

and gave values of 3.5 to 4.5 g./kg. The corresponding figure for diodone, still widely used as a contrast medium, was approximately 6 g./kg.

Excretion studies were carried out on adult female albino rats (WAG strain) and on rabbits. Six groups of three rats were given single doses of $PbNa_2$ E.D.T.A. by the oral, subcutaneous, or intraperitoneal route, two dose levels (100 and 500 mg./kg.) being used for each route. The faeces and urine from each group were collected separately each day for four days and then analysed for total lead polarographically.

On the first day after oral doses of 100 and 500 mg./kg., 2% and 3% respectively of the administered lead appeared in the urine, and thereafter this was free from lead. At the dose of 100 mg./kg. the remaining lead was excreted in the faeces during the first two days, but at the dose of 500 mg./kg. the total faecal recovery was only 88% over four days. After subcutaneous administration of 100 and 500 mg./kg. the urinary recoveries over four days were 79% and 82% respectively, the faecal recoveries being 6% and 12%. Although most of the urinary lead was recovered in the first day's voidings, there was still some present four days after the 500 mg./kg. dose. The four-day urinary recoveries after intraperitoneal injections at 100 and 500 mg./kg. were 70% and 50% respectively, the faecal values being 5% and 25%.

Fourteen days after treatment all the rats were killed; the organs of one rat from each group were examined histologically. There was evidence of slight renal damage (cloudy swelling of mid-zone and juxtamedullary tubules) with 500 mg./kg. This group had shown the highest urinary recovery and was still voiding lead on the fourth day. Apart from this finding, nothing abnormal was observed in any of the other rats. The liver, kidneys, gastro-intestinal tract, spleen, femur, and blood from a second rat in each group were assayed for lead. None was detected in these tissues in any of the rats killed fourteen days after dosing. All rats lost weight during the experimental period.

A further group of three young female rats were given single intravenous injections (100 mg./kg.) of $PbNa_2$ E.D.T.A. The excreta were collected for three days, when the animals were killed and their carcasses assayed for lead. The urinary and faecal recoveries were 85% and 8% respectively, 7% being found in the cadavers. The animals were still excreting small amounts of lead by both routes on the third day.

The excretion studies in rabbits were conducted as follows. Two adult rabbits in each of three groups were given single intravenous injections of $PbNa_2$ E.D.T.A. at levels of 100, 500, and 1,000 mg./kg. One rabbit on the highest dose died 24 hours later and the second after seven days. The remaining animals were killed one week after being injected. Except from the first rabbit, which of the total dose voided 71% and excreted 2% in the faeces before dying, the urinary and faecal excretions were measured for two days after administration. In this period the rabbit that died after seven days voided 87% and excreted 3%. The average urinary and faecal recoveries were 80% and 4% and 73% and 5%, for the animals dosed at 500 and 100 mg./kg. respectively. Histological examinations were made on the two rabbits that died and on one rabbit from each of the two other groups. There was evidence of hepatic and renal damage in the rabbits that died. The lungs and livers, and especially the kidneys, of the remaining two rabbits had clearly been affected by the drug, the degree of damage being related to dosage. Two further rabbits were given intravenous doses at 1,000 mg./kg. The first developed severe convulsions and screaming fits, and died two days later. After three days the second rabbit developed paralysis of the hind legs and was destroyed.

The urine from rabbits injected intravenously with $PbNa_2$ E.D.T.A. at levels of 100 mg./kg. or more gave positive reactions with benzidine. At 100 mg./kg. a positive reaction was obtained with the third day's voidings only, but at higher levels the test became positive within

16 hours of administration. There was no evidence of haematuria in rats given 1,000 and mice given 2,000 mg./kg. intravenously. It is interesting that Sapeika reports intravascular haemolysis in his fourth patient.

At this point it may be pertinent to mention the results of an *in vitro* experiment carried out by Mr. C. R. B. Joyce (private communication) at the London Hospital. $PbNa_2$ E.D.T.A. and $PbCl_2$ were compared for their effects on the mobility of K^+ ions in human erythrocytes suspended in physiological saline. The results showed that $PbNa_2$ E.D.T.A. was considerably less active than $PbCl_2$ in this respect, but that its effect was appreciable and increased with time.

