

a look back

In celebration of The Carle Foundation's 75th anniversary and in honor of the tenth anniversary of the reprint of *Carle Selected Papers*, we, the editors, thought it would be of interest to republish some of the articles that have been featured in this journal over the years. This section is titled "*Carle Selected Papers: A Look Back*."

We first chose an article on pain management and readers can draw their own conclusions as to the differences and similarities of this subject following six decades of medical progress. The reprint "Wine and Health" is timely as we have a follow-up piece on this topic planned for our upcoming fall issue. The article on polio presents a subject that is no longer in the forefront of medical news but was of great interest at the time, and serves as a reminder of the incredible progress made in the past few decades. Finally, the piece on healthcare policy from 1953 concludes that although corporate giving has begun to replace the philanthropy of wealthy individuals, there is a responsibility to maintain funding for health related issues, illustrating that more than 50 years later the issue of healthcare funding continues to be a topic for debate.

PAIN*

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This article originally appeared in the 1948 inaugural issue.

The author is engaged in a study with the object of ascertaining to what degree the symptom "pain" can be utilized in the differential diagnosis of gynecological affections. The first step is a review of the pain problem, in general, from the point of view of diagnostic possibilities.

CHARACTERISTICS OF PAIN

Pain is defined as being distress or discomfort, varying from a slight annoyance to extreme agony. No satisfactory method of studying pain objectively is available at the present time. Studies of pain are subjective and the description of what one feels is only partly accurate. One may present a description of pain *severity* by comparison with other pains of a similar kind and location. The *duration* may be recorded with great accuracy. *Intensity* and *time* may combine to aid greatly in description. The region in which the pain arises may be located with more or less precision. The description of pain is least accurate when an attempt is made to convey an idea of the pain *quality* or *tone*.

Skin: Pain derived from skin is accurately localized, varies in intensity and duration, and may change from moment to moment, but does not vary in quality or tone. This pain may be evaluated in many ways, but tests of pain perception where properly applied do not enable the subject to decide the method in which the pain is produced. A brief stimulus always is described as pricking. A prolonged stimulus, a cutaneous pain that continues, is described as burning.

Muscle: A needle may be passed through muscle without much discomfort, as may a sharp knife. Ischemia and irritant substances injected into muscle provoke pain. The muscle pain is disagreeable, diffuse, difficult to locate, and continuous. The quality eludes clear description. The pain is distinctive in the sense that it is impossible to confuse pain from skin and pain from muscle. It always lasts a few seconds. This is a second example of tissue from which pain of only one kind can be provoked.

Web, tendon, periosteum, joint: All cause a dull pain of constant quality similar to that derived from muscle, though the muscle pain is more likely to waver in intensity. It is these deep pains which, in their less severe forms, are generally described as aching pains.

Deep-lying somatic tissue and visceral organs give rise to similar qualities of pain. Probably there are only two types of pain, superficial and deep.

* Read at the weekly staff meeting of the Carle Hospital Clinic, Feb. 17, 1947.

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PERIPHERAL AND DEEP PAIN

Peripheral pain is derived from the ectoderm. Deep pain is chiefly derived from mesodermal structures, the endodermal structures containing only very few pain fibers.

Superficial and deep pain are clearly distinguishable. They differ not only subjectively but also in the symptoms accompanying the two forms of sensation. Painful superficial stimulation causes protective reflexes. This is not true with painful stimulation of deeper structures. Painful sensations from superficial structures are associated with brisk movement, rise of pulse rate and a sense of invigoration. Those from deep structures are often associated with quiescence, slowing of the pulse, fall of blood pressure, sweating and nausea. "Sickening pain" is never characteristic of pain from a superficial structure. The profound difference between superficial and deep pain may qualify them as separate forms of sensation.

Deep pain can arise from viscera or from deep somatic structures, the quality being the same in either case. The similarity of visceral and deep somatic pains has been convincingly demonstrated by Lewis and Kellogren. They showed that by injection of the interspinous ligaments with saline in patients who had experienced angina and renal colics, the pain could be exactly reproduced in all details to the satisfaction of the subjects, who were largely scientific men. A simple explanation of these findings can be given by assuming that there is a common, though complex, mechanism which is stirred into activity by different impulses derived either from deep-lying somatic structures or from disturbances of the viscus or, in anatomical terms, that the afferent tracts conveying pain from deep-lying somatic structures and from visceral structures unite at some point.

NEURO-ANATOMY

Pain arises from specific end organs and from free endings of sensory nerves. Pain from the skin and from somatic structures is transmitted by the spinal nerves. Pain from the viscera is conveyed via the sympathetic nerve trunks through the white rami communicantes to the posterior roots. The initial pathway for pain from the skin and from somatic structures goes in the same nerve trunks. As has been shown, there is a functional relation not between these two types of pain but between deep somatic and visceral pain.

The posterior root is the portal by which all sensations including pain are received from both visceral and somatic sources. The pain fibers enter the cord in a number of rootlets and break into medial and lateral filaments. These fibers pass into Lissauer's tract and ascend for a short distance, then enter and end in the grey matter of the posterior horn. New neurones arising in the horn cross the middle and enter the spinothalamic tract which ascends as an unbroken path to the lateral nucleus of the optic thalamus. The optic thalamus is closely concerned with the reception of pain impulses of all kinds. It probably is the essential organ for the appreciation of pain. The cerebral cortex controls and checks the activity of this center.

