REFERRED PAIN FROM BONE POINTS

BY

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The very stimulating articles by Sir Thomas Lewis and Mr. J. H. Kellgren in the *British Medical Journal* of February 12, 1938 (pp. 321 and 325), and the one by Dr. James Cyriax in the issue of December 31, 1938 (p. 1367), have prompted me to add to their experience that which I have acquired in the study of pain, referred or not, arising from some bone points. In a lecture delivered at the New York Academy of Medicine on October 5, 1922, I expressed my views on the subject,* but did not succeed in stimulating similar studies, perhaps because the lecture remained unknown. I think it will be useful for practical purposes to summarize it briefly.

It may be thought incorrect to speak of bone pain, since periosteum and fibrous, muscular, and ligamentous insertions may be involved. I wish, however, to use this term for the sake of simplicity and because of the possibility of topographic anatomical precision.

When examining patients who complained of severe internal or external pain it was possible in many cases, even when the pain was referred over a wide area, to find a very limited point over a bone from which it could be elicited by pressure. I was led to adopt that method of examination through the experience gained in cases of obscure external pains, of which the following is an example.

A woman of middle age was suffering intense pain which had appeared in a rather acute form three months before, and was located by her in the right shoulder as far back as the scapula and along the arm. The pain was tearing and pulsating in character at times, worse at night, and was increased by certain movements, so that she preferred to keep the arm still. She was treated a long time for rheumatic arthritis of the shoulder without success, and finally left as a chronic case. There was no noticeable wasting of the

deltoid muscle; the interarticular line and the bicipital groove were not tender to pressure; and the active and passive movements outwards and backwards, which were limited and painful, could be made easier by holding up the elbow and relaxing the joint.

What impressed me was that by exercising pressure on the head of the humerus at a point under and a little to one side of the coracoid process a sharp pain could be constantly elicited. Many subsequent observations led me to believe that this point is situated just outside the joint capsule or at its insertion in the groove separating the articular surface of the head of the humerus from the small tuberosity (anatomical neck), where the inferior attachments of the coraco-humeral ligament are also situated (Figure, point 1). This point is covered by the anterior fibres of the deltoid, and can be reached either direct or obliquely from the deltoid-pectoral interstice. This constancy, with the extreme limitation of the painful area, so that even one millimetre outside of it was free from pain, and the possibility of moving the arm if supported, impelled me to exclude any articular involvement and to attribute all the local and referred pain to that special bone point. By repeatedly injecting 10 to 20 drops of a 3 in 100 carbolic solution, holding the point of the needle in direct contact with the bone, the woman was cured.

Painful Bone Points in Various Conditions

That experience induced me to search for such points in various conditions of pain, and as they were found in many regions of the skeleton in cases of obscure origin, or with diagnosis of arthritis, bursitis, and even visceral diseases, I concluded that the existence of painful bone points was certain and that it had a general significance for diagnostic purposes. Of such points some, and the most frequent, are typical—that is, they are to be found exactly in the same spots. Some are atypical—that is, less frequent and in variable position. Typical for the upper limb are the one already mentioned (the superior humeral

* The Wesley M. Carpenter Lecture: *New York med. J.*, 1923, 117, 125.

point), the one on the internal epicondyle (point 3), on the tip of the styloid process of the radius (point 5), more rarely on the styloid process of the ulna, on the pisiform (point 6), and on the dorsal aspect of the first and second metacarpal bones. In the lower limb the point most often involved is on the external tibial condyle (point 9), anteriorly just underneath the articular surface, on the so-called infraglenoid margin (*margo infraglenoidalis*). The joint capsule ends just above or at that point, which has nothing to do with the tender points one finds so often at the insertion of the lateral ligaments.

From the limited tender point the pain spreads elsewhere. From the superior humeral point it can be referred to the anterior and posterior aspects of the shoulder, to the scapula, and along the arm; from the tibial point it is referred to the knee and to the leg in such a way that patients speak only of the referred regions and generally cannot locate the pain. Such extension of the pain is variably connected with tender points in other regions, as, for instance, on ribs (point 12).

Differential Diagnosis

Having these details in mind the differential diagnosis from arthritis in the case of humeral or tibial points is not difficult. There is no effusion or swelling of the joint; the active movements are limited in some directions, but the passive ones can be accomplished almost completely if the limb is supported and the joint not subjected to strain. It is characteristic of the painful spots that they are very limited in area, sometimes not bigger than a pinhead, so that no confusion can occur. With regard to the differential diagnosis between the tender superior humeral point mentioned above and arthritis, I may add that the same location of pain is said to exist in cases of shoulder arthritis. In every manual of surgery, among the signs of this disease is included that of pain elicited by pressing on the head of the humerus near or in the deltoid-pectoral groove. According to some this tender area corresponds to the convexity of the articular surface of the head. But this is not so, for that portion of the head is inaccessible except when the arm is rotated outwards.

