Clinical Lecture

ON

PRIMARY CANCER OF THE LUMBAR VERTEBRÆ AND SACRUM, SIMULATING, AT AN EARLY STAGE, CARIES OF THE SACRO-ILIAC SYNCHONDROSIS.

*Delivered at St. Mary's Hospital,*By ARTHUR T. NORTON, F.R.C.S.,
SURGEON TO THE HOSPITAL.

GENTLEMEN, — E. K., aged thirty-five, married, was admitted into the medical wards on the 13th February, 1878, and died on the 27th May. Perhaps in explaining this case it will be better to lay before you the post-mortem records prior to touching upon the history of the disease, as by this means you will more readily understand the course pursued by the disease, and recognise in what manner the symptoms were accounted for.

Post-mortem examination.—Nodules of cancer, apparently originating primarily in the substance of the bone, occupied the right side of the bodies of the three lower lumbar vertebræ and the greater portion of the sacrum; the bodies of those bones being replaced by the cancerous mass. The bones were soft and easily broken down, but there was no displacement. The right ilium was thickened and softened, being easily cut with a knife. The mesenteric and lumbar glands were enlarged, and infiltrated by cancerous matter; and the peritoneum was increased in thickness. The pelvis of the left kidney was much dilated, and cancerous material surrounded the ureter for about two inches, so as to almost obliterate it; the weight of the left kidney was nine ounces, and that of the right five ounces. There was no deposit in the liver. In the chest, the aorta and trachea were surrounded, hardened, and glued together, by cancerous deposit; there was a quantity of serum in both pleural cavities.

Now, having learned from the post-mortem examination exactly what pathological changes had taken place, we may proceed to examine the symptoms produced by those changes, and compare them with similar symptoms which are produced by other diseases.

History.—The family of the patient's parents were healthy, her father being still alive, her brothers and sisters being in good health, and her mother having died after fifteen years' hemiplegia. The patient had been married thirteen years, and had given birth to ten children, of whom five were dead. The last confinement occurred on Jan. 10th of the present year, the child being born prematurely, and since dead, and this confinement seemed to have been the cause of her present illness, for up to within about two months of the confinement she had been in good health, and since that time her disease had been increasing in severity.

Symptoms.—She first complained of pain in the back and loins, extending down the legs, and more especially the right leg, about four months ago, but since her confinement she had been unable to move about, for her pain became excessive, and she felt that she was unable to support herself. Her appetite was capricious, and she complained of thirst; her tongue was coated. Pulse 120; temperature 100.4°. Respiration was normal, and the heart and lungs were sound. Pressure produced pain in the right groin in front, and also in both gluteal regions, but more especially the right. There were no enlargements felt anywhere in the abdomen, though examined for. The urine was of a cloudy straw colour, depositing pink lithates on standing, acid reaction, sp. gr. 1033, no albumen. The case, you must understand, was at this time in the medical wards, but no substantial medical diagnosis could be ventured upon the symptoms which presented themselves, and as it was reasonably suspected that parturition was the promoting cause of the disease, the obstetric physicians were requested to examine the patient. They reported that there was no pelvic tumour, nor abscess, nor any sign of pelvic cellulitis, No. 2880.

and that the uterus was normal. Medicine and obstetric medicine failing, the case was referred to a surgeon.

I examined her on the 21st of March, and I will now tell you what diagnosis I formed, and from what signs I formed it. I found the patient in bed, and unable to stand or to sit—that is to say, she was unable to support the weight of her head and trunk upon the pelvis. She informed me that she was able to stand before her confinement, but that she had not been able to do so since. On turning her upon the abdomen, I discovered œdema over right half of sacrum and right lower lumbar vertebræ, extending outwards over the posterior third of the ilium, so that none of those bones could be distinctly felt. Flexing and extending the right hip-joint gave great pain, but gentle movement of the hip-joint gave no pain. This was further evidence to me that the hip-joint was not affected, and that the disease affected the pelvic bones. Shaking the right ilium gave great pain; shaking the left ilium also gave pain, but not to be compared with the pain produced on the right side. I evidently had then to deal with a disease affecting one or more of the bones of the pelvis, and on the right side of the pelvis. The temperature, which varied from 100.9° to 98° Fahr., exhibited the irregularity characteristic of a hectic, in which the rise is always at night and the fall in the morning. Here, as you see, the rise is sometimes at night, sometimes in the morning—a condition which occurs (1) in the early stage of caries before any collection of pus takes place, (2) in caries of cartilages of small joints of a slow or subacute form, the constitution not being much affected, and (3) in internal cancer, as I have recently ascertained by an examination of the charts of cases which have subsequently died of cancer.

