round hole about one-third of an inch in diameter, having a smooth, slightly thickened margin, situated about an inch above the aortic valves, was found in the attached walls of the two vessels. There was in this case no sign of the communication, but the double murmur of aortic disease was plainly audible. This peculiar murmur is probably caused by the forcible systole of the left ventricle ejecting blood through the aneurysmal sac into the pulmonary artery, and so producing the systolic portion of the murmur, whilst the elastic recoil of the aorta exerts sufficient pressure to produce a continuous flow from that vessel through the aneurysmal sac (which apparently acts as a reservoir) into the pulmonary artery, and so gives rise to the second portion of the murmur. The *bruit* has, therefore, its maximum intensity during the ventricular systole, and gradually diminishes during the remainder of the cardiac cycle until the next systole. The absence of this murmur in half the cases might be explained by (a) disease of the walls of the aorta interfering with their elasticity; or (b) the presence of a large amount of blood clot in the aneurysmal sac; or (c) excessive regurgitation through the aortic orifice, in disease of its valves, rapidly lowering the blood pressure in the vessel beyond. The presence of the second sound without any accompanying murmur outside the apex beat is an important point in the exclusion of aortic regurgitation; at the same time its absence, either at the apex or in the carotids, would not confirm a diagnosis of aortic incompetence, for the valves at the aortic orifice might be quite normal and yet, owing to the regurgitation from the aorta into the pulmonary artery, the reaction of the blood upon the aortic valves would be insufficient to produce an audible second sound.

6. *The pulse* in no fewer than 9 cases (I, II, IV, V, VIII, IX, X, XII, XVI) was described as jerking or regurgitant, though in only 2 of these cases was there disease of the aortic valves sufficient to allow regurgitation. In Case XVI the pulse was typically collapsing and there was marked visible arterial and capillary pulsation, though *post mortem* the aortic valves were found to be quite competent. Although there was no incompetence of the aortic orifice, there was nevertheless regurgitation from the aorta into the pulmonary artery, which would account for the quick fall in the pulse. Unfortunately no pulse tracing was taken in this case, though this characteristic is well shown in a sphygmogram figured with the description of Sir William Roberts's case (x) in the *BRITISH MEDICAL JOURNAL* of 1868. In the *XX Century Practice of Modern Medical Science*, vol. iv, Whittaker says that in this lesion "the peculiar pulse of aortic insufficiency is, however, never seen." The above cases appear to show, however, that this characteristic is by no means infrequent without co-existing aortic regurgitation.

I can find no reference in any existing textbook to a symptom of thoracic aneurysm which was very marked in the case (xvi) which was primarily the subject of this paper—I refer to the excessive flatulence present for a week before death; and, though this was more probably due to the acute dilatation of the stomach which is sometimes seen in patients dying from cardiac failure, I find that this symptom was noticed by Dr. W. F. Atlee nearly thirty years ago, and described by him in an excellent paper on A Case of Thoracic Aneurysm, with some remarks upon Continued and Obstinate Eructations as a Symptom of the Disease,⁵ due, he states, to pressure on the vagus. In the present case, however, the trunk of the vagus was not found to be involved.

This lesion then usually occurs in an adult male; the onset is sudden and often accompanied by pain across the sternum, and is followed by dyspnoea and cough, with profuse expectoration. The patient is usually pale and rarely cyanosed. The pulse is jerky or regurgitant in character, even when no signs of aortic insufficiency are present. In over 50 per cent. of all cases a purring tremor or vibratile thrill, systolic in time, is felt over the pulmonary area, and a continuous murmur is audible over the same situation.

Prognosis.—Death usually occurs in a few weeks or months, in only one case was the patient found to have survived the rupture for a year.

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Wien., 1857-7. *Beob. Taf.*, x, 51; (6) *BRITISH MEDICAL JOURNAL*, 1853, 683; (7) *Trans. Path. Soc.*, 1883-84, xxxv, 134; (8) *BRITISH MEDICAL JOURNAL*, 1880, 521; (9) to (13) Five specimens in St. Bartholomew's Museum, Nos. 1473, 1475, 1476, 1476A, 1477; (14) and (15) Two specimens in the Museum of the Royal College of Surgeons, Nos. 3164 and 3165; (16) One specimen in the Museum of the Faculty of Medicine of Paris. * *Pepper and Griffith, International Journal of Med. Sciences*, October, 1890. ⁵ *Amer. Journ. of Med. Science*, 1869, xviii.

