa takes origin usually in the roof of the tympanum, aditus, or antrum—we exclude for the moment extra-dural abscess formed from petrous disease—and to reach the apex of the petrous bone it has to burrow downward, forward, and inward between the dura and the anterior surface of the pyramid.

Extra-dural abscess of the middle fossæ may also be formed locally at the apex of the petrous by disease of those occasional aberrant air-cells of the petrous which we discussed in the last section, as in the case described and depicted by Wilkinson. It is by these abscesses that the cranial nerve paralyses are produced, of which recent otological literature presents several interesting examples.

From this region we may suppose that in order to produce pharyngeal abscess the pus of an extra-dural collection must find its way out of the cranial cavity through the foramen lacerum anticum, or through the foramen ovale, or through a fistulous opening in the bone produced by the disease.

That pharyngeal abscess is so rarely induced by this particular method—there seems to be only one case on record, that of Auvert—need cause no surprise. To begin with, the dura mater is very closely adherent to the bone of the petrous pyramid, so that, unless the pus follows a pre-existing channel, like that of the superior petrosal sinus, its inward passage must be made with great difficulty. In the second place, even when it has reached the neighbourhood of the foramen lacerum anticum, its escape from the cranial cavity will be opposed by the firm adhesion of the dura to edges of the foramen and by the stout ligamentous union between the petrous and the sphenoid bones.

In this connection we must refer to an extraordinary case reported by Boyce Barrow. The patient was a woman, aged thirty-eight, with middle-ear suppuration, facial paralysis, and headache. A mastoid operation was performed without relief, and, after several interventions, dysphagia and dyspnœa appeared, and the patient

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began to expectorate fœtid pus. In spite of all efforts death took place. The autopsy showed an extra-dural abscess on the external aspect of the frontal lobe, pus from which was draining through a perforation in the cribriform plate of the ethmoid. The extra-dural abscess communicated with an abscess in the temporal lobe.

By whatsoever channel the pus reaches the under-surface of the petrous once it has got to this region it is already in close relationship with the lateral wall of the pharynx. Here it may present passing in above the upper border of the superior constrictor within the lateral pharyngeal fascia. Or, following the downward and inward direction of the levator palati muscle which is attached to the cartilaginous portion of the Eustachian tube, it points in the palate above the tonsil, very much in the position of the ordinary peritonsillar abscess. (That being so the appearance of a peritonsillar abscess in the course of a suppuration of the middle ear, particularly if the latter is acute, should lead to a careful investigation of the case in order to exclude any connection with the disease in the ear.)

In this neighbourhood the abscess and its surrounding zone of inflammation come into contact with the pterygoid muscles, particularly with the inner head of the internal pterygoid (Hessler's case with *post-mortem*), whereby, as we shall see in the next section, certain characteristic symptoms are produced.

Further, the proximity of the pus, both within and without the cranium, to the inferior maxillary division of the fifth nerve is responsible for neuralgic pains, and may also induce spasm or paralysis of the muscles of mastication.

We have seen that the cells by which the suppuration traverses the petrous sometimes border upon the carotid canal. In this way ulceration of the artery and fatal hæmorrhage may occur. Short of ulceration the records show that the carotid canal may become filled with granulations and pus to such an extent as to compress the artery, as in Grunert's case, to a fine tube, "the size of a knitting needle."

In Grunert's case the posterior wall of the carotid canal at the apex of the pyramid had become separated and was found lying loose in pus. There was a retro-pharyngeal abscess continuous with the original collection at the apex of the mastoid.

The mention of caries of the carotid canal leads us to draw attention to a case of pharyngeal abscess reported by Guisez, in which a sequestrum of the antero-inferior wall of the tympanum was found and removed. And here, also, we may appropriately

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refer to those cases in which a fistulous opening has been observed in the anterior wall of the bony external auditory meatus communicating with the deep abscess. Cheatle has drawn attention to this circumstance, and similar cases have been reported by Kofler, v. d. Busch—quoted by Hessler—and others.

Three explanations may be suggested for this occurrence: first, that the abscess forming in the deep pterygoid and pharyngeal regions may erode the anterior bony wall of the external meatus; secondly, that, as Hessler, relying upon Huschke's findings, says, natural defects are common in the bone of the anterior meatal wall, and so the pus readily breaks through this wall; or thirdly, and most probably, pneumatic cells in the anterior meatal or adjoining tympanic or carotid walls which are participating in the production of the deep abscess, break down and thus form the fistula.

