ON RECURRENT FIBROMATA OF THE NECK, AND THEIR RELATION TO THE BRANCHIAL ARCHES.¹

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I PROPOSE to deal shortly with this subject under the following heads:

1. The history of a typical case of recurrent fibromata of the neck ;
2. The pathology of these growths ;
3. The morphology of the branchial arches, and their probable relation to these fibromata.

G. B., a labourer, was first admitted into the Bath United Hospital on March 1st, 1882, with a lump on the left side of the neck under the lower jaw, of six months' duration. The tumour was hard, rounded, freely movable, and about the size of a hen's egg, deeply situated in the anterior triangle of the neck, posterior to, but on a line with, the body of the hyoid bone and thyroid cartilage, lying on the deep vessels of the neck, and moving up and down during deglutition. It was removed without difficulty, and, after dividing the layers of the deep cervical fascia over a director, it shelled out easily. To the naked eye, the growth looked like a young rapidly developing fibroid. The man, after a sharp attack of quinsy, made a good recovery, and left the hospital a fortnight after the operation.

On August 25th, 1883, eighteen months after his discharge, he re-applied for admission, this time for a much larger growth under the jaw of the same side, situate on a higher plane, and involving the cicatrix of the previous tumour. It had been growing for six months, the interval of freedom being only a year. It was now lobulated anteriorly, hard to the feel, moved easily about on the underlying structures, placed obliquely to, and overlapping the carotid vessels in front, attached sparingly to the body of the lower jaw, and reaching upwards and backwards to the mastoid process of the temporal bone, but not involving the parotid gland in its course. Its longest diameter measured five inches and three quarters, its shortest three inches and a half. It occupied, therefore, the upper portion of both triangles, and the sterno-mastoid muscle was thinned and stretched over it. There were no enlarged cervical glands, no pain or tenderness ; and he complained of but little inconvenience, except the weight. No family history bearing on the man's condition could be made out.

The growth was removed under ether. After division of the skin, all the structures were divided carefully over a director. The sterno-mastoid and digastric muscles were expanded over its surface, the external jugular vein was made out, tied, and cut through, and the facial vessels were treated in like manner. By the aid of a blunt dissector and the finger, the growth was slowly separated. It was found adherent somewhat to the body of the lower jaw for about an inch, and a portion of the submaxillary gland being involved was removed. It was bound down everywhere, apparently, by the deep cervical fascia, strongly to the hyoid bone and its cornua below, and to the mastoid process above and behind ; but it shelled out in the end, leaving a deep chasm, at the bottom of which could be seen the hyoid arches, the constrictors of the pharynx, and, deeper still, the tip of the styloid process of the temporal bone. The hæmorrhage was inconsiderable and chiefly venous. The wound was swabbed with a thirty-grain to the ounce solution of chloride of zinc, plugged, drained with horse-hair, and bandaged firmly.

From the nature of the operation, much subsequent cellulitis followed, with superficial emphysema extending over the clavicle of the same side and upper part of the chest. Suppuration became very free, the pus passing down between the two layers of the deep cervical fascia between the first rib and the clavicle ; and, fortunately, not entering the thorax, it presented in the first and second intercostal spaces between the skin and muscles. Small and numerous punctures were then made by Mr. Gardiner, the house-surgeon, and frequent syringing with Barff's boroglyceride carried the man to a happy termination. Besides remarking that his temperature never rose over 100°, and that only for two days, there is but little to record ; and he left the hospital well, a month after the operation.

To the naked eye, there was a hard fibrous growth, of the size of a man's fist, cutting through like tough fibrous tissue until the centre was reached, where it was softer, mucoid, and resembling a myxomatous infiltration. Mr. H. G. Terry, on microscopic examination, reported the tumour to be composed of wavy bundles of young fibrous

tissue, with small spindle-cells seen on transverse and longitudinal section, the former having the appearance of small round or oval cells, but which, on closer examination, were found of different sizes depending on the spot cut. The soft mucoid centre had a looser arrangement. The first tumour resembled the second, excepting that it had no soft spots. We concluded, therefore, that we had to do with an undoubted specimen of the small spindle-celled sarcoma, or the old recurring fibroid of Paget. This view has since been confirmed by Mr. H. Butlin. There is no room to doubt that the growth was malignant, and will recur again in a short time. The softened mucoid centre was probably altered connective tissue ; but at any time it would, I take it, be difficult to determine whether a tumour be sarcoma with mucoid degeneration, or a myxoma with spots of embryonic tissue. The myxoma, however, would show elastic fibres or true adipose cells.