THE TREATMENT OF TUBERCULOUS DISEASE OF THE HIP-JOINT IN ITS EARLY STAGES.

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I HAVE no wish to intrude upon the attention of the readers of the *BRITISH MEDICAL JOURNAL*, or, for a moment, to challenge any views by which Mr. Tobin regulates his own practice in the treatment of hip disease in its early stages. But when a teacher of surgery occupying Mr. Tobin's position gives an account¹ of a novel proceeding, in reference to an important subject, some discussion of points that seem doubtful may, I hope, be allowed.

1. As to the "position of greatest ease." In what light are we to regard this posture, whether in the hip or in the other joints, when they are in the early stage of tuberculous disease? How is it to be explained, and in what manner, and in what degree, if at all, does it contribute to the advantage of the joint in which it is observed? Mr. Tobin, speaking only of the hip, says it is desirable to retain this position, and he adds further on in his paper, "If it is an expression of a desire for a rest in any particular position it is no small indication. Should we not believe in such an indication until it is proved to be false? Are not Nature's ways as a rule conservative?" In reply I will venture to say that in no joint except the shoulder,² and least of all in the hip, should the position of greatest ease be retained. On the contrary, it is the duty of the surgeon either at once, or as soon as may be, to exchange this for some other position which, however, will vary with the joint concerned.

To make good this contention it is necessary in the first place to study this position as it is observed in healthy joints. Take, first, the simplest examples—the wrist and the ankle. The wrist, during muscular activity of the forearm and hand, assumes many positions—flexion, extension, abduction, etc.; but when voluntary muscular action ceases the hand, unless it is supported by some external agency, drops by its own weight till it forms an angle of about 120 degrees with the forearm, so that all its component structures are in a position of easy relaxation. In the same way, under similar conditions and with a like result, the foot drops to an angle of about 120 degrees with the leg. In both the wrist and the ankle the agency which at a certain point counteracts the weight of the hand and foot respectively seems to be the tonic contraction of the extensors; for when these muscles are paralysed by damage to the musculo-spiral nerve in the upper, or as the result of anterior poliomyelitis in the lower limb, the drop of the hand and the foot is much more marked. As to the elbow. When voluntary muscular action ceases, and when the limb is left without external support, the forearm drops so as to form an obtuse angle with the upper arm. In the case of the knee under like conditions (that is, when we are sitting on a high seat so that the foot clears the ground, when voluntary muscular action ceases, and when the leg is unsupported), this segment of the limb drops by its own weight till it is suspended by the tonic contraction of the quadriceps extensor and by the ligaments of the joint. In the hip the position of greatest ease is assumed when we sit, and voluntary action of the muscles of the lower limb ceases. By sitting down we flex the joint, while abduction and eversion are due to the weight of the limb, opposed, however, at a certain point, by tonic muscular contraction.

Thus far it is seen that when voluntary muscular action ceases, the joints are left in a relaxed condition, and that the position which they assume is mainly determined by two factors (a) the weight of the distal segment of the limb, opposed when a certain point is reached by (b) the tonic con-

traction of the surrounding muscles. Under these conditions the joints are, as the phrase goes, in the position of "greatest ease," or, as it would be better to say, in the position of physiological rest. But it must be pointed out that as long as muscular action is in abeyance the joints will still remain in a position of perfect ease, even though their posture is considerably altered. In other words, the position of physiological rest is not limited to a particular angle, but it extends through a considerable range: and every day we avail ourselves of this fact. For if a joint, for example the wrist or the ankle, is kept in any one position—even if this is the position which we are in the habit of regarding as that of "greatest ease"—a sense of fatigue is soon experienced, and we are glad to change this for some new posture. The fact that any one position after a time becomes irksome is the explanation of the circumstance that, while at rest, we often change from one position to another. It is thus clear that even in health the ease and comfort of a joint when it is at rest do not depend on the maintenance of any particular position; but that they are promoted by a change, from time to time, from one position to another, within a certain range.

