

Original Articles.

NOTES ON THE NEW CONCEPTIONS OF SCIATIC PAIN AND ON ITS TREATMENT.

By J. B. HANCE, O.B.E., M.A., M.D. (Cantab.), F.R.C.S.E.,

MAJOR, I.M.S.,

Rajkot,

N. C. MODY, M.B., B.S.,

Radiologist, West Hospital, Rajkot,

and

SHIVA DATTA UJWAL, I.M.P. (C. P.),

Officer-in-Charge, Radiology and Electro-Therapeutics,
Hewson Hospital, Jodhpur.

THE pathology of sciatica, which has hitherto remained obscure, has recently been illuminated by the observations of Professor Putti and others, a summary of which was placed before the profession by the eminent Italian orthopaedist in his Lady Jones lecture of 1927.

As a result, not only has the pathogenesis of the condition been placed upon a more orderly basis, but an avenue has been opened up for its rapid and successful attack, as opposed to the symptomatic treatment hitherto employed, which can be described neither as rapid, nor as particularly successful.

Putti arranges his pathological classification of sciatic pain under three heads:—

- (i) *Primary sciatica*,
- (ii) *Secondary sciatica*, and
- (iii) *Idiopathic or rheumatic sciatica*.

Primary sciatica is expressive of a true peripheral neuritis, caused by generalized toxæmias such as alcoholism, lead-poisoning, diabetes or syphilis; while *secondary sciatica* is caused by irritation of the nerve in its course from local causes; neoplasms, vertebral or pelvic, malunited fractures, or syphilitic or tuberculous granulomata.

These form the minority of the cases seen; by far the greater number are of neither of these types, but belong to the third category, *idiopathic or rheumatic sciatica*, whose pathology has hitherto been indeterminate.

Putti claims that these cases are an expression of variations from the normal in the intervertebral foramina of the lumbar column, from causes anatomical or inflammatory, and usually from both in combination, the effect of which is to expose the nerve fibres to compression and irritation.

The objects of this paper, which is based on observations on a series of 15 cases of sciatica and lumbago treated by the senior author in collaboration with one and other of the junior writers, are to add, for what it is worth, their testimony to that of Putti regarding the

pathogenesis of so-called "idiopathic sciatica" and to bring forward suggestions as to its treatment.

Sciatica and its precursor, lumbago, is one of the commonest complaints of hospital practice in India, and, in the experience of the writers, such are cases in which treatment on hitherto accepted lines, analgesics, massage, counter-irritants, injections of so-called "specifics," nerve stretching, etc., yields results which are very far from satisfactory.

If, as the writers believe, Putti's conceptions of the pathogenesis of the condition are correct, this failure of treatment is not surprising, since it is based on faulty pathology, and leaves the cause untouched, if it does not, as in the case of nerve stretching, do actual harm.

Considerations of space forbid any but the briefest summary of Professor Putti's brilliant exposition; but a short review of points relevant to the writers' clinical findings is unavoidable.

They comprise consideration of:—

- (i) The anatomy of the spinal nerve in the intervertebral foramen.
- (ii) The anatomy of the intervertebral foramen.
- (iii) The normal character of the posterior intervertebral articulations of the lumbar region, with the more common variations from the normal, Putti's "anomalies of tropism," and
- (iv) The effect upon the intervertebral foramen and the nerve it contains of inflammatory changes in the posterior intervertebral joints.

(i) The spinal nerve, carried by the foramen, is the complete spinal nerve, i.e., that part formed by the junctions of the anterior and posterior roots, and which on emerging divides into anterior and posterior divisions.

This part of the nerve has been designated the funiculus; it is extra-arachnoid but intradural, and carries with it a funnel-shaped prolongation of the dura mater, which eventually blends with the sheath of the nerve trunks. In contrast to the intraspinal portions it has no protective bath of fluid, but is surrounded by a rich venous plexus, which is much influenced by mechanical and inflammatory conditions outside the funiculus.

(ii) The intervertebral foramen is bounded *above* by the intervertebral notch; *in front* by a small portion of the body of the vertebra above, the intervertebral disc and a small portion of the body of the vertebra below; *below* by the neural process of the vertebra below and *behind* by the posterior intervertebral articulation, any change in which must therefore intimately affect the foramen and its contents (Fig. 1). Further, the foramina in the lumbar region vary in size, the 5th being the smallest of all, but carrying the 5th lumbar nerve, the largest in size and the main constituent of the sciatic nerve (Fig. 1).

(iii) Normally the plane of the articular surfaces in the posterior intervertebral articulations in the lumbar region is the sagittal plane, with

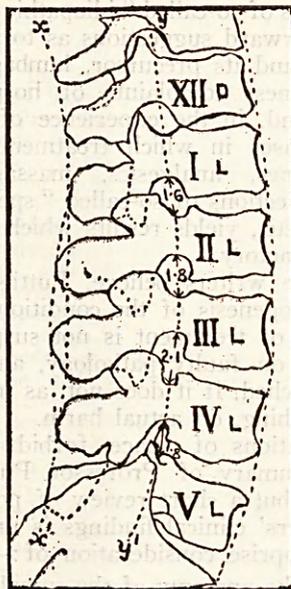


Fig. 1.—(After Putti).

the exception of those between the 5th lumbar vertebra and the sacrum, which are usually disposed in the coronal plane (Fig. 2).

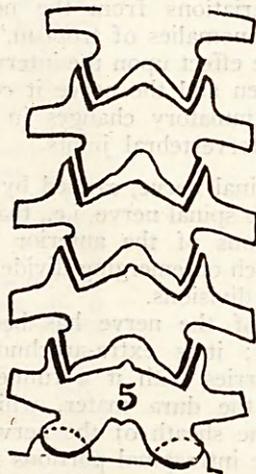


Fig. 2.—(After Putti).

But variations in this "tropism" are common, especially in the lower lumbar vertebrae, where one of a pair may be found normally disposed, while its fellow may be tending towards, or actually in, the coronal plane (Fig. 3).

These changes are especially marked and frequent in the lumbo-sacral articulations (Fig. 4).

It will be seen that any such anomalies of "tropism" will tend to constrict the intervertebral foramen and, possibly, to compress its contents, and where these changes are associated, as is not infrequently the case, with sacralization of the 5th lumbar transverse process, constriction of the foramen will be still more marked.

Both the normal articulations and variations from the normal are demonstrable by the *x*-rays; but skiagrams of a very high technical quality are

necessary for the purpose; and Figs. 2 and 4 are diagrammatic representations of the *x*-ray appearances.

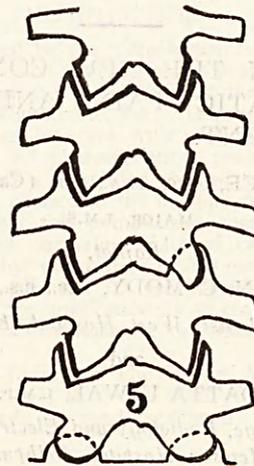


Fig. 3.—(After Putti).

Radiogram 1 also illustrates the normal, the line of articulation on the left side being clearly visible,

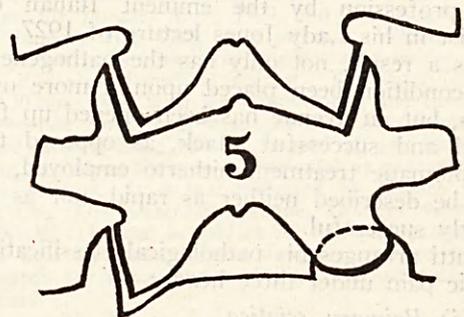


Fig. 4.—(After Putti).

that on the right being partially obscured by the arrow point.