Rokitansky and Billroth would have called this growth a fibro-sarcoma ; but Paget has shown that these recurrent fibromata show incomplete development of rudimental or embryonic tissue, with undue preponderance of cell-elements ; and points out, further, their tendency to recur *in loco*, not merely in the same tissue or organ, but adjacent to the scar of the first operation-wound (as in this case), yet distinguished from malignant growths by non-recurrence in distant organs. Their tendency, therefore, to recur *in loco*, their excessive cell-growth, and embryonic structural characters, make these growths correspond with Virchow's sarcomata.

Parenthetically, Ziegler remarks that all fibrous basis-substance has a certain innate predisposition to develop cancer, and that arrest of process may transform an osteoblast to develop an enchondroma ; that a fibroblast, in arrest, may transform itself into a spindle-cell of sarcoma. This is most interesting.

Morphologically, we find that the head and neck in man are laid down, as in all other vertebrates, in segments or visceral arches, from his earliest embryonic condition. In the human embryo, well developed arches are seen at the end of the fourth week, which have disappeared by the eighth week ; in the dog, they are well seen on the fourth week, disappearing on the sixth week ; and, in the chick, they are well seen on the fourth day, disappearing on the eighth day. Two of these arches are pre-oral, five postoral—the branchial or gill-arches of Rathke.

The first postoral or mandibular arch is formed of connective tissue-membrane surrounding Meckel's cartilage, its upper end articulating secondarily with the squamosal bone ; its primitive connection, as in all mammalia, being first with the auditory ossicle, the malleus ; and this explains how, in man, the "processus gracilis" is found lying in the Glasserian fissure, an embryonic relic of evolution. In birds and reptiles, this process is known as the quadrate bone, or ramus of the lower jaw.

In the second postoral or anterior hyoid arch, we have in man the lesser cornu, the stylo-hyoid ligament, and the styloid and tympanic processes of the petriotic bone, making up this arch.

In the third postoral or posterior hyoid arch in man, we have the body of the hyoid bone and its greater cornu composing the arch, this being equivalent to the third branchial arch, which, in fish, bears gills. The other two arches below abort after arranging the arterial aortic arches in the neck. The ear develops in connection with the second branchial arch.

Recent morphology, and the comparative embryology of the late Professor Balfour, have brought to light much that was long obscure and contradictory. Few of us could have believed that the little tympanic malleus constituted, in primitive forms, what is equivalent now to the ramus of our lower jaw ; that the little incus, also in the middle ear, is in reality the extreme summit of the hyoid bone in the lower animals ; and that, when linked with the still more minute stapes of the middle ear, it forms the columellar bone of reptiles ; that the incus in the cod and other fishes forms that huge hyo-mandibular bone ; that the minute stapes, although now claimed for the inner wall of the tympanum, was also secondarily connected with the upper part of the hyoidean brachial arch ; and that the familiar stirrup-hole in its centre probably carried through the mandibular artery. Obviously, therefore, the auditory ossicles are difficult to interpret in man himself, when taken alone.

Again, the hyoidean apparatus is a fragile structure in man ; a complex structure, with many joints, in the dog ; huge in the horse, rudimentary in the sheep, inflated and enormously expanded in the howling monkey ; connected above with the tongue, posteriorly with the ear, below with the larynx. We cannot fail to be struck with its rudimentary relics in man, when compared with its large and important bearings in the lowest vertebrates.

These arches have other bearings. Stannius² first pointed out that

¹ Read before the Bath and Bristol Branch.

