ARTHRECTOMY OF ELBOW AND ANKLE.

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Received July 5th—Read December 12th, 1893.

PREFACE.—My reason for bringing these cases before the notice of this Society is that surgeons do not as a rule, in the case of the elbow- and ankle-joints, follow the practice that they recommend and adopt for the hip and knee. I hope to be able to show that some modification of our treatment for these joints should be adopted under the improved circumstances of modern surgery.

ELBOW.

The old operation of excision of the knee has been much altered of recent years. The erosion or scraping away of all tubercular growth from every part of the joint is now the key-note of the operation. Whether a thin layer of cartilage is removed from the articular surfaces and the bones made to ankylose by pinning or wiring them together, depends upon the condition found at the operation and the views of the operator. As a rule, on account of the knee being in the centre of a limb where the chief function is that of supporting the weight of the body, it is better to aim at immediate

ankylosis than to leave the knee to slowly undergo a subsequent contraction. If the cartilages are left, such rapid fusion of the two bones cannot be obtained.

In the case of the elbow, however, the same argument for removal of articular surfaces does not exist. The tubercular growths would by all modern surgeons be removed in the same thorough manner as in the case of the knee. This may be taken for granted, but the question which I wish to raise in this paper is, *whether it is necessary or desirable to remove the articular surfaces of the elbow-joint*. There are cases in which the operation of excision is rather too severe a method of treatment. Quite early in the disease no one would feel justified in taking off the ends of the bones forming the articulation. In young subjects, excision shortens the arm very materially, and the amount of movement to be obtained after the operation is very uncertain. Sometimes too much movement is obtained, and the new joint is flail-like in its action. Sometimes there is not enough movement produced for the amount of suffering experienced and trouble expended. Consequently the operation of excision is not done till quite late in the progress of the disease. The elbow in the early stage is therefore generally fixed at right angles on a splint in the hope that recovery will take place with ankylosis. Now it is in this stage that arthrectomy carefully done will shorten the duration of the treatment, improve the condition of the child's health, and often leave a movable articulation in place of an ankylosed one. If, however, the operation has not been undertaken early in the course of the disease, it must be an open question whether excision or arthrectomy would be the better operation. There is this to be said for arthrectomy, that even if ankylosis result the elbow is much stronger than after excision, the progress towards recovery is much more rapid and the operation is less severe, which is a point of some consideration in a weakly subject. Moreover, it is the result which you ordinarily expect to obtain by the treatment

of rest on a splint without operation. So that the patient is not worse off than if recovery had taken place in the early stage by means of fixation on a splint, and all risk of a feeble or flail-like elbow is avoided.

But it is in the early stages of the disease that this operation is especially suitable. So soon as it has been demonstrated that the joint is not going to recover rapidly by the ordinary treatment of rest on a splint and good hygienic conditions, such as sea air and good food, &c., the operation of arthrectomy should, in my opinion, be recommended. The patient after operation at once improves in general health, and oftentimes to such a marked degree as to present quite a contrast to his or her previous condition. This is in part explained by the absence of pain, but who can doubt from the general experience of joint operations that the removal of the tubercular growth, provided suppuration does not take place, has a most marked effect upon the patient's general condition, even when the pain has not been a previous symptom of any importance.

If the operation of arthrectomy is done at this early stage, there is a very great probability that a movable articulation will be obtained *without any passive movement*. In none of my cases *was passive movement at any time employed*. Two of them became ankylosed, as the operation was undertaken at a late period of the disease, another suppurated and was eventually submitted to excision. But in the remainder the operation of arthrectomy was done fairly early, and a movable articulation was obtained without passive movement.

The operation of arthrectomy is conducted in the following manner, which is practically almost identical with that employed for the knee. The skin is thoroughly cleansed with soft soap or liquor potassæ to get rid of all the old epidermis. A transverse incision is made across the base of the olecranon, which is then divided with the saw. The olecranon is drawn upwards, and the fascial expansion on each side divided to still further permit its retraction. The joint

is thus freely opened, and all parts can be efficiently scraped without further division of capsule or ligaments. With forceps and scissors, and the occasional use of a sharp spoon, all granulations are carefully removed.

Special attention is paid to all recesses such as that around the head of radius within the orbicular ligament. If the cartilage is loose it must be scraped away, and any soft and carious spot in the bone beneath must be gouged or scraped out. The most difficult part of the operation, however, is to clear the front of the joint beneath the brachialis anticus. If an assistant exercise traction on the arm and forearm the ligaments will be found to allow sufficient extension in their softened condition to enable the surgeon not only to introduce the sharp spoon between the articular surfaces but so effectually to scrape the front of the joint as to partially lay bare the muscle itself.

