SPINA BIFIDA OCCULTA
WITH ENGAGEMENT OF THE FIFTH LUMBAR SPINOUS PROCESS

A Cause of Low Back Pain and Sciatica

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Although spina bifida occulta has often been blamed in the past for backache and sciatica, I have believed neither that it was a common source of these troubles, nor that the fibrous band that closes the sacral breach is a cause of nerve root compression, as has been suggested by some authors. I have often explored a concomitant sacral defect while operating for a disc lesion, and have never found even the remotest possibility that this membrane could press on the contents of the spinal canal.

Nevertheless spina bifida occulta may be associated with low back pain, because of the absence of the first sacral spinous process and the ligaments that normally run between it and the spinous process of the fifth lumbar vertebra. In the normal spine extension is often limited by the apposition of the fifth lumbar and first sacral spinous processes; because of the absence of the latter in spina bifida occulta there may be hypermobility in extension, and this may itself cause low back pain or sciatica.

THE ENGAGED SPINA BIFIDA AS A CAUSE OF PAIN

It is the purpose of this paper to show that pain can be caused in spina bifida occulta by the impingement of the spinous process of the fifth lumbar vertebra on either the stumps of the laminae of the first sacral vertebra or the fibrous band that lies between the stumps.

This mechanism of pain production is more likely to occur when the increased range of extension is accentuated by a more than usually horizontal sacrum, an abnormally long fifth lumbar spinous process, or lax spinal ligaments—in particular the anterior longitudinal ligament, which should control hyperextension. This pain-producing process in spina bifida is an entity, and is to be distinguished from hypermobility alone as a cause of pain (Fig. 1). It has been observed in fifteen patients.

It is possible that, in the extreme case, the fifth lumbar spinous process may compress the nerve roots in the cauda equina through the occluding membrane. Occasionally (in five of our patients) a rudimentary and mobile spinous process of the first sacral vertebra is pressed upon and in turn presses into the dura and underlying nerves (Fig. 2).

MATERIAL

Table I shows the treatment and operative findings in the patients in this series. I first suspected that impingement of the fifth spinous process on a spina bifida could cause pain during an operation in 1952 for a disc lesion at the fourth lumbar level, in a
patient who also had a wide first sacral spina bifida clearly shown in the rather unusual radiograph (Fig. 3). The spina bifida was explored during the operation, and the fifth lumbar spinous process was found to be firmly adherent to the fibrous membrane, the deep surface of which was also adherent to the dura beneath it.

**TABLE I**

**Treatment and Operative Findings**

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative treatment</td>
<td>4</td>
</tr>
<tr>
<td>Operative treatment</td>
<td>11</td>
</tr>
<tr>
<td>Combined operation (treatment of the spina bifida and fusion)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Findings at operation**

- Adherence of fifth lumbar spinous process to the fibrous membrane: 7
- Loose body interposed (rudimentary first sacral process): 4
- Adherence of fibrous membrane to dura: 8

Since then, fourteen other patients have been studied in whom the pain could be attributed to the impingement or engagement of the fifth spinous process on a sacral spina bifida, and eleven came to operation. Four were reported by the author at a meeting of the Sociedad Argentina de Ortopedia y Traumatologia in July 1956. At that time no paper had been discovered that dealt exclusively with this subject, but since then other articles have been found in which reference is made to it.

Ferguson (1934) mentioned the possibility of congenital fusion of the fifth lumbar vertebra and a rudimentary first sacral spinous process as a cause of pressure through the sacral laminar defect. Williams (1953) referred to this mechanism without reporting cases. Gill and White (1955) also referred to this type of pressure-producing mechanism, and detailed the symptomatology, but did not report on any patients.

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![Fig. 2](image-url)
CLINICAL FEATURES

There are two different types, depending on whether or not there is nerve root compression. *Spina bifida with impingement of the fifth spinous process without root compression*—This is probably the more common type. In spinal extension the fifth spinous process presses against the membrane that closes the spina bifida, or against its stumps, provoking a pain in the lumbo-sacral region that can radiate towards one or both lower limbs. The pain is deep and diffuse, and there is no loss of reflexes, sensation or mobility. The most important clinical sign is pain produced by pressing on the fifth lumbar spinous process and hyperextending the spine, especially with the patient standing. This was clearly demonstrated in one patient, a football player, who had no discomfort while practising physical exercises or playing football, but on prolonged standing complained of pain and numbness in both thighs. Most of the patients come into this group even though some were found at operation to have a dura adherent to the occluding membrane.

