ERASION VERSUS EXCISION IN CHILDHOOD; OR, THE REMOTE EFFECTS OF EXCISING OR ERASING TUBERCULOUS JOINTS IN CHILDREN.

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Operations during childhood possess features of interest quite distinct from those connected with adult life; and whether these be considered in relation to the immediate effects of an operation, or to its remote influences, they are of such a distinctive and important character as to demand separate consideration. The innumerable changes wrought during the process of development upon every part of the system will of necessity entail, at some more or less distant period, indications of previous interruptions with normal growth. In no part of the body is this better seen than in the case of the joints. The functional activity of these regions is such that any interference with them during the process of growth must show itself ultimately in a very marked degree, both in impairment of movement and in development. Inasmuch as the joint proper is dependent upon the action of muscles attached to other regions, these latter also suffer to an extent in proportion to the normal part they are accustomed to play under ordinary circumstances. What I propose to consider in these remarks is the effect observed in a limb after either excision or erasion of a joint, judged by the time which has intervened between the operation and a subsequent investigation of the parts. With the help of my assistant, Dr. Macdonald, I have been enabled to ascertain the results of several of my cases operated upon as far back as 1887. The number turns out to be a comparatively small one—twenty-six—but, I think, sufficiently large to prove instructive, and admit of certain conclusions being drawn. From the number of operations of this kind which I have performed in the Victoria Infirmary, during the last ten years, I had hoped for fuller statistics; but the impossibility of tracing some cases, and the death of others, renders it very difficult to present a long series, the result of one man's work. I might have extended my list by drawing upon reported cases, or upon the work of some of my colleagues in Glasgow. It seemed to me, however, that more value, as a rule, attaches to the operative results obtained by the same surgeon, than to those the collective results of several men's labour. The large class of excisions of the hip-joint I have not included in my table for discussion, for the simple reason that we cannot erase that joint; and there is, therefore, no data for comparison. On the other hand, I have included excisions of the shoulder-joint, because I believe, under
certain very favourable conditions, this might be erased. It will be seen, therefore, that the cases for consideration limit themselves almost exclusively to the elbow, knee, and ankle, where it is possible either to excise or erase. I should add, before referring in detail to the table of cases, that in every instance the operation was performed for tuberculosis; and, further, that I have made no selection whatever. With only one exception, I have recorded in this list every case that I have been able to lay my hands on. The exception was that of an erosion which, unfortunately, became septic either at or immediately after the operation. It did not seem to me fair, in discussing the relative merits of the two operations, to allow an accident of this kind to weigh either for or against any conclusions which might be drawn. I will now proceed to take up each series of cases, and discuss them in the order in which they appear in the table.

Table of Twenty-six Cases of Excisions and Erasions of Tubercular Shoulder-Elbow-Knee- and Ankle- Joints in Children, showing Results after intervals of from 1½ to 13 Years.

| No. | Name and Age (at Date of Operation) | Date of Operation | Period elapsed since Operation | Right or Left Side | Relative Measurements | Total Shortening of Limb. | Functional Activity | Remarks |
|-----|-----------------------------------|-------------------|-------------------------------|-------------------|----------------------|-------------------------|---------------------|---------|
| 1   | George S., set. 13. | April 5, 1888. | Years. 11 | R. | ... | In. 2½ | “Free movements at the shoulder-joint; limited elevation, unable to reach a right angle.” | “He has a perfectly useful arm, and can lift a half hundred-weight.” (Report of Dr. William Russell, New Mains.) |
| 2   | John L., set. 9. | May 6, 1893. | 5½ | L. | Arm 3 in., forearm 1 in. shorter. Circumferential measurements also much less. | 4 | Free movements at the joint; arm could be raised to a right angle with the body. | Hand diminished in size in all dimensions. |
| 3   | Patrick T., set. 4. | Jan. 17, 1896. | 3½ | R. | Arm 1 in. shorter; but forearm equal. | 1 | Free movements at shoulder; but can only raise limb to 45°. | Slight diminution in size of hand. In this case the excision was performed by a deltoide flap, which appears to have unduly impaired the action of that muscle. |
| 4   | Maggie C., set. 11. | Mar. 3, 1888. | 13 | L. | Arm 1½ in., forearm 2½ in. shorter. | 4 | Perfect flexion and extension of false joint. | Hand diminished in all dimensions. Upper part of thorax, 11 in. less on left side than right. Excision cicatrizes only. Very serviceable limb. |
### ERASION VERSUS EXCISION IN CHILDHOOD.

