TRIPLE ARTHRODESIS OF THE FOOT IN SPINA BIFIDA PATIENTS

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The feet of 13 spina bifida patients who had undergone triple arthrodesis in adolescence were reviewed at an average of 10 years after operation. Fifteen of 18 feet were considered satisfactory (83%); of the remaining three, two had recurrent planovalgus deformities and one a painful pseudarthrosis. Three feet had required revision of the triple arthrodesis, and there was one postoperative infection. No patient had lost ambulatory status as a result of foot problems and eight of the 10 patients who previously needed calipers were able to discard them or to use lighter ones.

In spina bifida patients who are able to walk, any persistent foot deformity which results in weight-bearing on a small area will lead to ulceration of the skin. Triple arthrodesis may be the only means of preventing this complication, yet the surgeon may be deterred from operating by the high failure rate (Hayes, Gross and Dow 1964), and by the fact that rigidity after triple fusion may itself lead to trophic ulceration. This present study was undertaken to determine the validity of these concerns since we could find no published accounts reporting the condition of the feet in adult spina bifida patients who had undergone triple arthrodesis in adolescence.

PATIENTS AND METHODS

Of 19 patients with spina bifida who had had a triple arthrodesis between 1970 and 1980, 13 (18 feet) could be located for follow-up and were evaluated by clinical and radiographic examination. There were five males and eight females whose average age at operation was 14 years (range 11 to 16 years). Nine of the feet had had an excision triple arthrodesis as described by Hoke (1972) and nine had had a lateral inlay triple arthrodesis (Williams and Menelaus 1977). All the patients had a myelomeningocele of the lumbar or upper sacral spine, and 11 of the 13 patients had required calipers before operation. Before the triple arthrodesis, 12 had been community ambulators and one a household ambulator (Hoffer et al. 1973). Their previous foot operations are shown in Table I.

Table I. Previous foot operations

Tendon lengthening	1
Soft-tissue release	8
Subtalar fusion	5
Tendon transfer	5
Tibial osteotomy	2
Total	21

RESULTS

All the patients were reviewed by one or both of the authors at an average of 10 years after operation (range 7 to 17 years), and the following observations were made.

Walking ability. There was no loss of function in the 12 community ambulators. The one domestic ambulator lost the ability to walk because of increasing knee instability and obesity.

Durability of footwear. Before the triple arthrodesis, 16 of the 18 feet had caused problems with footwear; at follow-up, these had resolved in 12 feet, four had improved and two, both with recurrent planovalgus deformities, still had significant problems.

Use of calipers. Before operation 10 patients had needed calipers; after operation, only five continued to use them and three were able to convert from double irons to polypropylene ankle-foot orthoses.

Skin ulceration. Only one patient developed a trophic foot ulcer after operation; this occurred under the first metatarsal head several years after the triple arthrodesis, and resolved after a metatarsal osteotomy.

Clinical examination. All the operated feet were plantar-grade. When patients were examined standing, the heel was found to be in the neutral position in five, in 5° to 10° of valgus in 11, and in 5° of varus in two. Two patients had occasional mild aching in the foot, and one complained of moderate pain that resulted in limited

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Table II. Results after triple arthrodesis (18 feet)

Type of triple arthrodesis	Number of feet	Pseudarthrosis*	Infection	Revisions	Satisfactory results
Excision (varus deformity)	9	3	0	2	8†
Lateral inlay (valgus deformity)	9	2	1	1	7‡

* Number of joints

† One patient had a painful pseudarthrosis

‡ Two patients had recurrent deformities in two feet

activity. Two feet had marked recurrence of the pre-operative planovalgus deformity, and one foot had mild recurrence.

Radiographic examination. Pseudarthrosis of the arthrodesed joints as well as degenerative changes in the ankle (that is, subchondral sclerosis and narrowing of the joint-space) were evaluated. Five joints in four feet developed a pseudarthrosis; four were in the talonavicular joint and one was in the calcaneocuboid joint. One pseudarthrosis was painful, and three were associated with recurrent planovalgus deformities in two feet.

Although Duncan and Lovell (1987) reported rapid degeneration of the ankle in spina bifida patients after triple arthrodesis, we found that only two ankles had mild degenerative changes, and one had severe degenerative changes associated with avascular necrosis of the talus. None of these patients, however, complained of pain.

DISCUSSION

For this study, a satisfactory result was defined as a stable, plantargrade painless foot without recurrent deformity, skin breakdown, or excessive shoe wear. Satisfactory results were achieved in 15 feet (83%; Table II). Two feet were considered unsatisfactory because of recurrent planovalgus deformities and excessive shoe wear, and one was unsatisfactory because of a painful pseudarthrosis. Of the 14 feet with solid fusions, in 13 the result was satisfactory.

Five patients required further surgery after the

triple arthrodesis: three required revision for incomplete correction of the deformity, one had a painful talonavicular pseudarthrosis fused, and one required a metatarsal osteotomy for a trophic skin ulcer. There was only one postoperative infection and, although this resolved, the foot later required revision of the arthrodesis.

Hayes et al. (1964) reviewed the results of triple arthrodesis in patients with myelomeningocele; of 45 feet, operation failed in 13 (with revision needed in eight), bone infection occurred in two, and superficial infection in two. Although not a long-term study, their results do indicate the difficulty of obtaining fusion in spina bifida patients.

Conclusion. Triple arthrodesis in a spina bifida patient is a demanding operation and may require revision, but once the deformity is corrected and a solid fusion obtained, the results do not deteriorate with time. It is therefore a reliable procedure for achieving a stable foot.

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