Results Obtained without International Dictation

If you ask me to go further and end by specifying in some conveniently quotable figures what this international system has saved the country in the way of avoiding importations of infectious diseases, I fear I must be disappointing. It is impossible to estimate events which have not occurred. Even if it were attempted the increased individual efforts and efficiency of our own port sanitary authorities in recent years, as well as changes in epidemic characterization, would have to be weighed in with the international factor, and responsibility apportioned between the three. But at least the extreme rarity of these importations, notwithstanding modern facilities of communication, when contrasted with the experiences of the end of the last century and the pre-war period, in which we relied almost wholly on our own "defence" measures, is some testimony to the value of the willing international co-operation I have outlined. I would insist on its willingness; in my experience the best work has been done by avoiding any semblance of international expert dictation, any suggestion of international inspection, or any interference with national administration. It has been achieved by working steadily for conferences and agreements between responsible health officers throughout the world, determined to help one another to carry out their respective national duties.

THE TREATMENT OF ADOLESCENT KYPHOSIS*

BY

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The danger against which the orthopaedic surgeon must fight in adolescent kyphosis is the spontaneous formation of compensatory lordoses in the cervical and lumbar regions. This is true of all types of the deformity, whether due to late rickets, sometimes called "kyphotic disease" and characterized by an osteomalacia of the dorsal vertebrae with a poor general state of health, a type that may be called "somatic kyphosis"; or whether it is the painful adolescent kyphosis, which is a special disease of indeterminate nature, regarded by some (Schmorl and his pupils) as connected with a subcartilaginous nuclear hernia, by others (Schauerbach, Sorrel, and Delahaye) as with epiphyseal trouble, and by others again (Calvé, Galland, Meyer, etc.) as connected with nuclear hernia combined with epiphysitis—a kyphosis of disk origin as opposed to the preceding type. This orthopaedic principle applies whether the kyphosis is capable of being actively and passively reduced—that is to say, a kyphosis due to bad posture—or whether it is irreducible with a certain number of dorsal vertebrae attacked by definite lesions, forming, as in Pott's disease, an actual focus. The aim of this short paper is to show why, in adolescent kyphosis, spontaneous lordoses form: why they are harmful; how they can be avoided; and by what they should be replaced. First of all it is necessary to recall several essential points in the normal and pathological physiology of the spine.

Movements of Flexion and Extension of the Normal Vertebral Column

Ignoring, for the moment, lateral, rotary, and twisting movements, the vertebral column can be divided into (1) regions of hyperextension, and (2) regions of flexion.

There are two regions of hyperextension: the cervico-dorsal, and the dorso-lumbar and lumbar region. As shown in the attached diagrams, the cervical spine with the three first dorsal vertebrae form the principal region of hyperextension—that is, a region in which the vertebrae as a whole allow quite a pronounced movement of hyperextension, very pronounced in certain persons who can touch the upper dorsal spine with their occiput. On the other hand, this region allows little or no range of flexion. The dorso-lumbar and lumbar region includes the ninth, tenth, eleventh, and twelfth dorsal, and the first, second, third, fourth, and fifth lumbar. Movements of hyperextension are highly developed here, and, in supple persons, when the trunk is bent backwards the head can be placed between the heels.

FIG. 1.—Normal physiology of the dorsal vertebrae. Region of flexion: (a) a certain degree of flexion is possible; (b) impossibility of extension.

FIG. 2.—Normal physiology of the lumbar vertebrae. Region of extension: (a) a certain degree of hyperextension possible; (b) with possibility of flexion.

The regions of flexion are the suboccipital and the dorsal. The movements of flexion which occur at the occipito-atlodian articulation should be considered separately from the rest of the vertebral physiology. They are, moreover, very limited, and play no part in the subject with which we are dealing. There remains the dorsal region, the seat of most of the movements of flexion of the vertebral column in its entirety. There are no movements of hyperextension.

The Disk and the Nucleus Pulposus in Flexion and Extension

This matter, which I have discussed elsewhere, has been the object of some very important research in Germany—research that is very well described in a recent work (Mauric: *The Intervertebral Disk*). It must be remembered that the disk acts as: (1) a nuclear axis through its gelatinous centre—the "nucleus pulposus" (Luschka); and (2) as a true anterior and posterior check ligament through the fibrous ring which connects the intervertebral disk with the overlying and underlying vertebrae (see diagram).

In the regions capable of flexion (mid-dorsal) the nucleus is situated at the junction of the posterior and middle thirds of the disk. The movement of flexion pinches the disk in front and pushes the nucleus backwards to a very slight degree. If the reverse movement is attempted—that is, an effort is made to stretch a dorsal intervertebral disk in front and pinch it behind—failure results. It seems as if, on the one hand, the anterior margin of the fibrous ring acts as a check, and on the other, the somewhat posterior situation of the nucleus in this region prevents the compression of the disk behind. Movement is thus blocked in a position in which the

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surfaces of the overlying and underlying vertebrae are parallel. By contrast, in the regions capable of hyperextension, the nucleus pulposus is situated further forward; it generally occupies the middle third of the disk. The disk can be stretched in front and pinched behind. This movement of anterior stretching is especially pronounced in the lumbar vertebrae. If, however, an attempt is made to destroy the parallelism by flexion—that is to say, to stretch the posterior part of the disk—this cannot normally be achieved. The posterior part of the disk acts as a check.