Every one of these signs pointed to injury and caries of the right sacro-iliac synchondrosis. 1. There was the labour, which in a person of a strumous diathesis would be liable to bring about this disease. 2. There was inability to sit or to stand—that is, to bear the weight upon the pelvis. 3. So far as we could judge, that inability to stand or to sit was due to some morbid condition on the right side only of the pelvic bones. 4. There was such a thermometrical chart as occurs in caries of a small joint. 5. There were œdema and the external signs of inflammation immediately along the line of the sacro-iliac synchondrosis, and extending a little distance above it. 6. There was pain always in the sacral region. 7. No collection of matter was to be detected, and it must be particularly borne in mind that caries of this joint may continue for months, even, I may say, for years, before any abscess can be detected.

Such was my diagnosis of the case at my first visit, and such was the reasoning upon which I framed the diagnosis; and it is well that I should here point out to you the fact that the cancer occupied the base of the sacrum, including a large portion of the bone, and in close proximity to the right sacro-iliac synchondrosis; and I should further add that the cancer, as it extended, developed itself entirely on the right side of the bodies of the vertebræ, thus accounting for all the signs I have mentioned.

Having concluded that the disease was in the sacro-iliac articulation, the prognosis was extremely unfavourable, for in a person of thirty-five years of age suppuration would ultimately occur, and would probably continue until it had exhausted the patient.

The line of treatment to be adopted was clear. Complete rest, with attention to diet and to the ordinary functions, and the combating of any symptom, such as insomnia &c., which might show itself, with the object, if possible, of preventing suppuration, and of directing a resolution of the inflammation—results which, if obtained, could not be expected without a very lengthened period of treatment. She was ordered the dialysed solution of iron; and to relieve the pain and obtain sleep, subcutaneous injections of morphia, when not able to be dispensed with. A starch bandage was applied around the pelvis, right thigh, and lumbar region.

I shall now point out certain important symptoms which exhibited themselves during the progress of the disease. On April 8th she lay upon the left side, with the legs somewhat flexed, and from that time refused to turn upon the right side or upon the back. Extension of the right leg gave pain in the loins, and she now complained of pain generally in the loins more than in the sacrum, as hitherto. There was hyperæsthesia and œdema of the right leg, and a few days later motor paralysis. On the 20th there was great relief from the spinal and sacral pain, and concussion of the pelvis produced comparatively little pain, whilst at the same time

the power to pass urine had diminished, and retention followed; and on April 29th there was complete loss of sensation in the parts to which the anterior tibial nerve was distributed, when a needle was inserted to the depth of about one-eighth of an inch. All these symptoms were evidence of the advance of the disease, and were such as would result from extension of inflammation, with oedematous infiltration in the spinal canal. Since the death of the patient, we have ascertained that these symptoms were due only to the oedema, for the new growth had not penetrated the posterior part of the sacrum nor of the vertebræ, and, therefore, there was no compression of the cord by the cancerous mass. The symptoms showed further that, if the disease had commenced in the sacro-iliac joint, it was not limited to it now, but had spread at least into the substance of the sacrum, and was affecting the spinal canal and its contents. The fact that concussion of the pelvis did not induce the same excessive pain, as in the earlier stage of the disease, must be accounted for by the destruction of some nerve-tissue in the substance of the bone, and the compression of the sensory nerves and the spinal cord, complete loss of sensation having occurred, as we have seen, in some nerve fibres (the anterior tibial).

On May 2nd an instructive change had taken place. She said that her loins were no longer painful, and she consequently felt her health improved, but she added that her left leg troubled her more than the right. The fact was that there was little or no power of sensation in the right leg, whilst hyperæsthesia now prevailed in the left, and the left leg, too, was paralysed. On the 13th she said she was better, for the pain was not so severe in the left leg, but on pricking the limbs with a needle she was unable to tell where the needle was, and in most places was unable to tell that she was being pricked by it. Strangely enough, she could on this day raise her right leg about two inches from the bed, a feat she had not been able to perform for some weeks. From this date to the time of her death on May 27th there was some slight improvement in the power of sensation in both legs, and on some days she was able to raise her feet from the bed, whilst on other days she was unable to do so.

