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The Autonomic Nervous System in Osteopathic Therapy*

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INTRODUCTION

The field of medicine has swung from the general practitioner to the specialist and is now going back to the general practitioner—the one who usually has the first opportunity to study the patient as a unit. The doctor of tomorrow will be the man who studies, observes, analyzes, and correlates his findings to the body in its entirety. The osteopathic physician will be that man if he will devote himself to this task. Even at the present time he is highly regarded as a person who sees the patient as a whole.

It is surprising to learn that the greatest clinical teachers, including Andrew Taylor Still, were without modern knowledge of the scientific basis of disease. But these great clinical teachers were keen observers and were students of anatomy and physiology. Osteopathic physicians should be proud of the fact that they are well versed in anatomy and physiology because the future practice of medicine depends upon this knowledge.

According to Pottenger,¹ the status of every branch of science, every profession, every business rests upon a mass of supposedly established and accepted facts. Whether or not these facts are true, they rule the branch of science, the profession, or the business with which they are concerned and progress can be made only as increased knowledge displaces error or as these "facts" are changed to meet new conditions. Dr. Still gave us important facts and startling observations, but I am certain he would never have proposed for us to stop thinking and searching for the truth. The so-called "consensus of opinion" leads us to conservatism and dulls original thought and investigation.

Owing to the magnitude of the subject of the autonomic nervous system in osteopathic therapy, it is not possible to cover it thoroughly in a short paper. Therefore, I shall limit the discussion to three main topics: I shall try to give you, first, a picture of the part played by the sympathetic and parasympathetic systems, or the autonomics; second, a review of the anatomy of these structures; and finally, my conclusions as to osteopathic technic which will make use of these nervous systems.

With these points in mind your osteopathic manipulative treatment will never be classified as gen-

eral. In my opinion many of the fine results obtained by the osteopathic physician can be credited to the action of the autonomic nervous system. If we understand this delicate mechanism clearly, our therapy will be specific and will bring about certain results desired.

PART I

Let us take up first the action of the autonomic nervous system and its effect on the normal human body.

Cannon,² who made an extensive study of the autonomics, has shown that the balance of the nervous control is maintained, for the most part, by the sympathetics. He goes further and states that the balance is controlled by a sort of thermostat located in the hypothalamic nuclei at the base of the brain. This center is known as the generator or dynamo for the reactions of the parasympathetic nervous system. It controls body temperature by means of vasoconstriction and vasodilatation, and reflexes of somatic origin, such as shivering and panting. It further controls or regulates water metabolism and urinary function.

One of the most difficult tasks in practice is to convince patients, after a thorough examination, that their trouble is functional and that their symptoms are not a result of organic disease. The most common functional disorders are in the digestive tract and many times they bring on disturbance of normal heart function. Most of the patients having these disorders are very intelligent individuals who are subject to emotional strain and develop an anxiety neurosis. We find them of the "driving type," unable to relax their mental or their skeletal structures.

It is most difficult to treat these patients from the mental and structural viewpoint if they have been told that their trouble is due to colitis, low or high blood pressure, increased or subnormal metabolic rate. We, as osteopathic physicians, can give these patients relief. We must gain their confidence, make a logical diagnosis, and treat them intelligently, always remembering that the brain, through the parasympathetic nervous system's functioning overtime, may be causing the distress.

The importance of the sympathetic and parasympathetic systems should not be overlooked by our profession. It is important to remember that every organ and tissue of the body is supplied by the autonomics. We in the osteopathic profession believe the saying that "the rule of the artery is supreme."

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The autonomic nervous system exercises control over the blood vessels and, by the action of vasoconstrictors and vasodilators, influences the most minute body structure.

Physiologists tell us that the cells of man depend almost wholly upon nerves for their nutrition and their power of action. Failure to find nerve tissue in a few of the less important structures does not prove that there is no nerve supply to that part. Any tissue which *acts* must have some means of nerve control.

The hypothalamus is important to the osteopathic profession in explaining to us the reactions of the parasympathetics. We can understand the patient with so-called essential hypertension, spastic colon, insomnia, jitteriness, and many functional conditions which are very real to him,

From a practical standpoint, the examination of a patient on 2 successive days should yield approximately the same result. Should one find the pulse rate, metabolism, and blood pressure the same on both examinations, he knows that the patient has a balanced autonomic system. Abnormal findings one day and normal the next would indicate an unstable autonomic nervous system.

