Any considerable thickness of fat, or œdema in the walls of the abdomen, necessarily obscures the clear notes of the subjacent viscera, and renders the more delicate distinctions impracticable. But by employing careful mediate percussion, the applied hand or fingers being pressed firmly on the walls, and the strokes being pretty forcible and abrupt, we rarely fail to obtain all the more important results of this method of examination.

In order to distinguish the dulness of fat or œdematous abdominal walls from that of increased density of the contained viscera, it is necessary to practise palpation in the modes already described; and having by these means determined the existence of unusual thickness of the walls, we shall be better prepared to estimate the amount of dulness which it would cause, and to use the degree of pressure and strong percussion which will elicit the resonance of the viscera underneath. Neither extreme flaccidity of the walls, nor rigidity from muscular action, materially interferes with the results of percussion; for this being practised mediately on the fingers, they supply the uniformity of superficial tension adapted, and required for the production of sound.

(To be continued.)

7, Holles Street, Cavendish Square.

ON SUPPURATION IN BONE; WITH CASES OF ABSCESS IN THE TIBIA SUCCESSFULLY TREPHINED.

By HENRY LEE, Esq., F.R.C.S., Surgeon to the Lock Hospital, Assistant Surgeon to King's College Hospital, etc.

CASE I. James Stocker, æt. 26, came under my care at King's College Hospital, on the 16th June, 1851. He then complained of intense pain in the left leg, which had prevented him sleeping, except at very short intervals, for a month previously. The pain continued without intermission, but was aggravated by occasional paroxysms. At such times, it would first be felt in the tibia, extend thence to the knee, and shoot up the thigh to the hip. This shooting pain was of a most excruciating character.

Upon examination, the shaft of the tibia was found enlarged to double its natural size. The enlargement occupied four or five inches of the bone, being most marked in its middle third, but altogether situated nearer the upper than the lower extremity. Pressure upon the swelling caused no uneasiness, nor did the position of the limb in any way appear to affect the character of the pain. No tender point could be detected in any part of the enlargement. When the pain was most severe, he appeared to derive some comfort from walking about; and he would occasionally get up in the night to do so. The pain and want of sleep had evidently given him a careworn appearance: but as far as the different functions were concerned, he appeared to be in perfect health; nor was there any history of his having suffered from constitutional disease.

He stated that, seven years and a half previously, he had, after some slight injury, first experienced pain in the leg. It was then worst at night, but used to leave him at five o'clock in the morning, "as regular as the clock struck". At that time, the pain lasted for nine weeks, and during the whole period was unaccompanied by any tenderness upon pressure. At different intervals afterwards, he experienced some slight return of the pain, but never so as to cause him much inconvenience, till he struck his shin against a chair, about five weeks before he came into the hospital. On the evening after this slight accident, he felt pain in the leg, which he at once recognised as of the same character as that which he had experienced seven years before. In two or three days the pain became so severe that it prevented him sleeping at night. He used different remedies, in the hope of obtaining some relief, but the symptoms continued unabated up to the time of his application at King's College Hospital.

A blister was now placed over the tibia, and was dressed with equal parts of mercurial ointment and extract of hyoscyamus. He was also directed to take four grains of the iodide of potassium in infusion of quassia three times a-day. This treatment was continued for a fortnight, when the pain had in a great measure subsided. He now took more to drink than he was accustomed to do, and the pain returned with all its former severity. It was, however, still unaccompanied by fever, or by any tenderness of the part. The same plan of treatment as before was adopted, and he experienced a remission from his sufferings for about a week. At the expiration of this time, without any apparent cause, the pain again returned, and a repetition of the medicine was not followed, as before, by any marked relief. I now determined to trephine the tibia, and advised the patient to come into the hospital for this purpose, which he did upon the 12th of August.

The operation was performed on the following day. As there was no spot upon the tibia that was particularly tender, a point was selected for the application of the trephine which projected, and which felt slightly hotter to the touch than the rest. A common trephine, with a shoulder, was used, as no other was at hand The instrument in consequence became buried in the bone, as far as it could conveniently go, before it reached the medullary canal. This depended upon the great thickness and increased hardness of the parts, and caused a little delay in the operation. After removing the trephine and reapplying it, some matter was observed oozing up by its side. A complete circle of bone, three-eighths of an inch in depth, was now removed, and an abscess in the medullary canal presented itself. Mr. Fergusson, who was present, observed the peculiarly white and creamy appearance of the pus. The cavity in which it was contained was about an inch and a half in length, and would have held two or three drachms. There was no portion of dead bone connected with the disease, and the matter was not in any degree putrid. The point at which the trephine was applied was exactly six inches from the head of the tibia.