(iv) The changes consequent on infective arthritis of the intervertebral joints are those of infective arthritis elsewhere: swelling, effusion, erosion and ankylosis; and their *x*-ray appearances are those of arthritis, "fluffing" of the outline of the articular cartilage and blurring of bony margins. Ankylosis is indicated as elsewhere by absence of articular outline. These changes are demonstrable in the intervertebral joints by radiograms of a high technical quality and the appearances are diagrammatically represented in Fig. 5, the left side showing arthritis and the right ankylosis. Such changes will also obviously tend to constrict the lumen of the intervertebral canal and to compress and irritate its contents. Further, constriction from whatever cause will tend to obstruct the venous outflow from the plexus, and still further to compress the nerve funiculus in consequence, while the inflammatory factor will add its quota to the concomitant venous congestion.

On these observations, and on the results of treatment directed to them, Putti bases his thesis that the so-called idiopathic sciatica is a symptom

of a neuritis of a specific nature; a neuralgia caused by pathological conditions of the intervertebral foramina and articulations. It is a symptom of irritation of the nerve in the bony canal through which it passes—"neurodocitis"—

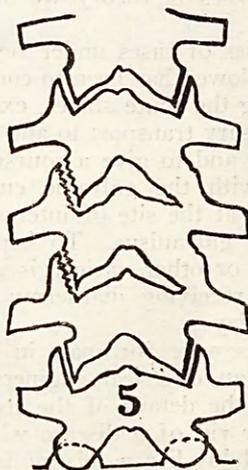


Fig. 5.—(After Putti).

and of lumbar arthritis; and Putti advocates the substitution of "arthritic" or "vertebral" for "idiopathic" in the designation of the disease.

Clinical Features.

Putti has shown that there is no pathognomonic sign or symptom in cases of sciatica, and few which are even constant; but there are certain features which, taken together, suggest the diagnosis; and skiagrams, if sufficiently good, establish it. The suggestive features are:—

(1) Preliminary lumbago.

(2) Rigidity of the lumbar spine with spasm of the erectores spinæ.

(3) Scoliosis.

(1) *Preliminary lumbago.*—This symptom receives no attention from Putti, but was a constant feature in all but one of the cases here recorded; in this one case of sciatica followed a violent spring to one side when jumping a ditch.

In all the others, each attack was heralded by preliminary pain in the back, aggravated by any but the slightest movement. This phase varied in duration from a few hours to one to three days, after which the pain adopted the typical sciatic character.

(2) *Rigidity of the lumbar spine.*—This was a constant feature in our series, and Putti states it to be invariable in idiopathic sciatica, thereby differentiating the latter from sciatica due to inflammation of the nerve roots, and from all forms of secondary sciatica. On examining the patient in the sitting position the erectores spinæ are found to be in spasm, hard and board-like. The patient, if asked to lean forward does so from his hips, while the lumbar and lower dorsal vertebrae remain fixed as in spinal caries; and any attempt on the part of the examiner to overcome this rigidity meets with instant and heart-felt protest from the patient on account of the

aggravation of his pain. This symptom is earlier in appearance than scoliosis and persists throughout the course of the disease, marked during attacks, less accentuated between them.

(3) *Scoliosis.*—This was a frequent, though not invariable physical sign in the present series of cases. It may be said that it was a feature of the more acute cases and was not so marked in those less severe. Examples occur of both homolateral and contralateral scoliosis, the latter, as stated by Putti, being the commoner.

No case of alternating scoliosis occurred in our series, although cases showing intervertebral arthritis of both sides—the condition which Putti considers the causative factor in alternating scoliosis—did occur.

Accepting, as we do, Putti's views on the pathogenesis of idiopathic sciatica, we consider that these three symptoms are the logical outcome of intervertebral arthritis.

The scoliosis is the fixture of the joints in a position of ease; the homolateral deformity results in the separation of the inflamed joint surfaces and the opening up of the intervertebral foramina, the contralateral is the fixation of the joints in the relaxed position and also relaxes the nerve cords as they pass through the foramina. The muscular spasm is identical with the protective spasm over any inflamed joint, and, as in the case of other joints, is the cause of the faulty position and, as in other cases, is diminished or abolished, with resultant diminution or abolition of the deformity by successful treatment. *Vide Case I.*

The lumbago is exactly analogous to the localized pain in arthritis of other joints. Indeed, if one considers the hip joint, affected with chronic progressive osteo-arthritis with periodical exacerbations, we observe the same phenomena except that we call them local pain, protective spasm, and fixation in the position of abduction or adduction; and the sciatica is exactly comparable to the pain often seen along the distribution of the anterior crural nerve, caused by pressure on its divisions as they pass over the deformed and distorted femoral head.

Diagnosis.

The diagnosis of idiopathic sciatica depends upon the exclusion of the other varieties, primary and secondary sciatica, and upon positive *x-ray* evidence. Careful history-taking and a meticulous clinical examination are essential; and special attention should be paid to such points as the Wassermann test, the passing of a finger into the rectum, and the presence or absence of rigidity of the erectores spinæ and scoliosis.

The writers would venture to emphasize the importance of the two former measures, which should be a routine, but which in practice they do not find to be so. Syphilis may cause sciatica of the idiopathic type by lumbar intervertebral arthritis, and an appreciation of the fact will bear materially on its treatment; while the practitioner who neglects to examine the rectum will one day

incur the chagrin and loss of prestige of failing to recognize the presence of a rectal carcinoma or other pelvic neoplasm.

Having excluded other causes by consideration of the history and appropriate examination, the diagnosis of idiopathic sciatica is established by the *x*-rays. It is important to take both antero-posterior and lateral radiograms, as well for appreciation of the extent of the disease, as for gauging the results of treatment. The technical details of milliamperage, kilovoltage and exposure time must necessarily vary with the build of the patient and the calibration of the individual *x*-ray unit used. The results at present illustrated were obtained with a transformer of the "Snook" type, a 30-milliampère fine focus Coolidge tube and the factors of current, kilovoltage, exposure and distance for patients of average build as tabulated below:—

Position.	Distance.	K-V. M.A.		Time.
Anteroposterior	25 inches	88	10	6 sec.*
Lateral	.. 25 inches	88	10	30 sec.*

With Potter Bucky Diaphragm.

* Time is for patient of average build, and is the only variable factor.

Treatment.

Putti summarizes the treatment of idiopathic sciatica in the phrase: "active hyperæmia and immobilization." He outlines his system of applying it, which consists of daily hot air baths extending over a period of 18 to 20 days, combined with an immobilizing (*not* corrective) plaster jacket which is followed by a celluloid jacket which "may be required to be worn for over a year."

Such a course of treatment, radical and admirable though it be, is out of the question for the Indian hospital patient, who would never submit to it even were a celluloid jacket within his reach, and is a severe handicap to the European patient, even of the leisured classes, of whom there are few in India. To most of them a degree of activity, greater rather than less, is an essential to the gaining of their livelihood, and few can afford to be laid up or partially inactivated for considerable periods.

The writers, therefore, had to cast about for some less exacting form of treatment, and one less restricting to the activities of the patient; and they wish to place on record their very deep sense of obligation to Mr. R. W. Armstrong of the Victor *x*-ray Corporation, who, in the course of a discussion on means of applying active hyperæmia, suggested diathermy.

Theoretically, the treatment is ideal, since, while the high-frequency current will generate heat impartially throughout the area of interest, this will be rapidly dissipated from the soft parts through the ordinary mechanism of heat dispersion, but from the denser, less vascular bony and ligamentous structures, its dissipation will be very

much less rapid. In other words, diathermy theoretically provides the means of applying a hot fomentation to the inflamed joints, and one whose effects are much more lasting than those of the more usual variety. That it carries out in practice what it promises in theory we hope to show in this paper.

In the series of cases under report the line of treatment followed has been to confine the patient to bed during the acute stages, except, of course, for the necessary transport to and from the radiological block, and to give a course of diathermy, alternating with the galvanic current with the negative pole at the site of interest, the so-called "dispersive" galvanism. To begin with, treatment of one or other variety is given daily, the patient thus receiving diathermy and galvanism on alternate days.