| No. | Name and Age (at Date of Operation) | Date of Operation | Period elapsed since Operation | Right or Left | Relative Measurements | Total Shortening of Limb | Functional Activity | Remarks |
|-----|-------------------------------------|-------------------|-------------------------------|---------------|-----------------------|--------------------------|---------------------|---------|
| 5   | Robert L., at 14.                   | Sept. 10, 1888    | 10 yrs.                       | R.            | "Arm 1 1/2 in., forearm 2 1/2 in. shorter. Arm 3 in. and forearm 1 1/2 in. less in circumference." | In. 4               | "Incomplete extension. Flexion to a right angle with arm." | "Hand smaller than left... discharging sinus for two years after operation. ... Very useful limb, but becomes exhausted after much use." — (From Dr. McLaren, Uddingston.) |
| 6   | Hugh S., at 14.                     | Mar. 6, 1894      | 5 1/2 yrs.                    | R.            | Arm 1 1/2 in., forearm 1 1/2 in. shorter. | 3                | Bony ankylosis at an obtuse angle. | The limb a very serviceable one. Numerous cicatrices exist around the joint. |
| 7   | James P., at 13.                    | June 20, 1894     | 4 1/2 yrs.                    | R.            | Arm 1 1/2 in., forearm 1 1/2 in. shorter. | 2                | Complete flexion and extension of false joint. | Hand 1/2 in. shorter, and proportionately small in other dimensions. Very few cicatrices present. A very serviceable limb. |
| 8   | Francis H., at 10.                  | May 7, 1895       | 3 1/2 yrs.                    | L.            | Arm 1 1/2 in., forearm 1 1/2 in. shorter. | 2 1/2             | Complete extension, but flexion limited to bending the forearm a little above the right angle. | Marked diminution of hand in all dimensions. Few cicatrices, apparently those connected only with the incisions for excision. Numerous and extensive cicatrices exist around the joint. |
| 9   | John H., at 7.                      | Nov. 1, 1895      | 3 yrs.                        | L.            | Arm 1 1/2 in., forearm 1 1/2 in. shorter. | 2 1/2             | Bony ankylosis at an obtuse angle. | |
| 10  | Sarah S., at 10.                    | June 25, 1895     | 3 1/2 yrs.                    | L.            | No shortening of either arm or forearm. Circumferential measurements of arm and forearm less. | 0                | Firm ankylosis at an obtuse angle. | Hand same in length, but slightly diminished in breadth (1/2 in.). |
| 11  | George T., at 7.                    | Oct. 23, 1895     | 2 1/2 yrs.                    | R.            | No shortening of either arm or forearm. | 0                | Flexion and extension to 60°; 30° to each side of the right angle. | A perfectly serviceable limb. |
| 12  | Rachel D., at 7.                    | Jan. 23, 1896     | 3 1/2 yrs.                    | L.            | No shortening of either arm or forearm. | 0                | Flexion and extension to 20°; 10° to each side of an obtuse angle of about 130°. | A perfectly serviceable limb. Girl strong and healthy-looking. |
| 13  | Thomas M., at 10.                   | Oct. 26, 1896     | 2 yrs.                        | L.            | No shortening of either arm or forearm. | 0                | Firm ankylosis at an open angle. | Both hands equal in all dimensions. (Report of Dr. William Grant, High Blantyre.) |
| 14  | Mary M., at 3.                      | Feb. 21, 1897     | 2 1/2 yrs.                    | R.            | "No shortening of either arm or forearm." | 0                | "Firm ankylosis; limited amount of pronation and supination." | |

**Series III.—A. EXCISION OF KNEE-JOINT.**

| No. | Name and Age (at Date of Operation) | Date of Operation | Period elapsed since Operation | Right or Left | Remarks |
|-----|-------------------------------------|-------------------|-------------------------------|---------------|---------|
| 15  | Wm. M/I., at 9.                     | Mar. 15, 1890     | 9 yrs.                        | L.            | 2 Parts firmly ankylosed; limb perfectly straight. |
| No. | Name and Age (at Date of Operation) | Date of Operation | Period elapsed since Operation. | Right or Left Side. | Relative Measurements. | Total Shortening of Limb. | Functional Activity. | Remarks. |
|-----|-----------------------------------|------------------|--------------------------------|---------------------|-----------------------|--------------------------|----------------------|----------|
| 16  | James M'G., set. 6.               | June 24, 1893.   | 5½ Years.                      | L.                  | ..                    | 2                        | Firm ankylosis, but slightly flexed. | The limb a very serviceable one. |
| 17  | Kate M.F., set. 8.                | Mar. 31, 1896.   | 3 L.                           | ..                  | ..                    | 2                        | Firm ankylosis; leg perfectly straight. | Foot markedly diminished in all dimensions. |
| 18  | Hugh B., set. 3.                  | Dec. 9, 1896.    | 2½ R.                          | ..                  | ..                    | 1½                       | Firm ankylosis, but with slight hyper-extension. | .. |

