THE SUN CURE AND THE WORK CURE IN SURGICAL TUBERCULOSIS.

BY

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HELIO THERAPY has come to be associated especially with high altitudes in the Swiss Alps. More than a quarter of a century ago the first clinic for the treatment of surgical tuberculosis by general and systematized heliotherapy was opened by me at Leysin, and the results have proved so favourable that heliotherapy has become recognized as the treatment *par excellence* for surgical tuberculosis. Leysin is situated in Switzerland, overlooking the upper Rhône valley and facing the picturesque ridge of the Dent du Midi and neighbouring snow-capped peaks. Although its height is between 4,000 and 5,000 feet, the site is protected from the north winds by pine-clad uplands and it slopes steeply towards the southern sun. The air is therefore still, and the daily amount of sunshine is exceptionally great, both in winter and in summer, so that heliotherapy can be practised here all the year round.

The idea of a work cure for bed-ridden patients is of more recent introduction, and might at first sight appear to be a contradiction in terms. Occupational therapy has for long been applied to consumptive patients—for example, by George Bodington (1840)—and in more recent times by Dr. Marcus Paterson, who, at Frimley, prescribed graduated work in the form of gardening. Dr. Varrier-Jones at Papworth, as well as by Sir Robert Philip, Sir Robert Jones, and many other authorities both in England and in America.

Rationale of Heliotherapy.

It would be well, in the first place, to say something in regard to the sun cure as practised by us for cases of surgical tuberculosis. For many years it was believed that the external lesions produced by the bacillus of Koch constituted a simple local malady, which was capable of cure by purely local treatment, and there resulted an era of surgical intervention, which only too frequently opened the door to secondary infections more serious than the tuberculosis itself. With surgical treatment in the past has been associated complete immobilization in closed plaster casts, which is too often respected as an unassailable doctrine. Such heavy and completely rigid apparatus possesses the grave disadvantage of atrophying the integuments, muscles, and skeleton, of favouring ankylosis of the joints, and, as a result of this excessive fixation and prolonged inactivity, of producing in the patient physical and moral torpor, which gradually breaks down the natural defences of his organism.

Professors Bonnet and Poncet at Lyons were the first to oppose operative intervention and to advocate the application of the sun's rays to localized centres of surgical tuberculosis. Dr. Bernard of Samaden in 1902 was the first in Switzerland to apply heliotherapy to the treatment of wounds, and later to external tuberculosis, but this insolation was localized to the part affected. In the early years of my practice at Leysin, I became convinced of the importance of general exposure to the sun's rays in addition to exposure of the part affected, and in 1903 I opened my first clinic for the treatment of surgical tuberculosis by general and systematized heliotherapy in Le Chalet at Leysin. We now have some one thousand of such cases constantly under treatment in numerous clinics.

The practice of this general and systematic heliotherapy led us quite logically to the suppression, first, of almost all surgical intervention, and then of every form of closed plaster cast, replacing these with simple orthopaedic splints which always allowed the sun's rays to have free access to the whole surface of the integuments. Carried out in this way heliotherapy soon demonstrated its efficacy. Sun bathing is, on the one hand, the finest stimulus of exchange and of vitality of the organism, and is therefore the best regenerator of the "soil"; on the other hand, it is the rational treatment of the tuberculous centres by reason of the sedative, bactericidal, cicatrizing, and recalcifying action of the solar radiations. One may confidently affirm that there is not an organ in the human body which

escapes the power of the sun's life-giving rays. Judiciously applied, the air and sun bath stimulates the appetite and the digestive functions, and renews energy. Under its influence, especially at a high altitude, the number of red corpuscles and the haemoglobin content of the blood are increased, and the exchanges become more active.

The skin, when put back into its normal surroundings—that is to say, when it is placed in progressive and continuous contact with air and sunshine—is toned up, becomes pigmented, and regains its full physiological functions, including protection, circulation, innervation, absorption, elimination, immunization, and internal secretion. One of the most striking evidences of the sun's action is that without any help from massage or electric applications, one can watch the muscles of bed-ridden patients develop and harden in a harmonious and often athletic manner. This may be explained partly by an improvement in the capillary circulation, and possibly also as a result of the vibratory impact caused by the sun's rays on the network of sensory nerve endings in the skin. Sunlight, in both rickets and tuberculosis, has also an indisputably recalcifying action on the bones. This cicatrizing and recalcifying action on centres of bacillary necrosis, however deeply situated, is most evident in a collection of more than 50,000 radiograms which we possess. In many cases—for example, where the head of the femur has almost disappeared—the reconstitution of the bone is so complete that one may, without exaggeration, term it "restitutio ad integrum."