These changes are easily explained, for, as I have already told you, the motor and sensory paralysis was entirely due to oedematous infiltration around the cord and along the nerves. Now it invariably occurs that when cancerous growths first appear and grow they compress and close up surrounding vessels, and thus, by compressing the veins, they produce congestion through venous obstruction, and consequently the parts around become swelled with oedema; but as the cancer increases in size it does not at all follow that the oedema will increase. On the contrary, surrounding vessels will often take up the circulation, and the infiltrating fluid is reabsorbed, so that if any nerve-filaments have become paralysed during the early period of the growth of a cancer or other tumour, they may, if not compressed by the cancer itself, recover their power, though the cancer continues to increase in size.

It might be asked, why did the motor paralysis precede the sensory paralysis, considering that the oedema probably surrounded the cord? This is a question which can scarcely be answered positively. In most cases of caries of the spine, accompanied by paralysis, and in many cases of fracture of the spine, we find motor paralysis without the sensory fibres being affected. Of course, if a growth or an angular prominence projected against the cord it would compress first the motor tracts of the cord, because they are in front; but where there is no growth nor any prominence projecting upon the cord, yet still the motor fibres are at first or alone affected. Perhaps it may be accounted for by the position of the cord, which is held by the nerve-roots close up to the venous plexus, which covers the post surface of the bodies of the vertebræ, and to which probably in a great degree is due the oedema or inflammatory infiltration, as the case may be. Oliver has given another reason—namely, that the motor impulses are transmitted by the superficial parts of the cord, whilst the sensory fibres run to the deep parts of the cord.

There is yet another point to be recollected with reference to paralysis in this case. At one period of the disease retention of urine took place, and catheterism had to be employed, but as the disease advanced the catheter was no longer necessary, and the patient voided her urine without assistance. The explanation of paralysis due to infiltration also holds good here.

Throughout her illness she perspired profusely; the pulse varied between 112 and 120, and was small and weak; the tongue was clean and moist; her appetite was indifferent; her nights were sleepless, mainly in consequence of the pain. The temperature at this time showed a rise sometimes at night, sometimes in the morning, never exceeding 101°. From about the 20th April it rarely rose above 99°, varying between 97° and 99·4°. From this it would appear that the temperature and the pain bore some ratio to each other, for about the same time that the temperature declined we find that the patient expressed herself better and free from pain.

Remarks.—Now, the great questions arise: (1) Was it possible in this case to diagnose that the disease was cancer? and (2) Has this case taught us anything by which we may feel more certain of the character of the disease, should a similar case come before us?

First: I am inclined to say that it was impossible to make a positive diagnosis in the case, the history of which I have just recited. Mr. Shaw, of the Middlesex Hospital, in his article on disease of the spine in Holmes's "System of Surgery," says: "A cancerous tumour is not unfrequently mistaken, according to its situation, for either a lumbar or a psoas abscess, and the uncertainty is increased if the cancer have invaded the spine, and, by converting part of it into its own morbid structure, has caused the column to become bent."

Now, these remarks by Mr. Shaw refer to cancer when the tumour can be felt; how much more, then, is one likely to mistake the disease when there is not even the presence of the tumour to guide one in the diagnosis? In the case of E. K—, careful examination of the abdomen and by the rectum and vagina, and of the abdominal organs, was made, but no tumour was discovered, for the cancer in this case occupied the bone-tissue chiefly, and projected from the sides of the bodies of the vertebræ only in the form of small nodules, which could not be detected among the abdominal organs. In this case we had only the subjective symptoms of the disease to guide us—not an objective sign was present. The disease evidently commenced in the sacrum, for in the first instance the pain was referred entirely to the sacrum and sacro-iliac region; all the symptoms, as I have already explained, were traceable to the sacro-iliac region; the oedema likewise commenced over the right sacro-iliac articulation. All the early symptoms and signs were such as are present with caries of the spine or sacrum or sacro-iliac articulation, and as these diseases are comparatively common, whilst cancer of the spine is extremely rare, we might well expect to find caries instead of cancer.

