RES MEDICA
Journal of the Royal Medical Society

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Abstract
Based on a Talk given to the Society on 7th February, 1964.

Pain is one of the many facets of our education where we learn the basic facts and theories in the early years of our medical course only to forget much of our learning by the time we are qualified and in practice. In the clinical years we tend too often to learn sites and types of pain by memory, each type associated with one certain disease: all too rarely do we stop and ask ourselves the question “Why? “ and attempt to reconsider the basic theories in the light of the present evidence. It is a healthy attitude to challenge current teaching now and then in order to see how well it matches up to current practice and current evidence.

ISSN: 2051-7580 (Online) ISSN: 0482-3206 (Print)
Res Medica is published by the Royal Medical Society, 5/5 Bristo Square, Edinburgh, EH8 9AL

Res Medica, Autumn 1964, 4(3): 19-24
doi: 10.2218/resmedica.v4i3.429

SOME ASPECTS OF ABDOMINAL PAIN

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INTRODUCTION

Pain is one of the many facets of our education where we learn the basic facts and theories in the early years of our medical course only to forget much of our learning by the time we are qualified and in practice. In the clinical years we tend too often to learn sites and types of pain by memory, each type associated with one certain disease: all too rarely do we stop and ask ourselves the question "Why?" and attempt to reconsider the basic theories in the light of the present evidence. It is a healthy attitude to challenge current teaching now and then in order to see how well it matches up to current practice and current evidence.

Pain is a prominent sympton in many diseases: its relief is often a perplexing problem to the doctor but paradoxically it can play a useful part in the construction of an exact diagnosis. A history which is well related by the patient and intelligently interpreted by the doctor is more important to the diagnosis and hence to the treatment than all the examinations, clinical or laboratory, which later follow. Indeed the history usually dictates the subsequent steps. Unfortunately the viscera of the body are not endowed with the same sensory precision as the skin and thus visceral pain is more difficult to describe and to locate than cutaneous pain. Progress in the understanding of pain has not been easy—not for want of interest but rather because of the difficulties concerned with any form of experimentation. It cannot be repeated too often that any theories offered must fit the facts. In recording the clinical facts of each case great care must be exercised to keep the facts quite distinct from the conclusions drawn from them — Darwin in the Descent of Man in 1889 warned us:

"False facts are highly injurious to the progress of science for they often endure long; but false views, if supported by some evidence do little harm, for everyone takes a salutary pleasure in proving their falseness."

Darwin's warning is all too often ignored and theories and deductions become taught as facts. Thus it is not uncommon to find Capp's work on the sensitivity of the peritoneum taught as an established fact rather than as a deduction; yet no less an authority than Mackenzie has claimed that the peritoneum is *not* itself sensitive to cutting, scratching, etc. Similarly we are used to describing the pain of passage of a renal calculus down the ureter as "renal colic" and tend thereby to imply the rhythmic waxing and waning of pain in association with peristalsis such as happens in intestinal obstruction: having learned the term "renal colic" it is too easy to forget the true fact that the pain of renal calculus is not colic in that sense at all. Dr. French of this medical school has drawn our attention to this danger and a few minutes spent by the bed-side of such a patient will convince the student of the truth of this. An attack of "renal colic" will impress even the sceptic. Theories of the mechanisms of visceral pain have to be fairly broad in as much as they must explain not only the every day occurrence but also the unusual: this can be illustrated by the following example:—

A male aged 57 complained of severe aching pain in the right loin and rigors; examination revealed marked tenderness in the renal angle and the urine contained pus. A diagnosis of right pyelonephritis was confidently made by a senior physician who demonstrated to a clinique "the tenderness of the right kidney". The diagnosis remains unchallenged but the kidneys of this patient were sited deep in his pelvis and lay nowhere near his renal angles, nor his site of pain, nor his site of tenderness.

Our theories of visceral pain must explain the location of this patient's pain and tenderness in the so-called "proper" site.