*Spina bifida with impingement of the fifth spinous process with root compression*—Although theoretically the possibility of compression of the cauda equina by the fifth spinous process pressing through the fibrous membrane is obvious, only two patients showed signs of nerve root irritation. One patient, who had suffered pain continuously for twenty years, had an absent ankle jerk; in another there were sensory changes in the legs. In eight other operations adhesions were found between the deep aspect of the membrane and the dura, at the level at which the spinous process was pressing, so severe and extensive in three that freeing the dura was difficult. None of these patients showed any neurological abnormality.

ASSOCIATED LESIONS

The presence of some other condition than the spina bifida must not be overlooked, such as an intervertebral disc lesion or another congenital malformation. Three of the patients in this series were operated on for a disc lesion between the fourth and fifth lumbar vertebrae as well as a spina bifida; one of them also showed sacralisation of the fifth lumbar vertebra. In all three the spine was fused after treatment of the spina bifida.

It must be noted that narrowing of the lumbo-sacral disc favours the development of impingement, in the same way as the horizontal sacrum, or the existence of a long fifth lumbar spinous process, by shortening the distance between the fifth spinous process and the sacrum.

RADIOLOGICAL CHANGES

Antero-posterior and lateral radiographs should be taken; the Ferguson position should be used to project the sacrum in a vertical position and show the full extent of the spina bifida. When there is impingement, the fifth lumbar spinous process projects over the breach of the sacrum. Three different radiological types of this anomaly can be recognised (Figs. 4 to 6). In type 1 there is a wide breach in the sacrum, with the fifth lumbar spinous process
The three different radiological types of spina bifida occulta. Figure 4 shows type 1, a wide breach in the sacrum. Figure 5, type 2, a narrow breach with stumps of the lamina on which the spinous process above impinges. Figure 6, type 3, a rudimentary first sacral spinous process is present.

Flexion and extension radiographs to show impingement of the fifth lumbar spinous process on a rudimentary first sacral spinous process.

TREATMENT

Patients with mild symptoms can be treated with flexion exercises to reduce the hyper-extension of the lumbar spine.

In most patients with severe symptoms excision of the fifth lumbar spinous process and the fibrous membrane is necessary.

In this series the usual procedure was to expose the spina bifida, and to define its limits. The fifth lumbar spinous process was removed by cutting it off at the base, and by separating the adhesions between it and the fibrous membrane across the spina bifida. The fibrous
membrane was then excised, care being taken in case it was adherent to the dura mater. If necessary the stumps of the defective sacral lamina were also removed. The gap that remains may be filled with a flap of muscle. Arthrodesis is performed if there is an abnormal degree of mobility of the fourth and fifth lumbar vertebrae.

RESULTS

Table II shows the results in the eleven patients treated by operation who were observed for more than one year afterwards.

TABLE II

RESULTS OF OPERATION FOR SPINA BIFIDA

<table>
<thead>
<tr>
<th>Outcome Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent (symptom free)</td>
<td>8</td>
</tr>
<tr>
<td>Good (few symptoms in the lumbo-sacral region)</td>
<td>2</td>
</tr>
<tr>
<td>Fair (persistence of some lumbo-sacral pain)</td>
<td>1</td>
</tr>
</tbody>
</table>

SUMMARY AND CONCLUSIONS

1. Fifteen patients with spina bifida occulta are described in whom the fifth lumbar spinous process was pressing on the fibrous membrane that closes the spina bifida, or on the bony stumps of the defective lamina.
2. That this is a cause of low back pain, with or without pain referred to the lower limbs, is supported by the findings at operation and the results of treatment.
3. Eleven patients were treated by operation; in each the spinous process of the fifth lumbar vertebra pressed against the spina bifida, either directly or through the vestigial remnant of the first sacral spinous process.
4. In eight cases the fibrous membrane was adherent to the dura mater; in one case the nerve roots were adherent.
5. Excision of the fifth lumbar spinous process and the membrane across the breach of the spina bifida was an effective method of treatment.

REFERENCES

ANQUIN, C. E. de (1956): Lumbociática por espina bifida sacra con incrustación de la 5a apófisis espinosa lumbar. Boletines y Trabajos de la Sociedad Argentina de Ortopedia y Traumatología, 21, 127.