THE CAUSES OF UNSATISFACTORY RESULTS FROM THE
OPERATIVE TREATMENT OF LUMBAR DISC LESIONS

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The exact place and value of operation in the treatment of lesions of the lower lumbar
intervertebral discs is still the subject of much profitable controversy. It is clear and
has been accepted that almost all patients recover partly or completely after conservative
treatment alone. There has, however, been no general agreement about the exact indications
for operative treatment, about the percentage of patients who require operation, or about
the results which may be expected after surgical intervention; nor have these problems been
much clarified in recent discussions.

This uncertainty concerning an important contribution to the treatment of a common
and disabling condition is surprising. Removal of diseased lower lumbar discs has been
practised for more than fifteen years—ample time to allow a critical appraisal of the procedure.
Nevertheless it is probably true to say that most medical practitioners in this country regard
the surgical treatment of a "prolapsed disc" as a rather speculative measure, only to be
advised as a last and somewhat desperate resort. It is true that operation is not uniformly
successful. In the recorded series anything between 5 and 40 per cent of unsatisfactory
results have been reported, and every surgeon dealing with large numbers of these lesions
meets with disappointments from time to time. In the present writer's view both too much
and too little attention is paid to these unsuccessful operations: too much attention in the
sense that the comparatively small percentage of poor results is used on argument that
surgery is never indicated in this condition, without regard for the many patients who are
completely relieved by operation after conservative treatment has failed; and too little
attention in that not enough time has been spent in analysing the causes of failure. It may
be, of course, that a certain proportion of disc lesions, especially in the late stages, are not
amenable to surgery, and that in such cases poor results are inevitable. The writer does not
believe this to be so.

This paper is based on the findings in patients with "failed" operation for disc lesions
seen at various hospitals. The series included Service patients and civilians from all over the
country; they had been operated on by many different surgeons. The writer considers that
it is possible to determine the cause of failure in most instances, and that the causes may
be classified.

THE PRINCIPLES UNDERLYING OPERATIVE TREATMENT

The aim of operative treatment is simple—the removal of all degenerated disc tissue,
whether displaced or not. Afterwards, rest and splinting of the lumbar spine will allow firm
fibrous healing of the disc remains. Provided there is the least possible damage to other
structures, the actual details of operative technique are not of themselves important; but it
is important that the causes of unsatisfactory results should be recognised clearly, and avoided
by suitable modifications of technique.

CAUSES OF FAILURE

Wrong diagnosis is perhaps the most frequent cause of unsatisfactory results from
operation. A patient with persistent low back pain may be subjected to laminecotomy; no disc
lesion is found—because none exists—and the patient will be no better, and may even be
worse than before. The case is then quoted as unsatisfactory and serves only to obscure the
issue whether the surgical treatment of disc lesions is or is not valuable.
Relative exposure obtained by the interlaminar approach (Fig. 1) and by the hemilaminectomy approach (Fig. 2). In each case the shaded area indicates the amount of bone and ligamentum flavum removed. Note the relationship between the theca, the spinal nerve roots and the lower two lumbar discs, and the much better access afforded by the hemilaminectomy approach.

The hemilaminectomy approach gives an adequate exposure of a pararadicular lesion (Fig. 3) or of a paracaudal lesion (Fig. 4) but a central lesion or a displaced nuclear sequestrum may be relatively inaccessible (Fig. 5).
In patients with genuine disc lesions who are not relieved by operation, the causes of failure may be classified in twelve ways:

1. **Failure to locate the lesion**—A lumbar intervertebral disc lesion may be present but may not be found at operation. This complication is under the direct control of the surgeon and usually occurs in one of three ways. a) Limited exposure may be carried out at the wrong level. The spinal canal may be opened by an interlaminar or "fenestration" approach at a level other than that at which the lesion exists—a limited approach which allows inspection of one disc only, the diseased disc never being seen by the surgeon (Figs. 1 and 2). b) The spine may be explored at the proper level, but, because of a poor exposure or haemorrhage from the extrathecal veins, the diseased disc may be obscured and either not found or not recognised. c) The exposure and recognition of the diseased disc may be a difficult technical problem and for this reason the lesion may be either not recognised or not adequately dealt with.

The commonest types of lesion presenting special problems are the central prolapse (Fig. 5), the "concealed" disc (that is, a degenerate disc which has not yet reached the stage of nuclear retropulsion), and the disc lesion associated with a displaced nuclear sequestrum (Fig. 5). All these lesions may be difficult to expose and recognise (especially so through an interlaminar exposure), and a nuclear sequestrum which has become widely displaced in the spinal canal may be quite inaccessible through such an approach (Figs. 3 to 5).

2. **Failure to recognise a double lesion**—In 12 to 20 per cent of all patients both the L4–L5 and the L5–S1 discs are affected simultaneously, and such a double lesion often cannot be recognised clinically. In these cases a bad result is inevitable if one disc only is exposed and dealt with. The only safe course is to expose and inspect both discs.

3. **Failure to deal with a bilateral lesion**—Many disc lesions are bilateral; that is, they either extend across the mid-line or else there are two separate retropulsions, one on each side of the mid-line. Such discs can be adequately dealt with only if they are exposed from both sides of the spinal cord; a unilateral exposure gives an unsatisfactory result.