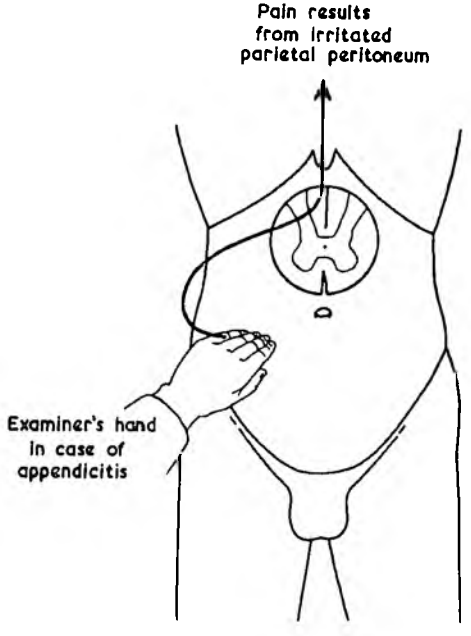
VISCERAL PAIN AND TENDERNESS

Visceral pain is characterised by poor localisation, wide radiation and frequent reference to parts other than those stimulated — this was Head's original description. Afferent impulses from abdominal viscera run in the so-called sympathetic afferent nerves—these are in fact slow conduction nerve fibres which utilise the pathways of the sympathetic system to gain the spinal cord. They do not relay in sympathetic ganglia however and are not truly part of the sympathetic system: travelling such a path and sometimes passing along the sympathetic chains before entering a posterior spinal root, the fibres from one viscus may spread their entry into the spinal cord over several segments. This is one explanation of the difficulties a patient has in localising visceral pain with any accuracy since the ultimate location of pain has probably to be done on a mental map of reference learned by experience and usually conceived as relating to the dermatomes of the spinal segments.

Thus the pain of coronary thrombosis is located diffusely by the patient in the praecordium, the neck, the arm and even the hand: afferent fibres are entering the spinal cord at all these varying levels of segmental distribution and the pain is associated with these appropriate segments on reaching consciousness. In some instances pain is interpreted by the brain as originating at a considerable distance from the site of stimulation—an example of this has already been given. Such apparent errors in localisation have been designated as "referred pain". John Hunter first conceived the idea of pain reference when he observed that diseases of the liver could cause pain referred to the shoulder. Since then many theories have been advanced and many heated arguments have occurred on this subject. In 1920 Makenzie suggested that visceral afferent stimuli set up an irritable focus within the spinal cord and in turn this so disturbed the somatic secondary neurones that their threshold was lowered and thus cutaneous impulses, previously sub-threshold, now reached consciousness. Cohen (1947) made this basic reasoning more elegant by postulating that referred pain is due to the summation of impulses from both the periphery (for example the skin) and from a viscus together exceeding the threshold for pain. It should be stressed that this means that impulses from either source if strong enough, or from both sources together, can cause pain but such pain will be interpreted as located in the area of skin concerned. With this theory the reference of pain to a site no longer present (e.g. an amputated arm) can be explained.

Visceral tenderness, or pain induced by pressure is an accepted fact. Morley (1931) considered that it was due to the "sensitive parietal peritoneum" coming into contact with the causative lesion—thus in appendicitis the secondary pain and the tenderness were in the

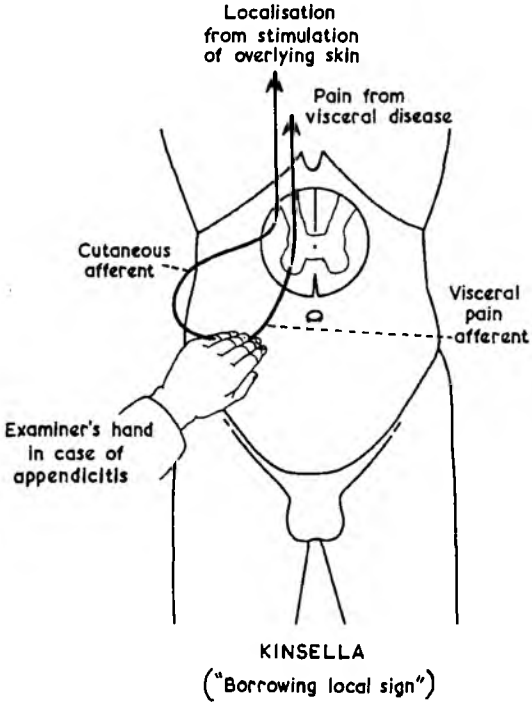
Fig. 1



right iliac fossa where the inflamed appendix lay (Fig. 1).

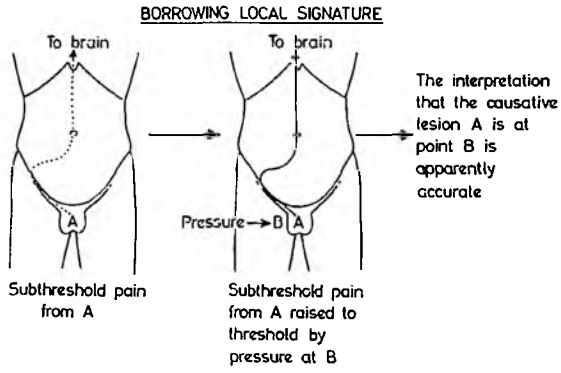
Kinsella (1948) has offered another theory which perhaps explains more clinical facts than does Morley's. In Kinsella's theory the pain from an organ such as the appendix travels along the sympathetic afferents and is felt in the mid-abdomen since the gut has bilateral innervation. The pain impulses probably originate in the rising tissue pressure of the inflamed organ. Movements of overlying tissues such as muscles, or pressure of an examining hand will increase the tissue pressure and aggravate the pain. The sensorium is well aware of the site of such an examining hand, etc., since the skin has also been stimulated and consequently locates the pathology there. This is what Kinsella has termed "borrowing local signature" (Fig. 2).

