character is the essential sign. But if it be admitted that this perversity may remain markedly identical to that of the age of the beginning of the disease—for instance, as in the case of Alix—one can quite conceive its seeming considerably exaggerated when the patient has become an adolescent of 18, a young man of 25, and, with all the more reason, a man of mature age. One is thus tempted to see deep instinctive perversity where there exists only the puerile perversity of a weak-minded person. There lies the capital phenomenon, which it is easy to recognize as soon as attention has been drawn to it.

The perversity of the congenital pervert, in fact, increases with age; in the case of the post-encephalitic it may get better, or sometimes worse; most frequently it remains identical through the different periods of his life, but—and this is the essential point—with a mental debility which is henceforth constitutional. This state may improve in some cases, but frequently it changes for the worse or remains stationary; one is then obliged to put such patients in schools for nervous and abnormal children, like the one of which I am the head at Le Bouscat, near Bordeaux, or in reformatories when they are too difficult to look after and watch over. But in any case it is the state of mental debility which dominates the clinical picture.

THE PATHOLOGY AND TREATMENT OF CERVICAL GLANDS IN CHILDREN.

A REVIEW OF 330 CONSECUTIVE CASES.

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WHATEVER may have been the advance in social legislation in recent years, any surgeon connected with a children's hospital in Scotland must have been struck with the prevalence of cervical adenitis. It is proposed in this paper to consider the pathology and to give, if possible, the true

FIG. 1.—Distribution of the cervical glands.

indications for conservative and operative treatment. It is essential to picture the distribution of the cervical glands and to understand their structure. Figs. 1 and 2 may suffice.

Children up to 12 years of age are treated in the Royal Aberdeen Hospital for Sick Children; 330 cases of cervical adenitis were treated during the period reviewed—March, 1923, to March, 1927. Enlarged cervical glands were found to be more common in girls than in boys. The numbers were 183 and 147 respectively. The present series has been followed up for two to six years after leaving hospital. They may be divided into two main groups: (a) Acute and subacute non-tuberculous adenitis—74 cases (22.4 per cent.). (b) Chronic tuberculous adenitis—256 cases (77.6 per cent.).

CONCLUSIONS.

To sum up: what must be remembered is the variability of the post-encephalitic delinquent case, the fundamental basis of which is, above all, mental debility. One does not meet with distinct, unmistakable, categorical types of delinquents; they are irregular, undefined, and do not fit into any of the nosographic classifications which have been established up to the present. It would seem that the morbid histological diffusion of the encephalitic virus, which is so evident, involves a sort of regrouping of mental clinical states, which, for the moment, disorientate the mind and bring to it an impression of disorder.

And, finally, there can be recognized even in the enumeration of the descriptions of the mental clinical forms themselves, and of delinquency in particular, the polymorphism of encephalomyelitis, to which I drew attention in 1917, and which, after having been ill understood and rejected at that time, has to-day become a classic datum which is no longer even questioned.

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ACUTE AND SUBACUTE NON-TUBERCULOUS ADENITIS.

Although poor general health and defective hygienic surroundings are undoubtedly contributory factors, enlargement of glands is usually secondary to some local focus of inflammation. The primary causes were:

Infections of the nasopharynx, including the	
exanthemata	28
Infections of the scalp	24
Chronic otitis media	8
Dental caries	6
Septic abrasions of the face	6
Unknown	2
	74

Infections of the Nasopharynx.—The jugulo-digastric and neighbouring deep cervical glands are usually involved, the prevailing organism being the haemolytic streptococcus.

FIG. 2.—Lymphatic gland.

Infections of the Scalp.—Septic abrasions following trauma or chicken-pox and impetigo contagiosa commonly cause enlargement of the occipital and posterior auricular glands. They tend to suppurate rapidly. The infection is most frequently staphylococcal. In the poorer classes pediculi and "nits" account for many cases. It has been said that the swollen glands are secondary to abrasions caused by scratching, or to infection entering the skin by the biting of lice. Such views are open to doubt. The glands affected are usually the jugulo-digastric and upper deep cervical group. They are oedematous to the touch, and differ in type and distribution from glands secondary to suppuration in the scalp. Whether they are toxæmic in origin or not, it is exceptional to isolate organisms from the glands. "Nit-glands" readily subside on treat-

ment of the scalp with sassafras oil, but soon become necrotic if the scalp is left untreated.

Chronic Otitis Media.—Disease of the middle ear, unless tuberculous in origin, does not appear prone to cause enlargement of glands. Occasionally a chain of small glands is found along the posterior border of the sternomastoid muscle.

Dental Caries.—It is surprising how few cases of cervical adenitis can be traced to this cause. Glands are usually secondary to a suppurative periostitis. A single gland of the submaxillary or submental group is most commonly found.