The next three complications also are under the control of the surgeon and arise from the way he deals with the abnormal disc. They are:

4. **Subsequent further retropulsion of nuclear tissue**—It is not enough to remove the displaced nuclear tissue alone: the whole of the diseased nucleus must be removed. If it is not—if, as Burns and Young (1947) put it, "the charge is not removed from the shell"—more nuclear tissue may subsequently be displaced and cause a recurrence of symptoms.

5. **Root damage**—The nerve root in its extrathecal course is often adherent to the retropulsed nuclear material, particularly in lesions of long standing. The root may be damaged while it is being freed or by too vigorous retraction. The consequent sensory or motor disturbances may be permanent.

6. **Root adherence**—After operation the root always tends to adhere to the scar of the track through which the diseased nuclear material has been removed. This always happens and is unavoidable to some extent. The root is liable to adhere particularly to nuclear tissue or to tags of the annulus fibrosis or posterior longitudinal ligament. Root adherence after operation can therefore partly be prevented by complete removal of the nucleus and of all loose tags.

Two complications not under the direct control of the surgeon may cause unsatisfactory results. They are:

7. **Subsequent prolapse of previously healthy disc**—A disc that is healthy at operation may later become abnormal and cause the recurrence of symptoms. This, in the writer's opinion, is a very uncommon source of post-operative complications; in most alleged cases a double lesion has been missed at operation.

8. **Permanent changes in the nerve root**—If a nerve root is compressed or stretched by retropulsed nuclear material for too long, permanent and irreversible changes may occur in the root itself, and its function does not return after removal of the displaced nuclear tissue. This complication indicates that operation has been delayed too long.
Two complications which may be described as "articular" are partly under the control of the surgeon. They are:

9. Damage to the posterior articular facets—Damage to the posterior articular facets on one side is little regarded by some surgeons; indeed, routine decompression of the nerve root in the foramen is sometimes advocated. The writer holds the firm opinion that damage to the facets, even on one side, produces an irritable joint which is a source of post-operative symptoms and usually requires subsequent arthrodesis.

10. Arthritis of the intervertebral joint—Degeneration or removal of the nucleus pulposus disorganises one intervertebral joint (Figs. 6 and 7) and subsequent arthritic changes are inevitable. These changes take place in all three parts of the affected joint; that is, between the vertebral bodies and in the posterior articulations. But if post-operative treatment is adequate the damaged joint usually settles down into a state of symptomless fibrous ankylosis. If post-operative treatment is inadequate—particularly if any attempt is made to mobilise the damaged joint while it is still irritable—symptoms tend to persist and increase until further surgical measures become necessary. The writer believes that this complication can be controlled almost completely by an adequate post-operative regimen. It is surprising how often, between three and six weeks after operation, patients are subjected to a course of vigorous spinal exercises, and sometimes even to manipulation with the intention of "mobilising" the lumbar spine. The effects of such ill-judged attempts at "rehabilitation" are invariably most unsatisfactory.

In both this country and America it has been suggested that, because the removal of a damaged nucleus inevitably disorganises an intervertebral joint, immediate arthrodesis is desirable. Without discussing in detail the arguments for or against immediate arthrodesis, the writer is of the opinion that it is undesirable, except in a few very special cases, because: a) it is unnecessary for the vast majority of patients; b) the recorded results of operation with immediate arthrodesis are on the whole worse than those without arthrodesis; c) to perform an operation that is likely to produce an effective bony arthrodesis involves some increase in
the immediate operative difficulties and dangers and a very great increase in the period of post-operative incapacity; d) when necessary an arthrodexis can be carried out in a second stage; and e) re-exploration, should it become necessary, is greatly complicated by a previous arthrodexis.

The final two causes of operative failure will be mentioned only for the sake of completeness; elementary though they may seem, they are by no means unknown.

11. Post-operative infection—Infection may take the form of wound infection, meningitis, or sub-acute infection between the vertebral bodies themselves. Any infection is associated with widespread post-operative adhesions involving the theca and extrathecal nerve roots. An infection between the vertebral bodies causes an irritable lumbar spine requiring months of immobilisation.

12. Gross damage to the spinal theca, to the cauda equina or to extrathecal nerve roots—Gross damage to these structures may be done during the exposure or from careless retraction. Opening the theca at operation adds to the immediate difficulties and causes undesirable post-operative symptoms. The results of gross damage to the cauda equina itself may be catastrophic, and gross damage to an extrathecal root or roots may produce crippling after-effects.

The patient in whom an operation for a lumbar disc lesion has failed to produce relief always presents a very difficult problem. Far too often this problem is regarded as insoluble and is never squarely faced by the surgeon. Some surgeons consider a spinal fusion, when it has not been done already, as the only solution, and advocate and practise this measure in all such cases.

In the writer's view it is usually possible to determine the cause of unsatisfactory results. Many patients can be relieved by further treatment, the nature of which depends of course upon the condition that is present. Conservative treatment, re-exploration and spinal fusion all have their place and value, and their intelligent and specific application makes it possible to salvage many patients otherwise destined to some degree of chronic invalidism.

REFERENCES