Lectures

ON

THE ANATOMICAL AND PHYSIOLOGICAL PRINCIPLES UNDERLYING THE TREATMENT OF INJURIES TO MUSCLES, BONES, AND JOINTS.

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II. JOHN HILTON'S PRINCIPLES OF TREATMENT.

Abstract.

In the spring of 1862 John Hilton completed in the theatre of this College a series of lectures which, when published in a book under the title of *Rest and Pain*, won an enduring place in the minds and hearts of medical men. I have our College portrait of him to show what kind of man gave those lectures here fifty-five years ago. "Rest and pain" is a title with more than a touch of romance in it; it prepares you to expect the finely chiselled face of a poet; but the man who wove those vivid and incisive lectures from materials freshly gathered at the bedside had nothing of the poet about him. His is a flat, rotund, plainly moulded, robust, and honest face. His contemporaries tell us that he had the outward appearance of a dapper, prosperous city man. There is nothing at all of the student's cast of countenance about this man whose skilful practice we are to follow. There is no trace in him of the society man; he cold-shouldered all the world save the few he selected for associates and friends. He could be, and often was, overbearing, rude, and mordantly sarcastic. But we shall see that he faced adversity with a brave heart, asking no favour and having no fear of any man, knowing well that he had that to sell which the world must buy, not at its, but at his price.

Having thus introduced John Hilton when he had established for himself a sure place in British surgery, I propose now to turn to his earlier years, and watch his growth in knowledge. Hunter served the apprenticeship to his life's career in the dissecting room; so did John Hilton. Hunter's dissecting room was in Covent Garden; Hilton's lay in the Borough, beyond the south end of London Bridge. In the year 1824, when Hilton, a lad of 17, came from Chelmsford Grammar School to commence his medical studies, the twin hospitals of St. Thomas's and Guy's were cheek by jowl in the Borough. They had a common dissecting room when Hilton attached himself to Guy's. He was born at Castle Hedingham, in the upper reaches of the Colne, in North Essex, as pure a Saxon settlement as is to be found anywhere in England. He was a Saxon in build of body and in frame of mind. His people were apparently not well off, for Hilton could not afford to pay the surgeon-pupil's fee which would have secured for him the privileges of climbing to the highest position in his hospital. Hunter had been dead more than thirty years when Hilton entered the Borough in 1824, but his name and teaching were kept green there by two ardent Hunterian pupils and disciples, Henry Cline and Sir Astley Cooper. Hilton could begin where Hunter left off.

In 1828, at the age of 21, having taken the diploma of this College, he entered the dissecting room of Guy's Hospital as demonstrator of anatomy, and there and in the *post-mortem* room he was destined to abide and work for seventeen long years, when, in 1845, at the ripe age of 38, he was appointed assistant surgeon to the hospital and lecturer on anatomy. Like Hunter, he served his apprenticeship to surgery in the dissecting room. Only it was a different apprenticeship. There was a home in the suburbs, but no experimental station in the suburbs, no sedulous cross-examination of freezing eggs, incubating chicks, or sensitive hydra to yield the secrets of life. Certain things had happened since Hunter's death which influenced the men of Hilton's time. Archdeacon Paley had cast a spell on the marvellous mechanisms of the human body. It became the chief duty of the anatomist

to discover the utility and design of every one of its many structures. Hence we find Hilton in the dissecting room seeking continuously for an explanation of the arrangement and use of its various parts. He turned his attention to the distribution of arterial trunks, and sought for a functional—or, as his contemporaries would have phrased it, a teleological—explanation. For him the internal maxillary became the "artery of mastication"; it was designed and laid down to supply all the parts concerned with the jaws and the muscles which moved them. Its large middle meningeal branch, far from proving his thesis to be wrong, proved its truth, for did it not supply that temporal area of the skull which provided a firm basis for the largest of masticating muscles—the temporal? On the same basis he explained the distribution of the branches of the subclavian arteries; they were "respiratory vessels" destined to supply muscles and bones concerned in the act of respiration. The coeliac axis was "the artery of digestion"; it supplied the organs immediately concerned in that act. We see him hot foot in the application of the doctrine of utilitarianism to the structure of the human body.