Septic Abrasions of the Face.—Swelling of the submental and submaxillary glands is common in children under 3 years of age. Suppuration rapidly takes place, with a local cellulitis of the neck. Staphylococci from abrasions about the chin and lips account for most of the cases. The average duration of acutely inflamed glands when first seen was twelve days. They may be divided into two clinical groups.

Group A.—Glands which have appeared suddenly—a simple parenchymatous enlargement without any appreciable pathological change in response to a peripheral focus of infection. They feel soft, elastic, and are freely movable, in contradistinction to glands which are hard, solid, and adherent—the invariable signs of necrosis and commencing suppuration. There are no reliable means of judging the bacteriology of glands which recover with conservative treatment, although some idea may be formed from the type of primary focus present. Active treatment of any infected area is our mainstay. Local applications are of little value, and remind one of the days of charms and love potions. Operation can be deferred indefinitely, provided the glands show no progressive change, but they should steadily subside after a few weeks' treatment.

Group B.—Glands which have gone on to abscess within a few days of onset. They are common in very young children, and follow some febrile disturbance or untreated septic focus. The inflammatory process is usually limited to the anterior triangle of the neck. In the fulminating cases suppuration takes place in a few days, and the outline of the glands is soon marked by an astonishing degree of periglandular infiltration. The picture becomes that of a cellulitis of the neck.

The child's general condition and throat require careful attention; glycerin of borax is useful in babies, glycothymoline in older children. Iodine, ichthyol, mercurial ointments, etc., applied over acutely inflamed glands can be of no possible value, and frequently hasten destruction of the skin. Fomentations are most useful in acute cases. On any sign of fluctuation or impending respiratory distress the neck should be incised and free drainage established. Pathological tonsils should be removed later. The results of treatment of non-tuberculous glands are noted in Table I. The single fatal case ended with a streptococcal septicaemia.

TABLE I.—Results, Non-tuberculous Glands (74 Cases).

	Peripheral Focus only Treated.	Dissected.	Incised.
Number of cases	32	5	37
Number traced	32	5	34
No glands remaining	24	3	27
Small glands, non-pathological ...	4	—	3
Recurrence of inflammation ...	4	2	3
Died	—	—	1

A child aged 2. Three days previously swollen glands were discovered in the right side of the neck. The mass rapidly increased in size, and symptoms of acute toxæmia with dyspnoea became evident. The neck appeared purplish-red, brawny, and indurated; this was particularly marked in the submaxillary region. On incising the neck no pus was found. The child died in forty-eight hours of an acute streptococcal septicaemia.

CHRONIC TUBERCULOUS GLANDS.

It is noteworthy that a family history of tuberculosis was only occasionally elicited. Many gave no history of antecedent disease. Infections of the fauces and nasopharynx,

alone or in association with the exanthemata, preceded the occurrence of a very large number, scarlet fever, measles, or whooping-cough acting as predisposing causes to tubercle or lighting up quiescent tuberculous deposits. Haemolytic streptococci appear closely related to the activities of the tubercle bacillus. The following table gives the previous history in 256 cases.

No history of previous illness	99
Disease of the pharynx or nasopharynx	90
Dental caries	17
Measles	16
Scarlet fever	13
Whooping-cough	11
Chronic otitis media	5
Diphtheria	3
Retropharyngeal abscess	2

It is interesting to note that, with the exception of a few cases of tuberculous otitis media and mediastinal tuberculosis, no case gave a history or exhibited a sign of tuberculous disease elsewhere.

Tuberculous adenitis is frequently ushered in by acute symptoms during the course of some of the exanthemata when the outline of the glands is at first obscured by periglandular swelling. The latter gradually subsides, leaving typical discrete chronic glands. The slight improvement so frequently witnessed with conservative treatment at this stage does not herald a recovery in the gland tissues, but rather suggests that the infection has simply been localized within the capsule. When glands remain enlarged, necrosis has probably taken place in the alveoli during the original acute attack. It is common to find typical destructive tuberculous lesions after a history of three to four weeks. The more chronic type commences as small glands which gradually increase in size and number.

Bacteriology.

Mitchell¹ of Edinburgh, from his investigations into the prevalence of the bovine type of tubercle bacillus, found that cow's milk containing tubercle bacilli was clearly the cause of 90 per cent. of the cases of tuberculous glands in Edinburgh and district. He found the tonsils tuberculous in 35 per cent. The tonsils may be large, pale, and obviously diseased, or small, embedded beyond the pillars of the fauces, and apparently normal. It has been proved that organisms may pass through the portals of the tonsils without the latter being diseased. Wood,² in an experimental study of the lymphatic drainage of the faucial tonsils, demonstrated, on injecting the tonsils by Gerota's method (Berlin blue and pure spirits of turpentine), that efferent lymphatic vessels from the tonsils passed directly to the jugulo-digastric and neighbouring deep cervical glands.