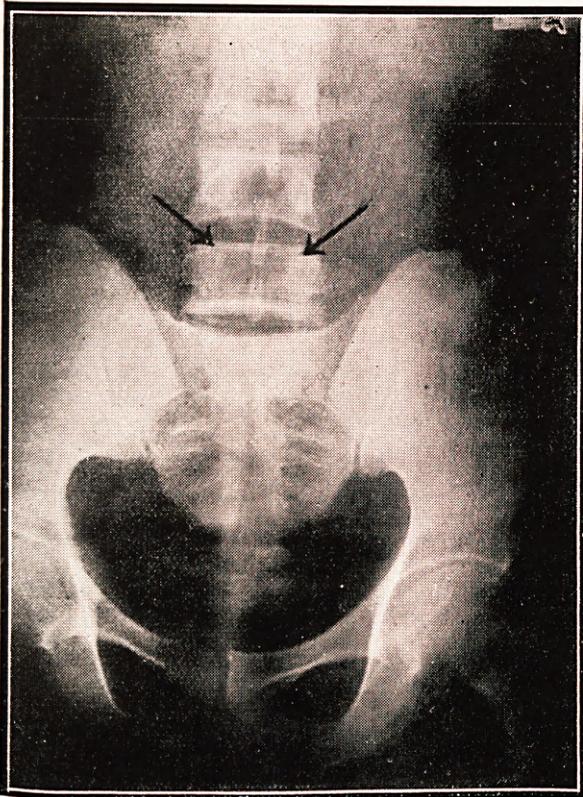
The writers were fortunate in having as their first patient an electrical engineer, who was as interested in the details of the course as he was anxious to be rid of a disease which had in the past rendered his life a misery for considerable periods; and they owe much to his constructive criticism, as well to his familiarity with electricity which gave them very useful information as to tolerance and dosage.

They find with diathermy, as Putti found with hot air baths, that the first effect is an aggravation of the pain, which, however, rapidly passes off giving place to marked relief. The aggravation of the pain lasts for an hour or two after the first application, for a much shorter period after the second, and is usually entirely absent after the third. Regarding the effects of galvanism, the writers cannot dogmatize, but the patient referred to definitely stated that the relief experienced from diathermy is greater when it is allied with galvanism than when it is applied alone. This may possibly be ascribed to the effect of chlorine ionization from the normal saline in which the electrodes were moistened or simply to the hyperæmia produced in the area of interest by the passage of the galvanic current.

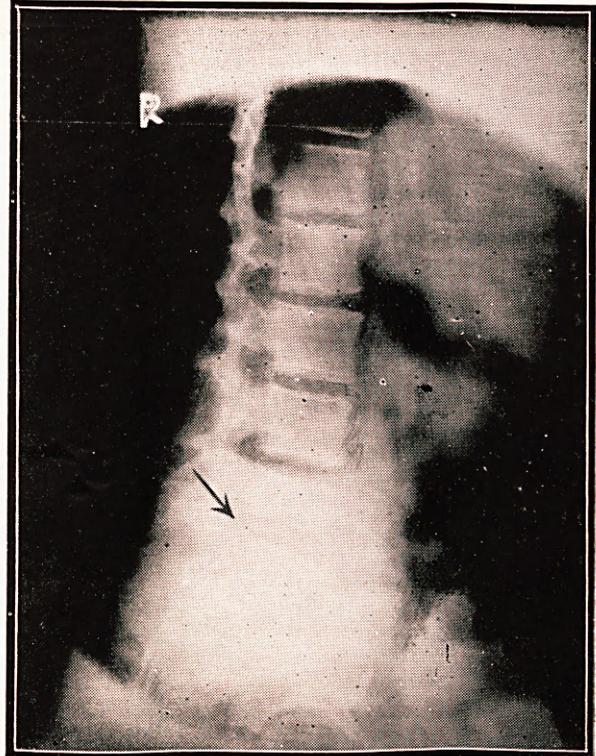
After a period of daily treatment which varies from a week to ten days, the patient may be allowed up with crutches or sticks, and usually requires these aids for a further week, after which they are no longer necessary, while after the third week all pain and discomfort have usually disappeared.

By this time daily attendances may be dispensed with and the patient need only attend on alternate days, still receiving each variety of treatment alternately. The interval may be gradually lengthened to attendances twice a week and so to weekly visits until they cease altogether.

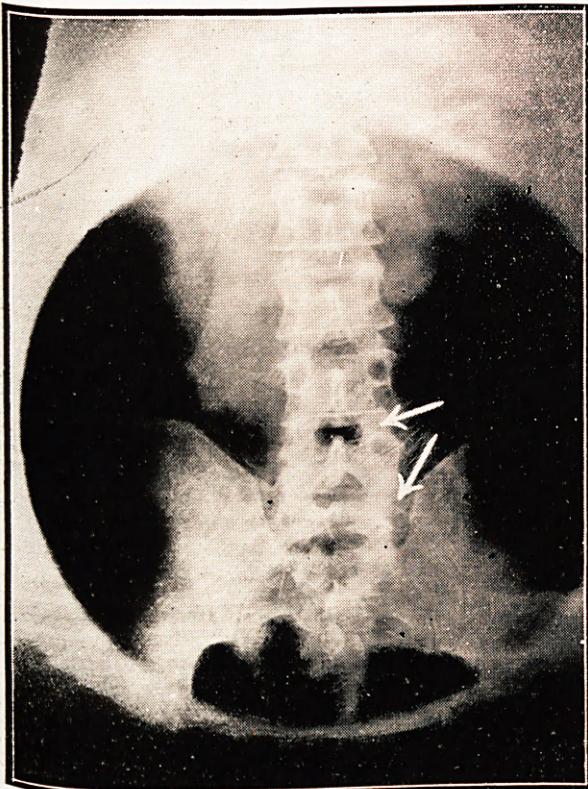
The effects of treatment should be gauged by periodical skiagrams which are most instructive, and which will be discussed in detail when considering individual cases; but it may here briefly be stated that in each case they show a progressive clearing up of the condition; joint outlines reappear, lateral views show clearing of the intervertebral foramina; scoliosis progressively lessens



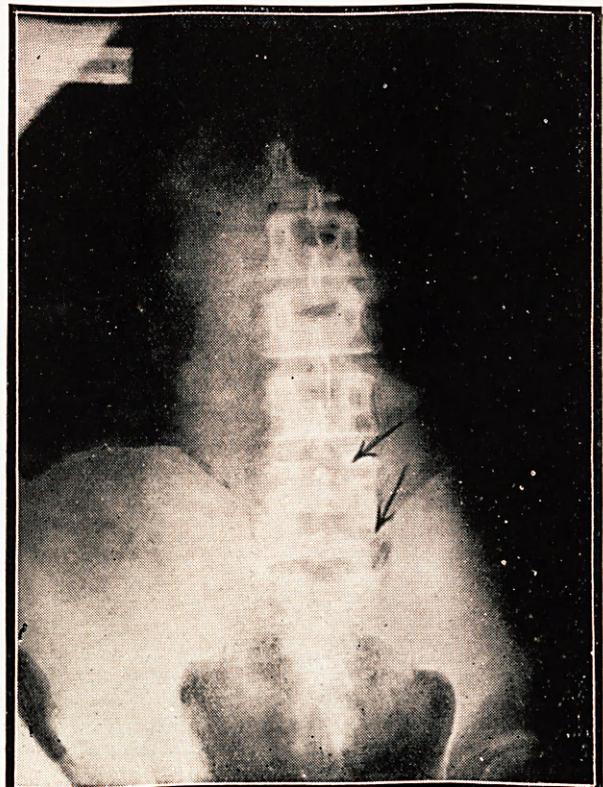
RADIOGRAM 1.
Normal. Note articular line on the left, partially obscured by arrow head on right.



