and that where only one sacro-iliac joint is affected, the pelvis fails to develop only on the ankylosed side, and the earlier this morbid change takes place the more complete is the deformity produced. Whitridge Williams and Merkel have both testified to the rapid growth of the pelvis in girls just before puberty, and they draw attention to the fact that it chiefly affects all the parts near the sacro-iliac joints.

In handling the pelves at the Royal College of Surgeons, I noticed how well developed the sacro-iliac joints were in native races. All circular pelves have this joint well developed. In all these the knob or boss on the auricular surface of the ilium was well marked and the articular surfaces extensive. Havelock Charles in 1894 showed how the influence of function has modified the Punjabi sacro-iliac joints, producing a larger articular surface, which, he says, is common to all Oriental races and is similar to those found in prehistoric man.

There should be in all men and women, as in Orientals, a mobility of this joint and a constant change of pelvic inclination as the subject walks, runs, sits, stands, or crouches, and the immobility of the joint leads to serious changes in pelvic shape. The squatting posture used by both men and women while sitting, and also when attending to the calls of nature, was, of course, also employed by primitive man for the same purpose.

In adults I find that the two halves of the pelvis can be seen and felt to move apart with change of posture. This can be tested by noting the position of the anterior superior spines and the tubera ischii—first in the tiptoe position as if preparing for a dive, and again in the squatting position. The whole pelvis is expanded to its utmost capacity in the squatting position, and this is most marked while the component parts of the innominate bones are still cartilaginous—that is, at any time before puberty.

It is the swing of the sacrum between the innominate bones that influences the final shape of the pelvic brim, which should be a circle. In India, when the girl has lived a confined life and has sat in a more or less crouching position for years, one often sees the antero-posterior diameter of the pelvis lengthened at the expense of the transverse, and St. John Brooke in Africa notes the change in pelvic shape in Zulu girls due to a custom prevalent among them of sitting so that their weight is borne on one thigh only.

In England the still soft pelvis is bent by long sitting at school, and this is not counteracted as it should be by the proper action of the sacro-iliac joints, which should be used daily, if only during the acts of defaecation and urination. The wearing of high heels also limits and cramps their movements, the body weight is thrown forward on to the arch of the foot instead of the heel, the pelvic angle is altered, and the back unduly hollowed to preserve the balance. That these facts are the real explanation of our increasingly difficult maternity is clearly seen when we compare them with conditions where motherhood is still natural and easy.

Observe the habits of the Indian woman, of the Shetland woman, the tent dwellers, the boatwomen, the tinkers, and the gipsies—in fact, of all those who live natural lives out of doors and exercise their sacro-iliac joints by hard manual labour, digging, weeding, hauling in nets, carrying and lifting heavy weights, and, more important than all, the daily crouching posture used in attending to the calls of nature. This posture is really the natural and only satisfactory one, and all these people are without the modern closet and most of them without chairs. The infants are breast-fed, later they have coarse but natural and fresh food. They roll and kick and tumble and squat and climb and run as much

as they like. Their elders have perfect teeth—the only really satisfactory evidence of the absence of rickets in a community. Maternity is consequently easy, the balance of the sexes well preserved because the larger-headed children are not destroyed by injury during birth, and the feeble-minded are not made, as so often among us, by the *successful* attempt to force a round head through an oval pelvis.

CONCLUSION

To sum up: maternity is a natural function and is easy and safe when the pelvis of the race fits the head of the race. The misfit is due to loss of area in the pelvic brim owing to a circle being bent into an oval. The change is caused by rickets and disuse of the sacro-iliac joints before 14 years of age. Perfect teeth are found with the round pelvis, and this is well understood among primitive people, who consider such teeth essential in a bride.

[The paper was illustrated by tracings and specimens, and a preparation to show the movements of the sacro-iliac joints.]

