has been established and then only as a prelude to therapeutic aspiration or rib resection.

(4) Therapeutic aspiration should be instituted in all cases until thick frank pus is present.

(5) In those cases where rib resection is necessary, and the bulk of cases will need it eventually, air-tight under-water drainage gives the best results.

(6) No acute empyema should be discharged until the cavity is obliterated and the wound is healed.

PAINFUL BACKS.

BY A. S. BLUNDELL BANKART, F.R.C.S.

IN recent years a great volume of literature has grown up around the subject of pain in the lower part of the back or, as American writers have called it, "low back pain." Under this title a number of clinical and pathological conditions have been described with a profusion and variety of detail that is quite bewildering.

I believe that the symptoms and signs of most of these conditions have been needlessly elaborated, and that the majority of people who complain of pain in the back are suffering from some simple affection which is easy to recognize and generally not very difficult to treat.

The commonest conditions met with are :—

- (1) The neurotic spine.
- (2) Sacro-iliac strain.
- (3) Lumbosacral strain.
- (4) Acute and chronic (lumbar) back strain.
- (5) Spinal arthritis (osteoarthritis) with or without sciatica.

In addition to these, we meet with cases of true lumbago, Pott's disease, compression fractures of the lumbar vertebræ, and other less common conditions, each of which presents a fairly characteristic clinical picture.

The Neurotic Spine.

This is placed first, not so much on account of its own intrinsic importance, but because of its frequent association with other conditions, and the confusion of diagnosis which so often results. The expression "neurotic spine" does not refer to the comparatively uncommon hysterical condition sometimes met with in young women, but to the condition which almost inevitably arises sooner or later in a patient of either sex who is suffering from long-continued pain in the back. For it is a fact, that in the great majority of the cases presently to be considered a definite neurosis is superimposed upon the genuine organic affection. It varies in degree from a more or less diffuse hyperæsthesia up to a condition of profound neurasthenia, and it has frequently led to the misinterpretation of otherwise straightforward cases. The characteristic feature of the neurotic spine is superficial and variable tenderness, in contrast to the constant and definitely localized pain of the associated condition. The treatment of the neurotic spine is primarily that of the condition which causes it.

Sacro-iliac Strain.

Strain or sprain of the sacro-iliac joint is the commonest cause of persistent pain in the lower part of the back. In this country the diagnosis of sacro-iliac strain has been regarded with a good deal of suspicion and scepticism for two reasons. First, that under the ill-conceived title of "subluxation of the sacro-iliac joint" it has been exploited as the alleged cause of almost every kind of pain in the back; and second, that the definite neurosis which frequently, if not invariably, accompanies this condition has afforded a wide and profitable field for every conceivable kind of physiotherapeutic stunting.

The sacro-iliac joint is exceedingly strong and possesses a very small range of normal movement, while the forces acting upon it are very great. If, during some sudden or unguarded movement, the joint is forced beyond its normal range, it is strained or sprained like any other joint in similar circumstances. Such strains are very common, but that any gross or demonstrable displacement or subluxation of this joint occurs, except in the rarest instances, has never been proved either by clinical or radiographic examination. It has often been remarked that the normal movement at the sacro-iliac joint is a slight rotation of the sacrum about a transverse axis between the iliac bones, and that a small amount of such rotatory displacement would not be visible in an ordinary flat X-ray picture. This is true; but neither do the best stereoscopic X-rays show any subluxation in ordinary cases of sacro-iliac strain. Other joints do not remain permanently displaced after they are sprained, and there is no evidence or reason to suppose that this one does.

Sacro-iliac strain either comes on suddenly with a sharp pain in the joint during some effort or after a fall, or it may seem to come on gradually. But many patients who give a history of gradual onset can recall an initial strain or injury when they are questioned about it. It is especially common in women, and it not infrequently follows childbirth or gynæcological operations, while in many cases it is associated with faulty posture and an exaggerated lumbar lordosis which throws a more or less constant strain upon the sacro-iliac joints.

The patient complains of pain over the back of the sacro-iliac joint, which is usually worse after sitting for a long time and often better when he is walking about. He has a feeling of insecurity which is quite characteristic. When asked to localize the pain, he feels more or less accurately for the posterior superior spine of the ilium, which overlies the centre of the joint, and firm pressure over this point, or immediately below it, evokes an expression of pain which is almost sufficient for a correct diagnosis to be made. In fact, the only serious condition to be excluded is tuberculous disease of the sacro-iliac joint, which is comparatively rare, much more disabling, and seldom presents itself before there is either an abscess or obvious evidence of bone destruction in the X-ray picture.