We must remember that this physiology, so to speak, of the vertebral column exists only in childhood, adolescence, and the early years of adult life. Premature senility of the disk, and especially of the nucleus pulposus, appears towards the age of 30, and is generally definitive at the age of 40.

What occurs in the upright position? The normal attitude is such that the line of gravity should fall in the middle of the base of support. The upright position is characterized by a slight cervico-dorsal lordosis, a slight dorsal kyphosis, and a slight dorso-lumbar and lumbar lordosis.

Pathological Physiology of the Vertebral Column

From what has just been said about the normal attitude of man in the upright position, it can be seen that kyphosis is merely an exaggeration of the natural curves. All causes which may increase these curves will bring about a kyphosis—for example, the occupational kyphosis of certain adolescents who are obliged to carry heavy weights on their shoulders and head. Here there is a special malleability of the vertebral bodies (dorsal rickets), which, destroying the equilibrium between the weight and the resistance of the vertebral bodies, constitutes a new cause of kyphosis. Every destructive or pathological modification of the dorsal vertebrae will be a new cause of kyphosis (the painful kyphosis of adolescents, cuneiform deformities of the vertebrae, etc.).

Another cause, which I mean to discuss more fully in a subsequent work, would seem to be a congenital predisposition to kyphosis, and, in my opinion, enough stress has not been laid on this point. This is the abnormal and posterior position of the nucleus pulposus in certain young people. We know that the nucleus pulposus is merely the remnant of the notochord. It is easy to imagine that, in certain cases, this notochord occupies a more posterior plane than is normal.

Be that as it may, a physiological kyphosis is followed by a pathological one. The posterior convexity of the back increases and becomes a prominence. In order that the upright position may still be possible, in spite of this deformity—that is to say, in order that the line of gravity should continue to fall in the middle of the base of support—compensatory cervical and lumbar lordoses immediately and spontaneously occur in the regions which are normally capable of hyperextension.

Why are Cervical and Lumbar Lordoses Objectionable?

In the first place, they are ugly. The neck becomes short, the abdomen prominent, and the dorsal prominence accentuated; this is the hunchback type. Secondly, they are harmful for two reasons: (a) under the effect of weight they become more and more accentuated, and, in consequence, tend to bring about a progressive increase of the kyphotic prominence; (b) a prominence is formed, not only of diseased or deformed vertebrae, but of sound vertebrae, a condition comparable with that of Pott's disease, where, even with a limited focus, healthy vertebrae help to form the gibbus as much in the upper segment as in the lower segment of the latter.

In the third place, when the compensatory lordoses become very accentuated, and this is found particularly in the lumbar region, a considerable expansion of the disks in front takes place, with a true propulsion of the nucleus into the anterior third of the disk. In this position the nucleus acts as a wedge, and blocks the overlying and underlying vertebrae. In this extreme position it prevents a return to the normal. Finally, these lordoses, which fix the vertebral column permanently into a bad posture, sooner or later become the seat of more or less tolerable pain. Every orthopaedic surgeon knows that kyphotics suffer more pain in the lumbar region than in the dorsal.

How can Spontaneous Cervical and Lumbar Lordoses be Avoided and Replaced?

In other words, how can a patient with kyphosis, when he is cured, be given an upright position consistent with the static laws—that is, so that the line of gravity always falls in the middle of the base of support and with a minimum of deformity? The same problem occurs in dorsal Pott's disease; for the spontaneous and natural cervical and lumbar lordoses there must be substituted

FIG. 3.—A, Spontaneous and wrong compensation of kyphosis by cervical and lumbar lordosis. B, In the same degree of kyphosis artificial and correct compensation by therapeutic curves produced immediately above and below the kyphosis.

FIG. 4.

FIG. 5.

FIG. 4.—Irreducible lumbar lordosis.

FIG. 5.—Modified physiology of the dorsal vertebrae after progressive adaptation, needing time and care.

therapeutic compensatory curves situated immediately above and below the kyphos. To obtain therapeutic lordoses the normal physiology of the dorsal vertebrae must be modified; movements of hyperextension must be brought about at the level of each sound disk.