**Series IV.—A. EXCISION OF ANKLE-JOINT.**

| No. | Name and Age (at Date of Operation) | Date of Operation | Period elapsed since Operation. | Right or Left Side. | Relative Measurements. | Total Shortening of Limb. | Functional Activity. | Remarks. |
|-----|-----------------------------------|------------------|--------------------------------|---------------------|-----------------------|--------------------------|----------------------|----------|
| 22  | John D., set. 8.                  | April 10, 1887.  | 12 L.                          | Thigh 1 in., leg 3 in. shorter. | 4                    | 0                        | Fibrous ankylosis, with slight flexion. | The foot much smaller in all dimensions. |

**B. ERASION OF ANKLE-JOINT.**

| No. | Name and Age (at Date of Operation) | Date of Operation | Period elapsed since Operation. | Right or Left Side. | Relative Measurements. | Total Shortening of Limb. | Functional Activity. | Remarks. |
|-----|-----------------------------------|------------------|--------------------------------|---------------------|-----------------------|--------------------------|----------------------|----------|
| 23  | Ellen M'G., set. 6.                | Mar. 22, 1895.   | 4 L.                           | Both legs measured the same in length. | 0                    | 0                        | Fibrous ankylosis, with free flexion, and extension at the ankle-joint. | In walking only a very slight limp was observable. |
| 24  | Kate M., set. 8.                   | June 18, 1895.   | 3½ R.                          | Both legs the same in length. | 0                    | 0                        | Fibrous ankylosis, with free flexion, and extension at the ankle-joint. | With the exception of the line of incision in front of the ankle, the result was so perfect that no difference could be detected between the two feet either as to appearance or function. |
| 25  | George R., set. 5.                 | Nov. 19, 1895.   | 3½ L.                          | Both legs the same in length. | 0                    | 0                        | Fibrous ankylosis, with free flexion, and extension at the ankle-joint. | The child walked so well, that the operated-upon foot was indistinguishable from the sound one. “No difference observable in walking. A complete success in every way.” (Report of Dr. K. Corbett, Barrhead.) |
| 26  | Martha C., set. 9.                 | April 6, 1897.   | 2 R.                           | "No difference in length of leg." | 0                    | 0                        | "Slight stiffness at joint." | .. |
ERASURE VERSUS EXCISION IN CHILDHOOD.

The first series comprises three cases of excision of the shoulder-joint. They are too few in number to admit of any special remarks regarding the amount of shortening that might be expected. But there is one striking feature which has come out very prominently in many of the other cases, and that is the diminution in growth which takes place in parts of the limb quite unconnected with the actual seat of disease and operation. This I shall refer to later; but it will be noted in Case 2, for instance, how both the forearm and hand were diminished in size as compared with the same parts on the sound limb. Functional impairment after excision of the shoulder is limited to the raising of the arm from the side; there are free movements in all other directions. This limitation in elevation of the arm doubtless arises from the altered mechanical conditions resulting from the removal of the head of the humerus. The arm of the lever being shortened between the insertion of the deltoid (the power) and the glenoid cavity (the seat of the fulcrum), a greater power is required to elevate the limb. But this diminution of the distance has lessened the contractile range of the deltoid, and hence, while required to do more, it can only do less. Added also to this diminution of power, when in reality more is required, the muscles which acted on the tuberosities have been detached, and are hence useless for any purposes of elevation. These few considerations are given to show that if it were possible in any case to erase the joint instead of excising it, better results might be obtained in every way; freedom of movement might be got almost equal to that so successfully acquired in the case of erased ankle-joints.

Passing to the second series of cases, those of excisions and erasions of the elbow-joint, we have some very interesting facts elicited. It must be borne in mind, in the first place, that by excision of a joint we take away the articular surfaces of the humerus, ulna, and radius, irrespective of their being diseased or not; while in erosion we remove the disease, and that alone, interfering as little as possible with any other parts of the joint which appear free from involvement.

The comparison of these two operations shows that in the case of excision we may, though by no means necessarily, get very free flexion and extension, associated with much shortening of the limb; while in the case of erosion we almost always get more or less ankylosis, either quite firm, or admitting of some comparatively slight flexion and extension (see Cases 11 and 12), but there is little or no shortening of the limb.