The patient with sacro-iliac strain may refer pain also to the outer side or front of the thigh, but not as a rule down the back of the thigh. *There is no tenderness over the sciatic notch or pain down the sciatic nerve in a typical case of sacro-iliac strain.* The condition is nearly always unilateral, although there may be some tenderness over the joint on the opposite side. When the hip is flexed with the knee straight, this movement is more restricted on the affected side than on the opposite side, and when it is forced, pain is felt in the sacro-iliac joint. Pressing the iliac bones together or

apart is valueless. The attitude and gait are neither characteristic nor important. The X-ray appearances are normal. When the condition is not properly treated, it may persist for years or indefinitely, and a considerable degree of neurosis is often developed. The history and the accurate localization of the pain and tenderness are the points on which the diagnosis is made.

Treatment.

The treatment of sacro-iliac strain is usually simple and straightforward. The great majority of cases can be cured by manipulation, and those that are not cured by manipulation can be cured by operation (arthrodesis of the joint).

Yet in spite of this it is common practice to treat these cases with rest, sacro-iliac supports, local applications, massage and exercises (without preliminary manipulation), while in some clinics the search for and elimination of hidden sepsis and intestinal toxæmia is vigorously pursued. Some of the measures advocated are indeed calculated to make an impression upon the most neurotic of patients.

I do not deny that the sacro-iliac joint may ever become the seat of a toxic or infective arthritis, either alone or in association with neighbouring joints of the spine. But I do believe that such a condition is rare, while the common affection which we are now considering occurs for the most part in reasonably healthy people and does not differ essentially from a sprain of any other joint in the body.

If it were possible to support the sacro-iliac joint (which it is not), that would be bad enough treatment for a sprain, the very essence of which is movement. But the sacrum is set deeply in the pelvis between the iliac bones which overlap it on each side, and tremendous forces act upon it *from above*. It is difficult to imagine how any encircling appliance, with or without pads over the back of the joint, could influence its movements, i.e., support it, in the slightest degree. It is true that some patients experience a sense of relief or additional security from a firm band or strap around the pelvis. But this relief is subjective and should not be allowed to detract from the proper treatment of the underlying condition.

Some cases of faulty posture with exaggerated lordosis, which do not respond to treatment by exercises, and particularly those who are obese and pendulous, may require some kind of support. But whether the support be called "sacro-iliac," or "low spinal," or merely a corset, it is essentially an *abdominal* support, for in such cases it is the abdominal muscles that are at fault.

The treatment of sacro-iliac strain is the same as that of any other chronic joint strain, namely, forcible manipulation under an anæsthetic, followed by massage and exercises. The anæsthetic may be brief, but it must be deep enough to give complete muscular relaxation at the moment of manipulation. Nitrous oxide gas, or gas and oxygen, is not a satisfactory anæsthetic for this purpose. The actual manipulation employed is a forcible twist of the pelvis upon the spine, performed while the patient is turned half over so that the leg on the affected side hangs over the side of the table. During the manipulation a grating or tearing sound is heard, like the giving way of adhesions. Both sides are always manipulated, and, in addition, forced flexion and hyperextension of the spine are practised as a routine. Massage and exercises are begun on the following day and are continued for at least a month and sometimes longer.

The general results of this treatment are extremely satisfactory; most of the cases respond readily and may be said to be cured. Occasionally the cure is sudden and

dramatic even after years. Some cases have to be manipulated more than once before they are cured, but in our experience it is exceptional to meet a case of straightforward sacro-iliac strain which obstinately resists treatment by manipulation and exercises. Such cases, when they occur, can be cured outright by arthrodesis of the sacro-iliac joint. The operation described by Smith Petersen is the neatest, simplest, and most effective method of arthrodesis of the sacro-iliac joint, and it is preferable to a massive bone-graft behind the joint, even when both sides are affected.

Lumbosacral Strain.

