general destruction of the face with its ostium. Nature makes every attempt to close any opening, while we persist in trying to thwart her.

This narrow opening as described will accomplish anything that the larger one will do: it permits access for observation, ventilation, drainage, and irrigation, and prevents the desiccation of the interior which results in the destruction of cilia and the metaplasia of the epithelium—an irreversible change which may start up disagreeable symptoms of its own.

The operation is comparable to a so-called "antrum window," which is effective because it lies away from the air-stream and leaves the ostium intact. It is of course not applicable to sinuses obliterated by large cysts and abscesses, nor is it designed for exploratory purposes such as the diagnosis of tumours, aneurysms, and the like. It would not apply to most of the type of cases described a few years ago by Pickworth and Graves, in which the bone had been deeply involved and the infection had reached the meninges, or to those discussed in Turner and Reynolds's classical monograph on intracranial invasions. For such the emergency suggests its own rules; fortunately they are the exception.

Collateral problems surrounding the sphenoid occur to one, such as its part in the causation of headaches, neuralgias, intracranial lesions, and retrobulbar neuritis. Each of them has been the subject of much debate, and I am not sure that I could add anything to what has been said many times on both sides of the Atlantic.

In the time available it seemed preferable to emphasize those physiological factors which may alter our conception of what is desirable in sinus treatment and open the way to better end-results in sinus surgery. My own approaches are of secondary importance. If this review has helped to awaken fresh interest in the subject or suggested a fresh point of view it will have served its purpose.

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To mark the beginning of the National Health Service the Minister of Health attended various ceremonies in Lancashire on July 5. Speaking at Preston Mr. Bevan said that he wanted to thank all those men and women—in local government, in voluntary hospitals, in insurance committees, in nursing associations, and in all those other bodies and organizations—which had had the job to do in the past and had done it so well. They were handing over much that was a good going concern, with good ready-made assets with which to start, and so making the task easier. "We are not changing the old services because they were bad; we are changing rather to make good services better and more available to all." He would also like to thank all those who had worked unremittingly during the last two years in framing the new scheme. Among them were the representatives of the professions who had helped with regulations and administrative arrangements, especially the chemists and ophthalmic surgeons and opticians, whose willing and constructive co-operation had been most valuable in working out a better scheme than would otherwise have been possible. He would particularly mention the staffs of insurance committees, who now passed to executive councils and who had had to carry a very heavy burden; the various local professional committees; those who had served on preparatory committees, such as the three presided over by Sir Will Spens; the Pharmaceutical Working Party under Mr. W. Penman, and the Dental Estimates Board and its officers. There were some doctors reported to be telling some of their patients that they would accept them as paying patients but not under the National Health Service. Such conduct was of course a complete abuse of the doctor's right of free choice of patient, and doctors guilty of it would be condemned by their colleagues as a disgrace to their profession. All could help the new scheme by co-operation, by approaching the Service with the determination to make it work well, and by not rushing for treatment which was not urgent in the early days of the scheme.

THE SURGICAL ANATOMY OF THE PAROTID GLAND*

BY

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Gray, Buchanan, Piersol, Cunningham, Quain, and Morris are among an elect company whose names strike a most familiar note in the mind of every member of the profession: one or other of their classic books recalls the early years of our professional studies. Rightly we regard our anatomical bibles with profound respect; the more so, perhaps, because anatomy, the basic subject of the curriculum, can be likened unto the law of the Medes and Persians.

Because of stereotyped descriptions in the anatomical textbooks we envisage the normal parotid gland as being possessed of a plateau-like superficial surface and a deep surface with prolongations into vulnerable and inaccessible recesses. For the same reason (strengthened by personal experience in the dissecting-room) the profession believes that in the midst of the gland lies the seventh cranial nerve, so intimately incorporated in salivary tissue that to display the nerve trunk, its two divisions, and, above all, its fine branches requires days of dissection by someone upon whom the mantle of John Hunter has fallen.

Little wonder, then, that general practitioners, physicians, and surgeons alike are steeped in the doctrine promulgated by that prince of surgical anatomists Sir Frederick Treves—"It follows from the complex relations of the parotid that its entire removal as a surgical procedure is an anatomical impossibility."