Certain events which occurred just before and just after he became demonstrator at Guy's in 1828, turned his attention to the manner in which nerves are distributed; these were the discoveries of Charles Bell and of Marshall Hall. On becoming a medical student Hilton could not have escaped the glamour of the doctrine which Charles Bell was still preaching from the precincts of Piccadilly; for the first time a utilitarian explanation of nerve roots had been given; for the first time it was shown that nerves going to muscles were compound in nature; they contained fibres which carried messages from the brain, and also others which carried messages to the brain. It was late in 1832, just as Hilton was commencing his fifth year in the dissecting room, that Marshall Hall, working in a laboratory extemporized in his Bloomsbury home, announced to an incredulous world his discovery of the "reflex"—or, as he preferred to call it, the "excito-motor"—function of the spinal cord. Hilton never understood the nature and full significance of Marshall Hall's discovery, but nevertheless it bent him towards the investigation of nerve distribution. Hence we find him dissecting out the exact distribution of the laryngeal nerves; he shows that the nerve which furnishes the mucous membrane of the larynx with sensory fibres also supplies the muscles which are situated beneath the membrane with motor fibres. For him that observation became the basis of a law—the nerve which supplied the motor power of a part also served the sentient surfaces connected with that part. For him the nerve trunk became the functional element. He preferred to work on what seemed a solid anatomical basis than trust himself to the intangible "excito-motor" theory of Marshall Hall.

He applied himself to the investigation of the nerve supply of joints. In the hip he observed that the three nerve trunks—anterior crural, obturator, and sciatic—which supply the muscles which act on the joint, also send sentinel branches to the joint itself. By such an arrangement he believed a consensus of action was obtained: the articular sentinels kept their muscular colleagues informed as to the condition of parts in all stages of a movement. In the knee-joint he found further confirmation of his belief: the obturator nerve sent a twig to the knee-joint because the gracilis—an obturator or adductor muscle—acted on that joint. For the same reason the nerves which supplied the extensors and flexors of the knee also supplied the joint. At the knee-joint he was able to go a step further: the nerves which supplied a joint also supplied the sentient skin which enclosed and protected the joint.

As regards the knee-joint this theory presented a difficulty: the internal saphenous nerve which furnishes a large branch to the skin of the knee was distributed chiefly in the leg and foot. A nerve which observed his theory should not do a thing like that. Hilton's was an eminently logical and practical mind, and this which seemed an exception to his law of "consensual distribution," he turned to its support in the following manner. The sartorius muscle acted not only on the knee-joint, but through its fascial insertion on the whole of the inner side of the leg. It was necessary, he conceived, that a nerve of a muscle group should supply the skin over its entire area of action, and hence the extension of the distribution of the internal saphenous nerve to the inner side of the leg,

He supported his contention by an appeal to the upper extremity: the posterior circumflex—the nerve of the shoulder-joint—sent cutaneous branches beyond the deltoid because that muscle had an insertion to the fascia of the arm; the musculo-cutaneous of the arm sent a branch to the forearm because the biceps, by its fascial insertion, acted on the forearm. In the dissecting room, and afterwards in his surgical lectures, we shall often find him straining a hypothesis far beyond its breaking point. But right or wrong, it was just because he tried to explain appearances and kept his eye ever on the alert that he became a power in British surgery. In 1839, while still engaged in these dissecting-room researches, he was elected to the Royal Society at the age of 32.

We are now to follow Hilton when he is launched in the field of surgery, at the ripe age of 38, and watch him apply, in the treatment of joints, muscles, and nerves, the knowledge he had gained during the seventeen years of continuous labour in the dissecting and *post-mortem* rooms. In some respects he is to out-Hunter Hunter. He never leaves us a moment in doubt as to the rôle the surgeon is to play in the treatment of disease. He must be nothing more and nothing less than Nature's humble assistant. At the end of his fourteenth lecture, when his experience was ripe, he summed up his philosophy in these words:

By regarding this subject of physiological and mechanical rest in what I conceive to be its proper professional light, the surgeon will be compelled to admit that *he has no power to repair directly any injury*. It will induce him to acknowledge in all humility that it is the prerogative of Nature alone to repair the waste of any structure. He will thus realize that his chief duty consists in ascertaining and removing those impediments which obstruct the reparative process, or thwart the effort of Nature, and thus enable her to restore the parts to their normal condition.