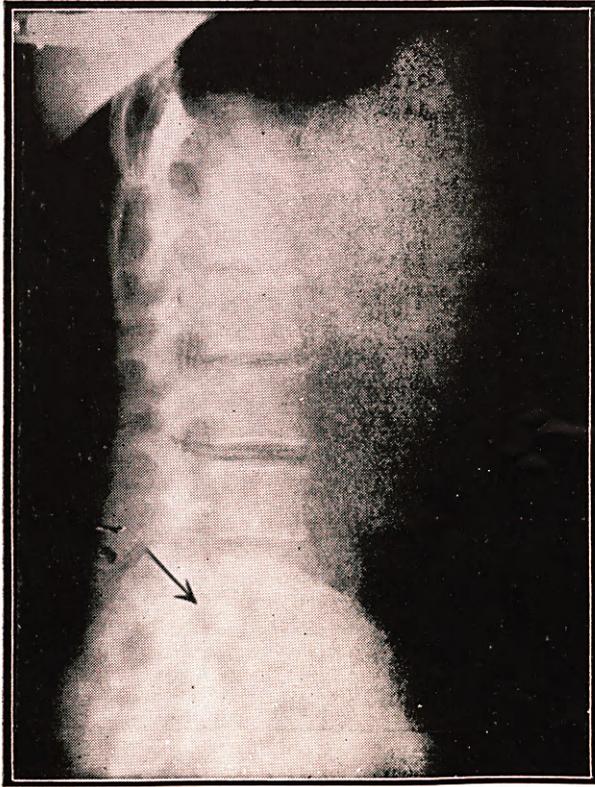
RADIOGRAM 3.
Partial filling of 4th foramen, 5th invisible.



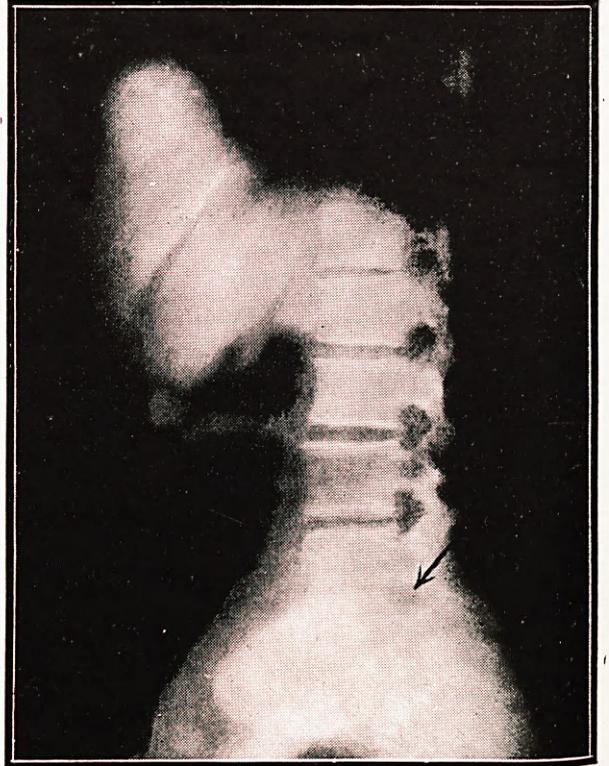
RADIOGRAM 2.
Note obliteration of articular line and contralateral scoliosis.



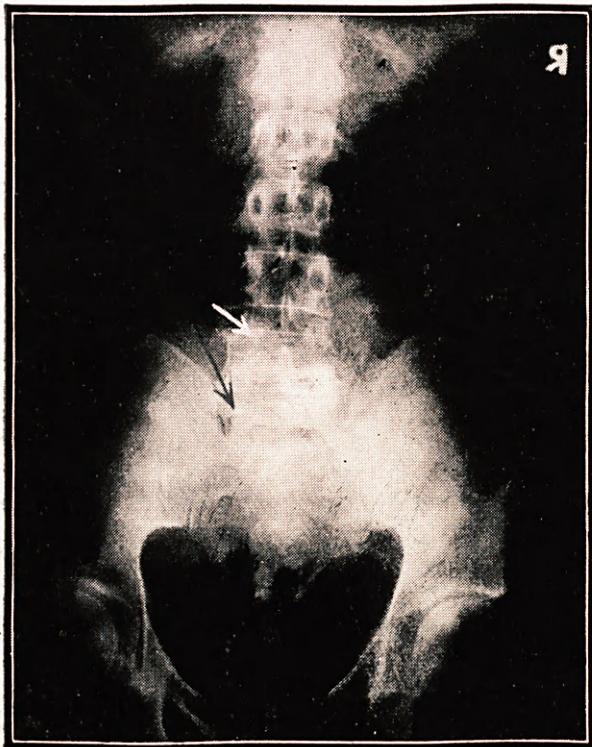
RADIOGRAM 4.
Articular line reappearing. Especially lumbosacral.



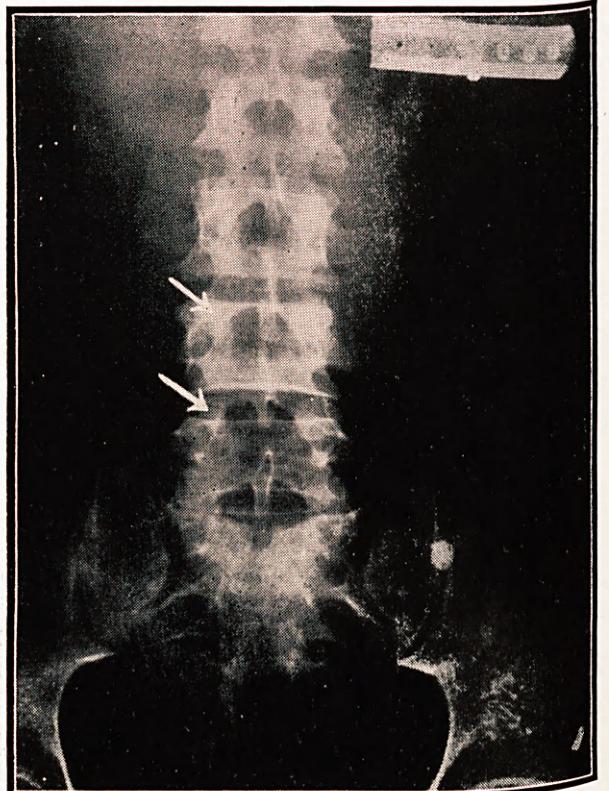
RADIOGRAM 5.
5th lumbar foramen visible, deposit in lower part of
4th clearing.



RADIOGRAM 7.
4th foramen clear.
5th distinctly visible.



RADIOGRAM 6.
Joint outline visible.



RADIOGRAM 8.

and disappears, while clinical examination reveals a diminution in lumbar spasm which finally ceases.

So much for treatment directed to the site of the disease. But there is another consideration which in our experience is of the greatest importance, eradication, where possible, of the cause.

The very name infective arthritis postulates an infective focus, and the most painstaking efforts to trace and eradicate such foci should be made. In our experience the majority are dental or intestinal, but all possible localities, tonsils, nasal sinuses, middle ear, urine, and, where possible, duodenum, should be investigated.

Two of our European patients revealed dental foci which gave pure cultures of non-hæmolytic streptococci, while a third, after a lengthy investigation, gave positive cultures of *B. flexner* from his stools.

Autogenous vaccines were prepared and administered in each case with beneficial results.

Indian patients of the hospital class, however, while they usually carry in their mouths obvious possible foci, have a strong objection to dental extraction for the purpose of culture, and treatment has often to be confined to diathermy and galvanism. But in two cases extraction of teeth, shown to be faulty by the x-rays, revealed short-chained non-hæmolytic streptococci, while in a third similar organisms were recovered from the urine, and in the case of a female patient catheter specimens of urine gave a pure growth of *B. coli*.