Lumbosacral strain is quite different from sacro-iliac strain, and should not be confused with it, even when, as sometimes happens, the two conditions are combined. In this condition also there may be a history of injury or of gradual onset, and in the latter case it is usually associated with faulty posture. When the patient is asked to localize his pain, he draws his fingers horizontally across the back above the base of the sacrum. Tenderness on pressure is found to be definitely localized to the tip of the spinous process of the fifth lumbar vertebra, and the space immediately below it in the middle line, pain is also felt here on hyperextending the spine. Forward flexion may be prevented by spasm of the erector spine muscles; but usually the patient can bend forwards fairly well, the movement taking place in the lumbar spine above the lumbosacral junction. There are no other signs characteristic of this affection, and those mentioned are amply sufficient for correct diagnosis. The X-rays are normal.

Treatment.

I believe this condition to be a chronic sprain of the interspinous ligaments between the spine of the fifth lumbar vertebra and the sacrum, and on pathological grounds it would seem that lumbosacral strain ought to be just as amenable to treatment by manipulation as is sacro-iliac strain. But in our experience it is not. And the reason is, that the lumbar spine as a whole is so movable that it is practically impossible to localize the manipulation to the lumbosacral junction.

Treatment by supports or exercises alone being generally unsatisfactory, we were at a loss for a rational treatment of this condition until it occurred to us that, if it was not possible to stretch the affected ligaments, it was possible to divide them.

During the last few years we have operated upon many cases of lumbosacral strain. A short vertical incision has been made in the middle line over the spinous process of the fifth lumbar vertebra, the soft parts have been separated from the process with a chisel, and the process itself has been cut off with angled bone forceps at its base. The after-treatment consists in exercises from the first. Even before the stitches are out, the patient is made to perform active movements of flexion and extension of the lumbar spine. The results of this little operation have been entirely satisfactory. In every case the pain has been relieved, and it has not returned since. It need hardly be pointed out that this is a minor operation compared with bone-grafting or spinal fusion, which has been recommended and performed for the same condition.

Acute and Chronic (Lumbar) Back Strain.

Acute back strain is another very common condition which presents quite definite clinical features. It is essentially a localized rupture of some of the deeper

fibres of the erector spinæ muscle on one side, produced by muscular action. In proof of this is the fact that occasionally, though rarely, one of the transverse processes of a lumbar vertebra is pulled off by the violence of the muscular contraction.

Without warning, the patient experiences a sharp pain like a stab in the back, either during some special effort, such as lifting a heavy weight, or while he is stooping in some awkward position. The sharp pain is succeeded by a dull ache or discomfort in the back, which is most noticeable when sitting with the muscles relaxed. Sometimes, however, the acute pain persists, and it may be severe. Some hours later, e.g., on the following morning, the lumbar spine is found to be rigidly fixed by spasm, and every attempt at movement is at once pulled up by a sharp pain like that which was originally felt. When asked to localize the pain, the patient indicates some spot over the erector spinæ muscle on one or other side.

On examination the whole of the lower part of the back is found to be hyperæsthetic, and there is a definitely localized point of tenderness over the erector spinæ muscle on one side.

If this condition is allowed to become chronic, there is a history of sudden onset as already described, there is a point of localized tenderness over the erector spinæ muscle on one side, the muscle on the affected side, and sometimes on both sides, is strongly in spasm, especially when the patient tries to bend forwards, and in performing this movement, either the lumbar spine does not bend at all, or the trunk inclines towards the affected side so as to avoid stretching of the muscle. Frequently there is a considerable degree of neurosis added, and I do not know of any other trivial injury which causes such a profound and disproportionate sense of disability. The X-ray appearances are normal, except in the rare instances in which there is a fracture of a transverse process.

The treatment of acute and chronic back strain should be prompt and decisive. It consists in immediate *mobilization* of the spine by manipulation under an anæsthetic, followed by massage and exercises. This usually cures the condition outright, unless there is an impending claim for compensation or a long-standing severe neurosis. The manipulation is practically the same in all cases—namely, forcible flexion, rotation in both directions, and hyperextension. Sometimes lateral flexion is added. Immobilization merely turns an acute back strain into a chronic one, or it prolongs a chronic strain indefinitely. Fracture of a transverse process is of little consequence and should not be allowed to alter the treatment. We have removed such processes, but now believe that it is unnecessary to do so. It is not the broken bone that hurts, but the things attached to it. The after-treatment consists in massage and exercises from the very first.

Spinal Arthritis and Sciatica.

A patient with arthritis (osteoarthritis) of his lumbar spine may or may not complain of his back. Many patients with this condition are quite unaware that there is anything wrong with their spines, or they do not connect it with their present complaint. They seek advice for, and are generally treated for, *sciatica*. Spinal arthritis (osteoarthritis of the lateral vertebral joints) is the commonest cause of sciatica.