It is interesting to contrast the findings of Howarth and Gloyne³ in the London area; they state that tuberculous changes in the tonsils were found in 5 per cent., and that tuberculosis of glands is a late infection and follows a previous invasion by the streptococcus. It appears probable that the prevalence of the bovine and human varieties of tubercle and the numbers of streptococcal cases

TABLE II.—Distribution of Tuberculous Glands.*

	No. of Cases.	Jugulo-digastric and Upper Deep Cervical.	Jugulo-digastric and Submaxillary.	Submaxillary and Submental.	Deep Cervical, Upper Group.	Deep Cervical, Lower Group.	Parotid.	Posterior Auricular.	Occipital.	Pretracheal.
Simple enlargement	2	2	—	—	—	—	—	—	—	—
Caseated glands ...	121	95	4	9	5	4	—	2	—	2
Caseated glands with abscess	111	78	4	6	9	6	3	3	—	2
Caseated glands with sinus	22	14	3	1	2	2	—	—	—	—
Total	256	189	11	16	16	12	3	5	—	4
Percentage		73.8	4.3	6.3	6.3	4.7	1.2	1.9	0.0	1.5

* Proved to be tuberculous on histological and bacteriological examination.

vary widely in different localities. This fact may well account for the extreme diversity of opinion regarding the treatment of cervical adenitis.

Tubercle bacilli reach the cervical glands along the course of the lymphatics from peripheral foci or find an entrance through the blood stream. (See Table II.)

Lymphatic Infections.—Of the 256 cases, 232 (90.6 per cent.) were considered lymphatic infections, as the distribution of the glands—jugulo-digastric group (78.1 per cent.), upper deep cervical (6.3 per cent.), submaxillary and submental (6.3 per cent.)—corresponded to drainage from local tuberculous lesions in tonsils, adenoids, and carious teeth. Further, it was found that no case belonging to this group showed signs of tubercle elsewhere either before or after operation.

Blood Infections.—The remaining 24 cases (9.4 per cent.) suggested blood infections from the glands involved—lower deep cervical (4.7 per cent.), pretracheal (1.6 per cent.), posterior auricular (1.9 per cent.), parotid (1.2 per cent.)—with associated tuberculous lesions in the mediastinal lymph nodes and the middle ear. Poirier and Cunéo⁴ have pointed out that the supraclavicular glands receive no afferent vessels from the mediastinal glands. In tuberculous otitis media the parotid and upper deep cervical glands are usually enlarged. Swelling of the pre-auricular is more commonly found in tuberculous otitis media than in any other condition. Blood infections are more common in very young children under 3 years of age, and multiple tuberculous abscesses are of frequent occurrence. The prognosis is decidedly more unfavourable, particularly in glands secondary to otitis media, in infants. The only two deaths, occurring some time after operation, came under this group.

Pathological Changes in Tuberculous Glands.

In lymphatic infections the most marked pathological changes are found in the alveoli near the periphery; in blood infections the medulla is the first portion of the gland to suffer. In the early stages no change may be seen with the naked eye in a sectioned gland, but soon multiple greyish-white foci appear, caseation rapidly takes place, and each area becomes filled with semi-solid pulsataceous debris or liquid pus. It is most important to bear in mind that a lymphatic gland is not a unilocular structure. During an attack of lymphadenitis the entire gland is swollen, but identical pathological changes do not take place in the whole gland nor in an equal degree in the different alveoli. Areas of caseation are multiple and so small that no sign of softening or fluctuation can be found. It is unusual for such areas to become completely confluent and for the gland to form a unilocular pus-sac exhibiting signs of fluctuation. More frequently only a few alveoli suppurate, while the intervening portions of the gland are replaced by a dense proliferation of endothelial and connective tissue cells. This accounts for the loss of elasticity and increased hardness of a pathological gland. It is surprising how universally clinicians fail to appreciate this danger signal.

Caseous material may lie quiescent within the capsule for several years before an extracapsular abscess forms: nevertheless it is well to remember that tubercle is not always chronic in its manifestations and that identical changes may occur in a few weeks' time. While the small septic foci steadily increase in size and threaten to involve the thickened capsule, successive attacks of periadenitis tend to bind the glands together and to form adhesions to the sterno-mastoid and digastric muscles, the deep veins, and the parotid and submaxillary salivary glands. Adhesions may be very dense where caseous material has locally eroded through the capsule. Ultimately the latter completely gives way, allowing the escape of pus and debris into the surrounding tissues and the formation of an extracapsular abscess. It is only after this catastrophe that "softening" can be appreciated. Signs of healing such as fibrosis and calcification, may be seen in an excised gland, but just as often areas of suppuration are found in other sectors of the gland. A natural recovery should never be assumed if the gland remains hard and palpable.