After the operation, the edges of the wound were slightly brought together and covered with wet lint. The pain ceased as soon as the patient had recovered the immediate effects of the operation, and did not again return. On the 22nd of August, the skin had nearly covered the wound, leaving a small opening leading into the cavity of the bone.

The tibia itself had by this time considerably diminished in size. This patient was sufficiently well to leave the hospital at the end of a month; and in two months, the bone had nearly regained its natural size.

The following case is from notes taken by Mr. Prescott Hewett, during the time he was house-surgeon at St. George's Hospital.

CASE II. William Mowbray, ætat. 24, was sent up from the country on the 17th of November, 1838, for the purpose of having his leg removed. His constitution was at that time evidently suffering from disease, connected with enlargement of the head of the left tibia. This was accompanied by constant pain and want of sleep, and was supposed to be connected with some affection of the knee joint. Upon examination, the leg in this situation was found to be nearly an inch more in circumference than upon the opposite side. The swelling, which was prominent and tender at one point, extended for three and a half inches down the inner side of the bone. A dark purple blush occupied the skin, covering its most projecting portion a little below the tubercle.

He stated that, six years previously, he first experienced a dull, heavy pain over the shin bone, which was followed by a swelling below the knee. The symptoms continued unabated for two months, during which time he applied leeches and took medicine. He then changed his residence, for the benefit of fresh air, but the symptoms still continued, and had not entirely subsided for four months more. He now considered himself well, and continued without suffering any inconvenience till three months before his admission into St. George's Hospital. The pain, without any apparent cause, at that time returned, and the upper part of the bone again began to enlarge. Leeches were applied, and mercury given internally, but without benefit. After his admission into the hospital, calomel and opium, sarsaparilla and iodide of potassium, were given in succession, but still without any alleviation of the symptoms.

On the 13th of December, Sir B. Brodie applied a trephine to the head of the tibia, and about three drachms of pus were evacuated from a cavity in the cancellous structure of the bone. This cavity extended upwards to the immediate neighbourhood of the knee-joint. The point selected for the application of the trephine was where the bone was most prominent, and where the greatest tenderness was experienced upon pressure. The operation afforded immediate relief. The man slept well the night following, and from that time improved in health and appearance. In a month, the cavity of the abscess was nearly filled up, and the patient was discharged, cured, on the 30th of January, 1839.

REMARKS. The disease, of which the above cases afford examples, was originally recognised by Sir B. Brodie in the year 1824; and the symptoms, then observed for the first time, have served to distinguish the affection in the cases which have subsequently occurred. The first case recorded was that of a man, twenty-four years of age, who had a considerable enlargement of the lower end of the tibia. The skin covering the swelling was thin, tense, and closely adherent to the periosteum, but the ankle-joint admitted of every motion, and was apparently sound. There was constant pain in the part, generally of a moderate

character, but every now and then becoming excruciating, keeping the patient awake at night, and confining him to the house for many successive days. The disease had been going on for twelve years, and instead of getting better, became every year worse. At length it was resolved to amputate the limb. The lower extremity of the tibia was found to be enlarged, and its surface presented marks of great vascularity. Just above the articulating surface, there was a cavity in the centre of the bone as large as a chestnut, and filled with dark coloured pus. This cavity was smooth internally, and the bone surrounding it was much injected and harder than natural.

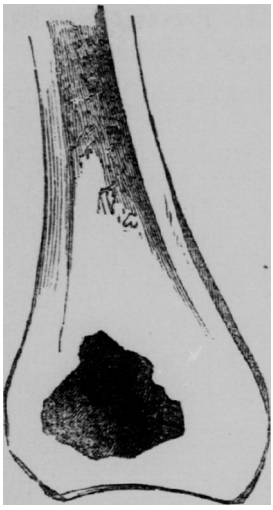

Fig. 1. Abscess in lower end of Tibia, with hypertrophy and much increased vascularity of bone.*

In every healthy inflammation the process of adhesion precedes that of suppuration, and pus when formed is consequently limited and circumscribed by lymph previously effused; but in unhealthy constitutions, the requisite power may be wanting to carry out the process of adhesion; and should suppuration then take place, the purulent fluid may permeate from cell to cell in the surrounding parts. These two processes are exemplified on the surface of the body by a common abscess and a diffuse cellular inflammation. In the cancellous structure of bone the actions are strictly analogous, though somewhat more tardy in their development. The products of the inflammation may be limited by the effusion of bony matter, which fills up and obliterates the surrounding cancelli; or the secretions of the part (when the adhesive process is imperfectly developed) may infiltrate the structure of the bone to an unlimited extent. We have thus a natural division of the cases of suppuration in bone into those which are circumscribed, and those which are not: into cases of abscess, properly speaking, and into those of purulent infiltration.