II. The Sub-occipital Variety.

We come now to discuss the modes of production of the second variety of otogenic pharyngeal abscess, that, namely, in which the pus collects in the sub-occipital region, whence it passes to reach the pharynx by a more or less circuitous route.

We must pause here to interpolate the remark that otogenic sub-occipital abscesses as a rule either remain limited to this region, pointing and discharging in the upper zone of the neck behind the sterno-mastoid, or else they gravitate directly downwards to open in the lower cervical region or, it may be, to extend to regions even more remote. The extension to the pharynx is exceptional. But for all that, the sub-occipital pharyngeal abscess seems to be commoner than the sub-petrous variety.

Following the plan adopted in the last section, we shall first of all examine the methods by which the sub-occipital abscess forms, and, secondly, the routes by which it may reach the pharynx.

As we have already seen, in this, as in the last variety, there are two sub-varieties: first, that in which the pus reaches the sub-occipital region directly from the bone-cells of the mastoid and of the occipital bone; and, secondly, that in which the pus reaches the sub-occipital region after traversing the posterior cranial fossa, usually as an extra-dural abscess.

The Direct Route from the Tympano-mastoid Spaces to the Sub-occipital Region.

We may define the sub-occipital region for the purposes of this paper as that part of the cervical region immediately below the occiput which lies posterior to

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the styloid processes and rectus capitis lateralis muscle, medial to the inner aspect of the mastoid process, lateral to the margin of the foramen magnum and the occipital condyle, and anterior to the superior curved line of the occiput. (This definition brings the jugular foramen into the *sub-petrous* region, and so assumes that pus emerging from that opening will pass to the pharyngeal wall *direct* as in Variety I. Probably this is just how pus having this origin would behave if it escaped beyond the carotid sheath, but we shall allude to this point later.)

When pus from the middle ear and mastoid process finds its way directly to the sub-occipital region it does so in a manner that reminds us of the formation of Bezold's abscess. The infection, passing to pneumatic cells at the base of the skull, sets up osteitis and cario-necrosis of the cortical wall of the cell, eventuating in the formation of a fistula through which the pus finds its way into the soft tissues of the neck. In this case these soft tissues are the muscles of the nape of the neck which are attached to the occiput, together with their intermuscular fascial planes. In this sub-variety, we may remind the reader, *intra*-cranial disease is not one of the steps of the process.

The researches of Cheatle, Perez, Mouret and others have shown that the cells which play the most important *rôle* in the production of sub-occipital, and so of pharyngeal, abscess is that occasional group which lies in the "digastric triangle,"—that is, in the bone between the mastoid process and the occipito-mastoid suture. These are known as the "sinuso-digastric cells." They communicate with the mastoid cells at a point on the inner wall of the mastoid process, midway between the vertical part of the lateral sinus, the posterior wall of the external meatus, the antrum and the mastoid apex—a spot which should always be carefully scrutinised in mastoid operations.

This group of cells may also extend across the suture and invade the occiput (Cheatle), where, in combination with an occasional extension of the sub-labyrinth group, they may lead to the jugular foramen being completely encircled with pneumatic bone.

When pus breaks out from these cells it finds itself, as we have already said, in the sub-occipital region.

The Indirect Route to the Sub-occipital Region.

So much for the direct or osseous route of infection of the sub-occipital tissues. We turn now to the group in which pus reaches the sub-occipital region after traversing the posterior cranial fossa *as an extra-dural abscess.*

In most of the case-reports it is assumed that the pus burrows down to the jugular foramen and finds its way to the exterior

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through this opening, a route which would bring it at once to the pharyngeal region.

Guillemin, criticising this view, expresses surprise that in none of the cases, with the exception of that of Laurens, has any note been made of interference with the nerves in the jugular foramen. This circumstance, coupled with the consideration that the dura mater of the sinus channel is closely adherent all round the foramen, leads him to doubt whether the pus does pass out by the jugular opening as often as has been surmised. He suggests, as an alternative and more likely route, that the pus may emerge through the occipito-mastoid suture where it traverses the lateral wall of the jugular foramen, a direction which would, of course, bring it definitely into the *sub-occipital* region.

A septic clot within the lateral sinus and jugular vein may give rise to pharyngeal abscess. But this particular origin of the abscess, curiously enough, seems to be very rare, as only one or two cases are on record.