In 1937, after coming across its superficial lobe accidentally during the course of an operation upon the parotid gland and subsequently being inspired by the anatomical studies of McWhorter (1917), I came to the conclusion that the parotid was a bilobed structure, and that the facial nerve lay not in the gland but between its two lobes; in short, that the facial nerve might be regarded as the meat within a parotid sandwich (Fig. 1). No other secretory gland, I argued, has an important motor nerve† running through it, and no other secretory gland has lymphatic nodes within its parenchyma. Surely both the nerve and the lymphatic nodes are extracapsular, just in the same way as lymphatic nodes lie tucked between the opposing capsule-covered surfaces of the buccal and cervical lobes of the submaxillary salivary gland.

Although there are considerable variations in the disposition of the nerve within the parotid gland, for practical purposes it may be stated that much more often than not the facial nerve lies between a comparatively large superficial lobe and a variably sized deep lobe, the two being connected by an isthmus. It is on this anatomical concept that the operations of superficial lobectomy and complete parotidectomy are rendered practicable; consequently the

FIG. 1.—Diagrammatic conception of a coronal section through the parotid gland, showing the branches of the facial nerve sandwiched between the superficial and deep lobes.

*Part of an address delivered before the Assembly of the International College of Surgeons in Rome on May 19, 1948.

†A possible exception is the recurrent laryngeal nerve, which, according to Berlin, traverses the thyroid gland in 7% of cases.

following description of the surgical anatomy of the parotid gland may prove helpful.

The facial nerve emerges from the base of the skull at the stylo-mastoid foramen. After a course of approximately $1\frac{1}{2}$ in. (1.25 cm.) it appears to plunge into the deep aspect of the gland a little below its middle. Actually it comes to lie in a groove on the under surface of the superficial lobe—viz., . I have noted repeatedly that the main trunk of the nerve can be separated by blunt dissection from the mobilized gland, aided here and there, in certain cases, by the sharp dissection of some fibrous bands. The main nerve trunk approaches the parotid isthmus from behind, and on reaching the isthmus divides into an upper temporo-facial branch which passes above the isthmus and a lower cervico-facial branch which passes below it (Fig. 2).

FIG. 2.—The disposition of the temporo-facial and cervico-facial divisions of the facial nerve as they embrace the isthmus.

Because of the relatively small size of the deep lobe, outlying subdivisions of the nerve—i.e., the pes anserinus—rest between the superficial lobe and the masseter muscle. Particularly from a surgical point of view, the temporo-facial division, which is often the larger of the two divisions, is the more important.

In a number of instances, after the two primary divisions of the nerve have embraced the isthmus they are connected at a varying distance in front of the isthmus by one or more anastomotic twigs (see Fig. 2). No doubt this accounts for some cases of unexpected late recovery of partial facial paralysis following parotidectomy.

The Isthmus.—This is variable. Sometimes it is relatively broad; even so, the primary divisions of the facial nerve seem always to embrace it.

The Superficial Lobe.—This also varies in size and shape. Large superficial lobes often extend as much as 2 in. (5 cm.) downwards into the neck (Fig. 3). On scores of occasions in the course of excision of adherent tuberculous cervical nodes situated in the upper third of the neck I have found it necessary to resect a portion of the cervical prolongation of the parotid gland. In a boy of 9, referred for operation because tuberculous cervical adenitis had failed to resolve, the swelling proved to be a mixed tumour situated in the cervical prolongation of the parotid gland, which extended so far downwards as to cause the swelling to be truly cervical.

The Deep Lobe.—I have learnt to segregate deep lobes into two categories—the “knob” and the “rabbit warren.”

The “Knob.”—In approximately 40% of cases the deep lobe is relatively small, ovoid in shape, and overlies the base of the condylar process (Fig. 4). It has been argued that if the tumour *has* been removed satisfactorily by superficial lobectomy it is inconsistent with radical surgery to leave behind a piece of the parotid gland (the deep lobe), even if this knob is presumed to contain normal tissue. To this I rejoin, “Quite so”; but (a) even the removal of the knob causes renewed venous haemorrhage from what I take to be radicles of the posterior facial or the internal maxillary veins, and (b) until further dissection has been performed it is sometimes uncertain whether the deep lobe is in truth strictly of the “knob” variety.