In cases of arthritis the tender spot is accompanied by swelling of the region, by pain along the bicipital groove, and by great or even total incapacity of the joint. If the tender spot exists alone it is not a sign of arthritis. As I have said, the patients do not point to the existence of a local trouble: they speak of pain either diffuse around the joint or radiating to a distance or during movements, aggravated sometimes in the night or having a neuralgic character. The course of the disease may be acute; it is generally slow and obscure at the onset but less so with time, and lasts even for more than one year and prevents the full use of the limb. Causes cannot be found, except the so-called rheumatism or sudden strain or an exaggerated use of the limb.

Among structures which could be considered to be the seat of the pain, the coracoid bursa in the upper end of the humerus has been described by Goldthwaite and Codmann; but so far as I know this disease has not been acknowledged in Europe, and its localization and extension do not correspond with the point I am speaking of. Many painful troubles of the upper limb not precisely localized, and which bear such names as, for instance, arthralgia or neuralgia of the joint, muscular pain, and brachialgia, are either due to the superior humeral point alone or are associated with tender spots on the fourth or fifth rib posteriorly between scapula and spine, on the scapula

itself, or on the spinous processes. Naturally a close search, including the use of x rays, has to be made to avoid errors.

Styloid Process of the Radius

The location of pain to the styloid process of the radius is common, especially in women. They complain of pain in the wrist, chiefly during dorsal or ulnar flexion of the hand, in abducting the thumb, or in grasping an object, without being aware of its precise locality. Many complain, too, of pain running down the dorsal aspect of the thumb and of the hand, or up in the limb, and are incapable of any work, even playing the piano or sewing. There is no change in the shape of the wrist, and all the movements can be made if not forced. The painful spot is as small as a pinhead, and beyond it there is no pain. Immobilization helps, but is not completely effective, and I have seen patients with a diagnosis of periostitis, arthritis, or even tuberculosis of the wrist wearing plaster casts for months. But the wrist-joints have nothing to do with the pain referred in the above cases.

Neuralgia of the joint and inflammation of tendon sheaths have often been diagnosed. The disease called by De Quervain tendovaginitis stenosans of the extensor brevis and abductor longus pollicis, and confirmed by Keppler and others, is unknown to me. Its diagnosis is based on pain along these tendons, on the presence of a painful spot, and on a certain thickening of the sheath, and he has cured it by cutting the tendon subcutaneously. I have never seen a case, and I doubt the correctness of interpretation. Certainly it is a strange fact that a tendon sheath should become narrowed without any cause. De Quervain never found signs of inflammation. The vagueness of the pain, the location, the frequency in women, and the strangeness of the disease make me think that a painful spot in the inferior radial epiphysis might be the cause. I will mention briefly the so-called epicondylitis or epicondylalgia (tennis elbow), well known for years past, and attributed to various causes and explained by many pathological suppositions. Here, too, the tender spot is extremely small and there is no pain outside that very limited area.

Pain in the Lower Limb

In the lower limb, besides the points above spoken of, there are others typical and atypical, as on the internal condyle of the femur (point 7), on the apex of the patella (point 8) or on its borders, on the internal side of the os navicularis (point 10), on the dorsal aspect of the base of the second and third metatarsal bones, and on the posterior and inferior surface of the calcaneus. I will not venture to say that many of the so-called achilloburnias, podalgias, metatarsalgias, and especially the Morton painful foot, are only due to painful bone spots, but certain it is that such vague diagnoses should not be made without first looking for them. In the so-called Morton foot it is easy to find a very limited tender spot on the inferior surface or the head of the fourth metatarsal (point 16). The results of treatment are of more importance than any supposition or discussion, and I am convinced of the correctness of my observations.

Pain in certain of the ribs is common, alone or associated with pain in the head of the humerus. I have seen in women a spot on the inferior costal edge (point 2), either left or right, and the interpretation had always been that some internal disease, especially of the gall-bladder, is present. I have treated cases in which the gall-bladder had been removed with no result, and it was

easy to find a tender spot on the rib and cure the patient with local injections. The vertebrae, especially their spinous processes (point 11), are often the seat of pain spreading up and down, along the arm, and towards the waist, the patient not being aware of its location. Treatment with plaster jackets, immobilization for years, and miraculous cures have not been infrequent in my experience. Women and neurotics are generally affected, so that hysteria has to be eliminated. In these cases the x rays are invaluable, but the clinical examination also can exclude organic lesions.