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SPONTANEOUS HAEMOPNEUMOTHORAX WITH UNUSUAL POST-MORTEM FINDINGS

BY

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AND

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Haemopneumothorax is not a common condition. The majority of cases follow trauma either in military or civil life, but the spontaneous form is distinctly rare. After a close scrutiny of the literature of the past thirty years we have only been able to find eight recorded cases, of which five occurred in this country. Dr. Newton Pitt,¹ who recorded a case in 1900—almost identical with the case described below—stated that “there is no reference to haemopneumothorax in the Index Catalogue of the United States Library, nor is it discussed in any of the standard treatises on medicine in either English, French, or German,” and at that date he could find only one case in the literature unassociated with trauma. Most modern textbooks make no mention of this condition, and no post-mortem examination of a spontaneous haemopneumothorax is to be found recorded since Newton Pitt¹ and Sir Humphry Rolleston² reported two to the Clinical Society of London in 1900.

The case described here is remarkable because of the rapidity with which the patient died, and the unusual findings post mortem.

The patient was a plumber, aged 44, who for at least the last nine years had complained of a winter cough, with an expectoration which had never contained blood. Associated with the cough, and persisting throughout the year, were attacks of pain referred to a point below the left clavicle. The pain had existed as long as the cough. The attacks came on at irregular intervals every few days, but were often of short duration. The intensity of the pain had been more severe for the past five years, and during the last three years the patient had noticed an increasing shortness of breath. He attributed his symptoms to muscular rheumatism, and as he had never consulted a doctor about them there is no record of previous investigations. Instead of the cough subsiding with the advent of warmer weather, this year it persisted, and since Christmas, 1930, the pain below the left shoulder had occasionally been sufficiently severe to disturb the man's sleep.

The patient was first seen on June 17th, 1931. The previous day he came home from work feeling quite well, but during the night, for half an hour, from 2.30 a.m., he had what he described as "a perfectly awful attack of coughing, when I seemed absolutely full of phlegm." There was some mucopurulent sputum, and he afterwards slept soundly till morning. He awoke with pain in his left pectoral muscles, but this worked off and he got up to go to work. Later the pain returned and he retired to bed again. He was a pale, thin-faced man, moderately well covered, and he demonstrated the position of the pain, as he sat in bed, over an area covering the pectoralis minor on the left side. His pulse, temperature, and respiration were normal. The chest showed some flattening over the apices, but movement on both sides was equal. The percussion note was unimpaired, and the heart appeared to be normal. No abnormality was found to account for the pain. As the pain eased he got up at mid-day, but returned to bed again at 8.30 p.m., complaining of pain in the same position. That night he slept well.

The following day, June 18th, he went to work but returned home because of pain. This subsided about mid-day, and apart from some cough he appeared quite well and pottered about in his garden in the evening. He again had a good night.

On June 19th he resumed work, feeling no pain, but returned home about midday because the pain had become severe, and went to bed at 3.30 p.m. Apart from the pain he felt well until 8.30 p.m., when he got out of bed to evacuate his bowels. Following defaecation the pain became intense, and he suddenly became faint and would have fallen if his wife had not saved him. He was examined again at 9 p.m. The pain had become very severe, and had spread over the whole of the left side of his chest. He also complained of pain in the abdomen and left leg. He was obviously very ill. His face was sallow and anxious, and the skin was cold and clammy. Temperature subnormal, pulse 100, respirations 40. The movement and air entry on the left side were diminished, and the percussion note was more tympanitic on the left side than on the right, but definitely less resonant than the note over the stomach. Owing to the collapsed condition of the patient he was not moved. The rectus abdominis muscles were rigid, but in view of the respiration rate and the condition of shock, pneumothorax was suspected.

Seen again at 6 a.m. on June 20th, his temperature was still subnormal, the pulse rate 120, very weak and thready. Respirations were still 40. The cardiac dullness was obliterated, and the percussion note over the left chest was definitely tympanitic, except at the extreme base, where it was dull up to the eighth rib, indicating the presence of fluid. The chest showed no bulging on this side, and a distant respiratory murmur was still audible. He was examined at 9 a.m. with Dr. H. Campbell Ferguson, who made the observation that the appearance of the man suggested an internal haemorrhage, and this, together with signs of air and fluid in the left chest, suggested the rare but probable diagnosis of spontaneous haemopneumothorax.