The “Rabbit Warren.”—Contiguous with the deep surface of the deep lobe is a prolongation that plunges behind the posterior border of the mandible (Fig. 5) towards the styloid process, which it surrounds. The most formidable possibility is that in the depths of the warren the deep lobe is adherent to the jugular vein near its bulb. It is for this reason more than for any other that the operator can give a sigh of relief that an exacting operation is virtually completed when he is convinced that a deep lobe

consists entirely of normal parotid tissue. After leaving deep lobes, including undoubted “rabbit warrens,” *in situ* many times I am still amazed by the fact that a salivary fistula following superficial lobectomy is conspicuous by its absence.

Stensen's Duct.—My experience of dissecting this structure in the living is at variance with what is depicted in works on anatomy. In over 80% of cases Stensen's duct is a rounded structure no larger than a fine hypodermic needle. In order to display the pes anserinus, after incising the parotid fascia longitudinally I employ transverse “haemostat dissection” (Fig. 6) similar to that so well known in connexion with clearing a vein before its cannulization. By this procedure a number of thread-like structures are isolated; all cross the masseter muscle transversely. It is usually impossible to identify any one of them as the parotid duct until bisection of the isthmus (a much later step of the operation) has been carried out. Only twice can I recall having displayed a goose-quill-like duct similar to that described and

FIG. 3.—Superficial lobe of the parotid gland with a cervical extension.

FIG. 4.—Deep lobe: Variety A, the “knob.”

FIG. 5.—Deep lobe: Variety B, the “rabbit warren.”

FIG. 6.—Haemostat dissection.

illustrated in works on anatomy, and only once have I seen a socia parotidis (accessory parotid gland), which one gathers from anatomical illustrations should be a regular appendage of Stensen's duct. McCormack and his co-workers (1945) found Stensen's duct to be duplicated in 7% of cases.

Results of Parotidectomy

I have performed parotidectomy 77 times. In 54 cases superficial lobectomy or total parotidectomy has been performed; in the remainder extracapsular resection of a tumour was carried out. Superficial lobectomy or total parotidectomy was undertaken:

For parotid tumour	45 cases
For sialectasis	6 cases
For tuberculous parotid lymphadenitis with sinuses	2 cases
For Boeck's sarcoid	1 case

In 17 cases the tumour was a recurrent one; in one case it had recurred four times after various operative procedures, and in two it had recurred twice. A number of the patients had received radiotherapy without benefit.

In six instances the patient had palpably enlarged cervical lymph nodes; these were excised either at the time of the parotidectomy or at a separate session. In five of the six cases the invasion of the nodes by the tumour was confirmed histologically. In all these five patients further metastasis has occurred, from which four of them have died. In the sixth obviously enlarged lymph nodes were (unexpectedly) reported upon as being inflammatory, and this patient, who had combined total parotidectomy and excision of cervical lymph nodes, is alive and well nine years later.

The original case of superficial lobectomy was Mrs. E. R., aged 65, and the operation was performed in February, 1937. In 1948 she was admitted to a municipal hospital with carcinoma of the stomach and metastases in the liver. I had seen her a year previous to this, and then she was well and without any sign of a recurrence of the parotid tumour.

All the patients who have had superficial lobectomy or complete parotidectomy performed have been followed up, and, with the exception of one who died accidentally and those who had secondary deposits at the time of the operation, all, including the recurrent cases, have been traced, been examined, and been found to be cured of their neoplasm for varying periods up to 10 years. In 80% of cases the report on the histologically variegated neoplasm, about which there is so much pathological controversy, can be summarized as "mixed parotid tumour." In a few instances the pathologist specifically stated that the tumour was a carcinoma. In three examples the tumour was found to be an adenolymphoma.*

As for the integrity of the seventh nerve, in two patients no attempt was made to preserve it, because in one the nerve had been cut at a previous operation performed elsewhere and in the other the neoplasm (which proved to be adenolymphoma) was so extensive and friable that the anatomy of the region was confused. Of the remaining patients over 40% had temporary facial palsy lasting for varying periods up to one year. Only five of these showed signs of facial muscular weakness after a year—but none of them are seriously inconvenienced by it. One patient has paralysis of the temporo-facial division, but by a fortunate coincidence she is the possessor of a glass eye on that side—the eye having been removed for an accident in childhood. This patient by reason of the glass eye, although