In most cases a finger even can be introduced and all cavities and recesses thoroughly explored. Whilst all this is being done, the joint is constantly flushed with warm boracic lotion, or weak perchloride of mercury solution, so as to wash out all the *débris* that accumulates from the scraping method of operation. When the joint has been freed from all the tubercular growth that can be detected, the olecranon is wired to the ulna in the same way that the patella is reunited in the case of the knee. The incision in the skin is completely closed with a continuous catgut suture, and a copious dressing applied to the back of the joint. No drainage-tube is now inserted, although one was employed for a few days in the earlier cases. A narrow strip of plaster of Paris is bandaged to the front of the arm, which is fixed at a right angle. In a favorable case this dressing is not removed for two or three weeks, when the wound is found healed and the catgut suture loose on the surface. If the temperature, however, should rise, the dressing has to be taken off for fear that there may be some distension of the joint. A director is in that case introduced between the edges of the incision and the fluid allowed to escape. When the

wound has healed, the plaster-of-Paris splint is applied to the back of the joint instead of to the front, to protect it from any accidental injury. This is kept on for two or three months till all tenderness has disappeared. The patient is then allowed to use the arm in any way that he or she likes. *No passive movement* has at any time been employed in any of my cases.

This absence of any passive movement in the after-treatment of the case is of considerable importance. Which of us can forget our experience as house surgeons of the suffering that was endured by patients whose elbows had been excised? Daily passive movement continued over many weeks and sometimes months was then the rule of practice, and indeed is still considered necessary by those who excise the elbow-joint. But I question very much whether at the present time it is necessary in either variety of operation.

If the wound has followed an aseptic course, the movement will be very easily re-established by the patient's unaided efforts. If suppuration has accompanied the healing process, no amount of passive movement will do more than yield a very limited amount of mobility, and that same amount I would venture to state can be obtained without any forcible manipulation. In arthrectomy, if the cartilages are found firmly attached to bone, the movements voluntarily obtained are likely to be extremely good, in fact little less than of the normal range.

If the cartilages have already peeled off, the movements may not be quite so free, but the strength of the joint in pushing and traction will be far greater than after excision. In most cases, however, where the cartilages have gone the joint is likely to ankylose.

The nine cases which are here recorded represent my entire experience of this operation on the elbow-joint. Where excision has been the first operation it has not been included, but in the last case it will be seen that arthrectomy was followed by excision. The first two cases resulted in ankylosis for reasons which are suffi-

ciently obvious in reading the history. But the disease was in each case arrested with the smallest amount of risk and discomfort to the patient.

CASE 1.—Edith J—, æt. 12, came from Wales and was admitted under my care at St. Thomas's Hospital in March, 1887. Her family history was bad. Her father and all her father's family had died of "consumption." She had lost one brother and one sister also of consumption. Three brothers and one sister were living. Her mother had died of heart disease.

Previous history.—At six years of age her left thigh had been amputated for disease of the knee.

The *present trouble* in the right elbow had begun five years before by its being painful and weak. During the last month or two the joint had been much more painful, and kept her awake at night.

There were the ordinary signs of disease with tenderness along the line of articulation, but no sinuses. The urine contained a trace of albumen. She was an extremely delicate-looking girl, but had no obvious signs of phthisis.

April 2nd.—The operation previously described was performed. There was a large amount of gelatinous synovial membrane to remove from all the recesses of the joint. The cartilage peeled off in large flakes from the bone, which was found soft, crumbling, and in parts replaced by tubercular granulation tissue. There were neither sequestra nor distinct cavities in the bone containing caseous *débris* of the tubercular growth.

The operation wound healed at once and required only a few dressings. Normal temperature was maintained after the first two days, and at the end of May she left for a convalescent home with the elbow in a plaster-of-Paris splint. There were then three very small tubercular sinuses which produced scarcely any discharge.

July 27th.—She returned to hospital with the sinuses healed. She had grown quite fat and strong, her appearance being in marked contrast to her previous condition.

The joint was ankylosed firmly at right angles, but she could use it freely and suffered very little inconvenience from the ankylosis. She had arrived more rapidly at the best result that would follow from the fixation of a diseased elbow in a splint than she would have done without any operation. She might, it is true, by excision have obtained a movable joint, but a glance at her history and physical condition did not lead me to expect a good result from excision. In her case I was more than satisfied with having arrested the progress of the disease and obliterated the joint as a nidus for further trouble.

CASE 2.—Elizabeth S—, æt. 12, first came under my notice at St. Thomas's Hospital in March, 1884, for disease of right elbow after a fall a few weeks before. The elbow was put up in a plaster-of-Paris splint, and she ceased attending in July, 1884.

In April, 1887, she again came under observation complaining in the same way of pain and swelling in the right elbow, after a fall about Christmas time. She was now unable to sleep on account of pain. The limb was fixed in plaster of Paris.

In September, 1887, she was admitted into hospital, as, although she was decidedly better after the four months' rest, the joint still presented the ordinary signs of active tubercular disease.

There was one point of importance in the family history, namely, that her mother had died of phthisis; she had had one sister, who died when a young woman from some cause which was unknown.

The right elbow on examination still proved to be slightly movable on flexion and extension. There was a good deal of swelling all round the joint, especially over the head of radius, and in parts it was distinctly fluctuating. There was lateral mobility and extreme tenderness on pressure all along the line of articulation, but there was no sinus.