The upper roots of the sacral plexus, namely the fourth and fifth lumbar nerves, lie in the intervertebral foramina in front of and actually in contact with, the articular processes of the fourth and fifth lumbar and first sacral vertebrae.

Osteoarthritic deformity and enlargement of these joints leads to compression and irritation of the nerves in the intervertebral foramina ("funiculitis"), and pain is then referred down the course of the sciatic nerve. Usually there is definite evidence of arthritis on X-ray examination; but, it should be noted that periarticular swelling and fibrosis precede the bony changes, so that a negative X-ray picture does not necessarily exclude spinal arthritis.

Most of the patients, as one would expect, are middle-aged or elderly, and they give a history of gradual onset, or of previous attacks of "lumbago." In younger patients there is usually a history of injury (traumatic osteoarthritis).

On examination the lumbar spine is found to be stiff. Forward flexion takes place at the hips and in the spine above the lumbar region. Hyperextension is resisted, and lateral flexion, if attempted, is apt to cause pain. In the most acute cases there is spasm of the erector spinæ muscles. In many cases, especially those with sciatica, the lumbar spine is curved to one side, the convexity being usually towards the painful side. This condition has been described as sciatic scoliosis and it has been attributed to flexion of the hip and tilting down of the pelvis on the affected side. It is, however, due to the spinal arthritis and it is an attempt to relieve pressure on the affected joints. Finally, in the sciatic cases there is tenderness on pressure over the sciatic notch and pain down the back of the thigh over the trunk of the sciatic nerve.

I would again insist on the differentiation of these cases from cases of sacro-iliac strain. If a patient localizes his tenderness definitely over the posterior superior spine of the ilium and the space immediately below it, he is almost certainly suffering from sacro-iliac strain. If, on the other hand, there is tenderness over the sciatic notch and pain down the back of the thigh, he will nearly always be found to have a stiff lumbar spine and other evidence of spinal arthritis, even though he is quite unaware of it. Uncomplicated cases of sacro-iliac strain do not complain of pain in the distribution of the sciatic nerve.

The condition referred to here is osteoarthritis, more or less limited to the lumbar region of the spine and to the lumbosacral articulation, and even when it is part of a more generalized osteoarthritis, it will not be confused with toxic or infective arthritis (spondylarthritis) which causes absolute rigidity or even ankylosis of the whole spine and sometimes of the neighbouring joints as well.

The connection between spinal arthritis and sciatica is important if only for the reason that so many people undergo prolonged treatment for sciatica, that is, treatment directed to the trunk of the sciatic nerve, while the real seat of their trouble, namely, the lumbar spine, is unsuspected and therefore receives no attention.

Treatment.

The bony changes in osteoarthritis are permanent, and no treatment will alter them. Much of the disability, however, is due to periarticular inflammation and fibrosis, which not only limits the movements of the spine itself, but is at least partly responsible for the inflammation of the nerve-roots in the intervertebral foramina. Mobilization of the stiff lumbar spine, if possible, will frequently relieve these patients of much of their pain, especially when sciatica is the predominant symptom. If the patient is at all suitable, manipulation of the spine under an anæsthetic should be done first. Afterwards, radiant heat, massage, including passive movements, and exercises should be

employed. Cases of intractable sciatica which do not respond to this treatment may still be cured by excision of the lateral joints (articular processes) between the fourth and fifth lumbar and first sacral vertebra, "decompression of the intervertebral foramina." During this operation the intimate relation between the nerve-roots and the articular processes is obvious. It is, however, a rather severe operation, which should not be lightly undertaken in an elderly patient.

Primary Sciatica.

In emphasizing the frequent association of sciatica with spinal arthritis it would not be fair to omit all mention of primary sciatic neuritis. Such a condition, I believe, is comparatively rare, but it certainly occurs, and provided that an affection of the lumbar spine can be definitely excluded, or at least is not ignored, treatment may be directed to the sciatic nerve itself. There is often a direct connection between exposure to cold or damp and the onset of this condition. Intraneural injections of saline solution give the quickest relief; massage, radiant heat, and other forms of physiotherapy are also employed.

Lumbago.