The sacral region, and especially the ilium (points 14 and 15) or sacrum near the ilio-sacral joint, often presents tender spots from which pain is referred to the buttocks, waist, and abdominal wall. Coccygodynia belongs to this category. One can say in general that these and other spots, particularly when near to joints, muscles, and tendons, may give rise to incorrect interpretations. They acquire more importance when a painful spot on the rib edge is mistaken for an internal affection. I recall that painful spinal spots in the course of gall-bladder diseases have been found by Mackenzie, Vidal, and others. I do not venture to doubt their existence: I only say that tender bone points may give rise to referred pain, even at a distance, towards and inside the abdomen. Many times I have heard women, very rarely men, complain of pain around the waist, spreading anteriorly and downwards to the inferior abdominal quadrant, for which no organic cause could be found. Diagnoses of floating kidney, nephralgia, appendicitis, and enteralgia had been made. If the patient is made to lie on one side it is possible to find an exquisitely sensitive spot at the tip of the third or fourth transverse lumbar apophysis (point 13), and this is almost always associated with pain on pressure on the lateral surface of some lumbar vertebral body, generally the one corresponding to the transverse process (point 4).

When examining patients for appendicitis one should have in mind that possibility. If the hand presses deep into the iliac fossa on to the underlying bone, or, if more medially, on to the vertebral bodies, very often pain is complained of and the diagnosis of chronic appendicitis is made and confirmed by incorrect palpation manœuvres under the screen. Such a pain has no value in the diagnosis: it may be present even in true cases of appendicitis, but has nothing to do with it. I doubt if the so-called Morris point—which that worker located deeply at one and a half inches from the umbilicus, on the line between the iliac spine and umbilicus, on the right side—should not be interpreted in this way. Therapeutic success confirms the diagnosis of tender bone points. The cause of this localized pain cannot be found. The majority of the patients are women, sometimes neurotic or with rheumatic conditions, or even affected by limited tuberculosis; but healthy men and women may be affected too.

Morbid Anatomy of Painful Bone Spots

The morbid anatomy of these bone spots is unknown to me. Small chips of bone excised with the periosteum have never shown structural changes. In a general way one may ask, What structures are responsible for the pain—periosteum, or the fibrous attachments to the bone, or the overlying muscles? In many cases—as in connexion with the tibia and the styloid process of the radius—structures other than bone may be excluded. The pain on vertebral bodies I have already discussed. Comparison of the points given in my figure with Mr.

Kellgren's sketches shows a great topographical similarity if not coincidence, and as a result of my observations I must exclude the possibility that the seat of pain could be in a muscle overlying the bone. I will not venture into hypothesis or discuss the question of diagnosis any further, since this paper is not meant to be exhaustive.

Treatment

It remains to say something on treatment. In the past I used to inject 10 to 20 drops of a 3 in 100 carbolic solution (1 in 100 may be used to begin with) direct, and exactly, on the bone spot. Pain is sometimes increased for hours, especially when the seat is the radius; then it diminishes and almost wholly disappears after from one to four injections. More than that number are useless.

It has been a source of satisfaction to me to read in Llewellyn Jones's book on fibrositis that Wilfred Harris has cured brachialgias by injecting alcohol on tender spots accurately localized on the scapula and the ribs. For some years I have used with success infiltration with novocain, and the results have sometimes been striking. As it does not usually aggravate the pain (though it may do so exceptionally after two to three hours), I think the best plan is to begin with it and to resort to the carbolic if unsuccessful. Is it possible that, when injected in quantity in cases of so-called muscular pains, it may reach and permeate the periosteum and structures attached to the bone and cure the pain in this way? I am sorry not to be able to discuss the quality of pain; but my observations are old, and, though as accurate as I could make them, they are far from fulfilling the requirements laid down by Sir Thomas Lewis. His suggestions will prove very valuable for the future. Also I believe that such painful spots on bone can be analysed even by studying normal people. Not rarely I have found in these persons the internal epicondyle, the third lumbar transverse process, and other bone points respond with pain if pressed accurately in a limited zone, as if these areas were for some reason the most susceptible to the localization of this obscure disease.

In my lecture of 1922 I stated my opinion that the field of pain is very large and the study of it most difficult and complex, and that I had presented only a very limited part of it. My only excuse is that I have tried to study this small part from a comprehensive point of view such as I believe has not been done before.

In the United States the cold storage of eggs is an important industry, about 3,000 millions being stored in commercial warehouses. The eggs are placed in store during March, April, May, and June, when production is large and eggs are cheap, and withdrawal begins in August, increasing gradually until mid-November, when the price has risen; very few eggs are carried over to January. Large quantities are stored for one to two months only, and then released on a rising market. In this country, on the other hand, few of the 3,350 million eggs produced annually are stored either by housewives or in commercial stores. The number of inquiries addressed to the food investigation organization of the Department of Scientific and Industrial Research has shown, however, that there is a considerable interest in the subject. The Department has accordingly issued a leaflet on the principles and relative merits of the methods used. Those dealt with are cold storage in air alone, partial "gas storage"—that is, cold storage with the addition of 2 to 2½ per cent. of carbon dioxide in the atmosphere of the store—and full "gas storage," involving cold storage in an atmosphere containing 60 per cent. of carbon dioxide. Copies of the leaflet, *The Cold Storage and Gas Storage of Eggs*, can be obtained gratis from the Secretary of the Department, 16, Old Queen Street, Westminster, S.W.1.