We have remarked above that from the jugular foramen pus would pass directly to the pharynx, seeing that the foramen opens anterior to the rectus capitis lateralis and the styloid process, but equally of course it would be contained—for a time at all events—within the carotid sheath, which is attached to the bone around the carotid canal and the foramen lacerum posticum. Probably, therefore, Guillemin's explanation is correct that pus in the sub-occipital region originating in a peri-sinus abscess gets out of the skull through some opening other than the jugular foramen. In addition to the occipito-mastoid suture it is obvious also that, like the mastoid emissary vein further up, the posterior condylar foramen may furnish an outlet for peri-sinus pus. This foramen, which lodges a vein, leads from the jugular bulb to the sub-occipital region.

Secondly, several authorities have suggested that an extra-dural abscess may pass out of the skull by the foramen magnum. But, as Guillemin points out, the close attachment of the dura to the margins of the opening, and anteriorly, the presence of the resistant occipito-atlantoid ligaments, must render its exit here a matter of great difficulty.

Thirdly, the anterior condylar foramen may conceivably provide an escape for an extra-dural abscess. This channel would, like the jugular foramen, bring the pus direct to the pharynx.

It is said that a small venous plexus, dependent upon the lateral sinus, accompanies the hypoglossal nerve in this canal, and if it becomes thrombosed may initiate pharyngeal abscess.

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Instead, however, of following such pre-existing channels the pus of an extra-dural abscess sometimes destroys the bone to reach the deep cervical region. The base of the skull at the side of the foramen magnum, for example, is liable to such penetration, as it is thin to translucency, especially where it forms the roof of the horizontal posterior condylar foramen, an opening which also, as we have just seen, may furnish a vent to extra-dural abscess.

In one or other of these ways, then—either directly from a fistulous sinuso-digastric cell or indirectly from the draining of an extra-dural abscess—pus reaches the sub-occipital region and the intermuscular spaces between the deep posterior and lateral cervical muscles attached to the occiput.

As a consequence, deep-seated cervical cellulitis is set up, which in most cases, as we have said, remains confined to the posterior cervical region, coming to the surface or being opened up behind the sterno-mastoid, but which also sometimes gravitates towards the pharynx and reaches that cavity in spite of the muscular and fascial obstacles to its progress in that direction.

It remains for us now to trace the paths by which sub-occipital pus may get to the pharynx. This involves a consideration of the muscles and the fasciæ in the region.

The key to the position is the rectus capitis lateralis muscle and the stout layer of deep cervical fascia which lies in front of it, stretching across from the pre-vertebral to the deep parotid fascia. In front of the fascial layer is the carotid sheath with its vessels and nerves.

The rectus capitis lateralis is a small quadrilateral muscle, which runs from the transverse process of the atlas upward to the jugular process of the occipital bone. (Its surface landmark is the posterior wall of the external auditory meatus.) It thus stretches like a curtain across the space between atlas and occiput, and extends laterally from the styloid to the occipital condyle, so that it divides the region into an anterior and a posterior compartment. The former we have termed the sub-petrous and the latter the sub-occipital region. In the *sub-petrous* region in front of the barrier are the styloid process and its muscles, the carotid sheath, and the structures lateral to the pharynx. Behind the barrier in the *sub-occipital* region lie the insertions of the deep posterior and lateral cervical muscles, the posterior condylar foramen, the vertebral artery, and so on. And here the pus gathers from diseased sinuso-digastric cells and from wandering extra-dural abscesses of the posterior fossa.

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From this region the pus tends to make its way out towards the surface, piloted generally by the occipital artery between the complexus and the splenius. The question we have to answer is, Why does it also sometimes get in front of the rectus lateralis so as to reach the pharynx.

Guillemin seems to hold that the pus may in some cases, under the influence of gravity, find its way between the medial border of the muscle and the occipital condyle, where only one layer of fascia is interposed. The route round the outer border, by the styloid process, is barred by three fascial layers—that of the rectus lateralis, of the deep parotid fascia, and of the carotid sheath—which here unite. Jacques supposes that in the cases where pharyngeal abscess forms, the fascial layers are weak or defective.

Without denying this, one may also suppose that when the fistula or the foramen of exit lies well behind the barrier, then the pus will be likely to remain limited to the posterior regions. Whereas, if it emerges close to the barrier, where the liquefaciant action of the pus can act upon the fibres of the rectus lateralis and of its fascia, then it will tend to spread both towards the surface of the posterior cervical triangle and towards the pharynx.