Clinical Types.

GROUP A. Simple enlargement ...	2 (0.8 per cent.)
GROUP B. Caseated glands ...	121 (47.3 per cent.)
GROUP C. Caseated glands with extracapsular abscess ...	111 (43.3 per cent.)
GROUP D. Caseated glands with sinus ...	22 (8.6 per cent.)

256

An average of one year elapsed before a patient came for surgical treatment. Bilateral glands were present in 6.4 per cent. of cases. Gross destructive changes had taken place in 99.2 per cent.

GROUP A.—Tuberculous glands without alveolar caseation are rare. Only two cases were seen—large solid glands which persist in spite of treatment and which cannot be distinguished from caseated glands. On section they exhibit excessive endothelial proliferation. The numerous small glands found during the dissection of a large caseated gland may not show signs of caseation, yet the vast majority, when examined microscopically, show invasion by the tubercle bacillus.

GROUP B.—Caseated glands may be of any size from a pea to a hen's egg. They feel firm and solid, occasionally hard and knotty, certainly not elastic or soft. In them a definite and, I maintain, appreciable pathological change has taken place. The typical picture is an enlarged jugulo-digastric gland near the angle of the jaw with a few smaller glands along the posterior border of the sterno-mastoid muscle. The larger gland stands out prominently in the neck. The swelling waxes and wanes with the child's general condition, the state of the nasopharynx, and the changes in the glands themselves. Alternate attacks of swelling and periods of quiescence are almost diagnostic of intracapsular necrosis and caseation; the increase and decrease of the swelling corresponding to the onset and recovery of successive attacks of periadenitis.

I have never seen a gland, showing clinical signs of caseation, recover with any form of conservative treatment. Some time ago I referred a considerable number for heliotherapy, rather against my better judgement. The glands persisted or went on to abscess. Glands may appear to shrink to half their previous size with any form of treatment as the periadenitis subsides, but it is surprising how large a caseated mass may be delivered from the deep surface of the sterno-mastoid when only a suspicion of swelling is present.

Most of the tragedies of prolonged conservative treatment result from the failure to picture the pathology of such glands. How often has one heard it said that he or she thought it quite safe to leave glands because they were still hard and showed no sign of "softening"! Ninety-nine per cent. of all glands which have persisted for three months and have attained the size of a hazel nut show signs of caseation when removed by dissection. Solid glands frequently contain pus although they have lain quiescent for twelve months. The fact that they do not change is surely a plea for removal rather than for a further period of conservative treatment; moreover, favourable occasions for successful surgical measures do not remain so indefinitely. Unsightly incisions are too often the "late" cases. Here the patient or the medical attendant is at fault; the latter should set the time limit and be competent to say when the pathological changes preclude a natural cure—and he should be capable of doing so before gross abscess formation stares him in the face.

GROUP C.—"Nature is often hidden, sometimes overcome, seldom extinguished." Caseated tuberculous glands go on to abscess whether they be treated by the carbon arc lamp, tonsillectomy, or by local applications. The following clinical types are found. (a) A small slowly developing abscess beneath the platysma in relation to a chronic gland, a round swelling not adherent to the skin and standing out prominently in the neck. The mass may be freely movable, and is apt to be mistaken for an enlarged gland unless fluctuation be elicited. (b) A large group of glands with a small superficial abscess. (c) An infiltrated mass in which the outline of the glands is lost in the surrounding inflammatory reaction. The sterno-mastoid is usually

densely involved, and fluctuating areas may be found in front of and behind the muscle. (d) A reddish-purple prominent swelling, the typical tuberculous abscess with the skin almost at bursting point.

Dissection is ideal, but often impracticable in the presence of gross suppuration. A surgeon has no qualms about embarking on a difficult dissection, and it is easy for him to be radical in his attack; but can he promise his patient the three essentials of success—no risk from haemorrhage, no injury to important nerves, no disfiguring scar? Provided the surrounding infiltration is not too great, the condition of the skin is the deciding factor. If he anticipates a soundly healed incision he should dissect. Scraping will cure many cases of abscess secondary to a single caseous gland. A large fluctuating mass should be thoroughly evacuated with a sharp spoon, and as much of the primary gland removed as possible. Residual masses may present a comparatively easy dissection at some later date. The removal of a few drops of liquid pus by aspiration is a method of treatment scarcely worthy of consideration. An infiltrated swelling, which precludes all question of radical treatment, may be benefited by heliotherapy.