Secondly: Have we learnt anything from this case which may lead to more certain diagnosis in similar cases? I think I may sum up a number of points bearing on the diagnosis of cancer, and which have been illustrated in the case of E. K—. I must here remark that cancer of the spine is so rare a disease, whilst caries is so common, that we shall anticipate the one by excluding the other. (1) With regard to the position of pain, we are very liable to be misled as to the seat of the disease. The nerves affected by internal cancers are not those which we are in the habit of using for touch. They are not, if I may use the word, educated like our nerves of touch, to tell us precisely where the injury is received; and, again, the plexus connexions of internal nerves are so numerous that sensations may be referred incorrectly, just as you know pain in the forehead often occurs as the result of a decayed tooth. Pain therefore must be taken as a sign of the seat of disease only when we can distinctly limit it by digital examination, or when it affects nerves the precise communications of which are well known; such, for instance, as a pain in the knee, indicating hip-joint disease. Touching upon this point, I shall refer to four cases of cancer of the spine which were marked in their early stage by acute pain in the hip-joint and its neighbourhood. One, E. K—, whose case we are now considering. A second, which is published in the Pathological Transactions (vol. xix., p. 426), in which the earliest symptoms were excessive and continued pain, and some restriction of movement in the right hip-joint, followed by the development of a painless tumour in the region of the spleen. The cancerous tumour subsequently involved the left kidney, and the bodies of the first three lumbar vertebræ, but not encroaching upon the spinal canal, and not altering the structure of the cord or of the nerves, though this patient suffered from excruciating pains of a

darting character down the right thigh and hip. A third case is reported in the Pathological Transactions (vol. xix., p. 356), in which there was extreme pain in the left hip, pelvis, and thighs, followed by numbness of the legs, with complete paralysis. The two lower lumbar vertebræ were converted into cancerous structure, soft and swollen. It was also found that the head of the femur, though not altered in size or shape, was soft and easily cut with a knife, and this tissue, examined by the Morbid Growths Committee, was declared to be an infiltration of cancerous cells. The ilium here, also, was swelled with the same infiltration. (This patient had had her breast ulcerated with cancer for eighteen months.) The fourth case may yet be said to be a little doubtful as one of cancer. She is a lady under my care whose breast I removed for cancer about a year since. Five months ago she was attacked with excruciating darting pain in the right hip, and movement of the hip increased the pain; then the pain extended to the sacrum and lumbar region. Then came hyperæsthesia in the right leg, and afterwards in the left leg. At the present time both legs are paralysed. I have examined the abdomen carefully for cancerous nodules, but find none. The hip-joint itself is certainly deformed, but not more so, in my opinion, than it was before I operated upon her for cancer, she having suffered some years previously from rheumatic arthritis. How closely this case corresponds to that of E. K—.

In all these cases I have noticed that the pain was excruciating; it was darting, and it was not limited to any particular part. The pain is certainly characteristic. It is the pain of cancer. It comes on in paroxysms, whether the patient is moving or is quiet. It is a pain described by the patient, and even recognised by the medical attendant, as of rheumatic or twinging character. In no other disease is the pain like it. With caries there often is no pain at all, and when the patient is still there is never pain; but with cancer the pain may come on at any time night or day, and when the paroxysm of pain arrives the thermometer rises; hence the irregular rise and fall of temperature, the high point being sometimes in the morning, sometimes in the evening, sometimes in middle day.

Can this pain of cancer of the vertebræ be mistaken for that of rheumatic spinal meningitis? It closely resembles it, but I would say that it may be detected by two points. 1. The pains of meningitis come on only when the patient moves, whereas cancer pains occur without movement; but it must be remembered that the very slightest movement is often in rheumatic meningitis sufficient to bring on the pains, therefore this point is reduced in value. 2. The cancer of vertebræ being generally below the cervical vertebræ the pains are below that; but meningitis of any form is not limited unless clearly traceable to syphilis, and therefore the pains are more general, attacking the back and upper limbs.

Caries occurs usually in young people, and more often in children. Cancer occurs later in life, rarely under thirty-five, much more often later.

If cancer exists in any other organ, or has been removed, there is a great probability of the disease being a secondary deposit in the bones.

Perhaps the history of the case and of the family may be of some importance. Is there hereditary predisposition, through the parents, to struma or to cancer? But in the case of E. K— there was hereditary predisposition to neither; for her relatives were proved to be particularly healthy.