Many cases of back strain are diagnosed as lumbago, which I believe to be a comparatively uncommon affection. True lumbago is an inflammatory affection of the lumbar aponeuroses, and it often comes on after exposure to wet and cold. It begins acutely, indeed almost suddenly, but never with the snap, so to speak, of an acute back strain. It produces a board-like rigidity of the whole lumbar region. The characteristic localized tenderness of acute back strain is not present. The disease runs its course and gets well in a few days with rest and local application. It is frequently recurrent, but not continuous and chronic.

Spinal arthritis also is quite different from either of the two foregoing conditions. It is, as we have seen, one of the commonest causes of sciatica. The stiffness of osteoarthritis is easily distinguished from the diffuse rigidity of lumbago and from the muscular spasm of an acute or chronic back strain. The X-rays show osteoarthritis when the disease is sufficiently advanced.

Compression Fractures of the Lumbar Vertebrae.

Compression fractures are produced by forcible flexion of the spine, whereby the body of one vertebra, usually the 12th dorsal or the 1st or 2nd lumbar, is crushed into the body of the vertebra immediately below it. The importance of these fractures to the medical man lies in the oftentimes trivial nature of the initial symptoms which accounts for the fracture in many cases being unsuspected. Thus, a lady was thrown from her horse in the hunting field and fell upon soft ground. She remounted and was able to ride for some hours. But then her back becoming painful, she went home, and in the evening consulted her medical man. She was kept in bed for ten days and then had massage for many months for "ruptured muscles." Eighteen months later she still complained of more or less constant pain in the upper lumbar region of the spine. On examination there was a slight prominence of the spinous processes of the 12th dorsal and 1st lumbar vertebrae. This part of the spine was quite rigid, and the X-ray showed a typical compression fracture between the bodies of the 12th dorsal and

1st lumbar vertebræ. A bone-grafting operation was done, and she was cured of her pain. In recent cases good results may be obtained by hyperextension of the spine and the application of a plaster jacket, the displacement being actually reduced by suspending the patient with the spine hyperextended. In late and chronic cases a spinal fusion operation should be done at once.

Conclusion.

Diseases of the vertebral column in general do not come within the scope of this lecture. Tuberculosis, syphilis, and new growths of the vertebræ are distinguished from the foregoing conditions by the severity of their symptoms and the early clinical and radiographical evidence of gross bone destruction. The conditions dealt with are for the most part simple traumatic lesions which are easily recognized by a few characteristic signs and which usually respond readily to appropriate treatment. To these I have added osteoarthritis of the lumbar spine which is often traumatic in origin or may be associated with a more generalized senile osteoarthritis. These conditions together are responsible for the great majority of cases of persistent pain in the lower part of the back or "low back pain."

THE EFFECTS ON THE HEART OF DISEASE OF OTHER SYSTEMS, AND INDICATIONS IN TREATMENT.

BY A. J. SCOTT PINCHIN, M.D., F.R.C.P.

[Abridged.]

A CONSIDERATION of the reaction of the heart to systemic disease involves a brief recapitulation of the structures of the heart; in certain diseases the incidence may be mainly on one structure whilst in others all parts may tend to be affected. The fibrous supporting tissue of the heart, the valvular structures, the peri-arterial adventitia (which is especially involved in rheumatic disease), the muscular tissue with its characteristics of tonicity, excitability, its capability of response by hypertrophy to extra work and its tendency to atrophy when the load is lifted; the nodes and bundle which may be involved specifically in certain diseases: syphilis, rheumatism, diphtheria and pneumonia. Lastly the nervous control of the heart by the vagus and sympathetic, examples of which occur in diphtheritic neuritis of the vagus, and sympathetic stimulation in thyrotoxicosis.

A résumé of the effects of disease such as I propose to put before you cannot be more than a somewhat superficial discussion of the principal features. Nevertheless it is a subject I do not remember having seen used as the matter of a lecture, which cannot be said of many subjects of recent years; and so it seemed it might be useful to review how disturbances by disease elsewhere may affect the heart.

The muscles and interstitial tissues of the heart seem in certain diseases to be particularly liable to attack.

Rheumatic fever is a disease so closely allied to heart disease that it is perhaps not fair to include it in such a summary. However, it is a general disease, and its effect on the fibrous structures, especially in the heart, where it manifests itself by the damage to valves and the formation in the supporting tissues (via the periadventitia of the smaller blood-vessels) of Aschoff's nodes, is of so much importance that it must be stressed.