is involved. Where the conjunctiva is alone affected and the subjective symptoms are negligible, it seems unnecessary to put the patient to the inconvenience of wearing a bandage, since there is no danger of serious infection and no scarring is to be feared as in the case of keratitis.

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ABSTRACT OF DISCUSSION

DR. W. ZENTMAYER, Philadelphia: Dr. Verhoeff's observations have been made with great care and unusual acumen, and on these observations he reasons logically, and to me, in some instances, convincingly, to sustain his views. To those who have found the want of anatomic proof of the existence of trophic nerves a strong objection to the acceptance of the trophic origin of these affections, he has advanced a plausible theory to explain the causation of these lesions through the sensory nerves. While I have nothing to advance in criticism but what Dr. Verhoeff has doubtless carefully considered and rejected, I wish to bring forward such thoughts as have seemed to me as possible objections, but for which I have no doubt Dr. Verhoeff will have satisfactory answers. Regarding neuroparalytic keratitis, the diversified combination of conditions recorded, the different types of corneal lesions found and the differences in the pathologic findings in the few cases which have been examined microscopically, are the material out of which the several theories thus far advanced have received support, and notwithstanding the strong evidence for the neuropathic theory the majority of writers still hold to the traumatic theory or some modification of it. As Dr. Verhoeff has pointed out, this question is thoroughly threshed out in Wildbrand and Saenger, and it would be a waste of time to bring forward the various arguments that have been advanced in support of the different theories to rebut Dr. Verhoeff's position, so that I shall simply mention the bearing of the pathologic studies that have been made and state the results in some recent research work. In two of the three cases in which microscopic examinations have been made (de Schweinitz and Treitle), the findings were those of a purulent keratitis, rather favoring the mycotic theory. In a recent study of a series of 21 cases of extirpation of the Gasserian ganglion for trifacial neuralgia, in 11 of which keratitis developed, Davies and Hall found in all an unknown bacillus whose presence seemed necessary for its production, but dependent on another factor, the eyelids, which was removed if they were kept closed. As Dr. Jackson says: "In the present state of our knowledge a rational view seems to be that disease or injury involving the trunk or the ganglion of the fifth nerve causes or predisposes to corneal disease partly by an obscure irritative influence and partly by favoring traumatism."

As to keratitis disciformis, such evidence as we have, aside from clinical deduction, favors the view of Fuch's that it is due to infection by micro-organisms of less virulence than those of abscess. While it is true that Meller's specimen was so complicated by conditions which supervened on the disciform keratitis that the deductions drawn from it are in a measure impaired, as it is the only specimen thus far examined, and as the findings support Fuch's contention, it is significant. Animal experimentation and clinical observations in which infection was the undoubted cause of lesions similar to keratitis disciformis have been recorded by Schirmer, and Zur Nedden records a case which went on to ulceration, the streptothrix recovered producing in rabbits an ulcerative hypopyon. It would seem to me that such evidence should have weight. If, as Peters states, the neuropathic element is responsible for the characteristics of serpiginous ulcer, and if, as Dr. Verhoeff believes, a large percentage of all cases of ulcerative keratitis be due to infection of lesions of a like origin, one would expect more of these cases to be of the serpiginous type. I have always looked on the large solitary phlyctenule situated some distance from the limbus as an ordinary phlyctenule with unusual infiltration of the loose cellular tissue between the conjunctiva and sclera in a person subject to lymphatic

enlargements and rather expected to see it finally classified as tuberculous. Recent evidence furnished by serum diagnosis is indicative of the correctness of this view. The associated conditions which Dr. Verhoeff has found are, however, very suggestive of it having a neuropathic origin where such conditions coexist, but so far as the individual characteristics of the lesions are concerned they do not seem to me to be of value at arriving at this conclusion. I can confirm what Dr. Verhoeff has said as to the value of holocain in the treatment of superficial erosions. It has been my practice, to prescribe holocain in the conditions under consideration, in corneal ulcerations and after the removal of foreign bodies from the cornea, but in so doing I was impelled not by the pathology of the affection, but because of the desire to use an anesthetic which would allay irritation, and while possessed of antiseptic properties would not at the same time act injuriously on the epithelium of the cornea.