A patient who is suffering is not so concerned regarding the pathological condition present as he is regarding the symptoms—which may cause him much harm. We must train ourselves to treat the patient as well as the disease.

PART II

The sympathetic system has its origin from all of the thoracic and from the first to third lumbar segments of the cord. The parasympathetic system arises from two widely separated portions of the nervous system—the midbrain and medulla at one end and the first to third sacral segments of the cord at the other end.

*The Sympathetic System.*³—This system innervates every organ and all tissue of the human organism. Briefly, it supplies all blood vessels and, by its twofold action of vasoconstriction and dilatation, acts on or influences all body tissues. It supplies many structures which apparently have no parasympathetics, such as the urogenital apparatus. It activates structures which the parasympathetics inhibit, for example, the heart and the sphincters of the bowel and bladder. It produces inhibitory nerves which counteract the parasympathetics as in structures of the head and gastrointestinal system.

Sensory fibers accompany the motor fibers in the sympathetics. These sensory fibers transmit impulses to the corresponding area of the cord. These impulses may be referred to neurons which in turn may influence other structures, causing symptoms of distress.

These sympathetic reflexes (especially of visceral origin) are of three kinds: motor, sensory, and trophic. The reflexes of visceral origin are typical examples.

Motor: It is agreed that the visceral motor reflex is the only real sympathetic reflex in muscular tissue of the skeleton. Skeletal muscles contract when a stimulus is carried over the sensory fibers of the sympathetics due to a motor response.

Should the bombardment of sensory impulses from the large bowel be of sufficient duration and intensity, the motor response in skeletal musculature would produce chronic contraction, the end result being degeneration of muscle structure and limitation of normal spinal motion. Nerve cells which are subjected

to long continued harmful stimuli eventually are impaired in function. Osteopathic lesions are not only maintained by this abnormal physiology, but they are most difficult to correct. A vicious cycle results, and further retrogression of physiologic bowel action is augmented by continued immobility of vertebral segments. This immobility very definitely interferes with sympathetic action of inhibition, which equalizes parasympathetic activation of the bowel.

Sensory: The sensory nerve response from the large intestine does not influence the motor response to the organ directly. Rather, the sensory action is distributed to spinal musculature, producing contraction and degeneration, resulting in disturbed function of the sympathetic nerves which supply the gut.

Pain is closely associated with most visceral sensory impulses. It is interesting to note the findings of Mackenzie according to Crile.⁴ A few of them are: First, that the deeper tissues of the external body wall are less sensitive to pain than the skin. Second, that the viscera are insensitive to stimuli which produce pain in the external body wall, such as pinching and heat.

These findings agree with the osteopathic findings of pain exhibited at the seat of vertebral lesions, whereas pathological changes may be developing in the bowel itself. Osteopathic manipulative treatment may break up this vicious cycle and will go far in preventing further development of pathology.

Trophic: I have found no authorities who have determined that there are special trophic nerves. It is agreed that nutrition of tissues is dependent upon the sensory and motor nerves which innervate it. Proper nutrition is essential to the normal function of all body cells. Thus, trophic change is a perversion of nerve function with the end result being an inadequate supply of nutrition to the cells.

Nerve cells may be injured by mechanical stimuli which occur from osteopathic lesions. Nerve cells may not be harmed by a moderate number of these stimuli, but a continued stream of these harmful impulses will produce injury to the nerve cells. The tissues supplied by these cells will undergo a nutritional change.

The functional capacity is reduced in injured cells, owing to constant irritability. Since nutrition of these tissues is controlled by the nerves, both motor and sensory, it is easy to see why a prolonged injury results in degeneration.

To apply the osteopathic concept intelligently in regard to the treatment of human ailments, we must know what effect stimulation or irritation has on the sympathetic system. Pottenger⁵ lists among the effects of stimulation of sympathetics the following:

Lessened mucous secretion in nose and throat; lessened secretion in gastrointestinal tract, manifested by retarded digestion and hypochlorhydria; lessened motility in gastrointestinal tract with relaxation of intestinal musculature; increase in pulse rate; increase in glycogen content of blood, its being forced from liver; increase in body temperature, and sweating. This last is found in hyperactivity of both sympathetic and parasympathetic systems.