It should be noted in the case of the excisions, that where ankylosis and not free movement was the result of the operation, there existed around the joint numerous cicatrices (Cases 5, 6, and 9), while, where there was free movement, there were simply the cicatrices of the operation incisions (4, 7, and 8). The inference naturally is, that where numerous sinuses exist before the opera-
tion, and especially after it—where, in fact, several subsequent scrapings may have to be performed—then we may expect anything between comparatively limited movement and firm ankylosis. On the other hand, where previously no open wounds exist, and none follow the operation, the most perfect functional activity of the false joints may be looked for.

Unfortunately, it was not noted whether similar considerations affected the question of movement in the case of the erasions. But the probabilities are, that the same would hold; that where discharging sinuses previously existed, or lingered after operation, firm ankylosis would be the rule; while movement to variable extents—never, however, to the same degree as in the case of excision—would follow the opposite conditions. The nature of the joint—a "hinge"—with normally no lateral action, renders it probable that any movement will be the exception rather than the rule.

In the third series, that of excisions and erasions of the knee-joint, there are also interesting comparisons. The operations themselves are virtually the same as those upon the elbow, with, however, functionally opposite results; for while in excision of the knee we aim at getting bony ankylosis, in the elbow we hope for movement; in erasion, we may get some movement at the knee, but we generally get firm ankylosis at the elbow. In other respects the results are fairly similar, for in excising we may, and probably will get, much shortening; while in erasing little or no alteration in the length of the limb appears to follow. There is another important point of difference between these two operations upon the knee, which, from the effect it has upon the after-treatment, must be carefully noted. In a successful excision, with firm bony ankylosis, the limb remains perfectly straight. In an equally successful erasion, there is a constant tendency, so long as growth is proceeding, for the knee to become flexed.

In the fourth series, that of excisions and erasions of the ankle-joint, the solitary instance of the case of excision renders it difficult to make any very positive comparisons. This one case, however, is probably pretty typical of what might be expected in others, and may certainly be taken in itself as representing as good a result as may ever be expected. Although the joint was excised, and bony surfaces brought together, yet the union has only been fibrous, with a very considerable amount of flexion and extension at the false joint. The shortening of the limb, however, was very marked—4 in.—necessitating a raised sole, and a considerable limp in walking. The foot also had failed to develop to anything like the extent of the sound one.

In the cases of erasion some of the very best results are seen of operations upon joints. Without exception the limbs were not shortened, and the movements of the feet so good that in walking
it was frequently impossible to distinguish the affected side from the unaffected.

So far I have attempted to deal with facts; now let me venture upon a few conclusions warranted by them. In the first place, it must be understood that we are dealing with a disease the very nature of which it is at all times difficult to gauge. While it may seem to be purely local in its manifestation, it may equally possess a far-reaching constitutional basis. For this reason, therefore, it is difficult to speak, except in the most general way. What operations should be performed, when and how, are questions that can only be answered in the face of each individual case. There is one guiding principle, however, which touches every case, and that, that our operation must have as its primary object the total removal of the disease. To effect this, however, is frequently to disregard all conventional and classical methods of making skin incisions for the excision or erasion of a joint. Cuts must be freely made in every and any direction, in order to get thoroughly at the infected parts. Indeed, it is only by these free incisions that secreted pockets of tubercular material are discovered. And, further, it may be stated as a practical and important matter of detail, that diseased tissues should be cut away, and not scraped away, as much as possible.

As regards, then, the knee and elbow, my practice is to make my incisions for the opening of the joint just as seems likely to give me the best exposure; and I do not hesitate to extend these or make fresh ones if there is the slightest indication that by so doing I can better cut away the disease. In erasions, after all the diseased tissues have been methodically excised, any pockets or spaces left are stuffed with sterilised gauze, all bleeding vessels having, of course, been previously secured. The skin incisions are stitched up to variable extents, and the limb fixed by simple splints in the required position—in the case of the knee, straight; in that of the elbow, at an obtuse angle. If the temperature keeps normal, and there is freedom from pain, nothing should be touched for a week, ten days, or even a fortnight, when the stuffing is removed, and properly applied pressure substituted.