GROUP D.—The clinical picture varies from a sinus leading down to a small indefinite mass of cicatricial tissue to one surrounded by an area of reddish-purple skin with large glands in the depths. "Sunlight" is worth a trial if no glands are palpable. Dissection is the proper procedure in most cases, as caseous glands await removal in the deeper planes of the neck. It may be difficult to secure a satisfactory scar if suppuration has undermined a large expanse of skin. Time may allow the skin to recover in a marvellous way, but mixed infections are common and skin recovers slowly.

Impressions on Conservative Treatment.

The armamentarium at a patient's disposal is truly amazing: a variety of paints and ointments, Bier's congestive treatment, Klapp's suction cups, cervical collars, tuberculin, tonsillectomy, x rays, radium, and heliotherapy. It is little wonder that many cases are far advanced and complicated by abscess when they have run the gamut of palliative measures and come at last for radical surgical treatment.

Surface Applications.—Nature is a powerful healer, and deserves most, if not all, the credit paid to iodine, ichthyol, mercurial ointments, etc. Counter-irritation is a myth. It is surprising that such applications are still in vogue. It was pointed out by Marnoch² twenty-three years ago that "when local applications reduced the size or caused the disappearance of swollen glands, it was very probable that one had to deal with glands which were not tuberculous at all, but which became inflamed from some irritation in the area drained by them, and that the decrease in size was due to the subsidence of the irritation and not to the applications."

Tonsillectomy.—We can take it for granted that the tubercle bacillus reaches the jugulo-digastric group via disease of the tonsils, and it is logical to attack the primary cause; pathological tonsils should be removed at the earliest possible moment. Nevertheless it is equally illogical to expect tonsillectomy to have any curative effect when advanced tuberculous changes have taken place in the glands. There are risks in dissecting with tonsils *in situ* if they are inflamed or harbour the all-too-prevalent haemolytic streptococcus.

Heliotherapy.—The brilliant results of Rollier in Switzerland have made many of us pause and wonder if surgical tuberculosis has not passed beyond our province. Treatment in the open air with exposure to the rays of the sun is always beneficial; unfortunately suitable periods are of brief duration. Artificial sunlight with the carbon arc or mercury vapour lamp improves a child's general condition, and small glands may disappear. Locally "sunlight" appears to hasten Nature's efforts at cure—that is, it accelerates the breaking down of caseous glands, abscess formation, and the discharge of pus. Taylor³ quotes satisfactory figures in certain types, and comments on the more variable results in large solid glands. There is a risk of suppuration if caseated glands are irradiated, and one

naturally hesitates to take that risk when a clean dissection is possible. I have removed glands after many months' irradiation and have found no change in typically caseated glands. This is not surprising, as the capsule is enormously thickened and there is no intimate vascular relation between a grossly pathological gland and the surrounding tissues. Heliotherapy is worth a trial in very early cases. Dr. Margaret Tod,⁷ reviewing a series of cases treated in Edinburgh, states: "It will be noted that in no case has a cure been claimed, 'greatly improved' being the best result tabled."

Treatment Advocated.

The prophylactic and general treatment of tuberculosis lie beyond the scope of this paper. In deciding whether glands are tuberculous or not, one commences by excluding septic absorption from drainage areas corresponding to the glands involved—for example, treatment of the scalp in occipital and posterior auricular glands, tonsillectomy and amygdalectomy in the jugulo-digastric group, attention to the middle ear in the parotid group, removal of carious teeth, and attention to the hygiene of the mouth in submaxillary and submental glands. Palliative treatment, combined with every effort to improve a child's general condition, may be continued for two to three months if the glands steadily decrease in size. If they persist, it is highly probable that they are tuberculous. Mild cases may subside with prolonged rest in the country or after a course of heliotherapy. Whenever signs of caseation appear the glands should be removed during the earliest period of quiescence. One usually finds a single group, the jugulo-digastric series, and a complete absence of tuberculous disease elsewhere. Why risk the gradual involvement of other glands, an abscess which will endanger the symmetry of the neck, or a general dissemination of tubercle, when the single tuberculous lesion may be safely removed? Totally erroneous ideas have arisen from the comparison of tuberculous cervical adenitis, a local manifestation in 90 per cent. of cases, with tuberculous disease of bone, joints, and peritoneum—conditions which presuppose a general infection and which cannot be eradicated by operation. The universal improvement in a child's general health and freedom from tuberculous disease are good grounds for advocating radical treatment.

Surgical Treatment.