September 17th, 1887.—The joint was opened in the

manner already described, and a quantity of purulent-looking fluid immediately escaped. The tubercular synovial membrane was all removed with sharp spoon and scissors, especially from the front of the joint and around the radio-ulnar articulation. The cartilage had almost entirely disappeared, and the bone beneath crumbled away before the gentlest application of the spoon. Nearly the whole of the head of the radius and a large portion of the external condyle of humerus were removed in this way. After the first five days the temperature remained normal, and the splint was removed on October 18th. It was then free from swelling and pain, and the wound was soundly healed.

She was sent to a convalescent home on February 7th, 1888, in excellent health. The joint was free from swelling and tenderness and firmly ankylosed, but there was one tubercular sinus.

April, 1888.—The wound was perfectly healed, and there was no sign of disease; but as there was no chance of obtaining movement a leather splint was ordered to protect the joint from any accidental injury.

January, 1889.—She was fatter and stronger than I had ever seen her before. The joint was perfectly ankylosed in good position, and free from any sign of disease.

CASE 3.—Eleanor T—, æt. 5, was admitted into the Victoria Hospital for Children under my care in March, 1888. "Family history of phthisis on mother's side." There were no other children.

There was a vague account of a fall on the elbow one and a half years before, and of a painless swelling for twelve months. A gutta-percha splint had been applied, and at the end of six months an abscess was opened. On admission there was much swelling of the left elbow-joint, with two sinuses, one on each side of the articulation.

March 26th.—The joint was opened by a transverse incision and division of the olecranon. A great deal of tubercular synovial membrane was removed, and carious

bone in the olecranon fossa was cleared away with the gouge. The cartilage was unaffected except at the spot just mentioned and at the margin of the articulation. I had some hope that this would in the end prove to be a movable joint, but suppuration took place and the temperature rose from time to time; the septic changes were, I think, due to the presence of sinuses before operation. She went to Margate on June 6th, and was last seen on October 29th, 1888. The joint was then healed, and there was a little movement. But she has been lost sight of, and there are not sufficient notes to speak positively of the final result, except that the disease was at an end.

CASE 4.—Ethel H—, æt. 6, was admitted into the Victoria Hospital for Children on October 22nd, 1888. There is no record of her family history. The disease was attributed to a fall on her elbow six months before, as the injury was immediately followed by swelling, pain, and stiffness. She had been treated by a splint. On admission there was considerable swelling of left elbow-joint with distinct fluctuation above the olecranon. Flexion and extension were extremely limited, but pronation and supination were unimpaired.

November 12th.—The joint was opened by division of olecranon, and a large caseous cavity was found in the lower end of the humerus extending into the trochlea and making a communication between the coronoid and olecranon fossæ. A large quantity of tubercular synovial membrane was removed from the front of the joint and from beneath the orbicular ligament. The cartilage and bone were healthy except at the spot above mentioned. The joint healed by first intention and gave no trouble or anxiety. Temperature rose to 100° within the first four days, but was afterwards normal. She went to Margate on December 6th with a fair amount of movement in her elbow. She had no passive movement of any kind, no recurrence of disease took place, and she has slowly acquired a movable joint. Flexion and exten-

sion are quite as free as a patient obtains after excision with the best results ; and, moreover, the movement is in the normal plane, *i. e.* without any lateral deviation. The strength and power in extension of the elbow-joint is far beyond anything that is seen after excision. Pronation and supination are scarcely less free than in a normal joint.

She was shown at the Medical Society in February, 1892, and these points demonstrated, and at the Royal Medical and Chirurgical Society, December 12th, 1893.

CASE 5.—Charlotte F—, æt. 8, was admitted into the Victoria Hospital on October 3rd, 1888. There was no history in her family of tuberculosis, and no definite account of injury. Pain and swelling in right elbow were first noticed in May—five months before her admission. As she had had no treatment by rest, the elbow was placed in a plaster-of-Paris splint and she was sent to the Margate Convalescent Home attached to the hospital on October 24th.

November 21st.—She was readmitted into hospital. There was no improvement visible in the condition of the joint. There was very considerable swelling of the elbow with rigidity and an unnatural lateral mobility showing that the ligaments were softened.

December 3rd.—The joint was opened by transverse section of the olecranon and a very extensive tubercular growth from synovial membrane exposed. This was all removed by scalpel, scissors, and scraper. The cartilage over the coronoid process came away, but in other parts it was firmly attached to the bone beneath.

By December 10th the wound was healed. There had been no pyrexia. On the 19th she was discharged.

May 6th, 1889.—She was readmitted with recurrence of disease in the external condyle of humerus. On May 13th the second operation was performed. This consisted in making a straight incision over the external condyle and the head of the radius ; a good deal of bone was scraped away, and the cartilage from the capitellum and the head of the radius was removed. On May 22nd the wound was

healed, and she was discharged with a splint. There had been no pyrexia.