DR. F. H. VERHOEFF, Boston: Dr. Zentmayer has taken issue with me on so many points that it would be impossible to attempt to reply to him in the limited time at my disposal. However, I think my paper itself is a sufficient reply. In regard to the question of the infectious origin of certain of these cases, the mere presence of micro-organisms in the eroded areas is of no significance, since they are clearly secondary invaders. I was, of course, familiar with the recent work of the English observers who claim that the neuroparalytic keratitis following extirpation of the Gasserian ganglion is due to bacilli, but I did not consider it worthy of comment. The bacilli they found were evidently the ubiquitous xerosis bacilli, to which have been attributed almost all diseases on earth.

TREATMENT OF OCCUPATION NEUROSES AND NEURITIS IN THE ARMS*

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In this brief paper is given personal experience in treating over forty cases of sensory and motor disabilities of the arms, the basis of which is usually a neuritis, mild or severe. Most prompt and thorough results are obtained by the personal attention of the physician, proceeding on the lines of:

1. Constitutional regulation, uses of drugs, etc., adapted from the interpretations of Dr. Sajous.

2. Relief of psychic hypertension or misdirection by educative persuasion. Relaxation is needed of the whole organism, as well as of the parts damaged. Economics in the expenditure of forces should be judiciously taught.

3. Quieting of the irritated vasomotor subcenters and also improving their nutrition by influencing the reflex vasomotor reactions, through manipulation of the paravertebral tissues; to be achieved by: (a) Determining by touch the degree of irritation or exhaustion shown by tenderness, infiltration or alterations in morphology of the structures lying adjacent to those segments of the cord in which the arms, etc., are innervated; (b) employing the kind and degree of hand pressure by which these subcenters shall be repaired; (c) relieving sensory disturbances by these same carefully distributed pressures; (4) stroking the lymph channels and the affected nerve paths, thereby relieving local stasis, freeing nerve sheaths and other structures from local hyperemia, toxic wastes, etc.; (5) stretching the limb by carefully graduated and increasing force along with torsions (this can be safely done only by the physician, and, when judiciously performed, affords one of the

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most efficacious means of relieving pain, aches, heaviness and restoring vigor); (6) re-education in co-ordination, which should be carried on for months or years, by personal effort as well as under supervision, to make sure of complete restoration.

No matter what measures may be employed to relieve the pain (special electric currents or other), unless this motor education is wisely pursued the radical cure may be compromised.

PRINCIPLES OF ACTION

In dealing with the problems of arm pains, disabilities both sensory and motor, occupation neuroses, "writer's cramp," and like disorders, success is obtained in proportion to the exact appreciation and correction of the underlying faults, which are both psychic and physical.

My chief object is to offer to practitioners measures which each one can readily apply—principles of action by the use of which prompt and permanent cures can be effected. It is true, indeed, that from the use of elaborate equipments in electricity, or long specialized systems of treatment at spas, in rest-cures, radical changes in lines of occupation, excellent results often follow. These, however, are expensive in time and money. They often fail. It is a common experience to find patients gravely discouraged who have run the gamut of protracted and costly treatments. Several of my cases were of from two, three or many years' duration, wholly unrelieved. Some of the worst conditions were cured in a month.

The factors most forceful in relief were found in the outline given above. Long experience in psychoanalysis and moral orthopedia has taught me the efficacy of persuasion or educative measures. Next in importance is a study of the conditions through a specialized knowledge gained by estimating abnormalities in local tension and sensitiveness. Facility in these can be acquired through practice. It is my opinion, often expressed, that physicians have neglected a most important field of diagnosis and treatment. This lies in the manipulation of structures, in the education of the hands so that they shall perceive and appreciate all those factors which the surgeon utilizes and a good deal more. The surgeon is content to learn the grosser differences which indicate such diseases and derangements as come within the sphere of his interests. The physician should be able to go much further and become an acute percipient of finer distinctions, of divergences from the norm. This is analogous to those more subtle data on which are built the findings of internal medicine.

A long experience in teaching in a postgraduate medical school (the Philadelphia Polyclinic College) has impressed me with the fact that the average well-taught practitioner makes little use of his hands; exhibits, indeed, marked distaste for manipulations; furthermore, that relatively few are equipped with tactile appreciation of morphology, minor differences in resistance, density, temperature, balance, position, tension, relaxation, rigidity, mobility, etc. All these exceedingly significant data, obtainable by means of refined touch, have the most direct bearing on daily problems. They are analogous to the exquisite sense perception usually acquired by the blind, and are within the reach of most, provided one elects to utilize his muscular and touch senses.