At 12.30 p.m. there was no cardiac dullness present to the left of the sternum. The percussion note over the whole of the left chest was tympanitic as far out as the axillary border. Outside this point it became dull, the dullness

shifting and becoming replaced by hyper-resonance on the patient being turned towards the right side. No *bruit d'airain* could be demonstrated. A very faint respiratory murmur could still be heard. From this time on, the patient gradually sank, showing all the signs of internal haemorrhage, and died at 7 p.m.

POST-MORTEM EXAMINATION

On the abdomen and thorax being opened the left dome of the diaphragm was seen to be bulging down into the abdomen. The left pleural sac contained air and blood in considerable quantity (two pints), much of which was clotted. The heart and mediastinum were displaced to the right. The left lung was completely collapsed.

On removal the left lung was found to be entirely airless, and showed a small puckered tuberculous scar at the apex. There were also present near the apex two subpleural blebs. These apical blebs intercommunicated and opened out into a small, thin-walled, smooth cavity. There was no caseous matter present in the cavity, and it appeared to be formed by the coalescence of many emphysematous dilatations. Attached to the apex of the lung, one of them to the emphysematous blebs, were two firm, cordlike adhesions, which appeared to have been torn away from the chest wall before death. On section the lung tissue appeared to be normal. There was no blood present either in the trachea or bronchi, and but scanty secretion. Careful search failed to reveal in the lung the site of its rupture or of the haemorrhage.

The right lung showed some general emphysema. At the apex was a scar adherent to the chest wall, and in the centre of the scar was a small calcareous nodule. Around the apical scar were several emphysematous blebs similar to those in the left lung. The heart, aorta, liver, kidneys, spleen, and oesophagus were all quite normal in appearance.

DISCUSSION

The chief interest of this case lies in the cause of the rupture of the lung and of the haemorrhage.

Of the eight previous cases mentioned six appear to have recovered. Two cases reported by G. A. Allan³ in 1925 were confirmed by *x* rays to be due to tuberculosis. Others reported by R. B. Ness and G. A. Allan⁴ (1910), R. Doria⁵ (1928), L. M. Hurxthal⁶ (1928), and A. H. Terry⁷ (1930), were all of uncertain etiology. Of those which were examined post mortem, one mentioned by Newton Pitt¹ revealed a large phthisical cavity with an eroded branch of the pulmonary artery running through it. At the post mortem of Rolleston's case no air was found in the pleural cavity although it was present during life, and after a minute examination the origin of the blood remained in doubt. The post-mortem findings in Newton Pitt's¹ own case were not unlike those in the present one. An emphysematous bulla, about half an inch across, with an imperfect wall, was found, attached to which was a fibrous band that had been torn across. No obviously patent vessel could be seen, but the adhesion was suggested as a probable source of the bleeding.

In the case described by us the necropsy revealed the presence of a firm pleural adhesion attached to an emphysematous cavity at the apex of the left lung. The adhesion appeared to have been torn away from the chest wall during life, and it seems quite possible that it was from the torn adhesion that bleeding took place. In support of this contention we would mention a case reported by Krause and Heise⁸ in which a man undergoing artificial pneumothorax treatment died of haemothorax due to a torn pleural adhesion.

The rapid death of the patient made further clinical investigations impossible, but in the absence of any other cause we are inclined to the view that the abnormalities found in the lung post mortem indicated the source both of the pneumothorax and of the haemorrhage, and that the strain caused by the violent attack of coughing during

the night of June 17th, and again by defaecation on June 19th, played a part in the production of the spontaneous haemopneumothorax.

We wish to thank Dr. H. Campbell Ferguson for helpful suggestions in connexion with this case.

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Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

ABDOMINAL MANIFESTATIONS IN RHEUMATISM

The article by Dr. K. H. Tallerman on abdominal manifestations in rheumatism (*British Medical Journal*, November 7th, p. 844) tempts me to report a case at present under my care.

On September 22nd a boy, aged 8, complained of severe headache, sore throat, and pain in the abdomen, left shoulder, and back of the legs. He was sick once, and his tongue was heavily furred. There was general abdominal tenderness, but no rigidity. The temperature was 102°; a few moist sounds were present in the chest, but disappeared after a few days.