Parasympathetic System.—As the parasympathetic system has only two vulnerable points of attack, namely, the first, second, and third sacral nerves and the vagus, which lies in the carotid, from the osteopathic standpoint I shall not go into its action as thoroughly as the sympathetics. However, we should know the signs of excess parasympathetic activity so

we can counteract the condition by means of sympathetic inhibition.

Parasympathetic stimulation produces some of many of the following symptoms:² Increased secretion of mouth, nose, and pharynx; increased bronchial secretion; spasm of bronchi; hypermotility and hypersecretion of gastric glands depending on degree of stimulation; irritable bladder; and incontinence of urine and feces.

It might be said that the parasympathetics provide the sustenance of man. They control ingestion and digestion, ejection of fecal material, and respiration. Food is prepared for the storing-up process in the body, to be used as required by the individual. Briefly, the parasympathetics activate the sphincters of the bladder and gastrointestinal tract. The flow of digestive juices, such as intestinal, gastric, pancreatic, biliary, and salivary are controlled by this system. It affects the general circulation of the blood by means of its inhibitory action to the heart.

PART III

Osteopathic manipulative technic is applied on the basis of the action of the sympathetic nervous system. It is important to remember that, generally speaking, the sympathetics inhibit and the parasympathetics activate (with a few exceptions). These two points give more meaning to osteopathic manipulative treatment. If the operator will keep these reactions in mind, his treatment will be more specific.

I wish to outline briefly the recommended treatment for a few common conditions which the general practitioner encounters in everyday practice.

1. *Stomach*.—Ulcers, gastritis, and hyperchlorhydria definitely indicate the need for treatment of the sympathetic nervous system. This treatment should be directed to the areas from the fifth to ninth thoracic, the most important segments being the fifth, sixth and seventh. By treating this area one inhibits muscular activity, decreases glandular secretions, and diminishes the output of hydrochloric acid. The physician readily comprehends the significance of this specific treatment.

In treating hypochlorhydria, parasympathetic stimulation by way of the vagus is definitely indicated, because the vagus causes contraction of muscles, increased activity of all glands, and increased output of hydrochloric acid.

2. *Gallbladder and Liver*.—The liver, embryologically, is formed from the alimentary canal and consequently has the same innervation. Hence, in dealing with the gastrointestinal tract, the liver and gallbladder are included. In treating cholecystitis and "sluggish liver," for want of a better term, one should treat the parasympathetics by way of the vagus for its effect on the sphincter of the common duct. The sympathetics should be treated in the region from the fifth to the ninth thoracic, their action being contraction of the walls of the gallbladder. Very short treatment should be given to the vagus, but longer stimulation to the areas involving the fifth and ninth thoracics.

It is evident that a general osteopathic manipulative treatment would not be effective and specific for gallbladder and liver disturbances.

3. *Head and Neck*.—The vasomotor system of the head and neck is controlled through fibers which originate from the first four thoracic segments. True, they do not pass directly to the blood vessels, but go to the lateral ganglia, which in turn send out fibers along the carotid artery to all vessels in the head and

neck. By treating and correcting lesions from the first to fifth thoracic, we lessen the engorgement of nasal tissues and secretions, therefore lessening the danger of sinus infection and extension of infection. This is one explanation of the good results obtained by osteopathic physicians in treating colds.

4. *Heart*.—The sympathetic nerve supply to the heart originates from the first to the sixth thoracic. These fibers pass to ganglia, which in turn send fibers directly to the heart muscle wall. The general action of inhibition is reversed to the heart, the action being activation or acceleration. It has been found that by osteopathic manipulative therapy applied from the first to the sixth thoracic, the heart rate is increased without elevating blood pressure. The pressure may fall in many cases, however. We are told by physiologists that there are fibers which increase the force of each heartbeat, decrease the time of systole, and step up the output of the ventricles.³ In my opinion, this is the reason why osteopathic manipulative treatment is helpful in managing the decompensated heart.

