The Journal of Bone and Joint Surgery

EDITORIALS AND ANNOTATIONS

HER MAJESTY THE QUEEN

Six years ago, when the *Journal of Bone and Joint Surgery* first became fully representative of the British Commonwealth of Nations as well as of the United States of America in "recording scientific progress and publishing new discoveries by all English-speaking peoples for the welfare of mankind" we had the very great privilege of receiving from His late Majesty a message from which these words are quoted.

To-day we acclaim with homage and devotion the coronation of our Queen, and we acclaim it with an assurance even greater than before that the English-speaking peoples are dedicated to the welfare of mankind. Indeed we are determined to show evidence of it in a reign that surely will be long and happy. Our responsibility is not light and our duty is not easy—but it can still be happy. May we therefore pay allegiance to Her Majesty the Queen in her year of coronation by saying that we too will try to accept responsibility with joyfulness.

SPINAL FUSION

It is interesting and perhaps useful to review procedures that are an accepted part of the stock-in-trade of the orthopaedic surgeon. Spinal fusion has become a relatively frequent operation in major orthopaedic centres during the last twenty-five or thirty years. Even so, not many individuals do the operation often enough in the course of a surgical career to produce a statistically significant series of long-term results. This being so, there is a natural tendency to establish a hospital or clinic technique, and to practise it whenever spinal fusion is required; this factor is also to some extent responsible for a healthy reluctance to give up accepted methods for new and untried procedures.

Ollier in 1867 described a method of bone transplantation using an osteoperiosteal graft. This was the beginning of attempts to join segments of the spine to arrest disease and to alleviate pain. Since then many distinguished surgeons have made their contribution to the subject. The most notable, in relation to the original nature of their contributions, were Albee—for the motor saw which permitted cutting and shaping of cortical grafts, and Hibbs—for the method in which "ankylosis" could be obtained without the introduction of any "outside" bone. In 1921, when the first Commission was appointed by the American Orthopaedic Association to investigate "the results of ankylosing operations on the spine" the only two methods in common use were those introduced by Albee and Hibbs, and the only condition for which the procedure had been carried out in sufficient numbers to merit investigation was Pott's disease. The method of posterior spinal fusion has been modified in various ways since then, but the modifications have been matters of detail rather than of principle. Methods of fusion of the vertebral bodies had been suggested by others, but the procedure was first carried out by Burns in 1933 for spondylolisthesis.

Modification of methods of fusion has naturally been accompanied by exploration of alternative materials to autogenous bone as an aid to the process. The materials worthy of mention are beef bone, os purum and os novum, and homogenous bone. Though these other

substances had extensive clinical trials, it was generally accepted before the last war that autogenous bone was by far the best material. This state of affairs has been to some extent modified by the great increase in the use of homogenous bone made possible by the use of the bone bank. Even now, years after the first reports of the method, it is still difficult to assess accurately the relative merits of autogenous bone and homogenous bone from the bank in spinal fusion. Any such assessment must take into account not only the incidence of failure of fusion after the use of each substance, but also the symptoms and scars created by the removal of autogenous grafts.

In a recent report on spinal fusion Wilson stated that in his experience homogenous and autogenous bone had shown little difference in healing time, though from the results quoted it is evident that, using the same technique, autogenous bone was more satisfactory than bone from the bank. Of forty-six patients there was failure of fusion in three, and in all these banked bone had been used. The proportion of autogenous bone to banked bone in the series was approximately 3 : 1. The results of the establishment in Holland of a national bone bank, in which calf bone is used and from which grafts of any shape or size can be obtained to order, will be awaited with much interest.

The accepted indications for spinal fusion have changed considerably in the last twenty years. More spinal fusions are now done for traumatic, congenital and degenerative lesions, and less for specific infections. This tendency has progressed along with a persistent effort to cut down the period of post-operative immobilisation. Whenever the post-operative immobilisation is inadequate the proportion of failures increases, and this matter of "adequate" immobilisation has always been a vexed one. In this connection the value of metal fixation in the form of screws and plates bolted on, as a method of doing away with other forms of immobilisation, is very much on trial. Public reports are encouraging, though unofficial comments on the methods are not always so favourable. This tendency to decrease the period of post-operative immobilisation has to some extent come into conflict with the changing indications. The greater the mobility of the segment of the spine to be fixed—before operation—the more effective must be the post-operative fixation. It must also be proportional to the strain thrown on the graft—in a "straight" spine this will increase from above downwards. Hence the preoccupation with lumbo-sacral fusion as the main problem in spinal fusion; it is most frequently called for and most difficult to obtain. The strains and stresses put on a graft for scoliosis are still in the realms of conjecture. Pseudarthrosis is relatively infrequent in this condition, because all agree that a long period of post-operative immobilisation is essential.

There must be few operations in which assessments of published results have shown such wide variations; the spine is an area of the body about which enthusiasms wax and wane. For example, in 1923 a series of 221 spinal fusions, carried out mostly for tuberculous disease, was published, in which it was claimed that there was failure of fusion in only one! In a similar series published in 1951, 25 per cent were found to have pseudarthrosis. The difference can be attributed to improvement in radiographic technique, and to acceptance of the fact that radiographs in two positions are essential in estimating fusion. Objectivity in analysis perhaps plays some small part!

In this number of the Journal we report two new methods of fusion. Each is a modification of methods previously described. James and Nisbet describe a "body to body" fusion through a posterior approach. This is based, apart from the obvious mechanical desirability of fusion of the bodies, on two main indications. One is that in spondylolisthesis the detached lamina and spinous process should be removed. This is an interesting observation, and one which may have a wider application than is immediately apparent. In a personal series of disc explorations and spinal fusions done over the last seven years each patient has had peripheral signs of root irritation, and has been relieved by removal of the appropriate spinous process and lamina, followed by spinal fusion. In none was prolapse of disc material found at operation.

The second indication is that both in spondylolisthesis and degenerative lesions the disc should be curetted at the time of fusion. This is probably an unnecessary procedure, provided sound bony fusion is achieved, and this cannot be done simply by curettage of the disc. James and Nisbet hope to improve on a quoted figure of 17 per cent pseudarthroses, and their results are promising. However, as they rightly point out, theirs is a preliminary report, and they have much more to do before the figures will be statistically significant. We must remember that this operation is one of election, and therefore must be done in such a way that not only is the desired result obtained, but that complications are reduced to the minimum.

McKee, in another paper in this issue, describes a new technique for fixing the grafts at the time of operation. The efficiency of the method will depend on how firmly the "match stick" grafts can be held by the rings, and whether the process of assimilation of the grafts will alter their size sufficiently to affect the hold that the ring exerts; also, and perhaps more important, at what stage in the process of fusion this change takes place. These are questions that could be answered only by exploration at intervals after the primary operation. What effect the tight binding together of these small grafts might have on the rate of their reorganisation is a question of some interest.

If it could be demonstrated conclusively that heterogenous bone grafts with metallic or mechanical internal fixation can produce uniformly satisfactory results in low lumbar fusion for degenerative conditions—thereby eliminating the need for removal of bone from other sites, and for keeping patients in bed for long periods after operation—it would be the passing of another milestone on the long road of progress in surgery. The milestone may be in sight, but it is still ahead.

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