² Vide *Journal of Anatomy and Physiology*, April 1882 ; "Cranial Nerves, their Segmental Value" by Professor Milnes Marshall.

the development of the segmental spinal-like cranial nerves was determined, not by the number of the skull-vertebrae, but by the visceral arches of the head and neck; and Gegenbauer has gone still further, and starting with the segmental nerves and visceral arches, determined from them the number of head-segments. Further, Balfour, in his *Plasmodonts*, has shown that the two halves of the body-cavity extend forward on each side of the neck; and that, on the appearance of the cleft of the visceral arches, each of these halves cuts up into a series of isolated compartments, one in each arch.

Milnes Marshall, quoting Stannius, shows how each visceral arch is supplied by two branches belonging to different cranial nerves—one running along its anterior, one along its posterior border. He points out how the first branchial arch is supplied along its anterior border by the glosso-pharyngeal nerve, along its posterior by the vagus; how the remaining branchial arches are supplied by the vagus, each arch by branches from separate stems; how the hyoid arch is supplied in front by the hyoidean branch of the facial, behind by the anterior branch of the glosso-pharyngeal; how the mandibular arch has the mandibular branch of the fifth nerve along its anterior, and the anterior branch of the facial along its posterior border, the latter being identified as the chorda tympani of birds and mammals. Finally, we must bear in mind how, in all vertebrates, the aortic arches of blood-vessels are formed by dividing over these branchial arches in the same manner as the segmental nerves.

I have dwelt at some length on the anatomical relations of these structures, in order to show that the guiding framework of the neck is the three postoral arches, and that the mandibular and hyoidean arches are highly specialised in regard to special functions; but the literature on this subject seems of the scantiest description: Ziegler and Virchow abroad, and Paget and Treves at home, seem to give us all we at present know. Yet there must be some close connection. If not, why do morbid growths occur so commonly in the neighbourhood of the lower jaw rather than in connection with the clavicle and first rib? The remains of the three first postoral arches persist, the lower ones aborting entirely, will, I think, explain this.

It has been asked whether the types that have been established for physiological tissues will be found to hold good, also, for pathological ones. Virchow says, "Yes;" and adds that every pathological structure has its physiological prototype, and that no form of morbid growth affixes which cannot, in its elements, be traced back to some model which had previously maintained at some time an independent existence in the economy.

Johannes Müller showed the law of correspondence between embryonic and pathological development; and Keimstock stated that connective tissue with its equivalents, as the common stock of germs of the body, could be shown as the general source of development of new formations. Reichert first noted that the body was made up of a more or less continuous mass of connective tissue-like constituents, in which muscles and nerves were imbedded.

Therefore, we say, in this connected framework of the branchial arches new growths develop; and in accordance with the same physiological law which regulates embryonic development *in utero*.

Again, Cohnheim has laid down that all tumours are the direct product of pre-existing cellular elements, and that these cells originate, not from mature tissue, but from embryonic cells, rudimentary relics of early embryo-life; and may not we ask if these fibromata of the neck are not of this origin, starting from the abortive, wasted, fibro-connective tissue of the gill-arches of early embryo-life?

Connective tissue is similar to embryonic tissue. Protoplasm increases, nuclei divide, without subsequent division of the cell; in this way the myelo-plaxes of Robin are formed in the medulla of young developing bone, and the giant-cells of sarcoma. Embryonic cells follow embryonic tissues (the grade is easy) which are not utilised during the period of physiological development; and Virchow has shown that many of the enchondromata, common in the parotid region, have their origin in the islets of cartilage left in the neighbourhood of the gland after the atrophy of the branchial arches.

Finally, indifferent embryonic tissues may give a sarcoma, a lipoma, an enchondroma, a myxoma; but we know nothing which determines the growth of young cells into various forms of morbid tissue. Tumours occurring in early life, and referable to the embryonic state, are numerous enough, such as sarcoma or myo-sarcoma of the kidney and spleen, and it is extremely probable—aye, certain now—that some ovarian adenomata, the tumours of a certain size which start from the broad ligament of the ovary, from the parovarium or organ of Rosenmüller (the aborted Wolffian body of the female) date back in their origin to the embryonic period.