Deformity is sometimes very great in cancer of the vertebræ; several vertebræ becoming affected and yielding, the pelvis may be twisted, or the spine doubly curved; whilst with caries (Pott's disease) there will be an angular prominence due to three spines of the vertebræ if one vertebra is affected, five spines if two are affected. With regard to the stage at which such deformity might be looked for, I think it may be reasonably expected that if the disease be caries, and the pain be as great as that which occurs with cancer, there must be sufficient disease to produce the deformity though the abscess resulting may not yet have appeared on the surface; so that, if no deformity exist, it is in favour of cancer.

Paralysis must result from cancer of the vertebræ. I know there are cases on record in which cancer of internal organs has spread to the vertebræ, and death has resulted without paralysis; but such cases must be looked upon rather as cases of cancer of those organs than of the bones, in which indeed the cause of death is not cancer of the vertebræ, and,

as regards the diagnosis, there is usually no difficulty in such cases, for a tangible tumour decides the disease and even the organ affected. With regard to the paralysis of the two diseases, there is one point of some importance in diagnosis. Cancer of the vertebræ seems to attack the lumbar vertebræ, and in some rare instances the dorsal vertebræ; and, as I have said before, this disease is surely followed by paralysis. There is usually no difficulty in recognising that the disease, whether cancer or caries, is confined to the lower vertebræ, and the important point I refer to is this, that caries of the lower vertebræ is *never* accompanied by paralysis. Paralysis in Pott's disease never occurs unless the disease is above the middle dorsal region, and even in this region only in the proportion of one to three. If, therefore, it is determined that the disease is in the lumbar vertebræ, whilst at the same time there is paralysis, the symptom points markedly to cancer.

The advantage of a digital examination of a *tumour* is very great in forming a diagnosis, but a tumour is often not to be discovered, and it is in the absence of such that you will find the foregoing points of great service in forming a conclusion as to the character of the disease. If the disease be cancer no tumour need be felt or even present. In the case of E. K— the growth consisted of only small nodules along the vertebræ, not able to be distinguished behind the abdominal viscera. In many cases there is only a secondary infiltration of several bones, and no tumour at all. If, on the other hand, the disease be caries, the collection of pus may be small in quantity, or may be contained within a loose sac, so that it cannot be detected in the form of a tumour. We must then decide without the assistance of the tumour to guide us; but if a tumour be discovered, still we must value the characters of the enlargement only as a series of signs possibly fallacious. Mr. Shaw, in an article in Holmes's System of Surgery, says: "It is the nature of medullary cancer to throw out globular projections on the surface, resembling greatly the pointing of an abscess; moreover, the feeling of elastic resistance at the apices of these lobes is so much like that of undulations of pus within an abscess that a mistake in diagnosis is very apt to be made." I will not, however, touch further upon the diagnosis of tumours; this is a subject you can learn for yourselves from your books on systematic surgery. I think, however, I have shown you several points by which you may almost certainly diagnose cancer from the other diseases of the vertebræ.

OBSERVATIONS IN URINARY PATHOLOGY AND THERAPEUTICS.

BY C. H. RALFE, M.D. CANTAB., F.R.C.P.L.,

PHYSICIAN TO THE SEAMEN'S HOSPITAL (LATE "DREADNOUGHT"),
TEACHER OF PHYSIOLOGICAL CHEMISTRY IN THE MEDICAL
SCHOOL, ST. GEORGE'S HOSPITAL.

I. EFFECT OF BICARBONATE OF POTASH ON THE ACIDITY OF URINE.

TWENTY-EIGHT years ago Dr. Bence Jones, in a paper read before the Royal Society,¹ showed conclusively, from a series of observations, that large doses of sesquicarbonate of ammonia not only did not diminish the acidity of the urine, but actually increased it; as he found that the day when most carbonate of ammonia was taken the acidity was higher than it had been any previous day, and that the acidity of the urine was still very high on the day following its discontinuance. Four years later a similar observation was made by Dr. W. F. Beneke² with regard to the effect of bicarbonate of soda. And, lastly, Professor Parkes,³ in his work on the Urine, published in 1860, instances a case of rheumatic fever in which the acidity of the urine on the day following the administration of bicarbonate of potash was considerably higher than on the day before it was taken.

It is strange that observations made by authorities so eminent and trustworthy, tending to controvert the generally received opinion as to the action of these alkaline bicarbonates

¹ Philosophical Transactions, 1850, Part ii., p. 673.

² Archiv des Wissenschaftlichen Heilkunde, 1854. Studien zur Urologie, p. 444.

³ Composition of the Urine in Health and Disease, p. 297. Churchill, 1860.