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THE OPERATIVE TREATMENT OF SPINAL CARIES.

LADIES AND GENTLEMEN, When trying to choose a subject on which to address you this evening, I thought the most interesting thing I could do would be to give you an account of my work in connection with the operative treatment of Spinal Caries.

The operative treatment of spinal caries is one to which I have devoted considerable attention for some years past, and I have been fortunate in meeting with a fair number of cases in the Belfast Hospital for Sick Children, the Throne Children's Hospital, and also in the Royal Victoria Hospital. The class of cases to which my remarks this evening refer are those in which the disease is in the dorsal and lumbar regions.

These cases differ from those with cervical and sacral disease, as in the former the infection is limited, as a rule, to the body, whereas in the latter the disease extends widely in the cancellous tissue and involves the pedicles and laminae in the cervical regions, and in the sacrum the entire bone is usually sooner or later involved. In the dorsal or lumbar regions, probably owing to the presence of large intervertebral discs, and the relatively small size of the pedicles, the disease is nearly always limited to the body of the vertebra, and does not easily spread to neighbouring vertebrae. It is therefore more amenable to treatment of any sort, as well as being more accessible for surgical interference.

It will be best first to give you as accurate an account of this work as I can, and then I will tell you what my conclusions regarding its value are, and leave you to form your own. While a student, and also as a resident in hospital, I saw several laminectomies done for the relief of pressure paraplegia, due to spinal caries; I also performed one laminectomy myself. I saw the results of these cases which were bad or useless.

This very moderate experience led me to adopt the opinion expressed, I believe, by Mr. Edmund Owen, that laminectomy for the relief of pressure paraplegia, due to spinal caries, was like the lady in modern drama, who had a disreputable past and a

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hopeless future. In 1896 I had under my care in the Belfast Hospital for Sick Children a patient who had for a long time suffered from complete pressure paraplegia, due to dorsal spinal caries, and I was asked to operate on her. I did a costo-transversectomy, or Menard's operation, with most satisfactory results. I showed this case at a meeting of our Society in the Museum, and also published an account of it in the *British Medical Journal.* So satisfied was I with the result that I operated on several other cases of caries with pressure paraplegia, and in all the paraplegia was cured.

I then commenced to do Menard's operation in cases without any paraplegia, but with large abscesses, such as lumbar, iliac, or psoas abscesses, that is, abscesses which could be palpated, emptying the abscess cavity and removing the carious or necrotic bone at the same time, or shortly afterwards. This procedure gave good results, and I finally

decided to operate on cases of spinal caries before any abscess formation or paraplegia resulted, and these early operations gave the best results. I was led to this early operation, partly on account of the satisfactory results following later operations, and also by the discouraging results obtained in early cases at the Throne Children's Hospital by prolonged rest in bed, fresh air, good food, and subsequent use of spinal supports.

According to the Martin Deed of Gift at the Throne Hospital, 20 per cent, of the beds must be devoted to the treatment of spinal caries, and no case may be sent out unless a committee is satisfied that the child cannot derive any further benefit from a longer stay in hospital. These conditions, with the fact that the hospital is in the country, enabled me to keep cases under observation and non-operative treatment for several years in healthy surroundings, and the results so obtained were bad. They were not nearly so good as the results since obtained by early operation.

In these early cases the disease is limited, as a rule, to one body, and the removal of all the cancellous tissue of one body, either in the dorsal or lumbar region, with subsequent falling together of the adjacent bodies, leads to remarkably little deformity and to practically no rigidity. The amount of deformity can hardly be noticed when the patient is fully dressed. I have tried to compile some statistics about this work and its results for you. I have had great difficulty in doing so, as in a number of the hospital cases the notes are of the most meagre description, and during the last month I have sent inquiry letters to all the cases operated on in the two children's hospitals during the years 1896 to 1907 inclusive, and have received very few replies. Two years ago I sent similar notes to all the Throne cases, and a large number of them came to see me, and I showed a number of these to the gentlemen attending the post-graduate course at the Royal Victoria Hospital.

Altogether I have operated on sixty-one cases of dorsal - and lumbar spinal caries. There were five deaths immediately due to the operation; three of these deaths occurred in adults who had suffered from the disease for a long time. In one of them, a paraplegic case, the operation had to be abandoned early, as the patient took the anaesthetic very badly, and he died suddenly a few hours later. In the other two cases the patients had very large abscesses, and were extremely ill before the operation. The other two deaths occurred in very weak children with large abscesses. As regards the effects on the paraplegia, in all cases it was cured. In ten cases, with large abscesses, the suppuration continued, and eventually the patients died.

The majority of the cases went out of hospital in good health, with sinuses discharging a small amount of pus, and I have seen a number of these since who have eventually healed up completely. I have notes of fourteen cases which were completely healed up when discharged from hospital. Of the cases which healed up completely and entirely before leaving hospital, most were among my later ones, and had no external abscesses and were in good health at the time of operation. These statistics are very incomplete, and I regret this very much. They are, however, to my mind complete enough to aid me in my plea for early operation, before abscess formation, pressure paraplegia or serious deformity has occurred. They also show that not a single case died after this operation when performed at an early stage. The mortality rises with the extent of the disease, amount of abscess formation, and consequent effects on the general condition of the patient, and on the presence of pressure effects on the cord. The length of time required for convalescence, and the ultimate results, depend on the state of the disease and size of abscesses.