Nowadays physicians are losing much of their prestige, and, worse than all, their usefulness, to a group

of self-assertive "practitioners" who invade their territories effectively. This is wholly unnecessary. The remedy is to examine every suffering person by touch as well as by stethoscope or laboratory methods.

1. Constitutional Regulation

The underlying conditions of neuritis are due chiefly to agencies which reduce the normal defensive properties of the blood. The phenomena are usually those of hypocalcemia, acidosis, accumulations of uneliminated toxic waste products, autointoxication. There is often a history of gout, syphilis, influenza, malaria, or other disease of a debilitating character, which reacts destructively on the organism, reducing the functional activity of the anterior pituitary body. I follow the teaching of Sajous, which explains and simplifies etiology and pathogenesis and renders precise the therapeutic indications. There is usually evidence of recent exhaustion states, due to overexertion, excessive strain, worries, shock, grief, also the overuse of exogenous poisons, tea, coffee, alcohol, tobacco, etc., which, by lowering vitality, derange all metabolic processes.

Among the commonest exciting causes is cold, especially when one is exhausted; also antecedent infections, e. g., tonsillitis, etc.

Measures are indicated which aid elimination, relieve the causes of neural congestion, of hyperemia, active or passive, in the arterioles of the nerves, the vasa nervorum and their capillaries, including the nervi nervorum; the latter, being swollen, exert a pressure on the surrounding swollen structures, which is the main source of pain; also of the heaviness, loss of power, atrophy, etc. These measures may be summarized as follows:

1. Agents to reduce congestion in the painful areas:

A. Drugs which cause general vasodilatation by depressing directly the general vasomotor center, e. g. sodium bromid, or chloral, or both together, veratrum viride in sthenic cases; the nitrites, etc.

B. Drugs which cause general constriction of the arterioles by stimulating the general sympathetic center, e. g. coal-tar products, morphin, atropin, aconitin, gelsemin, cocain, osmic acid.

C. Local remedies which produce reflex constriction of peripheral nerves by irritating directly the cutaneous sensory terminals, e. g. local application of aconitin, veratrin, ethyl chlorid, menthol, guaiacol, cocain, chloral, camphor, galvanism.

D. Measures which provoke direct or indirect depletion of perineural arterioles and, therefore, of the endoneural capillaries, e. g. guaiacol to the skin, leeches, venesection, cupping, hydrochloric acid, superheated air, local heat, warm pack to the abdomen, a hot flat-iron to the back, etc., to increase the catabolic activity of the trypsin, as chief agent in activating the auto-antitoxin.

E. Measures which tend to eliminate the causes of the neural congestion. For pain occurring intermittently gross accumulations of toxic materials in the blood should be removed, e. g. by purgatives, the best being castor-oil daily for several days. This increases reflexly the relative proportion of auto-antitoxin in the intestinal juices. One may also employ saline laxatives, careful dietetic regulation, use of physiologic salt solution or "sea-water" to maintain alkalinity of the blood, abundant water-drinking.

F. Drugs to controvert the gouty state by stimulating the adrenal system. Sodium salicylate, strychnin

in full or tonic doses, sodium iodid, colchicum, sodium benzoate. A course of desiccated thyroid (small continued doses) will often accomplish most good.

2. Relief of Psychic Hypertension

This subject has been sufficiently presented in the outline above.

3. Treatment of the Irritated Subsidiary Centers by Manual Means

This subject is too large for thorough presentation here; the outline of a few essential points must suffice. When there is active pain in the arms there will usually be found tenderness in the paravertebral tissues adjacent to the vasomotor subcenters from which the part is innervated. If the disability has become chronic and the only pain is the distressing ache which follows use, there will be found infiltration and thickening of the paravertebral tissues; disturbances in the alignment of the vertebrae (apparent, not real, due to divergences in nutrition of the structures involved) and these will return to normal morphology and sensitiveness on judicious hand treatment.

When there is hypersensitiveness in the continuity of the nerve gentle friction along its course will quickly and amply relieve it. If it be exquisitely tender, the procedure should be to quiet the center (a) by gently maintained (distributed) pressure; and (b) by gently maintained distributed pressure at the locality in the nerve; later (c) by frictions along the nerve sheath.