Once the barrier is broken through, the pus reaches the subpetrous region and passes thence to the pharynx.

In most of the cases the infection is severe. The bone-disease is extensive, and multiple fistulous openings exist with general cellulitis of the whole region, in which circumstances, muscular and fascial conditions are negligible.

Among other developments which may manifest themselves we may mention the following: The pus may follow the stylo-pharyngeus muscle to the inferior pharyngeal regions. It may pass with the digastric to the floor of the mouth, or in deeper parts it may break into the occipito-atlantoid articulation.

Symptomatology.

The most convenient way of describing the symptoms is first of all to take those which are caused by the local focus in the pharynx, and then, secondly, to allude to those due to the original lesion.

Symptoms caused by the Focus in the Pharynx.

In many of the cases the discovery of an abscess in the pharynx seems to have been accidental, and in a few the pharyngeal collection has been unsuspected until it was found at the autopsy.

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In these cases either local symptoms were absent, we may suppose, or they passed unnoticed in the presence of other and more prominent clinical manifestations.

The usual symptom which leads to the examination of the throat is pain on swallowing, and, if we were to judge by the silence in the case-records, we should have to dismiss the local symptoms without any further remark.

In a case under my own care, however, the symptoms present were so characteristic and indicated the location of the phlegmonous lesion so precisely that I venture to say that they are the inevitable accompaniments of abscess in the deep pterygoid and pharyngeal region, and that they will be found, if looked for, more or less plainly marked, in all cases where reactionary phenomena are not entirely absent. No apology, therefore, is necessary for detailing them.

Pain was the first symptom complained of, appearing several weeks before the pharyngeal abscess was suspected, and affecting all the teeth in the upper and lower jaw of the left side. So severe was it that the patient, believing it to be toothache, had eleven teeth extracted. This obviously was caused by irritation of the fifth nerve.

Several weeks later the patient came into my hands and a radical mastoid and labyrinthotomy operation was performed. A fortnight later the "toothache" disappeared.

Six weeks after the operation pain was again experienced, but on this occasion it was localised in the left cheek and parotid region. It was deep-seated and agonising in character.

After a week of pain, œdema of the left temple, orbit, and cheek appeared, and rapidly became very considerable. Although it affected the soft parts above and below the zygoma, the œdema was less over that process of bone itself, the position of which was indicated by a shallow transverse linear hollow.

With the appearance of œdema came difficulty in mastication, from pain and stiffness on moving the jaw. On examination the mandible was found to be fixed in a half-open position, so that it could neither be opened fully nor closed, and attempts to do so caused pain.

Pain was also felt on swallowing, and on inspecting the throat marked swelling and redness of the left tonsillar region and of the left side of the pharynx were observed.

The general symptoms need not detain us. They were those of septicæmia.

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Obviously nothing but a phlegmon situated in and limited to the depths of the pterygoid and lateral pharyngeal region could give rise to such a symptom-group.

The most important external signs were the distribution of the œdema and of the pain, and the fixation of the lower jaw in the half-open position. Closure of the jaw is effected by the masseters and by the internal pterygoid muscles. Difficulty in closing the jaw is also seen in furuncle of the anterior meatal wall, particularly where there is some associated inflammation of the parotid region. But in pharyngeal abscess furuncle can be excluded. Thus the difficulty in closing the jaw must have been due to mechanical interference with the action of the internal pterygoid.

Again, the jaw could not be fully opened. This symptom is found in simple peritonsillar abscess, but in that condition the mouth can be closed.

Perhaps, also, mechanical interference with the moving of the condyle of the jaw and of the ramus played some part in the causation of this symptom.

These are the symptoms produced by the focus in the pharynx, and we proceed now to discuss the clinical picture produced by the original lesions—excluding, of course, those referable directly to the ear.

Symptoms of the Sub-petrous Type.

Direct Type.—The symptoms which appear in this type need not be detailed as they are, of course, those of complications of middle-ear suppuration due to extension of the disease into aberrant pneumatic spaces in the petrous. Thus the condition may be entirely latent or we may have the signs of purulent labyrinthitis, of facial paralysis (as in my case quoted above) or of extra-dural abscess at the tip of the petrous affecting the cranial nerves in this neighbourhood—the third, fourth, fifth and sixth.