The resultant vaccines were administered in each case.

Details of Cases.

Considerations of space preclude a detailed discussion of each case in the present series; a summary of them is given in the attached table and the writers have confined themselves to a brief description of a few cases which may be accepted as typical of the clinical features and results of treatment.

Those of our readers who are experienced in radiology are aware that the lumbar spine is one of the most difficult subjects in the whole body as regards the production of radiographic detail. They will need no reminder from us that in such cases details which are perfectly clear in a 14 ins. by 17 ins. film when viewed in a viewing box may not be by any means so obvious in a 3 ins. by 4 ins. reproduction on a printer's block. The writers feel that much credit is due to the makers of the blocks of the radiograms published with this article for having reproduced with such clarity fine points of radiographic detail concurrently with so marked a reduction in size.

Case I. (Radiograms 2-7.) Mr. C. H. W., European, *æt.* 48 years, Electrical Engineer. Left-sided sciatica. November 1927.

Trouble dated from active service in Mesopotamia, since when patient had had four or five attacks becoming progressively worse. Last two had crippled him and necessitated the use of crutches for weeks on end. When

seen was crippled and on crutches, unable to get relief either sitting or lying except when pain was controlled by aspirin and caffeine. The pain extended from left gluteal region to left heel.

Examination.—Wassermann reaction negative; rectum normal; urine normal; wears denture with two remaining teeth, x-rays of which were pronounced healthy by dental surgeon. Marked lumbar spasm and exquisite tenderness of sciatic nerve at gluteal fold. Muscles of thigh and calf wasted by 1½ and ¾ inches respectively as compared to other side.

X-rayed, 5th November, 1927 (Radiograms 2 and 3). Contralateral scoliosis, joints between 4th and 5th lumbar vertebrae and between 5th and sacrum obscured. Filling of 5th lumbar intervertebral foramina with inflammatory exudate. Diathermy daily for 5 days, followed by diathermy and galvanism on alternate days. Marked immediate relief; aspirin abandoned after 3 days and slept normally. After 15 days walked easily with stick. After 3 weeks discarded stick. After one month climbed a hill to examine cable.

5th February, 1928. Slight recurrence of pain.

X-rayed again (Radiograms 4 and 5). Contralateral scoliosis present but less marked, joints and foramina much clearer, but still remains of exudate in 5th foramen. *B. flexner* isolated from stools and vaccine prepared. Diathermy and galvanism resumed on alternate days with immediate relief. Twice weekly after a fortnight for one month, thereafter weekly for one month.

11th May, 1928. X-rayed again (Radiograms 6 and 7). No scoliosis, joints and foramina clear. No lumbar spasm. Has performed all duties with entire freedom from symptoms and has indulged in a weekly small game shoot throughout the cold weather 1928-29.

Had slight twinge May 1929, which disappeared with purgative.

(Note.—Since going to press information has been received from the author that this patient has had a severe return of symptoms confining him to bed. *B. coli* have been isolated from the urine, and it is hoped that a combination of autogenous vaccine with diathermy and galvanism will once more give complete relief.—EDITOR, I. M. G.)

Case II. Mr. H. S. H., European, male, *æt.* 42, Civil Engineer. November 1927.

Slight sciatica cold weather 1926-27 which disappeared with massage and rest. Return in aggravated form November 1927. Primary and secondary sciatica excluded. Marked lumbar spasm. X-rays showed contralateral scoliosis, fluffing of joints and foramina (Radiogram 8). Dental x-ray; apical infection of upper molar.

Diathermy and galvanism alternate days for 14 days. Complete relief and proceeded to dental surgeon. Molar tooth extracted and cultured. Non-hæmolytic streptococcus grown and vaccine prepared. Diathermy and galvanism bi-weekly for 1 month after return from dentist, then discontinued. Has remained free of trouble.

Case III. Mr. J. P., European, male, *æt.* 40, Civil Engineer.

Acute right-sided sciatica following a side-ways jump. January 1928.

No evidence of primary or secondary sciatica.

X-rayed, 26th January, 1928 (Radiograms 9 and 10). Homolateral scoliosis, fluffing of joint outlines and filling of 4th and 5th foramina. Diathermy and galvanism alternate days for 1 week with rest in bed for 4 days. Left for dental surgeon who extracted and cultured suspicious bicuspid. Non-hæmolytic streptococcus isolated and vaccine prepared. Returned to own station and continued diathermy and galvanism for 6 weeks at increasing intervals. Has remained free of trouble since.

Case XI. M. S., Mahommedan, male, *æt.* 65, Faqir, April 1928.

Had fallen from a horse a year previously and had pain resembling renal colic at intervals for some 12 years back. After his fall was able to walk, but soon developed slight pain in back, which later settled into left-sided

sciatica and became progressively worse. Teeth foul, extraction declined. Primary and secondary causes excluded.

X-rayed, 13th February, 1928 (Radiograms 11 and 12). Stone in right kidney. Fluffing of left intervertebral joints between 3rd, 4th and 5th lumbar vertebrae and between 5th and sacrum. Narrowing of 4th and 5th foramina. Diathermy and galvanism on alternate days for 3 weeks. Complete relief and insisted on leaving hospital.

X-rayed, 11th March, 1928 (Radiogram 13). Joints much clearer.

Treatment of stone in kidney declined. Discharged relieved, and not since heard of.

Case XIII. Mrs. P., Hindu, female, et. 35, April 1928.

Acute sciatica at intervals of years, both sides, worse at periods. Hysterectomy some years previously but pain persisted. Poor general health. Primary and secondary sciatica excluded. Teeth foul, extraction refused. Urine cultured, pure growth of *B. coli*; vaccine prepared.

X-rayed, 23rd April, 1928. Slight left-sided scoliosis. Fluffing of intervertebral joints both sides, 4th and 5th lumbar foramina narrowed.

Diathermy and galvanism alternate days for 3 weeks with relief, then bi-weekly. After 1 week took discharge against advice, alleging herself cured.

Case XV. Z. S., Hindu, male, et. 20, zemindar, weight 20 stone. November 1928.

Acute sciatica, right side, developed spontaneously. Crippled, and can only hobble with stick, unable to stand upright or straighten right leg. Pain from buttock to ankle.

X-rayed, 15th November, 1928. Anteroposterior only, patient so bulky that nothing seen with lateral. Contralateral scoliosis with joints badly fluffed. Diathermy and galvanism alternate days, with immediate relief. After 3 weeks no symptoms, walks easily without stick. Diathermy and galvanism bi-weekly for a month, and then weekly for 3 months. Returned home. Radiographed 2 months later: joint outlines markedly clearer. Is leading an active life, entirely free from pain.

Technique.

For the information of those of our readers who may be inclined to check our results and adopt our line of treatment, we give the following brief description of the technique used by us:—

Diathermy.—The instrument used is the Victor vario-frequency Diathermy Unit made by the Victor X-ray Corporation, Chicago. Treatment can be given either in the sitting or the recumbent position as the convenience of the patient dictates. The electrodes used are made from lead- or tin-foil (the wrappers of photographic films serve admirably for the smaller ones). The "indifferent" electrode is large, at least 6 inches square, preferably 6 by 8 inches, and is placed upon the abdomen, while the "active" electrode which measures about $3\frac{1}{2}$ by $2\frac{1}{2}$ inches, is placed snugly over the area of interest, the centre of which corresponds roughly to the posterior inferior iliac spine. The electrodes are secured in position by a rubber bandage which should be as tight as the patient can tolerate without discomfort, for intimate contact is essential, if prickling and burns are to be avoided as the current rises.

The current is then turned on, and gradually increased till the limit of the patient's tolerance

is reached, when it is maintained for 10 minutes and then gradually decreased.