We now come to the consideration of the operation itself. An incision is made parallel to the middle line and just outside the tips of the transverse processes. The side on which the incision is made depends on the presence of palpable abscesses, or sinuses, or dulness denoting a mediastinal abscess or deep lumbar abscess, or pain radiating on one side only. If no signs or symptoms of any of these conditions exist, I always operate on the right side. This incision should have its centre opposite the vertebra, which is supposed to be the primary seat of the trouble. It should be borne in mind that the most prominent spinous process at the seat of deformity belongs to the vertebra immediately above the eroded body.

The transverse processes of three vertebrae should be exposed, and in the dorsal region the ribs outside the costo-transverse joint should be exposed for about an inch, and the pleura carefully separated from them. The pleura is very easily injured here. The ribs are then cut through with forceps and the heads and necks removed. The transverse processes are cut through at their bases with a chisel and removed, and the soft tissues are pushed off the pedicles and sides of the bodies with a periosteum elevator. The carious bone is then usually easily found. Difficulty is sometimes experienced from haemorrhage. This may be avoided by tearing the tissues and pushing them to

one or other side with the elevator, rather than by cutting them as I did at first. Bruising the tissues in this way is of no importance, as the wound should never be closed up, and consequently it does not matter if some of the soft tissues are injured by rough handling.

Three ribs and three transverse processes require to be removed in order to give free access to the affected body. An opening of this size allows a fair-sized chisel or gouge and one finger to be used in the wound at the same time. I found a smaller opening difficult to work in, and it closed up too quickly and had to be re-opened. Dorsal nerves which are in the way I always cut across. Lumbar nerves must be treated with more respect, and have to be pushed out of the way. All soft bone and all sequestra must be carefully removed. This may leave a cavity in the body, and it is necessary to remove with a chisel or gouge the anterior and lateral bony walls of such a cavity, so as to allow level surfaces above and below to fall together and obliterate this cavity. If this is not done, a permanent cavity secreting pus and giving rise to a permanent sinus will remain.

In a few cases the body is found surrounded by a horseshoe shaped abscess cavity, and it is necessary to make a second smaller opening on the other side of the vertebral column in order to obtain drainage. After the cavity has been cleared out and the bony walls cut away, the cavity being douched out if necessary, and then thoroughly dried, I packed it with sterilised gauze soaked in a saturated watery solution of picric acid. This acid forms an indecomposable compound with the albuminous fluids of the wound and helps to prevent decomposition. The wound is dressed every day, peroxide of hydrogen (10 vols.) and warm water in the proportion of 1 to 3 being used to douche it out, and the same sort of gauze dressing applied. In spite of the greatest care in the dressings, it is frequently necessary to re-open the superficial part of the wound and to clean out the cavity under an anaesthetic.

The patient is allowed up out of bed as soon as possible, in order to encourage the healthy vertebrae above and below the disease to come together and so obliterate the cavity left after the removal of the diseased bone. A spinal support is never used. In cases complicated by lumbar, iliac, psoas, or other palpable abscesses, these are opened and scraped out and packed some days or weeks before the operation on the spine is done, as the patient improves in health after the pus has been removed, and becomes better able to stand the major operation.

In cases with paraplegia, the spinal canal is not opened up at all; abscess cavities are dealt with, and all carious bone is removed just as if no paralysis existed. This has in all cases been sufficient to relieve the pressure on the cord. The pressure on the cord is apparently due to inflammatory products in front of the posterior common ligament.

In connection with this pressure on the cord, I may state that very slight pressure is sufficient to stop entirely the conductivity of the cord at any given point. Some years ago I held a licence to do experiments on animals in reference to this point. Professor W. H. Thompson, then in Belfast, assisted me, and we found that pressure equal to the weight of an ordinary dissecting forceps laid on the spinal membranes was sufficient to cause complete and immediate paraplegia in dogs.

Another point I would like to mention is, that I have operated in two cases where complete paraplegia had existed for eighteen months, and the patients recovered entirely, even their knee-jerks becoming quite normal, showing, I believe, that permanent changes in the cord do not follow prolonged pressure. In these cases sensation returned in a few days, and motor power was completely restored in a few weeks. In order, then, to obtain the best results for this operation it ought to be done early, while the disease is localised and before any complications have developed.

I would like to say a few words regarding the early diagnosis of these cases. There are three points which are of great value in the early diagnosis of spinal caries – pain, muscular rigidity, and deformity. The pain in an early case is localised in the spine, and is best elicited by jarring the spine. This can be done by getting the patient to jump off a footstool on to the floor and alight heavily on both feet. Movements of the spine also give rise to localised pain. The rigidity of the spine, which appears nearly always in these cases, is due to contraction of the posterior spinal muscles. Later rigidity is due to anchylosis. This muscular rigidity is absent in cases where there is no intervertebral inflammation, and this occurs most frequently in lumbar disease. These cases have also no pain on movement, and are often hard to diagnose. The other point of importance is slight and progressive angular deformity, which is nearly always present. Tenderness is of no use in diagnosing early spinal caries, except when elicited by percussing the rib or ribs, whose head, or heads articulate with the diseased vertebrae. Abscess formation and paraplegia I look on as complications which should be forestalled by operation.

In conclusion, I would summarise this work as

follows:

The operation was first done only in advanced cases with paraplegia or extensive abscesses. Now I do it, if possible, before any such complications have arisen. The results from early cases are very good, both as regards operation mortality, and as regards the ultimate result. Compared with non-operative treatment, everything in my experience has been in favour of the operation, and I would ask you to give this operation a fair trial, as it is only by general experience of any treatment that its true value can be ascertained.