Fig. 2



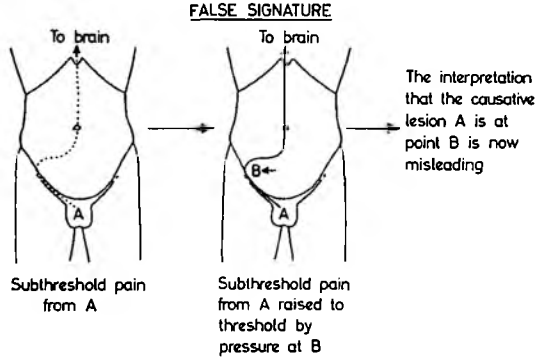
This borrowed signature may be helpful to the patient if it draws his attention to the true site of the pathology, as shown in Figure 3.

Fig. 3



or it may be apparently misleading if the second stimulus—the examining hand—is applied in the reference area of the pain, as shown in Figure 4. It is of course the unwary clinician who is misled rather than the facts which are misleading but doctors are not immune to the desire to excuse their shortcomings.

Fig. 4



Brown (1949) has offered a useful rule for referred pain, stating that an organ which is displaced from its primitive embryological position subsequently refers its pain to its

original position, e.g. diaphragmatic pain may be referred to the shoulder in C3, 4, 5 area from which myotomes the diaphragm was developed although subsequently widely separated from those segments.

CLINICAL APPLICATION OF KNOWLEDGE ILLUSTRATED BY TESTICULAR PAIN

An intelligent interest in the subject of pain must be carried over by the student from his basic science education into his clinical practice and will be amply rewarded by a better understanding of the patient's difficulties of description and localisation.

The subject of visceral pain can perhaps be illustrated better, and the current theories tested, by referring to one specific viscus. The testis is such a viscus, has its own peritoneal sac in the tunica vaginalis testis and yet is situated in an inaccessible site outside the abdomen following its descent from its primitive embryological position.

The testes develop in the same site as do the ovaries, at the brim of the true pelvis, deep to the deep inguinal rings. At this stage they acquire both their blood supply and their nervous connections which subsequently descend with the testes into the scrotum. Can there then be any good reason why a boy with a twisted testis (remember that this pathology does not involve the scrotum until a very late stage) should be expected to have pain in the scrotum while his sister with a twisted ovary has pain in the iliac fossa? It is a common misconception that pain FROM the testis is synonymous with pain IN the testis. In view of its superficial and easily accessible position one might expect acute testicular pathology to advertise its occurrence at an early stage yet a study of cases of testicular torsion reveals astonishing delays: Robb (1956) calculated the average delay between onset of symptoms and admission to hospital as 5.5 days. He also showed that in a large proportion of cases the testis is destroyed by the vascular insufficiency which occurs—of 30 patients he found only 3 who were left with a normal testis at follow-up. Since many of the patients suffering from this condition appear to have an underlying developmental defect often in the form of an extended mesorchium, and since that defect is usually bilateral, then infertility if not eunuchism is a possible outcome.

The large proportion of testes which are irretrievably damaged by torsion before coming to operation can be explained by the diagnostic delay: but what causes the delay? A study of these cases suggests that the procrastination is occasioned by the site and nature of the earliest discomfort or pain being misinterpreted by patient and doctor alike. Nearly all current text-books still teach that patients with torsion of the testis present with pain IN the testis. But in fact the initial pain is felt in the groin or lower abdomen in keeping with Brown's law referred to above. Indeed most men have at some time experienced the sickening pain in the lower abdomen or groin which follows a blow on the scrotum.