Tuberculous disease may transform the neck into a veritable maze of Daedalus. Dissections of cervical glands always require scrupulous care, are often difficult, and may be exquisitely dangerous in inexperienced hands. The operation can be safely performed at any age if the condition of the glands warrant their removal.

It is not sufficient to excise only the large masses, nor all palpable glands. Certain areas should be systematically explored; there are always glands behind the internal jugular vein and in the submaxillary region—they should be diligently sought for and removed. "Block excision" of large masses and chains of glands provides admirable museum specimens and may suggest the acme of surgical skill; unfortunately, such may be acquired at the expense of a segment of the spinal accessory nerve. It is often safer to split up large masses and to expose the nerve. The actual gland capsule should never be caught with forceps, as the larger glands contain pus and are easily ruptured. Tuberculous pus may be innocuous, but a streptococcal infection is occasionally superadded, and the less a surgeon smears his wounds with pus the better his results will be.

Dissections of glands complicated by abscess or sinuses may present formidable difficulties and may prove a very real test of skill and knowledge of pathological anatomy. Clear exposure and gentle handling will usually save the larger veins and spinal accessory nerve from injury.

Dissections in the Anterior Triangle.—The sterno-mastoid muscle stands out prominently in the neck. Between its anterior border and the line of the jaw lies an area in the shade crossed by two creases almost transverse in direction; here a scar may be almost invisible. The incision follows a skin crease and is made sufficiently long to ensure gentle handling and accurate dissection under full vision. The subcutaneous tissue and platysma are divided, leaving

a small portion of tissue over the convexity of the glands if there is any possibility of encountering pus. An elliptical incision surrounds a sinus or small superficial abscess. The external jugular vein is divided between ligatures. The sterno-mastoid muscle and surrounding structures are dissected away from the glands with a sharp scalpel. A small Mayo's scissors may be useful in exposing important nerves, but blunt and rough dissection with the finger or scissors in the depths is unsafe and liable to cause serious haemorrhage. The glands now lie in close relation to the digastric and stylo-hyoid muscles, the common facial and internal jugular veins, and the spinal accessory nerve. The internal jugular vein is exposed at a slightly lower level where the tissues are perfectly normal, the glands are elevated with forceps and are dissected off the veins, keeping the latter continually in view and catching small tributary branches before division. The wound is kept dry and free from staining. The spinal accessory nerve is found immediately beneath an enlarged jugulo-digastric gland. The deep glands along the outer border of the jugular vein remain to be tackled. A layer of fascia along the corresponding sector of the vein is divided in a parallel direction; two glands are usually found above the spinal accessory nerve and a long chain below. Although the wall of the vein may be in direct relation to the caseous interior of the gland, it is rarely necessary to remove a segment of the internal jugular vein. The submaxillary region is now explored. The salivary gland is frequently adherent to suppurating lymphatic glands, but is seldom grossly implicated. The whole gland or the most superficial portion may be excised. Care is taken of the mandibular branch of the facial nerve which passes along beneath the ramus of the mandible. Although Wood failed to trace an efferent lymphatic vessel from the tonsil to the posterior gland of the submaxillary group, I have frequently found this gland enlarged while dissecting the jugulo-digastric series. If the submaxillary glands are markedly involved, the submental region should also be cleared. All bleeding points are tied off with fine catgut and the wound is drained by a thin piece of corrugated rubber. Spaces in the neck cannot be obliterated by suture, and a collection of serum is fatal to a perfect surgical scar. The platysma is sutured with a continuous catgut stitch, which catches up a fraction of the subcutaneous tissue. The skin is closed with a subcuticular stitch of "gossamer" silkworm-gut. One or two interrupted sutures of the same material make the incision more secure. The drain is removed on the second day and the skin stitches on the seventh day.

Dissections in the Posterior Triangle.—Care must be taken of the spinal accessory nerve, which crosses superficially from the posterior border of the sterno-mastoid to the trapezius. It is well to remember that the thoracic duct is liable to injury in a low dissection. Fortunately it is more often in the form of a delta than a single channel.

Scraping of Cervical Glands and Abscesses.—A small incision is made immediately beneath the abscess, not across the convexity of a red area of skin. The primary gland must be attacked in addition to the actual confines of the abscess cavity. The bad results so frequently quoted are not surprising, as such cases are often left to those of little or no experience. The cavity is packed with a narrow strip of gauze, which is removed on the second day. Pathological tonsils should invariably be removed. One expects to have to dissect later in cases of multiple glands, or where a large gland has broken down locally to some slight degree.

Immediate Operative Risks. (See Table III.)

Mortality.—The risk of a fatal issue following the dissection of neck glands appears negligible.