These two classes of cases differ in their causes, progress, and termination. The simple abscess usually originates in young and healthy persons: the infiltration of purulent matter rarely takes place without some present depressing influence, or some former cause of constitutional weakness. The simple abscess is marked in its progress by excessive pain, and may continue in much the same condition for many months, or even years. Diffuse suppuration, on the other hand, may be attended with little local suffering, but very soon becomes the cause of much general excitement, and leads to the formation of disease in other parts. The termination of circumscribed abscess is generally favourable, however long it may have lasted, provided the matter be evacuated externally: whereas purulent infiltration in bone is usually fatal.

* For the drawings from which the accompanying figures are taken, and for much assistance in other ways, the author is indebted to Mr. P. Hewett, of St. George's Hospital.

Chronic abscesses require moreover to be carefully distinguished from cases of softened tubercle, with which they appear to have been confounded. In the excellent memoir of M. Nélaton, published in Paris in 1837, we find the following description of encysted tubercle in the extremity of long bones. "When an encysted tubercle is developed in the extremity of a long bone, it is at first confined in the centre of the cancellous structure, not far from the articular extremity. It gradually increases, and approaches on one hand the cartilage, and on the other the circumference of the bone, external to the joint. If in the progress of its development it reaches the exterior of the bone, it escapes into the surrounding cellular tissue: an abscess is there formed, which increases and empties itself externally, leaving a fistulous communication with the interior of the bone. But if, on the contrary, it makes its way towards the articular surface, the cartilage with which it comes in contact is perforated, and the tubercular matter empties itself into the joint." M. Nélaton says that he has seen several examples of this unfavourable termination of the disease; and his observations are narrated with so much circumstantial detail, that we cannot doubt that he has actually traced the processes which he describes, and has related that which he himself has witnessed. But the cases of crude tubercle in adult bone to be found in our museums are so rare, we cannot but think that the frequency of its occurrence has been greatly exaggerated, and that M. Nélaton, and other continental writers, have included cases of softened tubercle and chronic abscess under one common description.

Chronic abscess may probably occur in any bone of the body. In the museum of the College of Surgeons there is a specimen where it had taken place in the clavicle; and Mr. Arnott has mentioned an instance of its having occurred in the femur. At King's College Hospital a case lately presented itself, where a circumscribed abscess had formed in the lower jaw, the bone around being greatly condensed and thickened. By far the majority of cases of chronic abscess, however, occur in the tibia, and almost always in the upper or lower extremity of that bone. The first case above related offers a peculiarity, the part affected having been towards the middle of the shaft.

When an abscess is formed in bone, important changes occur in the surrounding parts. The periosteum and adjacent bone become inflamed and thickened. This is followed by the formation of new bone, both in the cancellous structure, and on the surface of the original bone. The bony matter thus secreted corresponds to the deposition of lymph around an abscess in soft parts. That which is formed on the surface of the bone is readily recognised. It is disposed in layers, or in small irregular masses (fig. 4), and never presents the fibrous structure of the original bone. This deposition may go on, as the bone in immediate contact with the pus is absorbed; so that, although the abscess is gradually making its way externally, it remains covered with the same thickness of bone as before.

Deposition of new bony matter occurs much more readily around the spongy extremities than upon the compact shafts of bone. In the former situation, it may take place to such an extent, as to render it very difficult to say precisely what part of the bone was originally affected, and a trephine applied under these circumstances may fail to reach the seat of the disease.

The accompanying wood-cut represents a case in which the trephine was unsuccessfully applied, and where the disease consequently remained uncured. It also shows the fibrous membrane which occasionally, but by no means always, lines the cavity of the abscess. A similar cyst has been observed in cases of deposit of crude tubercle by M. Nélaton. It is at first gelatinous and semi-transparent; but subsequently becomes firm and unyielding. Examined externally, it presents a rose-coloured tint, dependent upon the vessels extending to it from the neighbouring bone. When macerated for several days in water or alcohol, it is found to be composed of white unyielding fibres interlaced in every direction, and resembling in some respects the structure of the capsular ligaments of joints. In other cases, the abscess is enclosed in every direction by condensed bone, which, when injected, presents a number of small bright red patches, giving, at a distance, the appearance of a continuous vascular layer.

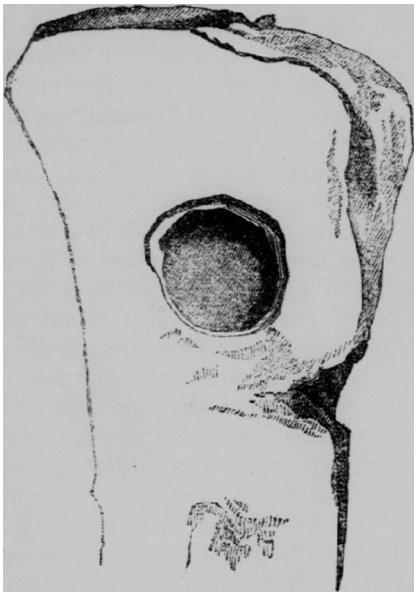

Fig. 2. Abscess in upper end of Tibia, containing putrid pus and dead bone; trephined unsuccessfully. The cavity lined by a dense membrane.