A WORD ABOUT ONE PHASE OF FEVER.

By J. MORTIMER GRANVILLE, M.D., M.R.C.P.

WHATEVER may be the nature of the materies morbi of Typhoid or Continued Fever, it cannot be doubted that its first attack on the previously healthy but now infected organism, is directly upon the nervous centres. We may infer the precise *locale* of the onslaught from the symptoms. Particularly those centres, whether cerebro-spinal or ganglionic, which preside over and, in truth, perform the functions of alimentation, comprising digestion, absorption, circulation, assimilation, disassimilation, and excretion, are affected. One of the first objective symptoms is acceleration of the heart's action, which, I take it, is due to the suspension or partial arrest of the inhibitory control of the vagus, a property it owes to the filaments it receives from the spinal accessory. The respiratory centre is also set free, and the movements of the lungs become more rapid, not merely in consequence of the heart's quick movement, but from the same cause which accelerates the speed of the central organ of the circulation, namely, *defect of control*. The heat of the body increases, and diarrhoea occurs, both presumably due to the arrest of function in the sympathetic, and local congestions occur from the same cause. Not to go into detail, which would only be to waste space, it may be briefly asserted that the phenomena of fever are, at the outset at least, those which we should expect to be produced by any force or influence which gave, as it were, a staggering blow to the principal nerve-centres of organic life. As a rule, the first effects of the accession or attack of fever pass off within a few hours, though not until they have been replaced by other results of the malady, which serve to perpetuate some of the earlier symptoms, notably the quickness of the pulse and the high temperature. Sometimes, however, it happens that the nerval or primary nerve-stage, or phase, of fever is prolonged, placing the life of the patient in imminent peril in the first few days, or even hours, of the illness, and throwing the practitioner on his beam ends as to treatment. What is to be done when we find ourselves face to face with this formidable danger and difficulty?

The patients who are placed in jeopardy, and too often die, in the accession-stage of fever, are, not unfrequently the very last we should have expected to succumb. They are often young and vigorous, and apparently have had nothing previously the matter with them. They are, however, nearly always *neurotic*, in the received acceptance of this term, and often constitutionally excitable, to the extent of exhibiting hysterical phenomena; but their general strength is not impaired, and it is all too early in the disease to think seriously of a fatal termination, yet they are gone like the flame of a candle before a puff of wind, to the horror of their friends, though not necessarily to the discredit of the practitioner. When a patient who has just been attacked by fever suddenly sinks almost without warning, there is no time to cast about for modes of treatment; we need to be prepared and able to act at once. It is useless to rely on alcoholic stimulants. I believe these not only fail in such an emergency, but often do mischief by exhausting the nervous energy, presumably by overstimulation of the nerve-centres, just as a fainting horse may be done to death by a careless driver with a persuasive whip. An effort is made, but the life is pumped out in making it. As to food, the digestive and assimilative functions are in abeyance, or nearly so; and if we hunt the *materia medica* through, it is doubtful whether we shall find any remedy which will act precisely in the manner required and with needful celerity. If the vital force be not sufficient to resist the "nervous shock" of the poisoning, the patient must die, not of the disease, but of the great nerve-depression produced by its onslaught.

The suggestion I have to make may be made in a few words, and it will, I think, at once strike the practitioner as both rational and practicable. I recommend that, in the face of this instant peril of death from nervous depression in the first days of fever, recourse should be had to the *bain électrique*, or electric bath, the bed being insulated, which is readily effected by moving the bedstead a few inches away from the wall, and, in doing so, without in the least degree disturbing or distressing the patient, placing the castors on small pieces of plate glass. The prime conductor of an electric machine is then to be brought into contact with the patient, preferably over the solar plexus as the centre of the sympathetic system, and the body charged with static electricity. The effect will be to *neutralise the depressing effects of the poison*, and to enable the patient to tide over the premature crisis, which, if life can be prolonged, will be found to pass in a very brief period.

I must content myself on the present occasion with a simple statement of the plan of treatment, only adding that I believe the way