Haemorrhage.—Troublesome haemorrhage occurred on two occasions; in both the bleeding point was ultimately caught with forceps and ligatured. The usual causes of haemorrhage would appear to be inaccurate vision and rough handling.

Injury to the Thoracic Duct.—The duct or a tributary was injured in one case. The surrounding tissues were gently approximated by a purse-string suture, and no fistula resulted. Judd¹² reports 10 cases in a series of

668 dissections; all recovered, although one lost 60 lb. before the fistula closed. Edington⁹ quotes one death and two recoveries. A further series of wounds of the thoracic duct have been reported by Cushing.¹⁹

TABLE III.—Immediate Operative Risks.

	Dissected.	Scraped.
Number of cases	187	79
Mortality	—	—
Haemorrhage	2	—
Injury to thoracic duct	1	—
Injury to nerves:		
Spiral accessory	—	—
Hypoglossal	—	—
Mandibular branch of facial	4	—
Wound suppuration	9	—

Injury to Important Nerves.—I have never been conscious of cutting the spinal accessory nerve, although I have often perilously nearly done so, nor have any of my cases to my knowledge suffered from paralysis of the sterno-mastoid or trapezius muscles. The removal of large masses of glands *en bloc* adds greatly to the risk. Clute¹¹ reports 12 cases of injury to the nerve in 140 dissections, and comments on the danger of "mass dissection." Judd¹² states: "We have injured and sutured the nerve on several occasions with no deformity resulting." In the present series the mandibular branch of the facial nerve was injured on four occasions. All recovered completely. Farr¹³ states that the nerve can always be preserved by making a transverse incision three-quarters of an inch below the jaw and incising the deep fascia till the vessels and submaxillary gland are exposed. This is only true in cases where the glands are not adherent to the jaw or complicated by abscess.

Suppuration.—Nine cases developed an acute post-operative infection of the neck. Haemolytic streptococci were grown from the wound and tonsils in all cases; streptococci had also been isolated from a few of the glands. This distressing complication would appear to arise from operating on children while they harbour an active infection of the nasopharynx. One case had an acute streptococcal septicaemia which almost proved fatal.

This patient was a boy aged 9. Cervical glands had been present for six months, and they had rapidly increased in size. The neck showed an enlarged jugulo-digastric gland with two superficial abscesses. Pus was encountered during a difficult dissection, and the wound was drained. Signs of acute sepsis were manifest in a few days, and haemolytic streptococci were grown from the wound and tonsils. His condition steadily deteriorated, with daily rigors and the onset of a pleural effusion. Cultures from the blood stream and pleural cavity were positive. The wound was opened up and treated by the Carrel-Dakin method. Treatment in the open air, combined with massive doses of anti-streptococcal serum, ultimately defeated the infection. The pleural effusion yielded to aspiration.

End-Results following Dissection.

Number of cases	187
Number traced	183
Alive and well	183
Developed tuberculous disease elsewhere	0
Recurrence of cervical glands	6

The danger of generalized tuberculosis would appear immeasurably greater in allowing tuberculous deposits in the neck to run a natural course than by removing glands by dissection. Demmè,¹⁴ reviewing twenty years' work in the Jenner Children's Hospital, Bern, treated 692 cases of cervical adenitis by constitutional measures, and found that 29.2 per cent. developed other forms of tuberculosis. All surgeons are agreed that the outlook is infinitely more favourable in children than in adults. Dowd¹⁵ states that the incidence of pulmonary tuberculosis following dissection of neck glands in children is about 1 per cent., whereas Judd,¹⁶ reviewing 600 dissections in adults, found that 5 per cent. developed tuberculosis of the lung.

Recurrence of Glands.—In the present series 6 cases showed post-operative glands; 3 of these required further

surgical treatment. Most of them were not true recurrences, but dated from the time of one's apprenticeship to surgery, when dissections were not so thoroughly performed. Excision of the gland-bearing fascia with a sharp scalpel is preferable to blunt dissection of individual glands with a Mayo's scissors. One case reported with several large glands in the anterior triangle after two previous dissections by a competent surgeon. On removing the glands for a third time a small abscess was found deep to the digastric muscle, and extending towards the pharyngeal wall. Any focus of infection may act as a stimulus to recurrence, and small particles of lymphoid material may grow and ultimately function as glands. It has also been said that lymphadenoid tissue, metamorphosed into fat, may resume its original lymphadenoid structure.

Condition of Scars following Dissection (see Table IV).—In 84 per cent. fine linear scars were present, with no suspicion of redness or surface prominence; of these, 40 to 50 per cent. were practically invisible unless the neck was closely inspected. A few broad scars are to be expected in cases reporting with abscesses or sinuses when the subcutaneous tissue had largely sloughed away. No case of

TABLE IV.—Condition of Scars following Dissection.