The application may be summarized as "five minutes going up, ten minutes at the top, five minutes coming down."

Soon after the current is turned on, the patient experiences a sensation of warmth which is not unpleasant and which increases as the current rises. The summit is reached when the sensation of warmth gives place to one of burning, when the current is slightly decreased and there maintained.

Provided the contact of the electrodes is good, no inconvenience is felt; but a loose electrode will cause a disagreeable prickling sensation, which will diminish tolerance, and the summit will be lower than could be borne with good contact.

Regarding tolerance, the highest level borne with comfort by any patient in our series has been 1,750 ma. (*Case I*).

Usually the tolerance rises with treatment; at the beginning 1,000 ma. is the average limit, while later currents up to 1,400 and 1,500 ma. are borne with comfort.

The higher the tolerable maximum the quicker and more marked the relief; and, fortunately, sciatica patients are so anxious for easement that they are not nervous, while they appreciate the warmth generated by high frequency current.

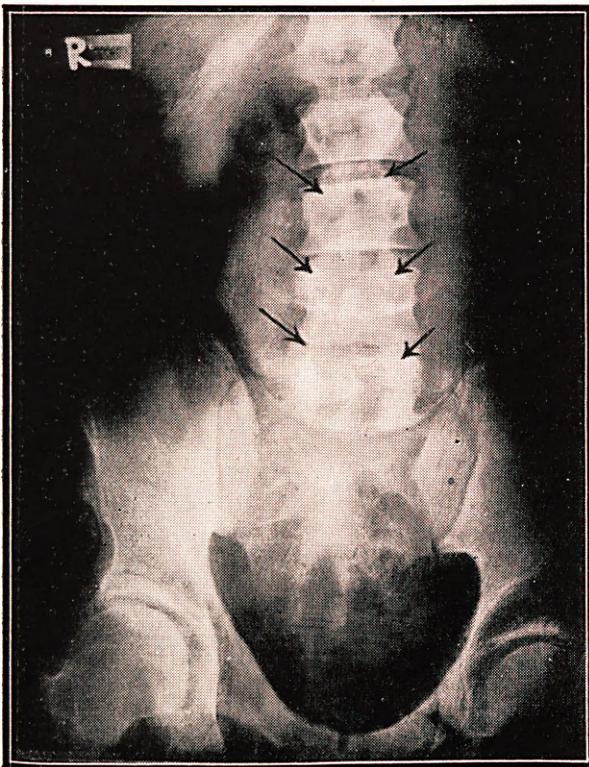
Galvanism.—Here the instruments used by the writers have been variously a Watson pantostat, a Newton and Wright pantostat, and a Victor multiple wave generator, in each case connected to the main supply, the instrument imposing the necessary resistance. The anode is connected to a foot bath, while the kathode, moistened with saline, is applied to the site of interest as in the active electrode in diathermy. The current is then switched on, and gradually increased up to the amount which it is desired to give, usually about 5 ma. As for diathermy, the increase and decrease is gradual, and the time occupied by treatment does not as a rule exceed 20 minutes.

Discussion.

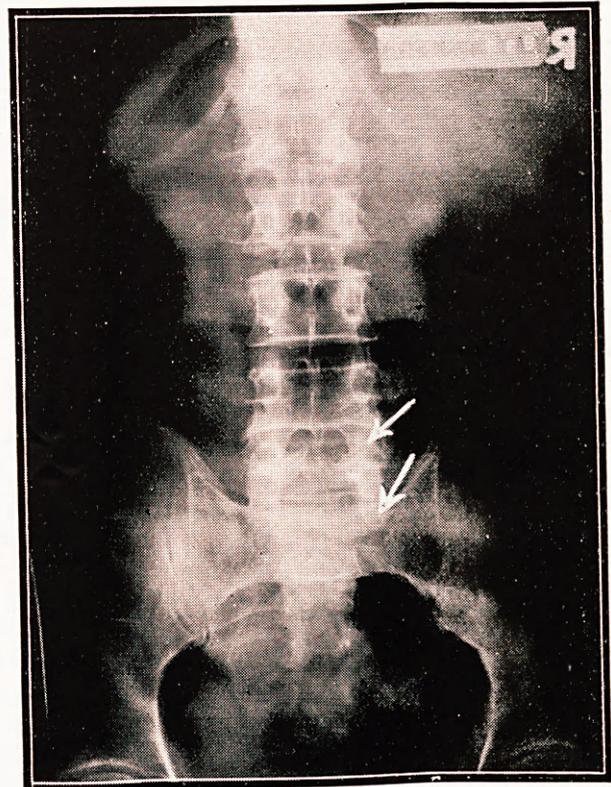
Through the kindness of the Director, Central Research Institute, Kasauli, the senior writer was enabled to look up the recent literature on sciatica in the fine library of the Institute. He could only discover two references to the use of electrotherapy in sciatica. The first was by Kowarschik in a Berlin paper and was not available, while the second was by Dattner (1927) of Vienna in which that author states that of recent years electrotherapeutics, and especially galvanism, have gained for themselves a permanent place among therapeutic agents; and he prophesies that they will be more extensively used because of their surprisingly rapid action. More recently O'Meara (1929) mentions that electricity in the form of galvanism and diathermy has been successful in obstinate cases.

It is apparent, therefore, that others besides the present writers have successfully treated sciatica with diathermy and galvanism, though they can find no reference in the literature to

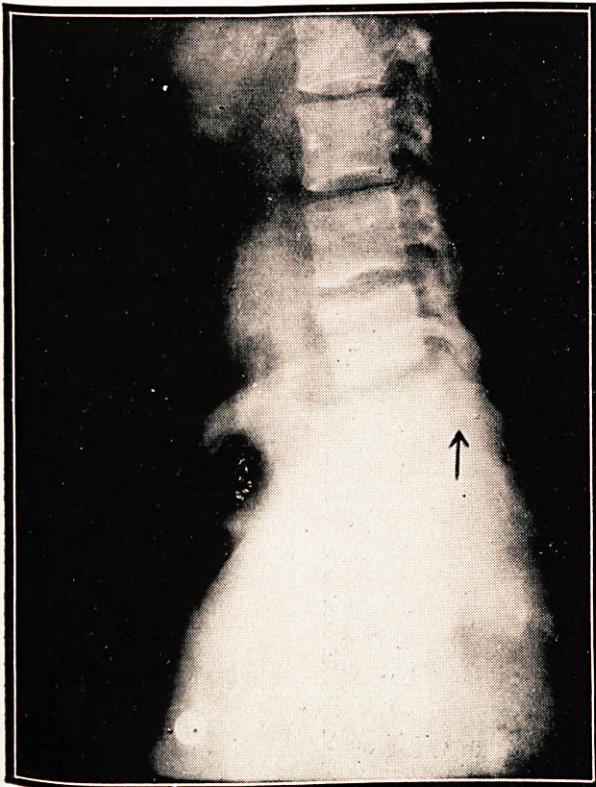
PLATE III.



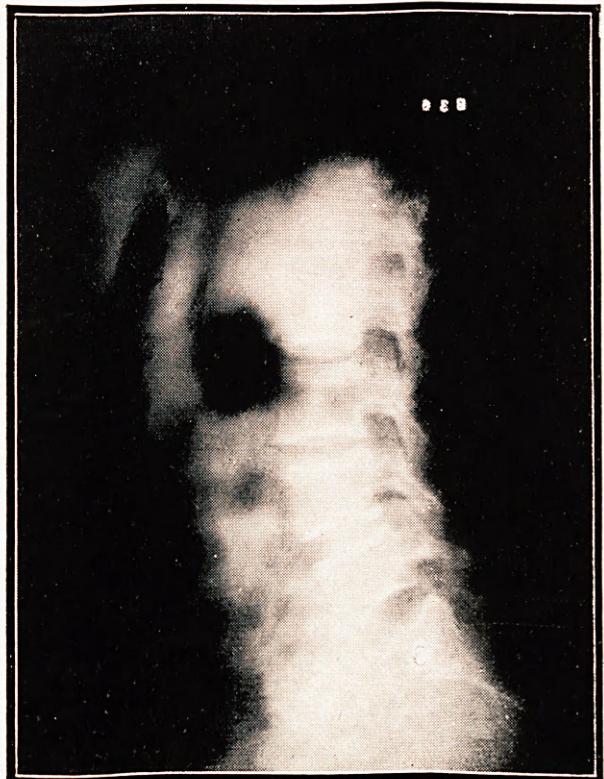
RADIOGRAM 9.