Summary

Our results may be summarized thus. $PbNa_2$ E.D.T.A. did not appear to be unduly toxic to mice and rats and did not cause haematuria in them. Although most of the lead was eliminated via the kidney after intravenous administration, a small percentage appeared in the gut. Also, some of the drug appeared in the urine after oral dosing. Although lead could not be detected in the liver, kidney, alimentary tract, spleen, femur, or blood of rats dosed fourteen days earlier, it is obvious from the excretion rates that the time required for complete elimination from the body is considerably longer than it is for diodone. The effects of $PbNa_2$ E.D.T.A. on rabbits were disturbing. Doses of 1,000 mg./kg. were fatal, and at lower doses the drug produced haematuria and caused severe hepatic and renal damage.

The results of our earlier experiments, here recorded, led us to conclude that we should not be justified in submitting the substance studied to clinical trial, and the confirmation of its toxicity provided by the later investigations caused us to lose interest in it as a possible contrast medium.

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Medical Memoranda

Tuberculosis of Pubis Presenting as a Cold Abscess of the Thigh

The pubic bone is an uncommon site of tuberculous osteitis: it is not mentioned by Girdlestone and Somerville (1952). Small series of cases have been described in recent literature (Clavel, 1951, three cases; Mallo, 1947, one case; Fical, 1949, two cases). Cold abscess formation from tuberculous osteitis of the pubis seems peculiarly rare. The following case presented as a cold abscess tracking down the thigh from the pubis.

CASE REPORT

A married woman aged 23 was admitted to hospital in August, 1953, complaining of a lump in the inner aspect of the upper part of the right thigh which had slowly increased in size over the previous two months. It was painless, and had not interfered with movement. Her general health had been good and there was no loss of weight or cough. She had one child, aged 2, and no abnormal obstetric history.

Examination showed a fusiform tumour in the adductor region of the right thigh deep to the superficial adductor muscles. Its long axis measured 6 in. (15 cm.), and its upper pole was attached to the pubis. It had a uniformly firm consistency, the surface was smooth, and the edge was ill defined. It was not tender nor did it fluctuate or pulsate. The pubic bone was not tender. The patient's general condition was excellent.

Investigations.—X-ray examination showed clear lung fields and an area of bone resorption in the body of the right pubic bone; adjacent bones were normal. A blood count showed red cells, 5,900,000; Hb, 116%; C.I., 0.99; white cells, 11,000 (polymorphs 80%, lymphocytes 13.3%, monocytes 6.7%); E.S.R., 17 mm. per hour (Wintrobe). The temperature and pulse remained normal during her 10 days' stay in hospital.

Through a small incision 8 oz. (230 ml.) of watery pus containing greyish-white shreds was evacuated. The cavity was 3 in. (7.5 cm.) in diameter, and was situated in the mass of the adductor muscles. The body and inferior ramus of the pubis could be felt and there was no obvious sequestrum. The wound was sutured without drainage. Acid-fast alcohol-fast bacilli resembling tubercle bacilli were seen in stains of the pus. Cultures for the selective isolation of tubercle bacilli were positive.

A 90-day course of streptomycin and *para*-aminosalicylic acid was instituted and the patient was sent home to bed. The wound healed by primary intention in the normal time, and showed firm scar formation after three months. Further x-ray films at this stage showed the area of translucency in the pubic bone to be reossifying.

COMMENT

It is of interest that the abscess fluid had tracked down the leg inside the sheaths of the adductor brevis and longus muscles, the origin of these muscles on the pubic bone coinciding with the situation of the abscess. The fluid tension inside the abscess masked the clinical features, as the "tumour" felt solid, did not fluctuate, and was not tender.

The radiological appearance of the lesion showed a patchy area of bone destruction, with no attempt at any bone formation. The absence of any bone reaction to the local tuberculous process would seem surprising in a young patient in such good general health. This type of x-ray appearance resembles that seen in osteitis pubis following prostatectomy, which also leads to gross rarefaction of the bone, giving a "moth-eaten" appearance (Mortensen, 1951). Osteitis pubis is a self-limiting condition, characterized by widespread decalcification and then normal healing, with no sequestrum formation (Hoch and Kurtz, 1951). This seems similar to the case presented here. The aetiology of osteitis pubis is still doubtful, although various factors have been described. May it not be that the pubic bone reacts in a similar way to lesions of different types—trauma, infection, ischaemia, tuberculosis, etc.?