August 11th, 1890.—She was readmitted with a small discharging sinus over the external condyle which had existed for a few months.

25th.—Third operation. The sinus was enlarged and a cavity in the bone scraped. There was no fever, but the sinus did not heal. She was therefore sent to Margate on September 17th.

After each operation this child wore a splint for two to three months, and passive movement was not at any time employed. She finally obtained complete flexion of the elbow-joint, and could extend the forearm about halfway beyond the right angle, towards complete extension. She had therefore a very wide range of movement in flexion and extension. Pronation and supination were, however, limited to half the normal range. She was shown at the Medical Society in February, 1892, in the condition described above.

CASE 6.—Bessie F—, æt. 9½, was admitted into the Victoria Hospital on March 15th, 1888. There was a family history of phthisis on both the father's and mother's side, but no history of any injury.

Ten months before admission she had first complained of pain in right elbow. The joint became swollen and stiff, but no treatment by rest had been adopted. On admission there was little or no movement in the joint, and a large amount of synovial thickening with fluctuation on either side of the olecranon. Although she had had no splint applied, I considered it more probable that she would obtain a movable joint if the diseased tissues were first removed by arthrectomy than if the joint were simply kept at rest.

April 30th.—The joint was opened in the same manner as in the other cases. The front of the joint and the head of the radius were comparatively free, and the main bulk of the disease was situated in the posterior part of

the joint. This appeared to have started from a cavity in the ulna between the olecranon and coronoid processes. This was scraped out and all the tubercular synovial membrane removed. The wound was healed on May 17th and she was discharged on May 29th.

No passive movement was at any time employed, and a splint was worn only for a short time. She came to report herself from time to time, and was shown at the Medical Society in February, 1892.

She has as perfect power of flexion as would be seen in a normal joint. But extension can only be obtained by the patient to a point a little beyond the right angle, whilst pronation and supination are quite as good as in a healthy joint.

She was shown to the Society December 12th, 1893.

CASE 7. Disease of right elbow, left wrist, and caries of cervical spine with paraplegia.—Louis W—, a boy æt. 9, was admitted into the Victoria Hospital in June, 1890, with disease of right elbow-joint which was most marked in the radio-ulnar articulation. He was sent to Margate with the elbow in a plaster-of-Paris splint on July 2nd, and was readmitted on October 27th with the joint practically in the same condition as before. On November 3rd the radio-ulnar and humeral joint was exposed. A cavity in the ulna was scraped out and much granulation tissue was removed from the joint around the head of radius. On December 8th he was discharged from the hospital with the wound healed and a fair amount of pronation and supination. A posterior plaster-of-Paris splint was applied to protect the joint from injury.

May 7th, 1891.—He was readmitted with well-marked recurrent disease in the whole of right elbow-joint. His left wrist, which had in the previous year been swollen and tender and consequently treated by fixation on a splint, was now decidedly diseased.

May 25th.—The right elbow-joint was opened by transverse division of the olecranon and the diseased

tissues scraped away. Very little of the head of the radius was left at the end of the operation. The wound healed rapidly as before, and on June 11th the left wrist was partially excised. The joint was opened by a single straight incision, and those of the carpal bones which were soft and loose were removed and the granulation tissue scraped away. This wound also quickly healed, and he left the hospital on June 27th.

In August he was seen at home by Mr. Nairn, who was then acting as house surgeon to the Victoria Hospital, and found to be suffering from cervical caries with paralysis of both arms, legs, and intercostal muscles. It was not at that time thought safe to move him to the hospital. He improved a little during the autumn, and was readmitted into hospital in February, 1892. He still had almost complete paralysis of arms and legs, but the intercostals were acting feebly. He had also a retro-pharyngeal abscess, which was opened externally behind the right sterno-mastoid. He developed under observation a swelling of the right half of the lower jaw, which proved to be due to caries. The two joints which I had previously operated on were free from gross disease, but the scar over the elbow was not quite sound. There was a little movement in the elbow-joint, and the position was good. The wrist-joint was very movable, and the fingers as pliable as those of the other hand.

He slowly recovered from the paralysis, and left the hospital in January, 1893, but the sinuses in the neck and under the jaw were still discharging. He died of tubercular meningitis in May, 1893.

CASE 8.—Lillie W—, æt. 4, was admitted into St. Thomas's Hospital on January 21st, 1891, with a history of only seven weeks' trouble in the right elbow after measles. The right elbow was very large and fluctuating all over, and thought to be filled with pus or softening tubercle. Temperature normal. It was not tender on examination, and movement could be obtained without

making the patient cry. Lateral mobility was very marked and rather painful. On the whole it was thought most likely to be a case of tubercular synovial disease, on account of the absence of acute pain and tenderness and the normal temperature. Chloroform was given on January 27th, and an incision made through the triceps into the centre of the swollen joint. Turbid fluid escaped, but the swelling was not much diminished. The wound was closed with a continuous suture, dressed, and placed in a plaster-of-Paris splint. No symptoms whatever followed this exploration, and the temperature remained normal.