But besides mere position, there is another factor which plays a much more important part in the production of physiological rest for the joints, namely, external support; and when, muscular action being in abeyance, a joint is furnished with adequate support, its position in any part of its middle range of movement is of very little consequence. Thus the wrist is at perfect rest not only when it lies in a passive state, in a position of slight flexion, but also when the hand is raised into, and supported in, a straight line with the forearm. The elbow, again, is as fully at rest when it is supported at an angle of 110° as it is at an angle of 160° .

We may now turn to the joints when they are in the early stage of tuberculous disease, and when their soft structures are swollen and abnormally sensitive. The first thing which occurs under these circumstances is that each joint assumes its position of greatest ease. After this what follows will vary with the joint concerned; and the difference will depend on the degree to which reflex muscular spasm is present. In some joints, notably the wrist, reflex spasm of the surrounding muscles is very slight; it scarcely exists. And it is much the same in the ankle. In both these joints in early tuberculous disease, movement is often but very little impaired. In the case of the elbow reflex spasm is more marked and movement is consequently more limited. In the knee and hip, especially in the latter, reflex spasm is so marked that these joints soon become almost or completely fixed. Now in regard to the wrist and the ankle—both of which, looking to the future, are in an unsatisfactory position; the wrist somewhat dropped, the ankle extended towards equinus—it will be found that they very readily allow their position to be altered; the hand can be raised into a straight line with the forearm, and the foot can be brought up towards a right angle with the leg without the least force and without the least pain. Indeed this change of position is often attended, just as it would be in a healthy joint, by a sense of relief for, as I have already mentioned, the original position of greatest ease after a time induces fatigue and discomfort. This is still more plainly seen in the later stages of disease, for example, of the wrist even when swelling (tuberculous or rheumatic) is very considerable. In such cases we often see a patient—using his other hand—first straighten the diseased wrist and then carefully support it in this position.

Under all these circumstances it is not clear that when the joints already mentioned are to be kept in a fixed position for some months, and when they may afterwards be somewhat stiff the position of greatest ease should be exchanged for that which will be the most favourable should stiffness remain? Otherwise if the ankle, for example, when the foot is pointed is kept for the necessary time in a splint, the patient after recovery may not be able to bring his heel to the ground.

As to the knee and hip. These joints in early disease after assuming the position of greatest ease become fixed by very marked reflex spasm of the surrounding muscles. Now if, while reflex spasm is present, the surgeon tries to change the position of the limb he will produce pain and do harm; for

when, by manipulation or the use of instruments, he straightens the leg on the thigh or the thigh on the trunk as the case may be, he will use leverage, and this will create (a) interosseous pressure, and (b) tension of the soft structures. He must, therefore, take a different course. The knee must, without any alteration of its position, be enclosed in splints, by which it will be kept at absolute rest. The result will be that in a short time spasm will subside, and then, without the slightest force or the slightest pain, the joint can be placed in a satisfactory position—that is in a position of extension. In the case of the hip the limb must be supported in its present position on pillows or otherwise, and weight extension must be made in the long axis of the thigh. By this treatment muscular spasm will soon subside and the limb without the smallest discomfort can be gradually brought down into a position of full extension.

If the above statements are correct, I think it is clear, as I have already said, that to allow any of the joints, except the shoulder, to remain in the position of "greatest ease" is a mistake, and that those who avoid this mistake readily also escape from the "important difficulty," in face of which Mr. Tobin has adopted what appears to me to be an unnecessary operation.

2. Mr. Tobin in his first paper based his criticism of the weight-and-pulley method on the view that in early tuberculous hip disease the joint capsule is distended with fluid, and that to straighten the limb when this condition is present is to increase tension within the joint. It seems to rest with Mr. Tobin to furnish evidence that this distension exists, for until this has been done his reference to Mr. Swan's experiment, in which the capsule is artificially distended, appears to be irrelevant. But, if this evidence is not forthcoming, will he show why, seeing that it usually at once relieves any pain which is present, even if this is very severe, extension in the line of the limb as described in the handbooks of general surgery ought to be given up and osteotomy adopted in its place?

3. Mr. Tobin's naïve though somewhat fundamental question, "Are not Nature's ways as a rule conservative?" is one which in a certain sense we can all regard with approval. It is entirely free from that spirit of presumption and that over-ready desire to subvert the established order of things, of which so many examples could easily be cited. But when we meet with it in a scientific discussion it seems likely to throw us a little off the scent. In many cases, in the spontaneous arrest of hæmorrhage, in the repair of simple fractures, and in compensatory hypertrophy, etc., the conservative powers of Nature fill the mind with admiration. On the other hand, what shall we say of malignant disease, lupus exedens, gonorrhœal ophthalmia, or internal strangulation? Does anyone think of leaving these conditions to run their course because Nature's ways are as a rule conservative?