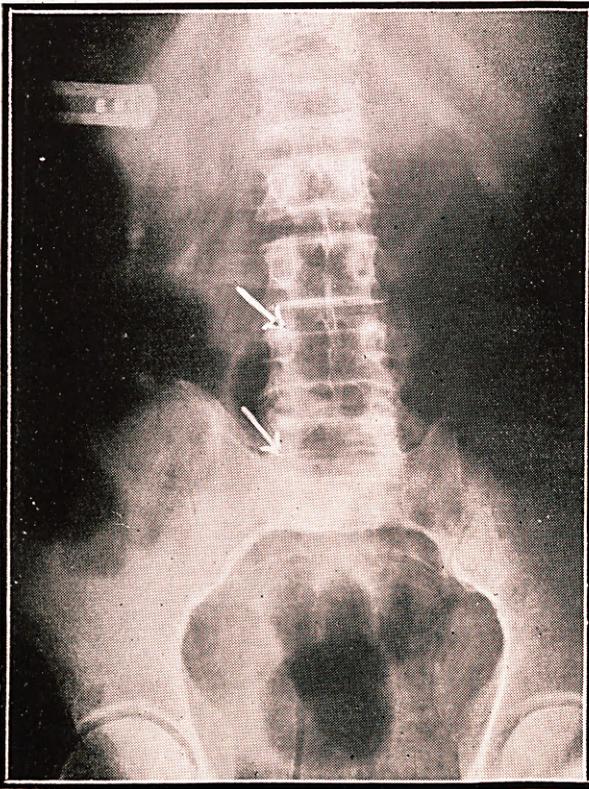
RADIOGRAM 11.
Arrows accidentally wrongly disposed. Placed on right
instead of left. Note stone in right kidney.



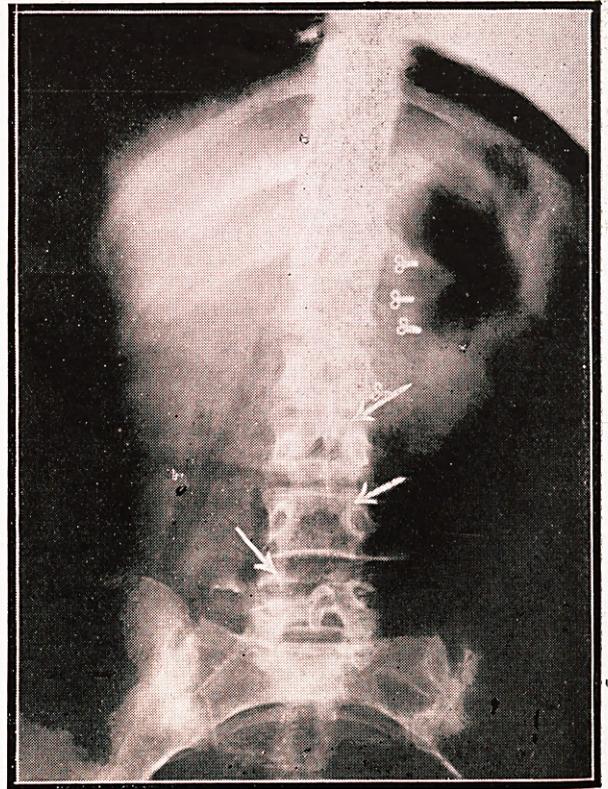
RADIOGRAM 10.



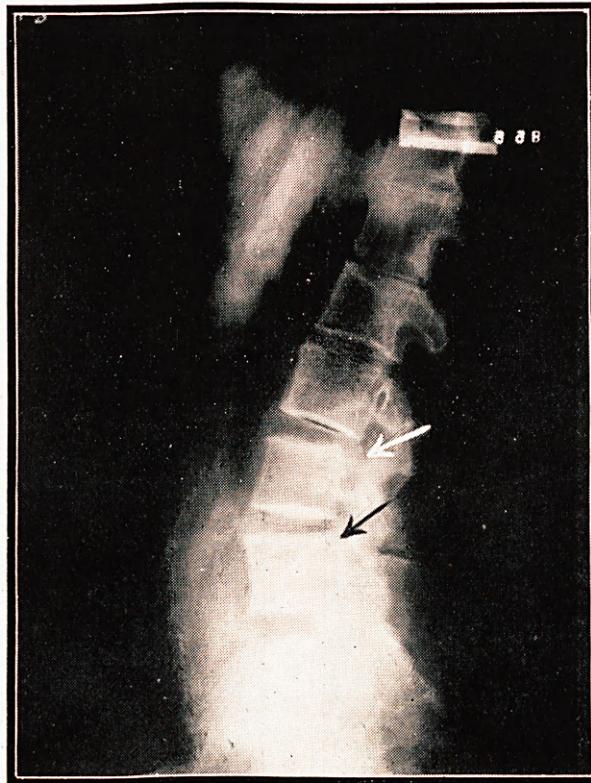
RADIOGRAM 12.



RADIOGRAM 13.



RADIOGRAM 14.



RADIOGRAM 15.

the checking of the efficacy of these agents by serial radiograms, and their curative—as opposed to palliative—effect recorded. Consequently they do not feel that they can claim originality for this article; nor do they consider the point of any importance compared with the main object in publishing it, which is to bring before the profession in India a line of treatment which has enabled them to give relief—and, they hope, permanent relief—to a number of sufferers from a hitherto most intractable complaint.

The writers desire to record their great sense of obligation to the Victor X-ray Corporation of Chicago, and especially to their Bombay representatives, who have been of the greatest assistance, not only in preparing the blocks of the radiograms herewith reproduced, but in supplying advice which has been of the utmost value in developing technique, both radiological and therapeutic.

Summary and Conclusions.

(1) The present series of cases tends to confirm Putti's claim that idiopathic sciatica is caused by an infective arthritis of the lumbar intervertebral articulations, with or without "anomalies of tropism."

(2) The physical signs of the conditions are identical, *mutatis mutandis*, with those of infective arthritis elsewhere.

(3) Diathermy, in association with "negative" galvanism, gives excellent immediate results both as regards relief of symptoms and amelioration of their causal arthritis; and if, as seems probable, its promise of permanent relief be fulfilled, it would appear to be the treatment of choice, since it is available to all classes of case within the reach of a radiological department, and, moreover, is free from the inconvenience to the patient which is inseparable from any form of retentive appliance.

(4) The search for, and if possible eradication of, the infective focus or foci is a most important step in the treatment of the condition, and should not be overshadowed by the more spectacular results of physiotherapy.

REFERENCES.

- Dattner, B. (1927). *Wien. Klin. Wochenschr.*, XL, 687, May 26th.
 O'Meara, E. J. (1929). *Medical Guide and Index of Treatment*, 3rd Edition. Butterworth & Co.
 Putti, V. (1927). New Conceptions in the Pathogenesis of Sciatic Pain. *Lancet*, II, 53, July 9th.

Tabular Summary of Cases.