He passed green stools once or twice a day during the first week, after which they became normal in colour, but constipated. The temperature remained between 101° and 102° until October 2nd, then fell by lysis. After the first week he ceased to complain of any pain except headache, which lasted a further week. There was no swelling of any joint; no rheumatic nodules or enlarged glands were noticed. The persistent headache, with slightly distended tender abdomen and a relatively slow pulse, suggested typhoid fever, but a Widal test on October 2nd was negative.

By October 21st the temperature was normal, and the child was eating and sleeping well. On October 29th he again complained of pain and stiffness in the left shoulder. The temperature was 100°, and there was no sore throat. The pain had disappeared and the temperature returned to normal by November 2nd. No abnormality has been found in the heart throughout. He has had diphtheria twice, once very severely; otherwise he has had no serious illness. He has occasionally complained of "growing pains" during the last three years. There is a strong family history of rheumatism.

Dr. Tallerman's cases strengthen my suspicion that this child's illness has been rheumatic in origin.

Leyton.

HELEN M. JARDINE, M.B., Ch.B.

RAPID METHOD OF WORKING OUT COLOUR INDEX

The present interest in microcytic anaemia prompts me to publish a chart which I made some years ago for determining the colour index, in order to avoid the usual calculation. Along the ordinate is marked the percentage of haemoglobin, and on the abscissa the number of red cells. A straight line is drawn from zero to the point of intersection of RC = 5 million with Hb = 100 per cent.; every point on this line represents CI = 1.0; thus, if there are 3.5 million red cells and 70 per cent. haemoglobin, a glance at the diagram shows the intersection of these lines to lie on the CI = 1.0 line. Another straight line is drawn from zero to the point RC = 5 millions, Hb = 50 per cent.; every point on this line represents CI = 0.5; for example —2 million red cells and 20 per cent. haemoglobin lies on

this line, so the CI in this case is 0.5. Other lines are drawn from zero to points above the RC = 5 million mark, each line representing CI = 0.1, 0.2, 0.3, and so on.

As examples: if RC = 3.6 millions and Hb = 52 per cent., the point of intersection will be seen to be just

above the CI = 0.7 line; by calculation CI = 0.72. Again, if RC = 1.2 millions and Hb = 30 per cent., the intersection is just above the CI = 1.2 line; by calculation CI = 1.25.

For accuracy the diagram should be drawn six inches square.

Westgate-on-Sea.

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CARCINOMA IN A LONG BONE SECONDARY TO CARCINOMA OF RECTUM

This condition must, I think, be exceedingly rare, and I therefore report the following case.

The patient, a man aged 69, had a colostomy performed for carcinoma of the rectum in December, 1928, and in the following February the growth was excised. In August, 1930, a swelling commenced on the left tibia, about the junction of the upper and middle third. As the growth gradually enlarged the pain increased, and the skin over it became tense and discoloured. The growth was of firm consistency, but not bony hard. The Wassermann reaction was negative.

Diagnosis of secondary carcinoma was made, but in view of the extreme rarity of this condition the possibility of an osteosarcoma could not be overlooked.

Report of X-Ray Examination.—The compact bone of the tibia below the superficial swelling shows destruction without any defined outline. Extending beyond the surface of the tibia into the swelling, there is an irregular and ill-defined shadow of bony structure. The appearances indicate a secondary carcinoma involving the tibia.

In March, 1931, the leg was amputated, and the pathological report of the tumour was as follows: Sections show a mass of very fibrous tissue in which are areas of haemorrhage, and scattered throughout are areas of osseous tissue. Interspersed among the osseous tissue are masses of very definite columnar-celled glandular tissue resembling that seen in a columnar-cell carcinoma of the rectum. The condition is undoubtedly a secondary deposit of a columnar-cell carcinoma in the shaft of the tibia.

My thanks are due to Drs. Grellier and Barlow, radiologist and pathologist respectively, for the care and interest taken in their investigations, and for the above reports of this case.

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