Evidence for the site of testicular pain:

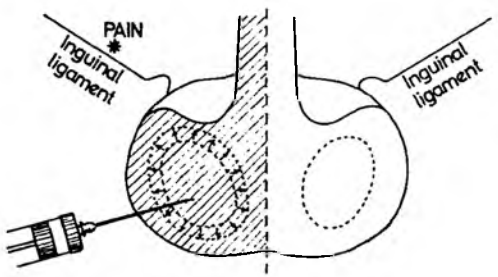
Three lines of evidence can be offered in support of the abdominal or groin site for testicular pain: in turn the theories of Morley, Kinsella, Mackenzie or Cohen can be tested against the clinical facts by the student interested in these problems.

i) A study of patients with spinal cord transections can be made and such patients' testicular sensation assayed with the concomitant knowledge of their sensory loss as mapped out by skin segments. Such a study suggests that when T 12 cutaneous segment is sentient, these patients have testicular sensation also but refer the pain resulting from testicular compression to the groin or to the area of the deep inguinal ring even although the skin over that area is itself insensitive.

ii) Hunter's advice of "try the experiment" can be taken. A series of volunteers had their scrotums anaesthetised by local anaesthetic. A needle was then passed through the anaesthetised skin into the testis: the volunteer felt no pain from this manoeuvre provided the needle was sharp. Through the needle the intratesticular pressure was raised by the injection of normal saline: the volunteer remained unaware of the moment at which this occurred until the pain threshold was passed; he then recorded only his subjective pain *from* the testis (it could be relieved immediately by lowering the pressure). Such experiments have been conducted both by Brown (1949) and the author independently and invariably the pain so produced was located at the deep inguinal ring (Fig. 5) but was poorly localised, dull and sickening.

Fig. 5

PAIN FROM EXPERIMENTALLY RAISED TESTICULAR PRESSURE



iii) The third source of evidence is to be found in the best laboratory of all—clinical practice. Thus patients with testicular pathology or vague lower abdominal pain can be studied in detail, their histories taken with patience and care, their relatives interviewed and their pathologies and clinical courses noted. Such a study again leaves little doubt that the site of the earliest discomfort or pain in a patient with testicular pathology is in the groin or lower abdomen and only later is localised to the scrotum by the patient.

Patients have been seen with a wide variety of diseases of the testis (torsion, torsion of the hydatid of Morgagni, trauma, epididymo-orchitis, tumour of testis, undescended testis, infarction of testis) and the collected evidence again led to the above conclusion as to the true site of the earliest pain.

It should however be noted that many of the patients referred to in (iii) above were unaware of the association of their vague lower abdominal pain with the "later developing" testicular lesion: so often were their medical advisers. A clinical case may be quoted to illustrate such points:—

A patient was admitted to hospital for aortography as investigation of his intermittent claudication; exactly 10 hours after the injection of dye into his aorta he summoned the house surgeon to complain of abdominal pain in the right iliac fossa. The doctor concerned could find no abnormality on examination. Fifteen hours after injection the patient again summoned the house surgeon to point out that he now had pain in his scrotum when he touched or moved the part but not when he lay still. Examination of the X-ray plates showed that the injection had filled the right testicular artery completely: necrosis of the testis followed.

From the clinical evidence referred to there seems little doubt that the patient's first discomfort or pain in such cases is in the region of the deep inguinal ring: this accords with Brown's law. At a later stage in the disease process the patient is enabled to localise his lesion to the scrotum either by virtue of self-examination or by pressure of his thighs raising testicular pressure still further, but in such circumstances he has really elicited scrotal tenderness, or as Kinsella put it, he has "borrowed local signature". The lesson to be learned is that early examination of the scrotum in cases of vague lower abdominal pain can elicit local tenderness of the testis at an early stage—a stage in fact when operative intervention could save a reasonable proportion of twisted testes.

CLINICAL MISREPRESENTATIONS

In 1923 Mackenzie wrote "In all your observations keep your facts distinct from your interpretation" and this advice is all too easily forgotten. The apparent logic of expecting to find pain located accurately to the site of the stimulus is so pressing to some clinicians that it can lead to frank misrepresentation of the facts. Thus on several occasions have house surgeons recorded in the case notes expressions such as "pain in the abdomen" or "pain in the groin" when admitting the patient to the ward at a time when the diagnosis was unknown: Their better qualified but undoubtedly less exact seniors have subsequently recorded in the summary of the case (or letter to the family doctor) that the patient was admitted "with pain in the testis"—the causative lesion by this time being known to be in the testis.

It is a very easy step to manipulate the facts from the point of truth to what seems to have been the truth without there being any deliberate intent to deceive. Patients too may be confused by their apparently logical conclusions concerning their own diagnosis; the mother of one boy who lost his right testis after a torsion

reflected how unfortunate her young son had been "in first having a threatened appendicitis for three days and then going and developing this trouble with his testicle". (This boy had been observed at home for three days with abdominal pain before localising his pathology to his testis.)

SUMMARY

Pain originating in the testis in a variety of pathologies has been used to illustrate the importance of an understanding of the mechanisms and theories of abdominal pain in the early diagnosis of the lesion. The same understanding can and should be applied to any visceral pain. Perhaps the term "understanding" is too presumptious—"enquiring attitude" might be more appropriate since the details of the theories are of less importance than the attitude of mind.

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