After a circumscribed abscess is formed in bone, the parts around appear to accommodate themselves to its presence. This is accomplished, not by the fibres of the bone being pressed asunder, but by an actual absorption of the osseous substance. The intense pain experienced depends, doubtless, upon the extreme tension maintained upon the unyielding structure, and every fresh accession of pain results from a fresh secretion of fluid. The influence of some medicines in restraining the symptoms may probably depend upon their power of promoting the absorption of the more fluid part of the abscess. Thus we find that the iodide of potassium, given in doses of three or four grains, will sometimes be followed by a temporary abatement of the pain; and it would appear from the cases recorded, that, after the first attack of pain, the symptoms may remain in abeyance for almost an unlimited period, until some accidental cause produces a fresh secretion

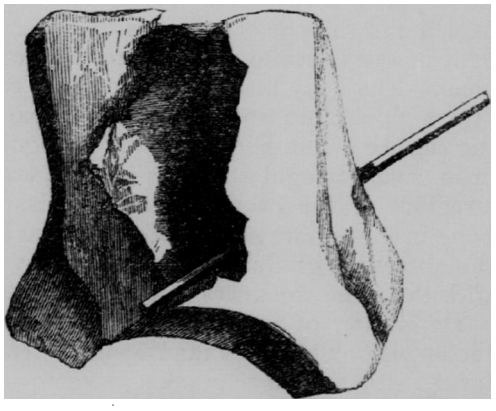

Fig. 3. Abscess in lower end of Tibia, opening externally.

of fluid. The cavity of the abscess then again becomes distended, and the pain of compression returns. The pressure of the fluid operates on all sides equally, and tends to cause absorption in every direction. But this is counteracted by the constant tendency to the deposition of new bone. A process analogous to the pointing of an abscess in soft parts not unfrequently takes place; the ulceration affects one point of the walls of the abscess particularly, and an opening may thus be formed, through which its contents are evacuated externally.

In other cases, the process of deposition goes on in the whole circumference of the bone as rapidly as that of absorption, and the abscess cannot then make its way externally. The compact structure of the shaft of the bone also prevents it extending in that direction; the articular surface is then the only one towards which the abscess can extend. No fresh layers of bone can here be deposited, and the fluid consequently makes its way towards the joint.

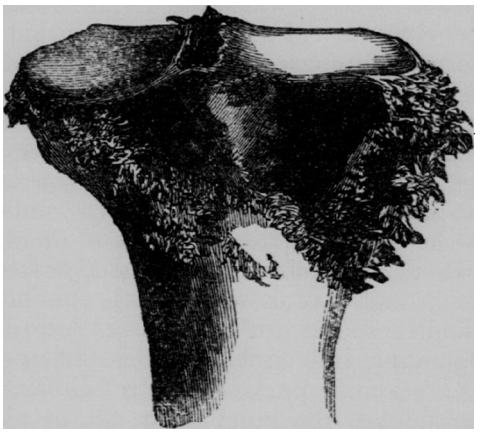

Fig. 4. Abscess in Tibia, opening into knee-joint.

The cartilage has been observed in such cases to be affected in two ways: either perforated, so as to allow the matter to escape directly into the articulation, or absorbed over a large surface without suppuration. In a case of the latter kind, recorded by Sir B. Brodie, the cartilage covering the head of the tibia in some places was perfect in its structure, but it existed only in narrow stripes; in other parts, it had degenerated into a substance something like condensed cellular membrane; in others, the only vestige of it was a kind of membrane, so thin, that the bone could be seen through it; and in other parts, the surface of the tibia was completely exposed, but not carious.

13, Dover Street, Piccadilly

SOME PRACTICAL OBSERVATIONS ON THE PATHOLOGY, MODIFICATIONS, AND TREATMENT OF CROUP.

(*Read before the Harveian Society, November* 6, 1851.)

By JAMES BIRD, A.M., M.D.

FEW infantile affections can more excite the fear of friends, or awaken the interest of the medical attendant, than the "croupy respiration" of children; nor are there many on the subject of which more contradictory pathological and therapeutical opinions are still entertained. In the estimation of some, this alarming and fatal disease is an inflammation of the larynx and trachea, terminating in the rapid formation of pseudo-membranous exudation, by which the air passages are blocked