Hilton had, the power of putting into words thoughts which were beyond the power of Hunter's utterance. Nor can I resist to quote here another instance from his third lecture which shows not only his opinion of the surgeon's place, but gives a glimpse of his humanity and his command of idiomatic English, learnt while a boy at Castle Hedingham.

A surgeon from the country lately came to my house with a patient. He said: "I want to consult you about a young lady who has a diseased toe." With her was a relative, an elderly gentleman, a very kind-hearted man, who thinks himself a good surgeon and goes about doctoring people, sometimes doing harm and sometimes perhaps a great deal of good. He is very fond of animals, and has a number of pets. After I had examined, with the surgeon, the lady's toe, the elderly gentleman said: "Well, Mr. Hilton, what are you going to do to cure this young friend of mine?" I said: "I think I shall put a splint on the foot and keep the toe quiet, attend to her general health, and Nature, in all probability, will do the rest." I then said to him: "What led you to adopt the occupation of a philanthropic surgeon?" "Well, Mr. Hilton," he replied, "I will tell you. Some years ago I caught a live mouse in a trap. . . . Then I thought to myself, 'This mouse must have had difficulties in the treatment of its injuries; and—' Interrupting his story, he said, "I hope you won't be offended at what I am going to say?" "No," said I, "not in the least." "Well," he continued, "I said to myself, surely this mouse, although it is cured, never had a physician or a surgeon! I agree with you, Mr. Hilton, that Nature is a very valuable surgeon."

This vivacious passage makes it very clear that Hilton considered the surgeon's first duty was to give the injured parts rest. It was by means of rest that he could best help Nature. The therapeutic value of rest has been recognized by surgeons of all periods. It constituted the fundamental principle of Hunter's practice, but while Hunter gave it a place at the end of a paragraph, Hilton made it the heading for a new chapter. He used his knowledge of the structure and function of the body as a means to discover how parts could be rested. He began by applying his dissecting-room investigations to the treatment of inflamed joints. "Why is an inflamed joint fixed and flexed?" he asks. His answer is that

the irritated or inflamed condition of its interior (say the knee-joint) involves all the articular nerves, excites a corresponding condition of irritation in the same nerve trunks which supply its extensor and flexor muscles. The flexors, by reason of their superior strength, compel the limb to obey them, and so force the joint into a *flexed condition*. . . . The muscles, indeed, appear to be told, through the medium of the nerves of the interior of the joint, that its articular structures are overtasked; the antagonistic muscular forces of the joint being thus *involuntarily* excited, the joint is at once rendered rigid and stiff for the purpose of keeping it at rest. . . . The flexors act

unceasingly day and night apparently without rest, and especially declare their mischievous assiduity by the wakeful slumbers and disturbed sleep of the patient.

The surgeon's first duty was therefore to give the exhausted muscles rest by removing the source of their disturbed action—the stimulus which arose within the diseased joint at each movement. That could be done in only one way: if we would set the muscles which act on the knee-joint at rest, then we must prevent the articular nerves of the joint from being irritated by the pressure and friction which result from every movement—particularly involuntary movements. There was only one way—rest. But not the rest given by a general instruction to patient, guardians, or nurse—as Hunter gave it; not rest in homoeopathic or intermittent doses, but a long continuous course. The methods used to secure such rest must be founded on a sure anatomical and physiological basis, prescribed with precision and carried out meticulously, until Nature had effected a cure. The application of splints was his chief means of securing physiological rest of joints. We shall have occasion later to allude to the designs he employed; his service to surgery lies not in the forms of splints he recommended, but in his insistence on their unremitted application.

In passing at once to Hilton's chief work—his application of the principle of rest to the treatment of diseased and injured joints—I have failed to do justice to the solid basis of observation on which he based his practice. He had noted, as had many a surgeon before him, that spasm departed from the orbicularis palpebrarum when the irritant, whatever form it might assume, was removed from the eye; that the removal of a fish-bone from the throat set the pharyngeal muscles at rest, and that the extraction of a calculus relieved spasmodic contractures of the bladder. To obtain rest the irritant had to be removed. He construed the word "rest" in a wide sense. You will recall this case:

That of a man who had received a blow on the chest from a fall upon the part. I could find no fracture of the ribs, but observed that the patient had a most worrying wife. I suggested to the physician that the sole cause of the pain was in all probability produced by the patient constantly moving the injured or bruised soft parts by using his chest and lungs in speaking. All I recommended was that he should hold his tongue and have his chest bandaged. I requested that his wife should not say a word to him. From that time he got quickly well by local rest.