Serial No.	Name.	Class, sex and age.	Date.	Complaint and duration.	X-ray findings.	Treatment.	REMARKS.
1	Mr. C. H. W.	E. M. 48	Sept. 1927.	Recurrent left-sided sciatica, 6 attacks in 10 years. Later attacks had crippled him.	5-11-1927. Obliteration of articular outline 4th and 5th lumbar intervertebral joints. Partial filling 4th lumbar foramen. 5th foramen filled with exudate, contralateral scoliosis. 5-2-1928. Joint outlines reappearing. 4th lumbar foramen nearly clear. 5th clearing. Scoliosis less. 11-5-1928. Joints and foramen clear. No scoliosis.	Diathermy and negative galvanism. <i>B. flexner</i> autogenous vaccine.	Complete relief except for twinge in May 1929 when constipated, which disappeared with purge.
2	Mr. H. S. H.	E. M. 40	Nov. 1927.	Right-sided sciatica 4 days. Slight attack winter 1926-27.	Contralateral scoliosis. Fluffing of joints and foramina.	Diathermy and negative galvanism. Non-hæmolytic streptococcus autogenous vaccine from dental focus.	Complete relief.
3	Mr. J. P.	E. M. 40	Jan. 1928.	Acute left-sided sciatica following jump.	Homolateral scoliosis. Fluffing of joint outlines. Filling of 4th and 5th foramina.	Diathermy and negative galvanism. Non-hæmolytic streptococcus vaccine from dental focus.	Complete relief.

Tabular Summary of Cases—Contd.

Serial No.	Name.	Class, sex and age.	Date.	Complaint and duration.	X-ray findings.	Treatment.	REMARKS.
4	G. J.	H. M. 35	Jan. 1928.	Left-sided sciatica for 15 years off and on. Lumbago constant.	Fluffing of joint outline, filling of 4th and 5th foramina. Partial obliteration of 3rd. Contralateral scoliosis.	Diathermy and galvanism. N. A. B. Bismotab.	Wassermann positive. Discharged against advice after 4 weeks alleging complete relief not since traced.
5	K. A.	M. M. 45	Feb. 1928.	Right-sided sciatica 3 weeks.	Fluffing of joint outlines right side. Blurring of 4th foramen, obliteration of 5th.	Diathermy and galvanism.	Discharged after 1 month alleging complete relief. X-rays showed restoration of outline of joints and foramina. Not since traced.
6	K. K.	M. M. 67	Feb. 1928.	Right-sided sciatica 1 year.	Fluffing of joints between 3rd, 4th and 5th lumbar and sacrum. Constriction of 4th and 5th foramina.	Diathermy and galvanism. Short - chained non-hæmolytic vaccine (isolated from urine).	Discharged completely relieved. Not since traced.
7	A. G.	M. M. 40	March 1928.	Right-sided sciatica every cold weather for years. Lumbago constant.	Fluffing of 3rd, 4th and 5th lumbar joints. Homolateral scoliosis.	Diathermy and galvanism. Vaccine of "short-chained" non-hæmolytic streptococcus from dental focus.	Complete relief.
8	S. L.	H. M. 30	March 1928.	Right-sided sciatica, 25 days. Following on appendicectomy.	Contralateral scoliosis. Tropism of 4th right lumbar joint anomalous, 5th joint outline fluffed, filling of 4th and 5th foramina.	Diathermy and galvanism.	Complete relief.
9	N. M.	M. M. 45	March 1928.	Left-sided sciatica 15 days.	Fluffing of 3rd, 4th and 5th lumbar joints with filling of foramina. Contralateral scoliosis.	Diathermy and galvanism. Autogenous short - chained streptococcus vaccine from dental focus.	Discharged against advice after 3 weeks alleging himself cured.
10	Mrs. S. N. M.	H. F. 23	March 1928.	Alternating sciatica. 4 months.	Fluffing of 4th and 5th joints both sides and 3rd joint right side. Filling of 3rd, 4th and 5th foramina. 15-5-1928. Joints clear. 3rd and 4th foramina clear. 5th almost clear.	Diathermy and galvanism.	Leucorrhœa. Retroversion uterus. erosion of cervix. Complete relief.
11	M. S.	M. M. 65	April 1928.	Left-sided sciatica intermittent 1 year.	Fluffing of 3rd, 4th and 5th lumbar joints. Constriction 4th and 5th foramina. Stone right kidney. 11-5-1928. Joints much clearer.	Diathermy and galvanism.	Declined nephrolithotomy. Left against advice after 1 month's treatment, alleging himself cured.

Tabular Summary of Cases.—concl'd.

Serial No.	Name.	Class, sex and age.	Date.	Complaint and duration.	X-ray findings.	Treatment.	REMARKS.
12	S.	H. F. 40.	April 1928.	Left-sided sciatica. 3 weeks.	Homolateral scoliosis. 3rd, 4th and 5th joints fluffed on left side. 4th and 5th foramina constricted and obliterated respectively.	Treatment declined.	Unrelieved.
13	Mrs. P.	H. F. 35	April 1928.	Intermittent alternating sciatica for some years.	No scoliosis. Fluffing of all lumbar intervertebral joints 4th and 5th lumbar foramina narrowed.	Diathermy and galvanism. <i>B. coli</i> vaccine from urine.	Discharged against advice after a month, alleging himself cured.
14	G. L.	H. F. 40	May 1928.	Right-sided sciatica.	Contralateral scoliosis. 4th and 5th joints fluffed. 4th and 5th foramina constricted.	Diathermy and galvanism. N. A. B. Bismotab.	Wassermann positive. Discontinued treatment after 6 weeks being free from symptoms. Not since traced.
15	Z. S.	H. M. 20	Nov. 1928.	Right-sided sciatica.	15-11-1928. Antero-posterior only. Contralateral scoliosis. Joints badly fluffed. Outlines much clearer.	Diathermy and galvanism.	Complete relief. Is leading active life. Weighs 20 stone.

WEBSTER'S OPERATION FOR ENTROPTION OF THE UPPER LID.

By R. E. WRIGHT, C.I.E., M.D.,

LIEUTENANT-COLONEL, I.M.S.,

Superintendent, Government Ophthalmic Hospital, Madras.

It needs no apology on my part to claim the attention of those readers of the *Gazette* who are interested in ophthalmology to the above procedure, if amongst them there is anyone to whom it is unfamiliar. The operation mentioned in the title was described by MacRae in the *British Journal of Ophthalmology*, January 1928. It was devised by Webster in Beyrout over thirty years ago, but apparently had remained comparatively unknown, although no doubt similar procedures were employed in various parts of the world from time to time. As MacRae points out, numbers of different methods have been devised of operating for the relief of entropion of the upper lid, but this is "superior to them all." He described it in the hope that "what he considered the best operation for this condition" might find its way into the textbooks and displace many of the old (some of them barbarous and mutilating) procedures which are still described. He goes on to say that the operation is practically "fool-proof," even should it fail no harm is done, but in his hands it has been uniformly successful. When one considers the number of procedures

described in the textbooks for this condition, the claims which the author makes for this operation seem almost too good to be true. When I read MacRae's article, this was my first impression, but the author's simple dogmatic statements were somehow convincing and I determined to give it a trial; for, after a considerable experience of other operative measures for the relief of entropion of the upper lid, I had come to the conclusion that there was not one of them really satisfactory in hospital practice. Over a year's experience of the method has convinced me that the claims made by MacRae are fully justified, and in the interests of ophthalmological science, I consider that any surgeon who does not know the operation ought to become familiar with it. A really good method of treatment such as this can bear repetition in the medical press in order to emphasize its value just as a bad procedure deserves criticism. Dr. Webster deserves great credit for its evolution, and although MacRae claims no share in having invented the operation, he justly merits the thanks of ophthalmologists for having brought it to notice.

For the convenience of those who have not got ready access to the paper above quoted perhaps I cannot do better than give the essentials of the technique in the author's own words.

"A Snellen's entropion clamp is used reversed: the left-sided clamp being used for the right eye and *vice versa*. The flat plate of the clamp is applied to the skin