5. *Splanchnic Nerves*.—The splanchnic nerves arise from the fifth thoracic to the third lumbar and are considered by most physiologists to be the most important vasomotor center of the body. Due to the fact that connector fibers are sent to the semilunar, superior, and inferior mesenteric, renal, ovarian, and spermatic ganglia, osteopathic manipulative treatment of this area has a far-reaching effect. The blood vessels act as a reservoir for surplus blood, serve to control blood pressure, and exert an influence in all cases which involve circulatory disturbance. Arthritis is greatly benefited because all patients with arthritis have some circulatory involvement.

6. *Large Intestine*.—In treating bowel conditions, it is important from an osteopathic standpoint to know that every viscus receives its sympathetic connector fibers from certain segments of the cord and sends back its afferent stimuli to definite segments of the cord. The spastic and atonic bowel is caused by an imbalance of sympathetic and parasympathetic action. Muscular contractions in the bowel are produced by stimulation of the parasympathetics and the increased activity of secretory glands is augmented by this stimulation. Mental strain, excitement, and fatigue definitely stimulate the action of the parasympathetic system, producing spasm, diarrhea, and abdominal pain. Colicky pains are recognized among the most common symptoms from increased vagus stimulation.⁴ When parasympathetic and sympathetic systems are equalized or are in unison, normal function results. A direct control over the sympathetics is available through osteopathic manipulative therapy. Doctors of osteopathy can definitely counteract parasympathetic activity by increasing sympathetic inhibition. Firm specific correction of all osteopathic lesions from the fifth thoracic to the third lumbar will do much to control a spastic bowel.

CONCLUSIONS

I wish to emphasize again the importance of sympathetic and parasympathetic action. (1) In general, the sympathetics inhibit and the parasympathetics activate. (2) The main exception to this general rule is found in the heart. Here the sympathetics activate through the acceleration fibers while the parasympathetics inhibit by way of the vagus. (3) All blood vessels are supplied by the sympathetics and provide the osteopathic physician with a powerful weapon to combat disease and maintain physiological equilibrium.

I firmly believe that most of the splendid results from osteopathic manipulative treatment are obtained through action of the autonomic nervous system. It is my opinion that a more thorough understanding of its two great component systems would lead to a more scientific application of osteopathic technic and better and more constant results.

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REFERENCES

1. Pottenger, F. M.: Symptoms of visceral disease. Ed. 5. C. V. Mosby Co., St. Louis, 1938, p. 22.
2. Cannon, W. B.: Bodily changes in pain, hunger, fear and rage. D. Appleton Co., New York, 1915.
3. *Op. cit.*, ref. 1, p. 191.
4. Crile, G. W.: Man—an adaptive mechanism, edited by Annette Austin. The Macmillan Co., New York, 1916.
5. *Op. cit.*, ref. 1, p. 217.
6. *Op. cit.*, ref. 1, p. 218.
7. Gaskell, W. H.: The involuntary nervous system. Longmans, Green & Co., New York, 1916, p. 36.
8. Alvarez, W. C.: Prevention of post-operative gas pains. California State J. M. 16:338, July 1918.

Editor's note

The pages appearing in this "Special reprints" section have been electronically scanned from the original journals in which they appeared. Consequently, the scanning process at a density to enhance readability has picked up such artifacts as "bleed-through" type from reverse pages and other "blemishes" that existed in the original paper on which the text was printed. Even the yellowing of the original pages has caused some darkening

of the margins. JAOA regrets these anomalies and hopes that readers will overlook them and concentrate on the content of these works published in the osteopathic medical profession's early history.

For interest sake, concluding pages of articles may contain "newsy" items of the original date.

Gilbert E. D'Alonzo, DO, October 2000

JAOA to continue special reprints series

In 2001, JAOA will be continuing this series of special reprints from past issues to commemorate 100 years of continuous publication, beginning in September 1901, as the osteopathic medical profession's archival journal. The JAOA editors and staff hope that the articles selected will provide practitioners, osteopathic physicians-in-training, and students greater understanding and a firmer foundation in the history and evolution of the philosophy and practice of osteopathic medicine.

The topics to be represented by the arti-

cles selected by Associate Editor Michael M. Patterson, DO, and Albert F. Kelso, PhD, for this series will include:

- Principles of osteopathy—transition years
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- Functional thinking in osteopathic medicine
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- The California issue
- Osteopathy in other areas
- Education
- Perceptions of the profession—its future