Orthopaedic Arrangements.

A brief outline of the orthopaedic treatment adopted by us in association with the heliotherapy is as follows. The bed is very simple, provided with a special firm mattress upon a movable bed-frame, of which the position can be regulated at will. The bed can be wheeled readily from place to place as required, and is provided with a firm table at the head, which can be set at any angle and is capable of bearing an electric motor and tools.

In Pott's disease of the thoracic and lumbar regions we do not employ any support other than a wedge-shaped pillow, and we alternate the dorsal with the ventral position, in which the patient rests partly supported by his elbows, so that he can use the hands for working. The development of the dorsal muscles under full sunshine is remarkable, and they form a perfectly sufficient natural corset. In the case of cervical disease, the patient lies upon his back and an extension apparatus is attached to the head.

For hip disease we employ an extension apparatus attached to the thigh and a sliding splint, whilst the patient is raised upon a cushion placed beneath the pelvis, so that the vicious positions of the hip-joint are readily corrected, and the region of the hip is fully exposed to the sunlight. For osteo-arthritis of the knee we add to heliotherapy extension of the leg upon an inclined plane, so that compression of the articular surfaces is relieved and circulation is promoted. We attach great importance to these rational positions in treatment of the hip and knee. The ankle is, of all the joints, with the one exception of the wrist, the most favourable from the point of view of curability. Fixation is effected in a hollow splint, which permits free access of air and light to the leg and joint. Elevation upon an inclined plane, as in the case of the knee, is desirable.

In arthritis of the shoulder we seek to fix the arm in a position of abduction by means of an apparatus which is attached round the waist and can be opened gradually. The patient during treatment has full use of the forearm and hand. We have never been obliged to have recourse to resection of this joint, and the average duration of treatment has been about fourteen months. For the elbow we make use of a double hollow splint, by which the joint is kept in the rectangular position. In about half of our cases there has been complete restoration of articular function, while in the majority of the remainder the range of movement on recovery has varied from 30 to 70 degrees. Osteo-arthritis of the wrist is treated upon a splint with, in some cases, extension fixed to the fingers, so that the hand, wrist, and forearm in any case remain uncovered. In this position cure has, in our experience, invariably been accompanied by return of the function of the joints.

Osteo-arthritis of the metacarpus and phalanges is treated by fixation upon a small splint, accompanied by extension, and complete recovery is almost always the rule, provided secondary infection has not been present.

Tuberculosis of the pelvis, whatever be its localization—for example, as a sacro-iliac arthritis—has invariably recovered in a period of about one year under heliotherapy, when the disease was closed, even in cases with cold abscess; but cases that have become open, whether as the result of spontaneous rupture or of surgical intervention, have proved most refractory to treatment. The formation of a cold abscess is a quite natural phase of the healing process, and so far from its presence constituting a serious complication, in our opinion, it forms one of the attributes of healing. It may be regarded as a depot of antibodies, which contributes in great part to the immunization of the patient. We therefore deprecate its premature puncture.

The treatment of secondary infection necessitates a special technique. The first condition is to ensure effective drainage from the sinuses. We have recourse in certain cases to continuous siphonage with Dakin's solution, or physiological salt solution, and in other cases the patient is sent for a course of sulphur water baths, particularly of those at Lavey.

The action of heliotherapy upon sequestra is most interesting. In many cases of closed osteo-arthritis the sequestra gradually absorb, but more often, as shown by a series of radiograms, they become organized and incorporate themselves again with the living bony tissue. In general, we consider it useless and mistaken to interfere too quickly with a sequestrum, unless this is "en panne" or "en grelot." In closed tuberculosis the sequestrum is rarely necrosed, and consequently it is able to reorganize easily with the bony lesion from which it is temporarily detached. In open tuberculosis the sequestrum is practically always necrosed, as in osteomyelitis, and it consequently eliminates itself, or should be eliminated by sequestrectomy.

One of the few forms of tuberculosis in which we incline to early surgical intervention is renal tuberculosis, when operation is advisedly associated with heliotherapy.

Work as an Adjuvant to Heliotherapy.

The effect of heliotherapy on the mentality of the patients is too apparent and too striking not to deserve special mention. Many patients, after a course of sun cure, in proportion as they have improved physically, have improved morally, and hope has revived. The beneficent light of the sun, in winter as in summer, brings a deep and intimate sense of well-being. Even in the mountains, however, there are days when the sun does not shine, and even the most continuous sunshine is not always enough to restore the morale of unfortunate patients, haunted by the insoluble problem caused by the loss of their occupation and by the painful knowledge that their homes must be a burden and expense to others.