March 7th.—The outer side of the joint was now much more swollen than any other part, and distinctly fluctuating. Chloroform was given, and an incision was made into the outer side of the joint. Pus escaped, and a finger being introduced a cavity was found in the outer condyle of the humerus containing a small sequestrum. This was removed, and the cavity scraped out with a sharp spoon. The cartilage was firmly attached over the whole of the articulation which was within reach. The joint was washed out and a drainage-tube introduced for a few days, and the arm fixed as before in a plaster-of-Paris splint.

April 17th.—The wound has been healed for some time. There is no swelling of the joint and no sign of disease. Some movement can be obtained without pain.

May 13th.—The limb was rather too straight from want of the splint, which had been left off without sanction. Plaster of Paris was reapplied with the elbow in over-flexed position.

After this the child was lost sight of for many months. The mother was written to, but no answer was received and the letter was not returned.

May 18th, 1892.—Twelve months after last note the child reappeared on account of tubercular dactylitis, for which a splint was ordered. The elbow was then found to be in a most satisfactory condition. There was no sign of disease. Flexion could be voluntarily obtained to half

a right angle, whilst the power of extension was nearly normal. Pronation and supination were perfect.

CASE 9.—Herbert A—, æt. 21, first came under my observation in consultation with Dr. Hamilton Allen, in February, 1890. He had complained of weakness in the right elbow since the previous November. A swelling had formed about a month before his visit, and had been opened with considerable relief by Dr. Allen. He had a sinus just below the inner condyle of right elbow, the probe passing deeply to the ulna but not absolutely striking dead bone. The joint was apparently free from any sign of disease.

April 19th, 1890.—This sinus was enlarged and the finger was introduced. The ulna just below and behind the seat of articulation was found rough and carious. This surface was scraped with a sharp spoon and the joint was fixed in plaster of Paris. The case did well till August, when it was found that the joint had become involved, with swelling, much pain, and starting at night.

August 29th, 1890.—A complete arthrectomy by transverse division of olecranon was performed in St. Thomas's Home. The operation was a complete failure. Sepsis undoubtedly took place, with profuse discharge and high temperature.

In October he went to Margate, and returned in the middle of November with well-marked disease of elbow and several sinuses. By the kindness of Mr. Watson Cheyne he underwent Koch's treatment in King's College Hospital during December and January, but with no beneficial result.

April, 1891.—He was admitted into St. Thomas's Hospital with sinuses on both sides and in front of the elbow-joint. There was a great deal of discharge and swelling, but no pain.

May 2nd, 1891.—The elbow-joint was excised, by making an H-shaped incision, on account of the sinuses. A small fragment of the olecranon was saved to attach to the ulna for the sake of the triceps, but in all other

respects the operation resembled the old-fashioned excision. There was a good deal of subarticular caries, but the bone beyond this area was healthy. All the gelatinous synovial growth, which was very profuse, was removed, the operation on this account lasting an hour and a half.

This operation was satisfactory, for in June he was attending as an out-patient and being dressed twice a week. There was then very little discharge, and the elbow had contracted to a moderate size.

December, 1891.—The sinuses still existed, but there was a limited amount of movement and very little discharge.

September 22nd, 1892.—The sinuses exist, but the discharge is insignificant; there is no pain and some movement in the joint.

June 23rd, 1893.—Dr. Allen sent this patient to me again on account of a chronic lumbar abscess. His elbow was almost well. There was no swelling and a fair amount of movement. There were still a few superficial spots with occasional discharge. It was a very useful elbow for all ordinary purposes.

ANKLE.

Nearly all surgical writers unite in condemning excision of the ankle-joint, and state that a Syme's amputation is far more satisfactory for those cases which do not recover by rest on a splint.

Since 1887 every ankle-joint which has required operative interference at my hands has in young subjects been submitted to arthrectomy by multiple incisions. One case only, in a man aged sixty-nine, was submitted to amputation.

The six cases here recorded of this operation are sufficiently encouraging to make one think that more effort should be made in the conservative treatment of this joint than appears at present to be the practice of operating surgeons. It must, however, be of limited application, for many cases in which the ankle-joint is involved have well-marked disease of nearly all the tarsal bones.

Obviously this operation would be unsuitable if both the whole tarsus and ankle-joint were involved. It is not my intention to speak here of disease of the tarsus, but of the ankle-joint proper.

In one case, in addition to the ankle-joint, the os calcis was extensively diseased and required almost complete removal from its periosteal shell. But with this exception the cases were those of true ankle-joint disease, in which, however, more or less of the astragalus was gouged away. They were at first treated by plaster-of-Paris splint and a knee-rest, unless they were too young to use this means of locomotion. It was only after this had failed to produce a good result that the operation was performed.