This involves a work of repair and adaptation which needs time and care. Two procedures are employed. (1) The Minerva plaster jacket and recumbency in an outstretched position and in complete hyperextension. This plaster apparatus, made with the whole spine in extension, blocks the body in such a position that the physiological, cervical, and lumbar lordoses are suppressed and can no longer occur. It is enough then to make a large window at the level of the kyphotic region, and

exercise a slow and progressive correction with the aid of a compression pad, to achieve the desired result in a more or less lengthy space of time. (2) Correction in horizontal recumbency and a hyperextended position. A cast of the shape described by the attached figure can be used, or—and I prefer this procedure—the plaster bed. Whichever procedure is adopted the position of the recumbent patient is such that the lumbar lordosis is completely suppressed, and in the segment of the upper vertebral column, at the apex of the kyphotic deformity, a permanent and progressive straightening force is exercised under the influence of the weight of the upper part of the trunk and head. The action thus taking place can be compared to a permanent pressure on the shoulders.

FIG. 6.—First procedure. The Minerva plaster jacket with window at the level of the kyphosis. Progressive correction with the aid of compression pad (cotton or felt). Impossibility of cervical or lumbar lordosis.

FIG. 7.—Second procedure (the better). Correction in horizontal recumbency and in a hyperextended position. No cervical and no lumbar lordosis. At the same time, and in this position, massages and exercises are carried out.

In my opinion the second method only should be used in an adolescent kyphosis. It permits a number of orthopaedic measures which are indispensable for these patients—that is, in the recumbent position many gymnastic and massage movements can be carried out which develop the muscular system of the young patient, and little by little endow him with a solid muscular corset, which will allow him to maintain the correction when it is obtained. In horizontal recumbency the action of the kyphotic forces is destroyed, and the principal one—weight—becomes, on the contrary, a valuable help.

M. TSURUMI (*Bull. Off. Internat. d'Hyg. Publique*, October, 1934) states that in June, 1933, antityphoid inoculation by mouth was carried out on 32,130 persons in the prefecture of Saitama, near Tokyo, while 45,790 persons in ten other towns served as controls. Up to the end of December, 1933, six cases of typhoid fever occurred among the inoculated as compared with thirty-nine among the controls. One of the six persons fell ill six days after inoculation, which therefore took place during the incubation stage, so that there were really only five cases among the inoculated and forty among the controls.

ALLERGY, METABOLISM, AND THE AUTONOMIC NERVOUS SYSTEM

BY

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My object here is to give you what I consider should be a clinical conception of allergy. In previous papers^{1 2 3} I have led up to this conception. First of all allergy should be distinguished from infection and its reactions. One big difference clinically is that allergic manifestations tend to be afebrile and evanescent, and infectious illnesses febrile and of slower subsidence. Allergy arises from processes which, though initiated by foreign proteins, are primarily metabolic, internal, and autonomic in nature. Infectious illnesses arise from reactions to the foreign invading toxins of bacteria. Allergy must not be confused with immunity. Clinically the first is an irritative and the second a protective phenomenon. Rich⁴ has shown experimentally and quite clearly that hypersensitiveness to bacterial allergens and immunity to the same bacteria can be separated: when the serum of allergic immune animals is injected into normal ones the immunity is transferred, but not the hypersensitiveness.

Bacterial allergy may be connected with infection in that individuals may be infected and become sensitive to the proteins from the bacteria in some septic focus in their own bodies, but this reaction is an irritation phenomenon, and is not necessarily related to immunity. An infant *in utero* may conceivably be sensitized, and is often prepared for sensitization by irritating body fluids from the mother. It can also be given a temporary immunity by the stimulating effect of body fluids from the same source. In the first case, however, the infant inherits the peculiar type of internal metabolism that can be irritated into sensitization, while in the second it receives a transferred acquirement which is only temporary and which depends on the chance of the mother's illnesses and their effect on her body fluids. Allergy, then, is internal and due to peculiarities in the individual endowment; infection and acquired immunity are foreign and fortuitous.

Inheritance

That heredity plays an important part in relation to allergy is shown by family histories and by the early age at which the symptoms become evident.

Case 1.—A baby of 8 months had curd dyspepsia with chronic diarrhoea, urticaria, and seborrhoeic eczema. The mother and the grandmother had had asthma, and there was also a history of eczema in the same branch of the family.

Case 2.—In another family the mother has eczema and a tendency to rashes with cineraria flowers. Of eight children one has hay fever, another urticaria, and a third asthma. The last baby has eczema, and was allergic to the mother's milk, and the penultimate child had eczema and developed asthma as the eczema disappeared.

Case 3.—In one family of ten children one had milk dyspepsia, two eczema, one croup, one asthma, and one serum sickness. Of the children of the last individual one had asthma, eczema, and urticaria, and the other angioneurotic oedema. One of the children of the asthmatic had asthma.

The following three histories show that in addition to inheriting a tendency to allergic manifestations a child may inherit a sensitive metabolism.

Case 4.—A baby aged 8 months had eczema, and had had acidosis three months before. There had been milk dyspepsia, and the child had decided digestive disturbances if given cod-liver oil or orange juice.