*All the patients were elderly men. An adenolymphoma, in contradistinction to all other tumours of the parotid gland, is radio-sensitive, but clinically there is no method of distinguishing this tumour from others. A radiotherapeutic test would probably segregate these cases.

an intelligent woman, is not aware of the fact that she cannot approximate her left eyelid. In two patients on whom the operation was performed less than a year ago full recovery of the facial nerve is improbable. In one of these an immense tumour displaced the nerve medially at the stylomastoid foramen, and although the branches are intact the nerve may be damaged at its exit from the skull.† In the other the cervico-facial division entered a very large tumour which had been removed elsewhere a year previously, and I cut this division deliberately.

Envoy

In all instances before carrying out parotidectomy I warn the patient that the integrity of the seventh nerve cannot be guaranteed and a degree of facial palsy must be expected for several months. I am thankful to say that I can now sound this warning less loudly than in time past. Moreover, I am relieved to find that in cases of parotid tumours the advice to have a large part or all of the parotid gland removed is to-day less at variance with world opinion than it was even a year or two ago.

Old beliefs die hard, and the misconceptions to which I referred (Bailey, 1947) are by no means dead, but, as a result of this follow-up, dead are my earlier beliefs and fears that my days would be darkened by disconsolate, doleful individuals whom I had hideously deformed by carrying out parotidectomy on unselected cases, particularly when operative treatment had been discouraged or stated to be definitely contraindicated by experienced general practitioners and, in some instances, by front-rank surgeons. Dead, too (or at any rate comatose), are those disturbing thoughts of standing in the witness-box pilloried by the prosecuting counsel who, holding aloft a pre-operative photograph, exhorts the jury to "look upon this picture, and on this"—my patient. In only one instance have these trepidations been vindicated even in a very mild degree.

The patient was a man, aged 34, whose obvious parotid tumour, which he said was getting bigger, added asymmetry to a face that could never have been his fortune. None the less, after removal of a tumour of a deep lobe which surrounded the styloid process, relentlessly he assured me that as the tumour had given him no trouble he would rather have kept it than be compelled to greet his staff and customers with a unilateral smile. Owing to the difficult nature of the operation I was convinced that in his case the paralysis would be permanent. Before recommending Lodge's operation for facial palsy I sent the patient to Dr. Yealland, who advised waiting until 12 months had passed. This was the only patient who did not attend the follow-up I organized for the purpose of writing this review. All the other patients came, some from great distances—e.g., the North of England and Wales. Eventually, however, after five requests he condescended to call (his office being situated five minutes from Harley Street). The affected facial nerve was functioning perfectly.

"All hooley"—a descriptive term not yet in the authors and writers' codex—succinctly conveys the impression regarding parotidectomy with preservation of the facial nerve that was gained by candidates for the Scottish and Irish as well as the English Fellowship at instructional classes in 1947. I am glad to find that, thanks to the testimony of my former house-surgeons and postgraduates, this teaching is being modified.

Regarding the pure anatomy of the facial nerve, so far as I have ascertained, Barry Anson, professor of anatomy in the Northwestern University of Chicago, whose contributions on applied anatomy are so helpful to surgeons, stands alone among English-speaking anatomists in teaching that the parotid gland is a bilobed structure with the facial nerve running between the lobes. Morris's is the only

†Since writing this, the patient has been re-examined, and the function of the seventh nerve is returning (10 months after the operation).

textbook in English that makes any mention of the bilobed conception, and in the 1942 edition McWhorter's (1917) paper is quoted. On the other hand, the French school of anatomists have long accepted the newer teaching, and in their standard textbook (Rouvière, 1943) the account of the parotid salivary gland is replete with a description of the facial nerve lying between a superficial and a deep lobe. In this connexion it should be emphasized that the American surgeon McWhorter (1917) admitted that he derived his ideas from the French surgeon Grégoire (1912).