The method of procedure was by a series of vertical incisions round the ankle-joint, through which a sharp spoon and even a finger could be introduced. Four incisions, one in front and another behind each malleolus, avoiding ligaments and tendons but freely opening the joint, were generally employed. If traction was made on the foot, the finger could always be introduced to examine the joint surfaces after the use of the sharp spoon. The nozzle of an irrigator with a full stream of aseptic fluid was kept constantly going through one or other of the openings round the joint. The introduction of the finger was especially useful in hunting for soft patches of tubercular granulation tissue, for then the sharp spoon could be directed to that spot. In most cases the cartilage came away and the bone beneath was attacked with more or less vigour, according to the condition of the fragments which were removed. An objection has been raised to this method of procedure, namely, that the surgeon cannot *see* the condition of the structures upon which he is operating. But if the finger is used as described above, and when the bone is being scraped the fragments are carefully examined, there is really little difficulty in arriving at a conclusion as to when enough has been done. The consistence of the bone and its resistance to the action of a sharp spoon is not alone suffi-

cient, for, in the neighbourhood of a diseased articulation, the bone is often rarefied without being invaded with tubercle. When the operation was finished, a drainage-tube was usually inserted into the two posterior openings and retained for a few days, but latterly this has been given up. A copious dressing was applied, and over this a plaster-of-Paris splint was put on with an iron bar at the back, and windows at each side to enable us to watch for oozing of blood and discharge. When the patient was able to get up, a knee-rest was ordered to be used for many months.

Brüns has described exactly the same method of operating in the 'Münchener med. Wochenschrift,' 1891. It is, in fact, the plan which any surgeon would adopt who wished to scrape out the ankle-joint without a very free division of the tendons and ligaments round this articulation.

Mr. Arbuthnot Lane has recently (November, 1892) described at the Clinical Society two cases in which he opened the ankle-joint for the removal of disease by an incision across the front and outer side of the articulation, dividing all the tendons except those behind the internal malleolus. After the disease had been removed, he reunited the tendons and obtained an excellent result so far as the disease was concerned. Possibly this may be the better way of thoroughly clearing the joint of all tubercular growth, but it is a severe measure of which I have not as yet made a trial. After the results that have been obtained by the method described in this paper, I should feel inclined to think that Mr. Lane's plan should be reserved for cases of very advanced disease in which the growth has extended beyond the capsule of the joint.

But in the ankle, as in other joints, an early operation on the lines here indicated would I think save most cases from such extensive operative measures.

Mr. Lane could not give the precise results in his first case as to power of walking and mobility of the toes.

In the second the child could not move the toes, and the tendons had since required shortening. Information

is still wanting as to the result of this secondary operation and on the usefulness of the foot in walking. Both were cases of such advanced disease that a Syme's amputation was the only alternative. So far this is satisfactory, but it is necessary to show that the power of walking is as good as it would be after amputation to gain converts to this extensive division of the tendons of the ankle-joint.

CASE 1.—Charles R—, æt. 9, was sent to me at St. Thomas's Hospital by Dr. Weddall Thomas, of Peckham, in November, 1886, with the following history. Six years before, at the age of three, he had received an injury to his right ankle. This was followed by an abscess, which healed in a few months. He remained well for three years, when he was again lame for a short time. Two months before I first saw him was the date of the commencement of the attack for which he sought advice. The right ankle was swollen and very tender. There was a cicatrix close to the external malleolus. He could walk, but was very lame. The ankle was placed in a plaster-of-Paris splint and a knee-rest was ordered. He was given cod-liver oil and iron.

March, 1887.—The ankle was very little if at all improved; he had really carried out the principle of perfect rest to the joint for five months. He was therefore admitted into hospital for operation. There was gelatinous synovial thickening all round the articulation, filling up the hollows and depressions, but most marked in the neighbourhood of the external malleolus where the scar was placed. Here also there was more tenderness on pressure than elsewhere. Passive movements of the joint were comparatively free and unaccompanied by pain.

The operation previously described was performed, by four vertical incisions, one in front and another behind each malleolus. About an ounce of purulent-looking fluid was evacuated and a large quantity of gelatinous synovial membrane was removed with the sharp spoon from the whole articulation. The finger was easily introduced, and

a cavity was found in the external malleolus communicating with the tibio-fibular portion of the common joint cavity, This was thoroughly scraped out and the softened bone around removed. The scar previously mentioned was exactly over this cavity, which was no doubt the spot at which the disease had originated in the lower epiphysis of the fibula and from which the whole joint had become infected. The temperature after the operation never rose above 99°, and the wound healed rapidly, leaving, however, small sinuses with scarcely any discharge for a few months. He went to a convalescent home in June with his leg on a knee-rest, and returned in August. His ankle was then in first-rate condition without swelling, pain, or tenderness, but there was still one sinus over the external malleolus.

February, 1888.—This sinus leading to the tip of external malleolus was scraped, and then it finally healed. He still continued both splint and knee-rest, although there was no sign of disease in the ankle-joint. In November, 1889, he was allowed to walk about at home but still to use the knee-rest out of doors. The joint was then quite movable and free from disease.