I should like to thank Mr. R. K. Debenham for permission to publish this case, and Mr. T. S. Donovan for his advice about its management.

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Sacro-iliac Strain

The wave of popularity for the "disk lesion" as the cause of low backache with associated referred pain in the leg has tended to submerge other diagnostic labels that were previously in favour. The term "sacro-iliac strain," used to define pain of mechanical origin arising in the tissues of the sacro-iliac joint, has in my opinion suffered an undeserved eclipse, an opinion which has been notably reinforced by personal experience of the symptoms thereof on three separate occasions.

For the diagnostician no teaching can compare to that of personal experience. I am therefore in the fortunate position of being able to recognize without difficulty those of my

patients who are suffering from the same condition, and may also, I feel, be able to help others to sort out this particular cause of backache from the rather confused clinical picture as it presents itself to the clinician.

On the first occasion I noticed difficulty in standing upright on emerging from a bathe in a rather rough sea. On attempting to do so I experienced pain in the region of the left sacro-iliac joint. By the next morning I felt stiff in this region, with pain, particularly on attempting any twisting movement, local tenderness over the posterior ligament of the joint, and referred pain to the upper and outer aspect of the thigh and in the groin. The following day I was manipulated by my chief assistant. The movement comprised a rotation of the pelvis to the right, the left iliac crest being also thrust downwards at the end of the movement. At this point I felt a "thud" in the region of the left sacro-iliac joint, as if something had "snapped" rather than clicked home. The pain was immediately relieved.

A few years later, some hours after digging a trench and throwing out the earth to the right, I felt an ache in the same spot. This became worse during the next few days and referred pain of the same distribution developed. I then had a further manipulation. Although I again felt a "thud" as if something was reseating itself, I was disappointed to find the pain still present. However, it disappeared during the course of the next twenty-four hours.

On the third occasion the pain came on gradually without any specific injury, though I had been indulging in various physical activities. After about three weeks I got tired of it and had another manipulation. For the first time this was a little painful, and there was no satisfying "thud." The pain was not relieved but gradually subsided before I got to the point of having a "proper" manipulation under thiopentone.

COMMENT

As the result of these experiences I am personally convinced (1) that there is such a condition as a sacro-iliac subluxation, this being probably a slight rotatory displacement of the joint surfaces, the sacrum being twisted downwards and forwards on the affected side. The feeling of something reseating itself when the pelvis was forcibly rotated in the same direction, associated with an immediate feeling of relief of tension, was quite unmistakable. (2) That there is also a condition of sacro-iliac strain which results from strain on the ligamentous tissues with, subsequently, a reflex inflammatory reaction; and that this may occur as a result of some unaccustomed activity without there necessarily being any actual subluxation of the joint. (3) That, from observations on patients, sacro-iliac strain may also be secondary to disk lesions in the lower lumbar region complicating the clinical picture produced by the disk lesion itself. Finally, the following clinical signs and symptoms will help to distinguish lesions of the sacro-iliac joints from other causes of low back pain. (1) The pain is produced or intensified by rotatory movements, flexion and extension being free and painless unless forced. (Whereas in disk lesions it is flexion and extension that causes pain, rotation being painless.) (2) Referred pain when present will be in the upper and lateral aspect of the buttock and thigh and into the groin. No lesion of the lower lumbar spine can produce referred pain in the groin. (3) There will be tenderness over the posterior ligament of the joint—that is to say, one finger-breadth below and medial to the posterior inferior spine. (4) There will be no limitation of straight-leg raising, although this may cause slight pain at extremes, and no loss of reflexes or other evidence of disturbed function of the peripheral nerves.

In conclusion, I would point out that my own reaction to treatment was typical of the average case—dramatic cure after the first manipulation, delayed relief after the second, and no relief with the third; though there is the consolation that the condition is, I think, and hope, unknown in the elderly.

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