The instance shows us that he used the word "irritant" as well as "rest" in a wide sense. He considered that the false membrane which forms on an acutely inflamed mucous surface, the scab which spreads over an open wound, the exudates which appear on the surfaces of inflamed serous membranes, were Nature's means of protecting these parts from irritation and thus providing them with rest. It was to give rest that he excised painful cicatrices, and cut the nerves which supplied the painful points of irritable ulcers. He rested the heart by confining the patient to bed, and elevated the extremities to rest their vessels. He relieved tension to give rest—the tension of abscess, of stretched nerves, and muscles. Occasionally he resorted to tenotomy to give a spasmodic muscle rest. One series of cases which he treated by rest for the relief of tension of nerves is now of particular interest to us. They are cases which Hilton described as "cervical exostosis," but which we now know are due to the pressure of the lowest trunk of the brachial plexus against the uppermost rib—usually one attached to the seventh cervical vertebra. Hilton treated such cases by rest—rest in the recumbent position, which relieved the suspensory muscles of the shoulders and lifted the nerve trunk from the point of pressure. Whether we agree with Hilton in all his interpretations of Nature's intention or not, we must admit that he sought for and obtained a rational basis for his means of treatment—one founded on the facts of Anatomy, Physiology, and Pathology.

In his scheme of therapeutics action finds no part—neither active movements nor passive movements are considered. "No counter-irritation, none of the old horse-doctoring style of treatment, no setons, issues, or painful applications of any kind," is his verdict as regards ancient and widely established practices. He gives us no reason; simply his dogmatic assertion. He warns his readers of the danger of "walking off" muscular pains and stiffnesses. He had never seen long-continued rest produce harm:

healthy joints which had been confined for months came out undamaged from months of continuously enforced rest. Yet there is one of his observations which does bear on the utility of movement in preventing ankylosis. He remarks on the rarity of ankylosis in the joints between ribs and spine. They are joints at which movements go on unceasingly throughout life. But he refused to associate their freedom from disease and from ankylosis with their inability to assume a position of continuous rest.

If Hilton's first service to surgery was to give "rest" a foremost place in the means of treatment, his second service was to give "pain" its rightful place in the means of diagnosis. He was a teleologist; he regarded the human body as a specially designed machine provided with a sense of pain to serve as a signal of disease.

I conceive that pains situated on the surface of the body, and associated with some abnormal state of an internal viscus, must be looked on as a beneficent provision, enabling us by external pain to receive the information and to appreciate slight organic changes or derangement of function of the internal viscera.

That statement of Hilton's was particularly directed against those who hide their ignorance by tracing all obscure pains to rheumatism and gout. In his opinion, pain was provided by Nature to guide the surgeon to the seat of disease; a knowledge of the distribution of nerves and the manner in which the nerve system acted was the means by which the surgeon was to obtain a correct diagnosis. Pain was a demand for rest. He made certain observations which throw some light on the production of pain. In a case where the ulcerated articular surface of the astragalus was exposed, he made his pupils note that when he merely touched the ulcerated area the patient felt nothing, but when he pressed it there was pain. Pressure gave pain; rest relieved it. In another case, one of necrosis of the tibia, he showed how pressure on the artery above the seat of disease diminished pain, while pressure on the veins increased it. Pressure within the capillaries caused increase of pain.

I should give a very imperfect picture of the foundation of Hilton's methods of treatment were I to omit his inquiries into pathological conditions. I need only cite two cases to show you that he sought in every case, before commencing treatment, to realize the exact nature of the deeply seated lesion; he never allowed an opportunity to escape which would yield him information. The first case I shall cite is this:

A young gentleman, 18 years of age, living in Islington. On a Sunday evening, returning from chapel, wearing a very narrow high-heeled boot, walking at the edge of the pavement, his left foot turned inwards with a sudden jerk, and he exclaimed to his sister, who was with him: "Oh! I have twisted my foot; I never had such a dreadful wrench before." I saw him on the following Sunday with Dr. Billingham, and I then came to the conclusion that he had sustained some injury to the lower epiphysis of the tibia, for, upon close examination, I found the ankle-joint free from mischief. Hilton advised rest. Some days later, when he was visiting patients in the city, he learnt by accident that the young man was dead. He set out for Islington. "The hearse was at the door, so that I had only time to unscrew the coffin and examine the leg. I took away the bit of tibia; it fairly rewarded me for the trouble. There was a laceration between the shaft of the tibia and its lower epiphysis—precisely the spot where the boy had the first sense of pain on the Sunday morning."