4. Stroking Lymph-Channels and Affected Nerve-Paths

Chronologically this is among the first of the indicated procedures. It should be performed centripetally and slowly, gradually increasing the pressure (time about two minutes). Afterward the tissues should be grasped with thumb and fingers and the entire limb squeezed, from extremity to shoulder, to remove local hyperemia, vitiated lymph and other toxic wastes, etc.

5. Stretching or Traction

The one point in the treatment of arm pains on which I am enthusiastic is the application of judicious and graduated stretchings.

For a long time surgeons treated neuralgic states, such as chronic sciatica, by cutting down on a nerve, lifting it out of the surrounding structures and subjecting it to rather severe tractions. This procedure is now abandoned, but skilful masseurs know well that it is possible to secure the effects of stretchings by many cunning devices of marked efficacy. A large personal experience convinces me that the physician is better fitted to apply this measure than anyone else. His knowledge of the pathologic conditions existing in a given instance enables him to be both cautious and emphatic as his judgment decides. The phenomena of repair involve not only derangements in the nerve itself but adhesions in adjacent structures, muscle sheaths, blood vessels, lymph channels, etc., etc. Moreover, it is a well-attested fact (to be explained by the neuropathologist) that stretching of a peripheral nerve exerts reparative effects on centers both subsidiary and primary. Where a limb retains power and elasticity enough to encourage voluntary effort we know that the centers can be thus made to improve. Passive movements are also habitually employed with more or less effect in proportion to (a) the degree of damage to the center, and (b) the degree of skill and persistence of the operator. As to how this should be performed demonstrations are better than description.

The methods which I use are these: I cause the patient to relax the muscles completely; seize the wrist by clasping the fingers of both hands, and bring the "heels of the fists" firmly together. This prevents a painful drag on the skin of the patient. I exert traction on the part slowly, to the point of discomfort, and no more; relax tension and place the limb in another position and again pull; relax and change repeatedly until the limb is made to stretch in about a dozen different positions, describing various arcs about six inches apart on the periphery, and completing the normal circle of arm positions at full length (time about two minutes). Of greater nicety is to place one hand of the operator firmly on the shoulder (deltoid, near the insertion), press the humerus down in the socket; to seize the elbow, using the humerus as a lever, and repeat the various arcs. During these movements the humerus is moved about in its socket in divers possible positions. Finally I seize the arm near the head of the humerus and cause it to describe circles in two (first obverse, then reverse) directions, so that all the tissues immediately thereabouts are put upon the stretch (time about one and one-half minutes). Next I exert torsions to include the full limits of motion, holding tense a few seconds at the end. By this time any painfulness is usually removed. Finally, I lift the arm again, as at first, to its full limit four or five times, almost raising the body weight (time complete about five minutes).

The degree of force should be gradually increased, until after two or three weeks (on alternate days) a considerable degree of force can be exerted without marked discomfort.

6. Re-education in Coordination

After each passive treatment it is well to direct the patient to extend the arm and fingers with increasing force, and to hold the tension at the end of the act for three or four seconds; to relax, extend, again hold tense, rotate in various directions; again to extend, hold tense, describing all the normal excursions.

This series of active movements is not only important to insist on; they should be practiced daily, and later, three times a day for months. Since occupation neuroses are the outcome largely of overuse of the arms in positions of flexion long maintained, this training in extension affords the normal physiologic relief. Furthermore, it is necessary for the motor centers to be stimulated by exciting the extensor reflexes systematically.

Also, since most forms of arm neuritis, especially the protracted and chronic ones, are followed by contractures, and as these are in the flexor sphere, it is essential to overcome them by systematic, forceful extensions, carried on persistently for many months. It will prove a relief to the readily recurring arm aches to insist on the practice of these systematic extension exercises.

By the means outlined any deft physician can relieve or cure most of the motor and sensory disabilities of the arms which present.

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Diagnosis of Tuberculosis.—The early diagnosis of pulmonary tuberculosis should not be beyond the capacity of any physician; furthermore, the responsibility of its early discovery rests on the shoulders of every general practitioner. It is estimated that the patient's chances of recovery are five times greater if the disease is recognized in its incipency.—C. N. Haskell in *New York Medical Journal*.