4. Mr. Tobin says: "Moreover, a large number of cases treated by means which disturb this position (that of greatest ease) go on to suppuration," and he adds that "a treatment that in good hands yields such results does not silence speculation." I am quite sure that Mr. Tobin writes with perfect good faith; and, not leaving his readers to form their own conclusion, he is careful to state that he does not write in ignorance. But he seems to believe that at the present day suppuration takes place in 69 per cent. of cases of early hip disease treated by weight extension. To establish this view he quotes from Erichsen the statistics of the Alexandra Hospital for Hip Disease. These cases, however, were treated between 20 and 30 years ago. Moreover (the duration on admission of almost every case is given in a separate column in the original report), the average duration of the disease before treatment was commenced in these cases was about 11 months; and many had been going on for two, four, or more years. But how can such cases be regarded as examples of early disease? But, further. In a large proportion of instances (as another column in the report shows) the patients had abscesses at the time they were admitted; that is, before ever the treatment was begun. Under these circumstances I can only believe that Mr. Tobin has never read the report³ from which he quotes. When writing on this subject two years ago,⁴ I stated my belief that "when hip disease is seen early (in the first three or four months), and is adequately treated, suppuration does not occur in more than, at the

most, 15 per cent. of the total number of the cases." But I can readily understand that when Mr. Tobin was reading up the subject this estimate escaped his notice.

5. Mr. Tobin states that there is reason to believe that section has a beneficial effect on tuberculous bone. "How often," he remarks, "in resections of the knee, do we put together bones much rarefied and otherwise affected by tuberculous disease, and find that they unite firmly and remain sound." But is it a fact that in early tuberculosis of the hip-joint the shaft of the femur below the trochanters is involved in the disease? Is not the bone at this level almost invariably healthy? Mr. Tobin's view that section has a beneficial effect on tuberculous bone is so novel, and the evidence he adduces in proof of it is at first sight so remarkable, that I am sure surgeons who have a turn for pathology would be interested to hear something more on the subject.

6. In conclusion, it seems desirable that Mr. Tobin should mention specifically the works on general surgery in which the plates show the "weight as applied to the limb in its normal instead of its abnormal position," so that in future editions this error may be corrected. As the case stands there appear to be authors whose plates are inconsistent with their letterpress. But who are they?

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¹ BRITISH MEDICAL JOURNAL, April 24th, May 29th. ² It is notable that while the other joints when diseased assume undesirable positions, the shoulder undergoes no deformity even in far advanced disease. ³ *Clin. Soc. Trans.*, vol. XIV, 1881. ⁴ *Disease of Joints*, 1897, p. 402.

TWO CASES OF TUBERCULOUS DISEASE OF THE KNEE-JOINT TREATED BY IODOFORM INJECTIONS: RECOVERY.

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CASE I. Tuberculosis of Knee in a Man aged 25 Years.—H. L., aged 13 years, a tall, overgrown youth, with very pink and white complexion and red hair, came to me on May 1st, 1885, with an oblong swelling at the inner side of the right knee; it extended upwards and outwards for $3\frac{1}{2}$ above and $1\frac{1}{2}$ inch below the patella; pain complained of over inner condyle. He first noticed the enlargement in February of the same year; there was no history of an injury. He was ordered rest.

On June 10th the tumour was much the same but now presented distinct fluctuation. Under ether, and using the carbolic steam spray, I made a free incision, got 4 ounces of pus and a quantity of partially organised lymph from the abscess, and having thoroughly cleaned out the cavity dressed with McGill's salicylate silk waste and iodoform and put on a back splint, I could find no communication with the joint. The wound soon healed, but the joint never quite recovered its natural size.

On April 12th, 1896, the patient, now aged 24 years, came to consult me for a discharging sinus at the inner side of the right knee, and complained of pain on movement of joint, and as his work necessitated an amount of kneeling it caused him great inconvenience, and he was unable to walk with any degree of comfort. On passing a probe for $\frac{1}{2}$ inch I found the sinus divided into two passages, one upwards and outwards above the patella, and the other upwards and inwards towards the flexor tendons. I was unable to find any communication either with the former suppurating cavity or with the joint. The knee was enlarged and had lost its natural contour, and was also cedematous.