Indirect (or Extra-dural) Type.—Extra-dural abscess may, of course, be entirely latent, and in that case the appearances of the pharyngeal complication would be unaccompanied by any other clinical signs, except those in the ear-spaces.

Otherwise, the presence of headache or paralyses, or irritation of the cranial nerves exist.

It must be remembered, however, that the picture we have just drawn is that of direct otogenic pharyngeal abscess in its early stages.

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As might be expected, the subsequent progress of events effects considerable alteration in the aspect of the case if the abscess remains unopened. To begin with, the lapse of time leads to an increase in size of the pharyngeal tumour, with the result that difficulty in breathing, sometimes very grave, may be added to the dysphagia. Further, the collection of pus tends to gravitate also down the neck. It is said that there is little or no possibility of abscess in the posterior pharyngeal wall sinking below the cricoid since the pharyngeal aponeurosis merges into the œsophageal wall at this point (E. Urbantschitsch). But with regard to lateral pharyngeal abscess, the reports show that gravitation of the pus in the deep planes of the neck does undoubtedly occur, in which case, of course, the usual signs of deep cervical cellulitis make their appearance.

With these local symptoms in the severer cases appear the signs of grave septicæmia or pyæmia.

If still untreated there is the risk of the deep cervical abscess finding its way into the thorax and causing death from mediastinitis and general sepsis.

But in a large number, perhaps the majority, of cases the condition relieves itself by the spontaneous breaking of the pharyngeal abscess into the pharynx. And experience has shown that, apart from such untoward and uncommon happenings as asphyxia or aspiration pneumonia from a sudden gush of pus into the trachea, the discharge of pus into the pharynx is the natural method of cure in these cases.

Symptoms of the Sub-occipital Type.

Apart from the local pharyngeal signs and symptoms, the appearance presented by this type differs markedly from those of the sub-petrous type.

The most prominent phenomena are those of cellulitis of the posterior cervical triangle.

A typical case constructed from the records will be described, it being understood that departures from type are frequent, and moreover, that the picture may be modified by the presence of complications, of which the most frequent is lateral sinus thrombosis. We shall omit the symptoms of extra-dural abscess.

In the course of an acute suppuration of the middle ear, or of an acute exacerbation of a chronic suppuration, especially if there has been some delay in opening and draining the mastoid, the

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signs and symptoms appear of cervical cellulitis in the upper region of the posterior triangle.

There is pain, especially on moving the head—torticollis is usually very evident. In the early stages swelling, with œdema, and tenderness on deep pressure over the neck close to the skull appear, and the whole area manifests a tough, brawny induration. These inflammatory phenomena tend to spread down the neck, and in some cases have reached as far as the clavicle before the pus close to the skull had got to the surface. Along with the local phenomena we find the usual signs of severe toxæmia.

This leads to operation. Incisions are made in the upper part of the neck and deepened until pus appears, which, as in Guillemin's and Jacques' case, may be seen to be oozing from the bone of the base of the skull.

At the same time, or earlier, the mastoid is opened and drained.

The drainage, however, does not remove the general symptoms. More or less pain, fever, and toxæmia continue, and further explorations in the neck or ear may be undertaken, but again without any decided or continued relief.

About this period discomfort on swallowing begins to attract the patient's attention, and if the pharynx be examined pharyngeal redness and swelling of the lateral wall or supra-tonsillar region will be observed.

The further course of the case corresponds with that just described in the last section.

In the literature I have not yet come across a case in which the definite signs of the deep pterygoid abscess were noted and described. This may be due to one of two causes. First of all, the special symptoms may have been overlooked, or, secondly, a sub-occipital abscess passing round the medial border of the rectus lateralis, situated as it would be some little distance from the pterygoid region, may not set up these special phenomena.

The course of the illness, in both types of the disease, as may be gathered from the foregoing account of its developments, is usually tedious and prolonged, but it is continuous. Intermissions and temporary halts do not seem to occur. The average duration of the cases is from one to two months.

Diagnosis.

Lateral or retro-pharyngeal abscess from strictly local causes is not an uncommon condition. What is important is that we

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should be able to recognise the fact that it proceeds from the ear when it does so. At times this will be impossible, and at other times the real state of matters will escape notice. The combination of ear discharge with the pharyngeal abscess should awaken suspicion, and this will be strengthened if temporal or facial œdema, fixation of the jaw, or cervical cellulitis is present. The importance of detecting the true nature of the case lies in the fact that a radical mastoid operation would be called for, if it had not already been performed.