Masterly sharp dissection with a knife that is deftly honed at frequent intervals is a heritage of which members of the Anatomical Society of Great Britain and Ireland are justly proud. To display the arborescing facial nerve by cutting formalin-hardened, dehydrated if not desiccated salivary tissue calls for much honing and great skill. I believe that if the supple parotid gland of a fresh subject was distended by injecting an appropriate blue-stained fluid into Stensen's duct, after employing the knife to disengage the peri-parotid fascia and to free the excised mastoid process with the sterno-mastoid muscle attached, the scalpel could be laid aside, and under these conditions, by haemostat and blunt dissection only, the main trunk of the facial nerve could be followed to its bifurcation and further without incising any (blue-stained) salivary tissue.

I am deeply indebted to Dr. L. R. Yealland for examining the muscle reactions and accurately prognosticating in a number of instances where recovery from facial palsy was doubtful; to Professor Anson and his pupils for their encouraging anatomical substantiation of the bilobed structure of the parotid gland; to Mr. C. Eisinger for great assistance in translating foreign works on anatomy; and to Dr. Donald Teare for his careful histological study of the tumours I have removed.

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Hull Royal Infirmary was founded on March 22, 1781, and received its first patients in September of the following year. To mark the transition which took place on July 5 the Managing Committee has issued a handsomely produced booklet which has been prepared by Mr. K. J. Lowson. This tells the story of the Infirmary from its foundation to the present day and includes brief biographical notes on all the members of the honorary medical staff. Also included in the booklet are pictures of the hospital in 1784 and in 1850 and there are photographs of the present and past honorary staffs.

ACUTE URAEMIA

BY

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Extrarenal uraemia—or “prerenal uraemia” according to Fishberg (1939) and “renal anoxia” according to Maegraith *et al.* (1945)—is probably the most frequent form of acute uraemia (Zondek, 1944, 1946; Maegraith *et al.*, 1945). This view is supported by the results referred to in this paper.

Extrarenal uraemia is a non-specific body-reaction—i.e., a pathological process met with in entirely different diseases. The uraemia in question is called “extrarenal” (other possible terms will be discussed later), as it occurs in diseases not primarily involving the kidneys and in patients who may not have previously suffered from kidney trouble. The renal failure in these cases seems to be of a functional nature; another, and essential, characteristic is its association with extrarenal azotaemia, a process caused by increased endogenous breakdown of protein which can be diagnosed (Zondek, 1944, 1946) by symptoms such as an increase of non-protein nitrogen in the blood in addition to a dissociation of the urea-sodium-chloride excretion (in the urine, great quantities of urea and small quantities of sodium chloride).

If quite different groups of diseases, comprising not only general affections such as burns, crushing, surgical shock, and general infections (e.g., Weil's disease) but also affections of special organs, such as liver diseases and myocardial infarctions, can cause either pure external azotaemia or extrarenal azotaemia plus renal failure—i.e., extrarenal uraemia—might not primary renal disease, too, occasionally be the cause of this symptom-complex? The following case may prove this assumption correct.

Case 1

A man aged 48 underwent a calculus operation of the urinary bladder a few months before the onset of his present illness. Three days before his admission to hospital cystoscopic examination was carried out because of new troubles and was followed immediately by chills and high temperature. Death occurred 48 hours after admission. While in hospital he had two more chills and the usual symptoms of severe infection. X-ray examination revealed the presence of a calculus in the lower part of the right ureter. The urine contained only traces of albumin and leucocytes. A blood examination showed: white cells 13,400 per c.mm., with a marked shift to the left (juvenile cells 34%). Urea on the day of admission was 136 mg. per 100 ml.; two days later (the day of death) it was 153 mg. Uric acid was 8 and 9.7 mg. per 100 ml. respectively. The urine output for 24 hours amounted only to 1,200 ml. Its NaCl concentration was 0.8 g. per litre and its urea concentration 18.4 g. per litre; accordingly the total excretion on this day was NaCl 0.96 g., urea 22 g. The NaCl-urea ratio was 1:23. Though death resulted from severe septic infection the uraemia certainly was of clinical importance; the nature of the latter did not differ from typical extrarenal uraemia as seen in the course of various non-renal diseases, which is proved by the dissociation of the urea-NaCl excretion and to some degree also by the fact that the urine was actually free from albumin and contained no casts and no cells except leucocytes.

Extrarenal azotaemia is probably also a manifestation of non-specific pathological processes caused by quite different diseases and appearing even in persons who may never before have suffered from any kidney troubles. But what will happen if a person suffering from chronic kidney trouble contracts one of the various diseases potentially able