On April 14th, ether having been administered, I opened up the sinuses as far as they were superficial, and having scraped away all diseased tissue, packed them with iodoform and gauze. They were four months in healing up. Shortly afterwards two small points broke out, discharging a thin-looking pus; they continually healed up only to open and again discharge.

On January 26th, 1897, the knee presented a very enlarged, rounded appearance, all the natural points of the joint having disappeared and bulged towards the outer side, the patella being displaced outwards. There was distinct fluctuation of a pulpy character. The patient complained of severe pain

on any joint movement, and could neither fully flex nor extend the leg; altogether it was now a typical tuberculous joint. In consultation with Mr. W. H. Brown, we agreed that before I proceeded to excise the joint (which we warned the patient might even be necessary) to give a trial to injection of iodoform and glycerine.

On January 28th, having drawn off five ounces ($\frac{3}{4}$ v) of slightly clouded synovial fluid by aspiration, I injected through the same cannula 2 drachms of glycerine and iodoform; this was followed by great pain and swelling the same evening.

On January 29th the knee was much distended and very hot but there was no increase of temperature.

Ten days afterwards (February 6th), the knee having recovered its former size, I again operated, but only obtained 1 ounce of synovial fluid, coloured and smelling strongly of iodoform. I injected 2 drachms as before. The same night there was great pain and swelling but no increase of temperature.

The third aspiration was performed on February 14th, removing 2 drachms of stained fluid. I injected 2 drachms of glycerine and iodoform. The joint looked much healthier and felt much firmer. This time there was hardly any swelling afterwards nor pain.

On February 23rd 2 drachms of stained synovial fluid were removed, and I injected 2 drachms. This was not followed by pain nor swelling until next day, when there was very little swelling.

The fifth injection was made on March 3rd. I had great difficulty in getting into the joint, the knee being so much firmer and knit together. This injection was followed by no pain or swelling.

On March 21st, the sixth injection, for the first time there was no fluid in the joint. The knee was very much smaller.

On March 29th, the seventh injection, I had difficulty in injecting only 1 drachm of fluid.

On April 15th, the eighth injection, I injected again 1 drachm.

On April 30th, the ninth injection, I was only able to get $\frac{1}{2}$ drachm into the knee, and I believe it was only into the crack of the trocar. He could walk a short distance without difficulty or pain. The joint was nearly its natural size, but there was slight stiffness.

On May 26th, eighty-eight days after the first injection, the patient walked nearly two miles and felt no worse afterwards. There was very little difference in the size of the two knees. He only complained of slight stiffness, and informed me that his knee felt stronger and more to be relied upon than for several years. In this case, although I injected nine times, I believe the last three were unnecessary, though the great difficulty is to know when our object is attained. There is no doubt that a few years ago, before the present treatment was known, this knee-joint would undoubtedly have been excised, if not amputated.

June 26th. He has now returned to his work, at least has my sanction to do so.

CASE II. Tuberculosis of Knee in Child aged 8 Months.—M. K., a Jewish child, aged 8 months, a sickly, puny infant, came to the out-patient department of the Leeds Public Dispensary March 5th, 1896. The right knee was greatly enlarged, pulpy, and with nearly all shape of the joint lost, presenting a barrel-like appearance, and flexed almost at a right angle, and a white cheesy colour. There were two discharging sinuses, one at the outer side passing upwards and inwards, the other extending completely across the joint, probably, however, extra-articular. Under chloroform I dilated the sinuses, thoroughly scraped them out, and having inserted two drainage tubes, put on a back splint and dressed with gauze, iodoform, and wool.

On April 2nd the knee was larger and the joint full of pus, and felt on movement to be entirely disintegrated. Under chloroform I made a free incision into the joint from the outer side, and a counter incision at the inner side. The joint was washed out with corrosive sublimate solution 1 in 2,000 and a drainage tube carried across the joint from one incision to the other. It was dressed with gauze, iodoform, and wool, and put on back splint.

On April 14th the knee was much smaller and firmer, and the child generally improved in health. The drainage tube was taken out, and the knee dressed as before.