	Cases.		Scars.		
	Dissected.	Traced.	Fine linear.	Slightly prominent.	Broad or adherent.
Simple enlargement	2	1	1	—	—
Caseated glands	121	120	107	12	1
Caseated glands with abscess ...	46	44	33	7	4
Caseated glands with sinus ...	18	18	13	3	2
Total	187	183	154	22	7
Percentage			84.2	12.0	3.8

keloid was seen. The pathology of this condition is still wrapped in mystery. The following are in my opinion contributory factors: an active untreated primary focus, a "bevelled" incision, inaccurate closure of the skin, the use of catgut skin sutures, and any swelling leading to stretching of the scar. The skin incision should be closed by a subcuticular stitch, which coopts the edges so accurately that they immediately adhere. No raw area should remain to ooze or heal by a process of superficial granulation.

Results of Curettage.

Of 111 tuberculous glands complicated by abscess, 32 were dissected,* the remainder were scraped, with the following results:

No glands remaining	38
Small glands, non-pathological	13
Required dissection later	14
Pathological glands still present	7
Untraced	5
Died later	2

79

Two infants, suffering from tuberculous mastoiditis with secondary glands and abscesses, succumbed to tuberculous meningitis a few months after operation. The spread to the meninges would appear to have taken place directly from the petrous bone. In neither case was any radical operation performed on the ear or mastoid cells.

I find that 50 per cent. of tuberculous glands complicated by abscess ultimately require dissection, that 34 per cent. recover completely after curettage, and that the remainder have small palpable glands which do not appear pathological. Cases of chronic abscess arising from a single caseous gland have a reasonable prospect of cure, as the smaller associated glands subside if safeguarded from further bouts of infection by removal of tonsils, etc. One naturally wonders if a follow-up period of two to six years is not rather brief, but end-results in tuberculous

*I now dissect a much larger proportion.

adenitis are akin to malignant disease—there is no time limit to recurrence. It is by no means easy to be dogmatic about small glands remaining after curettage, as I find the jugulo-digastric glands palpable as small ovoid bodies about the size of a haricot bean in 85 per cent. of healthy children, and smaller glands along the posterior border of the sterno-mastoid are not uncommon. Dowd,¹⁷ commenting on similar nodules, remarks: "I have watched nodes of this kind year after year, and have hardly ever seen them increase in size and have frequently seen them subside, a few have been removed and almost without exception have proved to be hyperplastic."

I maintain that minute glands which are perfectly soft and not larger than a bean can be safely left to Nature; other observers might deem them pathological—then they present the easiest of dissections if one is obsessed with the idea of removing the last shred of palpable lymphatic tissue from the neck.

CONCLUSIONS.

1. As seen in a surgical out-patient department 10 per cent. of glands are likely to recover with treatment of a peripheral focus of infection. Such glands are probably not tuberculous.

2. Necrosis and caseation take place rapidly in tuberculous glands.

3. The signs of caseation are increased hardness and loss of elasticity, not "softening" as is generally thought. Softening or fluctuation indicates an extracapsular abscess.

4. Palliative measures may allow the subsidence of peradenitis, but have no influence on the intracapsular substance of the gland.

5. The fact that 51.9 per cent. of tuberculous glands are complicated by an abscess or sinus suggests that conservative treatment is usually unduly prolonged.

6. Tuberculous glands should be removed by dissection whenever signs of caseation become manifest; the presence of an abscess is no contraindication.

7. Curettage gives satisfactory results in selected cases.

I have to acknowledge my indebtedness to Dr. E. A. Johnston and Dr. T. O. Morrison for their help in arranging the "follow-up" of patients, and to Miss Kathleen I. Stewart for her assiduous care and skill in the post-operative treatment of my cases.

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SOME ASPECTS OF THE TREATMENT OF RHEUMATOID ARTHRITIS.

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In briefly outlining the most important forms of treatment of rheumatoid arthritis, I would draw attention particularly to the benefit ensuing from consideration of the mechanical aspects of the affliction. Drug and vaccine therapy are scarcely considered, for both are strongly represented in current literature, and neither has proved of much efficacy.

So long as it is held that the presence of focal sepsis is the chief or only etiological factor, so surely shall we make no progress in the treatment of the disease. Prior to the advent of the wave of enthusiasm for bacteriology, clinicians directed their attention to the constitutional abnormalities of the individual as a whole. Resulting therefrom came the masterly accounts of the disease, such as that of Kent Spender,¹ unsurpassed in accuracy of clinical observation by modern writings. When the medical mind focused on the dangers of dental and tonsillar sepsis, the concurrent