To raise the morale of these invalids, whose trouble is mental as well as physical, and to bring them pecuniary assistance, we have instituted the work cure, which can be carried out in all weathers, in open-air balconies when the sun shines, and in neighbouring workrooms when the weather is unfavourable. Experience has convinced us that invalids, put under the discipline of work appropriate to their individual needs, soon become aware of a steady return of their powers, and experience that encouraging sensation which accompanies the normal functioning of their organs, and the adaptation of the human machine to work. The marvellous moral and physical stimulus of manual labour may be realized by watching the joyous animation which reigns on one of our balconies, the inward satisfaction to be read on those bronzed faces. Special contrivances make it possible for the patients to work in all the positions which their treatment necessitates, without ever endangering the latter.

Our first attempt at organizing the "work cure" was made in 1909, when we started a work colony at Leysin, which provided the necessitous patients with easy tasks, such as basket-work, caning of chairs and other furniture, woodwork, etc. Thanks to the salary they obtained from it, the inmates of the colony could, to a large extent, help to pay for their maintenance, and they lost the depressing

sense of uselessness, and established contact with normal life again as they finished their cure. The results were excellent, and in the following year we established a small agricultural colony for children at Cergnat, near Leysin. Here the work included the rearing of cattle, milk production, market gardening, and bee-keeping, the inmates being recruited from among young convalescents who had suffered from surgical tuberculosis, and also from among delicate children sent to us direct from the plains. Later on, to this agricultural colony we added the "school in the sun," where predisposed children could have the necessary physical training, this being the first solar preventive institute at high altitude. The children of our clinics, whether confined to bed or not, receive open-air instruction in school tasks, varied by light manual work; this breaks the monotony of treatment, gives an object to long hours of idleness, and introduces healthy emulation among the children.

During the war much experience was gained at the Swiss military clinic in Leysin, which we had been called upon to organize in 1915 for cases of "surgical" tuberculosis. Here the invalid soldiers devoted themselves more especially to the making of slippers and toys, but the work cure expanded to the manufacture of more than eighty different kinds of articles, and an annexe was built for convalescents, where large workshops enabled them to work at their ease in spacious sun balconies, or indoors if the weather was bad. The excellent results of this work cure encouraged us to introduce it more and more widely in our various clinics, until it became no longer a matter of fitting up makeshift workshops in our popular clinics, but of building a special establishment, where the work could be organized, and, like heliotherapy itself, included in the patients' regime in such a way that their orthopaedic and solar treatment would in no way be interrupted.

For this reason we have built an international factory clinic with 120 beds, where indigent patients, suffering from surgical tuberculosis, will benefit, from the moment of admission, by a model technical organization, and where they will have an opportunity of earning their livelihood by easy and remunerative work, while continuing their solar treatment. This establishment will have the dual character of a factory and a clinic. The spacious balconies and dormitories will be fitted up as workshops, fully exposed to air and sun, and the patients will have at their disposal, either upon a table attached to each bed, or near their beds, very complete and specially adapted appliances worked by electricity in such a way that the work will never interfere harmfully with their solar and orthopaedic treatment. Bed-ridden patients will make pieces of small mechanism, such as parts of watches, hosiery, pottery, etc., to the order of factories and workshops that have already promised us substantial and regular orders. Work demanding more effort will be reserved for convalescents who will work in special rooms on the ground floor of the factory.

A whole floor will be devoted to an international school of commerce, where young patients can obtain an official diploma, and there will be courses of modern languages. Finally, the highest story of the building and the solarium (a flat roof constantly exposed to the full effect of air and sun) will be reserved for experimental observations upon the physiological effects of work carried out under exposure to full sunshine. Here, in a suite of laboratories some 4,500 feet above sea-level, the chemical and physiological equipment necessary for research upon respiration, excretion, metabolism, fatigue, and other factors allied to working capacity, will be provided.

If sufficient funds are received for the complete realization of this project, the sum chargeable to working-class patients will cover merely their maintenance and the cost of working materials, so that it will be possible for the patients, while under treatment, to support their families at home. If this hope is realized, the factory clinic will be a useful contribution to the difficult social problem of disposal in cases of surgical tuberculosis among the indigent, who, being thus provided with means of support, will be as advantageously placed for treatment as members of the privileged classes. The building is now almost finished, and it is anticipated that it will be fully equipped and opened for the reception of patients at Easter, 1930.