In the case of erasion of the ankle-joint, somewhat more definite lines may be indicated regarding the steps of the operation. In all the cases in Series IV. (B) the joint was exposed by an anterior incision, extending across the articulation from one malleolus to the other; other incisions were made afterwards to expose sinuses or pockets extending usually up the leg. After dividing the skin and subcutaneous tissues, the tendons are picked up and secured by stitches in such a way that after division, and at the conclusion of the operation, they can be easily reunited. Attention to this comparatively small detail will save a good deal of trouble in seeking for the retracted tendons, when they are subsequently required for reunion.
A study of these cases collectively brings out the remarkable fact, that in not a single instance was the growth of the limb interfered with by erosion, while variable degrees of shortening followed in every case of excision. Another striking fact, not altogether easy of explanation, was the diminution in size of other parts of the limb, other than those directly associated with the diseased or operated-upon region. Unfortunately, this fact was not noted in every instance, but in such as were examined it was found that the want of development showed itself in the cases of excision and not erosion. The natural explanation, and possibly after all the most likely, would be functional inactivity; that parts grow in proportion to the function they have to fulfil. Yet it is strange to note that in both the cases of excision of the elbow (Cases 4 and 7), where there was good flexion and extension, the hand of the affected side was markedly diminished in size; while in the only two cases of erosion in which it was noted (Cases 10 and 13), where there was complete ankylosis at the joint, the hands were practically the same in size on both sides. If functional inactivity be the true cause of this want of development, then it would serve to indicate that an erased ankylosed elbow gave a more serviceable and useful limb on the whole than an excised movable one: that a patient is able to make much more use of her hands in the former case than she can do in the latter.

Attempting, in conclusion, to express an opinion as to the best operation to perform upon tuberculous joints in children, as based on my own experience, and such of it as is shown in the accompanying table, I should unhesitatingly advocate erosion in every joint where it can be executed; and the younger the child the more imperative the practice. In the case of the shoulder, I see no reason why this joint should not be erased, by turning the head well out of the socket. But the disease must be limited, otherwise it is impossible to get room enough to cut it out without excising the head. With the elbow, care must be taken to fix the limb at the time of the operation in the position required, should firm ankylosis occur, that is, at an open angle of about 130°.

As regards the knee, prolonged care is required to prevent subsequent flexion. This is best combated by the comparatively frequent re-application of a plaster splint. The firmness of the ankylosis seems to determine chiefly the tendency or not to flexion. So long, however, as the tendency to flexion lasts, so long must the limb be kept forcibly straight.

Lastly, with the ankle, the only precaution necessary is to prevent the patient making too soon use of it. Freedom of movement will come readily enough when the child once begins to get about; but to allow it to attempt to walk before the deep parts are soundly healed will be only too likely to light up some fresh foci of disease.
I wish, in conclusion, to thank those medical men, whose names are quoted in the tables, for the reports of cases kindly forwarded to me; and also to express my indebtedness for other useful information about cases from Dr. Donald Macphail of Whifflet, Dr. James Alexander of Galston, Dr. James Clark of Beith, and Dr. J. Reid Foulds of Clydebank.

PUERPERAL HYPERPYREXIA, WITH AN ILLUSTRATIVE CASE.¹

By J. Lamond Lackie, M.D., F.R.C.P.Ed.

Hyperpyrexia is well recognised as one of the most serious of complications occurring in the course of many diseases, the mortality, indeed, being as high as 84 per cent. From Bryant's most exhaustive paper on the subject, one finds that brain and spinal cord lesions were responsible for 29 per cent. of the cases; that pyaemia and septicæmia were the cause of 17 per cent.; that in 7 per cent. the complication arose in the course of acute rheumatism; while pneumonia, infectious fevers, ulcerative endocarditis, tuberculosis, heat stroke, etc., were the cause of the remaining of the hundred cases recorded.

One is bound to distinguish between those cases in which the hyperpyrexia is of what is known as the pro-agonistic or prolethal type of Wunderlich, and those cases in which the high temperature occurred some time before the death of the patient, and was in itself the direct cause of a fatal issue, or from which the patient recovered.

With the pro-agonistic type of hyperpyrexia most must be familiar, and in obstetric practice it is probably met with most commonly just before death from eclampsia. But, as occurring in the course of a puerperium from any cause, and as being the direct cause of death, or as being the most important symptom, hyperpyrexia must be extremely rare. Pye Smith of Sheffield records the case of a young married lady who, after her first normal labour, had for three weeks a temperature from 104° to 106°-2, usually in the morning after a sleepless night. She was of a nervous temperament. Wunderlich says, that after parturition the temperature may reach 107°-6, and in a few days fall to normal without any apparent cause. A case is recorded in which the temperature rose to 110°-2 at death, on the fifth day following labour. This case, however, was obviously of the prolethal type, and is comparable to those cases of, for example, fatal eclampsia, in which an exceedingly high temperature occurs just before death.

Beyond these, I can find no record of hyperpyrexia occurring

¹ Read before the Edinburgh Obstetrical Society, 10th May 1899.