ANTERIOR SPINAL FUSION FOR SPONDYLOLYSIS AND
ISTHMIC SPONDYLOLISTHESIS

LONG TERM RESULTS IN ADULTS

C. L. CHENG, D. FANG, P. C. LEE, J. C. Y. LEONG

From the University of Hong Kong

We reviewed 20 adult patients with spondyloysis and isthmic spondylolisthesis an average of 10.5 years after treatment by anterior spinal fusion. Nineteen patients had excellent or satisfactory results. Ten of the patients were symptom-free at one year, and 15 were asymptomatic at final follow-up.

Anterior spinal fusion can produce results comparable to those of posterior fusion with or without decompression. The results tend to improve with time in contrast to the known worsening of late results after posterior decompression without fusion.

The earliest report of anterior spinal fusion for non-infective lesions was by Capener (1932) in cases of spondylolisthesis and since then, this has been one form of treatment for adult spondylolisthesis. Early reports suggested that this gave good relief of back pain (Hodgson and Wong 1968; Freebody, Bendall and Taylor 1971), but more recent papers (Flynn and Hoque 1979; Thomasen 1985) have included heterogeneous groups of patients having operations for lumbar intervertebral disc degeneration and spondylolisthesis, with a proportion who had had previous surgery. However, in patients with spondylolisthesis of unspecified aetiology, Flynn and Hoque (1979) had 87% good results, and Thomasen (1985) reported that 75% of patients were relieved of back pain and 95% of radicular pain. Both these series had a minimum follow-up of two years but the average follow-up was not given, so the long-term results of this method of treatment are uncertain.

We now report the results of anterior spinal fusion for fresh cases of isthmic spondylolisthesis in 20 adults with an average follow-up of 10.5 years.

From 1965 to 1980, 52 adult patients with spondylolisthesis were treated by anterior spinal fusion in the Department of Orthopaedic Surgery, University of Hong Kong. Of these, 20 patients with isthmic spondylolisthesis (Wiltse, Newman and Macnab 1976) had adequate prospective documentation and follow-up. The average age of these 20 patients was 40.6 years (range 18 to 63). There were 13 females and seven males. The level affected was L4-5 in three patients and L5-S1 in 17
All patients had an anterior discectomy by a left-sided retroperitoneal approach and fusion using tricortical iliac crest grafts at the affected level. Postoperatively, all the patients had bed rest for two weeks, and five then wore a plaster jacket for an average of two months (range six weeks to three months). The average follow-up was 10.5 years (range five to 20 years).

RESULTS

Results were assessed at one year and at final follow-up, and were classified as follows: Excellent. No pain, full daily activities including heavy manual work. Satisfactory. Significant improvement in symptoms, occasional mild residual pain. Unsatisfactory. Insignificant improvement, frequent pain requiring analgesics.

At one year, 10 patients were excellent, nine were satisfactory and one was unsatisfactory. At final follow-up, 15 patients were excellent, four were satisfactory and one was unsatisfactory. Of the nine patients with sciatica pre-operatively, six had no sciatica either at one year or at final follow-up, two had occasional sciatica and one had constant pain.

Further analysis showed that of the 10 patients with excellent results at one year, eight remained symptom-free and two had been pain-free for some years and then had some recurrence of back pain. In one of them, the cause of pain appeared to be an L4–5 disc prolapse above a solid L5-S1 fusion. The other patient was a 63-year-old lady who also had a solid L5-S1 fusion; her mild pain was thought to be due to generalised degenerative changes. Of the nine patients who were satisfactory at one year, two remained the same, while seven had improved to the excellent category. The one patient with an unsatisfactory result at one year underwent a posterior spinal fusion at 18 months, but remained unsatisfactory at final follow-up, despite a solid posterior fusion after his failed anterior fusion.

Sixteen patients were fully employed before the operation, and 15 returned to work afterwards, 12 being heavy manual workers. Three patients changed to a lighter job. The time of return to work after operation averaged 6.7 months (range three to 12 months).

We also assessed the fusion rate, considering it to be complete only if there was radiological evidence of bony continuity on both sides of the graft and flexion-extension radiographs showed no radiolucent lines between the fused segments (Figs. 1 to 6). At one year, fusion was seen to be complete in 13 patients and seven had radiolucent lines (Figs. 3 and 4). Two of these showed complete fusion at final follow-up (Figs. 5 and 6). The one patient who had both anterior and posterior fusions showed incomplete fusion anteriorly but the posterior fusion was solid. The other four patients still had a radiolucent line on one side of the graft at final follow-up.

An attempt was made to correlate symptoms with

patients. The amount of slip (Meyerding 1932) was Grade 0 in six patients (spondyloytic), Grade I in 12 patients and Grade II in two.