Touch, temperature, and pain systems of sensation are separate entities, as exhibited in the well-known dissociation between cutaneous sensations in diseases of the nervous system.

VISCERAL PAIN

The term "visceral pain" is used to denote one of three things : (1) Pain that arises in a viscus, (2) pain that is localized in the viscus, (3) a form of pain of special significance and one depending upon a mechanism specific for a viscus. These three notions will be discussed separately.

Pain certainly can arise directly from visceral structures. However, such pains are usually diffuse, ill-defined as to position, frequently referred to distant points or even frankly segmental. It is to be assumed that the viscera as well as the deep somatic structures are represented in the sensorium only in bulk, collectively, and not in great detail. It may be regarded as natural enough that the detailed local reference should be reserved to relatively superficial regions from which we are habitually receiving sensory impressions and which are endowed with some positional sense. Where such regular afflux of sensations is missing and the reference is not detailed, as is the case in viscera, the localization cannot be too precise.

Therefore, pain arising in a viscus and pain localized in that viscus are not necessarily the same thing.

Segmental pain can arise directly from visceral structures. It also may arise from any adequate stimulation by a diseased viscus of adjacent somatic structures such as the abdominal parietes. Segmental distribution of pain reference does not distinguish between sensory nerves attached to somatic or sympathetic systems or between pains referred to somatic structures and pains actually arising in them through spread of the pathological process. Neither do superficial tenderness and muscle rigidity distinguish between absence and presence of true involvement of somatic structures adjacent to the diseased viscus. The symptoms can be due to segmental spinal cord reflexes as well as to spread of the disease.

Visceral pain is physiologically not a distinct entity, being indistinguishable from deep somatic pain. The pathways of pain transmission differ, but there is no physiological sanction for regarding the pain nerves of the sympathetic system as distinct from those supplying deep-lying somatic structures. Physiologically and anatomically, pain fibers supplying the two types of tissues are alike; the fact that those from somatic structures at first use the channel of the anatomical sympathetic system before entering the posterior roots, is really immaterial.

From the foregoing remarks, it is clear that visceral pain is not a type of pain of any specific significance because (1) there is only one system of pain nerves for deep-lying tissue, visceral or deep somatic pains; (2) visceral pain does not differ in quality from somatic pain, and (3) either deep somatic or visceral pain is capable of displaying referred phenomena.

DIAGNOSIS OF PAIN

A history of pain as related with the full circumstances in which it is felt by an observant subject may be itself diagnostic of a given disease or of disturbances of given tissue; but as a rule the description of pain supplied by those who suffer from such pains, in words purely of their own choice, fail to convey sufficiently precise ideas of the sensations experienced, and therefore do not adequately identify the pains. One reason for such inaccuracy and inadequacy is the difficulty of recalling distant memories, so that the closer the history to the event, the more accurate it is and the description is most accurate at the time the pain occurs. Another reason is the difficulty of finding the right words of description and of appropriate illustration.

To be complete, a description of pain experienced must at least comprise a statement of *severity*, of *kind*, or *quality*, of *locality*, of *relation to time* and of the precise *circumstances* in which it is felt, with mention of factors which aggravate or relieve the pain and the results of attempts to duplicate the pain.

Severity. The general level of a pain's severity is recognized to possess some clinical value. Few spontaneous pains can be described as agonizing and most of these are known to be derived from viscera. The intensity of the pain as described largely depends on the type and motive of the describer. The degree of severity may be best judged by comparison, such as with other pains or other fairly well-known factors leading to pain. However, due to the human element of the varying of the pain threshold, the severity of the pain cannot be given too much clinical significance.

Quality of pain has been mentioned previously. Superficial or skin pain stands separate. Once pain is properly identified as having this particular quality, its origin from the superficial structures is certain. Pain clearly recognized as having a quality such as that elicited by squeezing the webs of the fingers always comes from deep structures. The quality of pain should always be described under such terms as superficial or deep—these descriptive terms of quality can be used with accuracy and to convey essential information.

Localization. Pain arising from skin is localized with almost negligible error, while that arising from deep-lying organs may be referred remotely. When pain has a segmental distribution it is to be assumed that it may arise from any deep structures innervated in that segment. Experience will provide knowledge of relative frequency, and will guide judgment as to the probable source of the disease in that segment.

Duration, time intensity relation, associated circumstances. The circumstances in which pain develops form the most important, often conclusive evidence of the meaning of pain from the standpoint of disease. In the case of the syndrome of deep pain it is only when localization with time-intensity circumstances and severity are

considered that reliable conclusions are reached. Also to be noted are the associated factors which aggravate and relieve the pain.

Duplication of pain. If pain can be duplicated to the patient's satisfaction, accurate diagnosis is much aided. If a tubo-ovarian abscess were palpated while examining a patient, she would likely inform the physician that he was reproducing the pain of which she had previously complained.

Threshold changes. The threshold of pain varies remarkably in different individuals. Various types of tests have been originated in an attempt to judge more accurately the response to measured painful stimuli. To date a satisfactory quantitative test has not been devised. If the area stimulated is altered by disease, injury, or toxic chemicals, the pain threshold is definitely reduced. Such is the case in both superficial and deep structures.

The information about pain which a patient volunteers is usually of very limited diagnostic value. A comprehensive careful investigation is necessary to get all the diagnostic benefit contained in the symptom "pain."

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