Hilton thus provides us with an everlasting example of the manner in which surgery is made into a rational art. The second case I am to cite is equally instructive.

A man, going across Blackheath rather the worse for liquor, fell down or jumped six or eight feet into a gravel pit, and, alighting on his feet, his leg was very severely broken. I amputated the leg below the knee. On examining the ankle-joint, which had apparently not been injured, I found the articular cartilage upon the astragalus actually depressed at one part, and at another I saw within it a large black, deep patch.

This patch Hilton cut out and brought to my predecessor at this College—Mr. Quekett—who cut microscopical sections of it, and found that it was due to an extravasation of blood beneath the articular cartilage. In this instance Hilton provided us with a kind of observation of which we still stand much in need—the lesions of joints which we classify under the generic term of "sprain."

GASTRO-INTESTINAL SEPSIS A CAUSE OF MÉNIÈRE'S SYMPTOMS.*

BY

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SINCE Ménière's paper dealing with a set of symptoms produced by hæmorrhage into the labyrinth, and consequently producing an incurable form of deafness, was published on February 9th, 1861, this set of symptoms, with which his name has been associated, has conveyed to the medical profession at large the idea of a condition of the ear for the relief of which little can be done.

Although aural surgeons of late years have clearly drawn the distinction between Ménière's disease, or the class of cases to which Ménière referred in his paper, occurring suddenly in patients without previous ear trouble, and Ménière's symptom complex occurring in patients suffering from an affection of the middle ear—which condition for many years I have preferred to call by the simpler term of Ménière's symptoms—the distinction is not as yet universally understood in the profession, and there is in consequence a tendency, except with aurists, for any patient suffering from the group of symptoms which Ménière described to be regarded as having an incurable ear disease, so that palliative treatment is all that is possible.

It is not my intention now to deal with the cases in which the symptoms are produced by syringing the ear when perforation of the drumhead exists, or by quickly rotating the patient, or to an extension of suppuration to the labyrinth, or are found in the course of an acute disease from inflammation or infective processes extending to it, or with the attacks of giddiness and tinnitus which occur sometimes as part of the vasomotor disturbances which accompany the menopause, or any of the cases in which the cause is obvious, but to confine myself to those which occur in patients suffering from middle-ear disease and come on without the reason being apparent.

Having noticed a similarity in the general condition of patients who become affected in this way, I began to pay close attention to the matter, and found that the treatment adopted not only greatly diminished the frequency and severity of the attacks, but in some cases practically freed the patients from this distressing condition.

Many of the patients I have seen had the following conditions present at the first visit: A furred tongue, congested pharynx, nasopharyngeal catarrh, hypertrophic rhinitis, flatulence frequently causing a considerable amount of distension, and constipation, although sometimes the motions were broken and light coloured. Several patients have told me that previous to an attack the motions have been noticed to be especially offensive.

With these symptoms it did not surprise me to find often, although not invariably, the blood pressure high, for toxæmia due to intestinal sepsis is a common cause of increased blood pressure, and as might be expected some dilatation of the heart often existed, although this symptom was not always present. It is not customary habitually to examine the size of the heart by gently percussing the chest wall whilst a stethoscope is held against it; if this were done the transition of sound from clear to more dull, indicating that the cardiac area has been reached, could easily be appreciated, and dilatation would be found to be far more often present than is now generally supposed.

Although I have only mentioned toxæmia due to intestinal sepsis, oral sepsis due to pyorrhoea, decayed teeth, crowns, or bridges must not be overlooked, or any other condition which might tend to produce this result.

With the patient in the state which I have described, it is not surprising that closure of the Eustachian tubes is usually present when Ménière's symptoms exist, for gastro-intestinal derangement is a common cause of congestion of the pharynx and nasopharyngeal catarrh and consequent closure and catarrh of the Eustachian tubes. Nor is it to be wondered that tinnitus and giddiness are found when toxæmia is present, these symptoms being more the result of this condition than caused by high blood pressure when it exists.

* A paper read before the Otological Section of the Royal Society of Medicine, November, 1917.