Nineteen patients had presented with back pain and eight of them also had sciatica. The duration of back pain averaged 21.3 months (range two months to eight years). One patient presented mainly with sciatica. Four patients had a neurological deficit, with hypo-aesthesia and weakness in L5 and S1 root distribution. Nine patients gave a history of injury to the back before the onset of pain. The indications for surgery were persistent or severe symptoms despite conservative treatment. Of the six patients with spondylosis (Grade 0), four had had back pain for more than a year, and two had had back pain and sciatica for only a few months, but the symptoms were severe enough to warrant operation.

VOL. 71-B, No. 2, MARCH 1989
radiological fusion. Of the seven patients who had incomplete fusion at one year, five were symptomatic. At final follow-up, of these five symptomatic patients (excluding the patient with solid posterior fusion after a failed anterior fusion), one patient went on to complete fusion and became asymptomatic, the other three patients still had incomplete fusion. Two of them were asymptomatic; flexion-extension radiographs showed no movement at the affected level in either of them. The remaining patient still had symptoms; flexion-extension radiographs showed some movement at the affected level.

Complication. One patient had an iatrogenic injury to the cauda equina during anterior discectomy. She developed a drop foot but had made a partial recovery at final follow-up.

DISCUSSION

In adults spondylolisthesis and isthmic spondylolisthesis present with back pain and sciatica. These symptoms may derive from another, unrelated disc level, but when they are related to the level of the defect, back pain is thought to be due to disc degeneration and to instability (Davis and Bailey 1972; Newman 1973; Kaneda et al. 1985). Radicular pain may be caused by root compression from fibrocartilage and scarring at the site of the isthmic defect (Newman 1973; Kaneda et al. 1985), and bony stenosis of the intervertebral foramen has been reported in specimens showing isthmic spondylolisthesis (Edelson and Nathan 1986).

Where radicular symptoms are predominant, direct posterior decompression of the nerve roots has been advocated. However, better results are obtained when fusion is combined with decompression (Davis and Bailey 1972; Kaneda et al. 1985) and posterior decompression alone has been associated with deteriorating late results (Österman, Lindholm and Laurent 1976).

In patients in whom back pain predominates, fusion is more important. Anterior discectomy and insertion of two iliac grafts effectively restores the height of the disc space and gives stability. Restoring the disc height also relieves any nerve root compression caused by disc collapse, since this will enlarge the intervertebral foramen.

The unpopularity of anterior surgery is related to the potential complications of impotence and retrograde ejaculation. Flynn and Price (1984) have collected data on about 4,500 patients from 20 surgeons throughout the world who have at least 15 to 20 years of experience. The frequency of retrograde ejaculation was found to be 0.42% and of impotence 0.44%. They concluded that the incidence of both sterility and impotence had been overestimated and they were actually very rare. Flynn and Price (1984) further point out that impotence may be functional and that retrograde ejaculation resolved spontaneously in one-quarter of the reported cases. In our series of 253 cases of anterior disc surgery up to 1988 only four patients complained of impotence or weak erection after surgery (Luk 1984; Fang, Luk and Leong—in preparation). One of our patients had an iatrogenic injury to the cauda equina. This is a very rare complication and was caused by too aggressive decompression of the dura from the front.

Anterior surgery has the advantage of avoiding the epidural scarring which is a serious complication of posterior surgery. Though iatrogenic injury to the nerve roots is not common at posterior surgery, it remains to be seen whether transpedicular screw fixation will increase neurological complications. Using such instrumentation, Roy-Camille reported 7% and Louis reported 2.2% of neurological complications though most of these were reversible (Louis 1986; Roy-Camille, Saillent and Manzel 1986). The use of implants may lead to problems such as deep infection or metal failure.

After lumbar interbody fusion, it is sometimes difficult to assess radiological union (Freebody et al. 1971; Stauffer and Coventry 1972; Flynn and Hoque 1979; Chow et al. 1980). We felt that fusion was apparent when lateral flexion-extension radiographs demonstrated no measurable movement, but termed the fusion "incomplete" when a radiolucent line appeared on one side of the graft, usually on the extension view. This represents a "functional union" which although not yet radiologically solid, is sometimes stable enough to prevent pain (Leong 1987).

We have previously reported the maintenance of good and excellent long-term results of anterior fusion for prolapsed lumbar intervertebral disc (Leong et al. 1983) and now we have found that the clinical results in spondylolisthesis were not only maintained but even improved with time. We believe that this further improvement is due to increasing stability. Both Flynn and Hoque (1979) and Thomasen (1985) also reported better results in spondylolisthesis than in disc degeneration. Kaneda et al. (1985) reported 90% good and excellent results at mean follow-up of 39 months in 53 cases of isthmic spondylolisthesis treated by distraction rod instrumentation and posterolateral fusion with or without nerve root decompression. The early results of anterior spinal fusion for isthmic spondylolisthesis are at least comparable to those for posterior fusion with or without decompression, and the further improvement shown in the late results prove it to be a useful procedure.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES


Luk DK. Anterior discectomy and spinal fusion for deranged lumbar intervertebral disc. Thesis. M Ch Orth, University of Liverpool, 1984.