December, 1890.—For some time it had been noticed that, although the ankle was free from disease, the foot was becoming everted from irregular growth at the epiphysial line of the tibia, so that the centre of gravity did not fall upon the tarsal arch but to the inner side. Apparently this was due to deficient growth on the outer side of the tibial epiphysis, for the fibula was bent and the internal malleolus unduly prominent; but it might have been due to overgrowth at the inner side of the epiphysial line.

In February, 1891, an osteotomy of the tibia and the fibula was done about $1\frac{1}{2}$ inches from the joint line, removing a little bone from the inner side of the tibia in the form of a wedge. The foot was then easily brought into the correct position and fixed in plaster of Paris. The wounds healed at once and the deformity was corrected.

In June he was walking about with boot and side-irons to maintain this improved position.

October, 1892.—For the past twelve months he had been acting as a hosier's assistant, standing for twelve hours behind the counter lifting heavy boxes and parcels, &c., from the shelves. He was not lame, his ankle was movable to a slight extent and free from disease. To see him walk no one would suspect that he had had disease of his ankle. He came only to ask if he ought to renew the double irons that were supplied in June, 1891, as he had outgrown them.

He was shown to the Society December 12th, 1893.

CASE 2.—Réné van der V—, æt. 3, was sent to me at St. Thomas's Hospital by Dr. Cook, who was at that time in practice in Honor Oak. His ankle had been swollen and painful for four months, and a discharging sinus had existed for six weeks. There was a history of a blow two months before the ankle was first noticed to be swollen. On his mother's side the grandfather had died of phthisis, but there was no other history of consumption, and his mother had had three other children, who were alive and well. The right ankle was much swollen with tubercular synovial membrane all round the articulation. Above the internal malleolus there was a large open sinus leading directly into the tibia at the epiphysial line. The child was admitted into hospital, and on August 13th was submitted to operation. The sinus was enlarged and the bone scraped. A carious cavity was found at the epiphysial line, formed chiefly at the expense of the shaft, from which the epiphysis was almost detached and loose. This was on the wrong side for the disease to have spread to the ankle-joint by continuity. Still the path may have been present but unobserved. The ankle was opened by four incisions as before described, and all the granulation tissue, of which there was a great quantity, was scraped away. The cartilage on both the tibia and the astragalus was seen and felt to be firmly attached to the bone beneath. The highest temperature recorded was 100° F., and the sinuses had almost healed when in October

he was found to have contracted scarlet fever. This he had in rather a severe form, followed by albuminuria. In February, 1888, he came back to my charge in a feeble condition. But the joint, although discharging more than it had done when he left the surgical ward, was not in a hopeless state. There was not much swelling, very little pain, and the ligaments were still intact. The friends, however, were convinced that he was going to die, and insisted on removing him from the hospital. They had not seen him whilst he was suffering from scarlet fever, and judged by the altered appearance of his face that the ankle was the cause of his having become thin and weak. To my mind there was a very good prospect of perfect recovery both of health and of joint, but the case was not seen again and no positive statement can be made of the result.

CASE 3.—Frederick Walter L—, æt. 7, was admitted under my care at the Victoria Hospital for Children in May, 1889. He had had measles a year before, and shortly after an injury to his left ankle, which had never been well since.

There was a great deal of pulpy swelling all round the line of articulation, with tenderness on pressure and pain on movement. He had been treated as an out-patient by rest, but without any improvement. He was therefore, after a few weeks' confinement to bed, submitted to arthrectomy of the left ankle. The same method of operating was employed, and the tubercular granulation tissue was scraped away. The cartilage over the tibia and the astragalus was loose, and came off in large flakes. A good deal of the astragalus had to be gouged away before sound bone was reached. He was sent to Margate in June with his leg on a knee-rest. He was readmitted in August with sinuses, but his general health was very much improved. The sinuses were scraped, but no disease of bone was discovered. The wounds were all soundly and permanently healed by the end of September, and he left the

hospital in October; 1889, with his leg still on a knee-rest. He was made to continue the use of the knee-rest during the whole of 1890, but in 1891 he was allowed to give it up whilst indoors.

In 1892 he was allowed to walk with boot and iron, as he had had no relapse and the joint had remained free from any sign of disease.

On October 20th, 1892, the following note was made:—"The joint is ankylosed at right angles, but there is free movement in the mid-tarsal joint, so that there is scarcely any perceptible lameness in walking."

He was shown to the Society December 12th, 1893.