Prognosis.

The prognosis of the otitic complications which lead to pharyngeal abscess is serious, until the pharyngeal abscess forms and breaks or is opened. Then a lightening in the symptoms takes place with surprising rapidity, the flow of pus from the ear and from the cervical wounds lessens and stops; the infiltration and cellulitis diminish; the pain and constitutional symptoms subside and disappear, and the patient gets well.

The reason for this welcome transformation lies in the fact that the pharyngeal extension is generally the most dependent pocket of a diffused and widespread abscess, so that once it is opened efficient and continuous drainage of the whole region is effected. So strikingly is this exemplified in the records that Guillemin has suggested that in severe sub-occipital cellulitis the surgeon himself should, by breaking through the barrier of the rectus lateralis with a blunt instrument, offer this line of escape to the inflammatory products.

Naturally the prognosis is less favourable if the other complications are dangerous.

These considerations render fallacious any argument we might base upon case-mortality.

Treatment.

Prevention.—In the sub-occipital variety most of the case-narratives show operation on the initial mastoid suppuration to have been delayed, for one reason or another. Thus, the best method of preventing the cervical cellulitis and other complications of which the pharyngeal abscess is merely an expression, is to open up mastoid cells as soon as mastoiditis is diagnosed. This, of course, is nowadays the general practice. Consequently I have expressed the opinion that these complications of suppurative otitis are probably rarer to-day than formerly.

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This remark does not apply with the same force to the sub-petrous variety, in which the extension of the suppuration to the pharynx is an early event in the evolution of the case.

Curative : Sub-petrous Variety.—If diagnosed early the treatment I employed in the case already mentioned may be adopted. An opening is made with a gouge in the anterior bony wall of the external auditory meatus, so as to form a window close to the tympanum, and deep to the temporo-mandibular articulation. This leads to the sub-petrous abscess. After the pus has been evacuated the abscess cavity is lightly packed through the artificial opening, and the patient is kept lying on his back, so as to encourage drainage. The mastoid wound is left open and the packing is removed and replaced daily by this route. In my case complete recovery followed in ten days.

This method is recommended in early cases, that is to say before the bulging in the pharynx has attained to such dimensions and prominence as will enable it to be easily and safely opened through the mouth. But if the pharyngeal wall is prominently bulging the experience which has been gained in the treatment of the sub-occipital variety shows that, in spite of the very natural *à priori* objections to opening an abscess due to bone disease in the pharynx, this route of access and of relief is not only quite safe but is also curative of the original disease upon which the pus-formation depends. We may, therefore, safely recommend it in the treatment of this particular variety also.

The older surgeons have been at pains to open these abscesses from the outside of the neck by an incision through the skin in front of or behind the sterno-mastoid. But unless there is extensive or progressing cervical cellulitis an external incision is unnecessary. Should widespread cervical cellulitis be present, however, especially if it has reached a level lower than the angle of the jaw, then undoubtedly most surgeons would consider an external incision not only justifiable but imperative.

The opening of the abscess through the mouth presents no difficulties whether it is situated on the lateral or on the posterior wall of the pharynx. The plan followed in opening simple peritonsillar abscesses is applicable also to the otogenic variety. A small incision is made through the mucous membrane. Through the incision the closed blades of a pair of dressing-forceps are inserted into the abscess cavity, opened widely and withdrawn open.

Care should be taken to keep the opening patent until the abscess is healed.

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Sub-occipital Variety.—The best method of attacking the cervical cellulitis after the mastoid cells and their extensions have been opened up, is to detach the sterno-mastoid muscle, to remove the apex of the mastoid process, and to work our way inwards close to the bone of the digastric fossa and the jugular process of the occiput, so as to provide free exit for the pus in this region. This dissection may necessitate the division and ligature of the occipital artery. Additional incisions of relief at lower levels in the neck will be called for when the circumstances demand them.

With regard to the pharyngeal abscess, it should be opened through the mouth in the manner already described.

Appendix.

Guillemin's Cases:	
His own	2
Collected	45
My Cases:	47
Tollens, 1; Grunert, 1; Haug, 1; Kofler, 1; Kreiss, 4;	
Cheatle, 2; Hessler, 1; McKenzie, 1; Gatscher 1 . .	13
Total	60

Deaths, 12 out of 59. (In several of the cases the pharyngeal abscess seems to have been overlooked until the *post-mortem* examination.)

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