CASE 4.—Nellie K—, æt. 2, was admitted under my care into the Victoria Hospital for Children in August, 1889. She had well-marked disease of the ankle and inner side of tarsus, which had commenced about three months before admission. The foot was put up in plaster of Paris, and the child sent to the Convalescent Home at Margate attached to this hospital. She was readmitted at the end of five weeks, when the disease was found to have steadily progressed in spite of the enforced rest and good hygienic surroundings. An abscess was at once opened on the inner side of foot, and on September 25th a complete arthrectomy was performed. The same method was employed as in the other cases, but the disease was much more extensive, involving the astragalus, os calcis, and scaphoid, besides the whole of the ankle-joint proper. These bones had therefore to be scraped and gouged in a way that did not give much prospect of success. But so far as the immediate result was concerned it looked most hopeful, for the wounds rapidly healed. At the end of October recurrence of disease was, however, clearly established, and a second scraping operation was performed. Again the wounds did well for a time, but in December a third operation of the same kind became necessary. On this occasion nearly the whole of the os calcis was removed from within by the gouge, leaving only a shell of bone. A good deal of the articular end

of the tibia had also to be removed. She left for the Convalescent Home at Margate on January 15th, 1890, about five weeks after this last operation, with, as I thought, poor prospects of a useful foot. However, it recovered from these severe operations in the most marvellous manner, and by June, 1890, the wounds were healed and the foot was free from disease. I certainly did not expect such a good result, but as the child was healthy and bore these operations well without any marked constitutional disturbance or septic contamination, I thought it worth while to persevere, as the foot could at any time be removed by Syme's amputation.

The child has unfortunately not been seen since June, 1890, and letters sent to the former address have been returned through the post. If the child had been old enough for a knee-rest, she would undoubtedly have been brought back to know if it might be left off. As it was the child walked about in a plaster-of-Paris splint, and this soon ends in the splint being removed by the mother, and if there are no wounds to dress and no pain, she does not think it necessary to come to hospital. We may therefore conclude that the case has been successful.

CASE 5.—Lydia W—, æt. 6, was admitted into the Victoria Hospital under my care in September, 1890. Her right ankle had been swollen and painful since December, 1889. She had worn a plaster-of-Paris splint and used crutches since March, with considerable benefit. At the time of her admission the ankle was steadily getting worse, with increasing swelling, more pain and tenderness, and "night starts."

On October 13th, 1890, complete arthrectomy of the ankle-joint was performed with the same incisions as in the previous cases. The synovial membrane was freely removed and the cartilage easily peeled off from tibia and astragalus.

It was found necessary to remove a good deal of the astragalus with spoon and gouge, but the tibia seemed fairly firm and sound. The temperature remained normal,

and the wounds were healed by January, 1891. She left for Margate on January 15th with her leg on a knee-rest and her foot in plaster of Paris.

There has been no relapse, and the ankle is now perfectly well. She began walking in May, 1892, with boot and iron, and has been seen many times since then. At the present time (June, 1893) she walks without lameness, has a fair amount of movement in the ankle-joint, and looks the picture of health.

She was shown to the Society December 12th, 1893.

CASE 6.—Florence B—, æt. 6, was admitted under my care into St. Thomas's Hospital in August, 1890. Eight months before admission she had slipped off the kerbstone and injured her left ankle, which was swollen immediately after and had never properly recovered.

There was no family or previous history of importance. She had been treated by me in the out-patient room for six months with plaster of Paris and a knee-rest, but no marked improvement had taken place. There was swelling all round the left ankle of the kind usually seen in tubercular arthritis. There was distinct tenderness along the line of articulation, but there was still some movement in the joint. Arthrectomy was done in September in the manner before described. Pus was found towards the outer side of the joint. The cartilage came away from both the tibia and the astragalus, and a large part of the latter was removed, as it was thought from examination of the fragments that it was tubercular.

Early in October the wounds had healed, the joint was movable, and there was no pain or tenderness. She was sent to a Convalescent Home with her leg on a knee-rest.

June 19th, 1891.—She was readmitted. She had not been seen since the preceding October, but had worn her knee-rest ever since, and had improved immensely in general health. There was a painless gelatinous swelling all round the articulation, but the tarsal bones and joints were quite free from any signs of disease. In July the

joint was opened in the same manner as before, but with the exception of a small amount of tubercular growth beneath one of the original wounds there was no disease to be detected. The joint surfaces looked and felt quite healthy. The wounds healed rapidly and she became an out-patient, coming up from time to time for examination. During the whole of 1892 she continued to use a knee-rest and a plaster-of-Paris splint with an iron bar at the back. No recurrence of disease took place, although from the polished condition of the iron bar round the heel and sole of foot it was clear that she walked about at home.

January, 1893.—She was ordered a boot and iron for walking. There was no sign of disease, and some movement was retained in the ankle-joint. She has been seen several times since this note was made, walking well but with some stiffness in the ankle-joint. Increased mobility, chiefly in the tarsal joint, will take place as in the other cases with time and exercise.

April 12th, 1893.—The movement in the ankle-joint is decidedly increasing.

Shown to the Society December 12th, 1893.

Two other cases might also be mentioned in relation to this operation, although they have not been included in the above list because the whole ankle-joint was not submitted to arthrectomy.

Both were cases in which the head and neck of astragalus were partially removed by scraping and gouging. The ankle-joint was opened through the incision necessary for this operation, and the anterior part only of this joint was treated with the sharp spoon. In one of these cases complete recovery took place, and the child is now walking about with a sound foot. In the other the disease returned, and during my absence from work last summer (1892) was submitted to amputation. I am unable therefore to say what was the condition of affairs.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. vi, p. 29.)