

## Spinal bracing for children with atonic cerebral palsy

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Some children with severe cerebral palsy have atonic spinal muscles that cannot support the trunk, consequently they cannot sit unaided. Kindly parents and staff prop them up but they slump forward or sideways. In time, the spine develops a fixed kyphosis or scoliosis with all the attendant complications.

The Department of Health and Social Services in Northern Ireland provides a Special Care Service for subnormal children including many with atonic cerebral palsy. A survey was carried out of all children within this category at Muckamore Abbey Hospital and it was found that many of them had "collapsing spines", could not sit unaided and had not developed a fixed spinal deformity. The survey indicated that about 70 children required some form of support. Initially this was intended as a preventive measure, but other, more pressing reasons emerged with experience. Previously, some children who had developed fixed spinal deformities had been fitted with Milwaukee braces, they could then sit and balance for the first time. However, the expertise and the production time required to fabricate and fit a Milwaukee brace precluded its use for so many children, and an alternative means of support had to be found.

### Brace production

Due to the unsettled situation in Northern Ireland there was a shortage of orthotists and it was necessary to devise an effective spinal brace that could be produced easily, quickly and cheaply.

A cast of the trunk was made, with the spine straightened by head traction. This cast of plaster of Paris was made as thin as possible. The brace itself was of polyethylene, lined with Plastazote by heating them together at 120 degrees Centigrade. It was made in a front and a

back half joined by Velcro straps, for this facilitated easy fitting by the parent or nurse. In order to eliminate the production of a positive cast, the hot plastic was moulded on the outer surface of the plaster of Paris body cast. The slightly increased circumference was eliminated by trimming the edge of the plastic where the front and back halves joined, this was done at the fitting stage. The brace reached to within 25 mm of the sternal notch above and to within 12 mm of the pubis below. The working time for producing the brace was approximately forty minutes (Figure 1).

### Results

Our experience is now based on some 80 children fitted over the last five years. The initial aim was that the support should prevent the onset of a fixed spinal deformity. Whilst none has occurred this remains to be proved.

Further reasons were found for providing polyethylene supports for these children. They could now sit up in a chair or wheelchair, this enlarged their horizons and increased their interest in the world about them. Child psychiatrists reported that they were more contented and that their mental state had improved. Some of the children learned to balance as a prelude to walking. Parents and nurses favoured the brace as it made the children easier to hold and to support when feeding.

Initially a flared base was tried so that the child could sit independently, but this caused some obstruction when the child was sitting in a hard-backed chair or was lying down.

For children with "floppy necks" the front and back panels of the support were extended up to the chin and the occiput. These extensions proved to be uncomfortable and it was found that the tone of the neck muscles appeared to improve if the trunk only was supported. The neck extensions were abandoned and, when necessary, a soft plastic collar was used.

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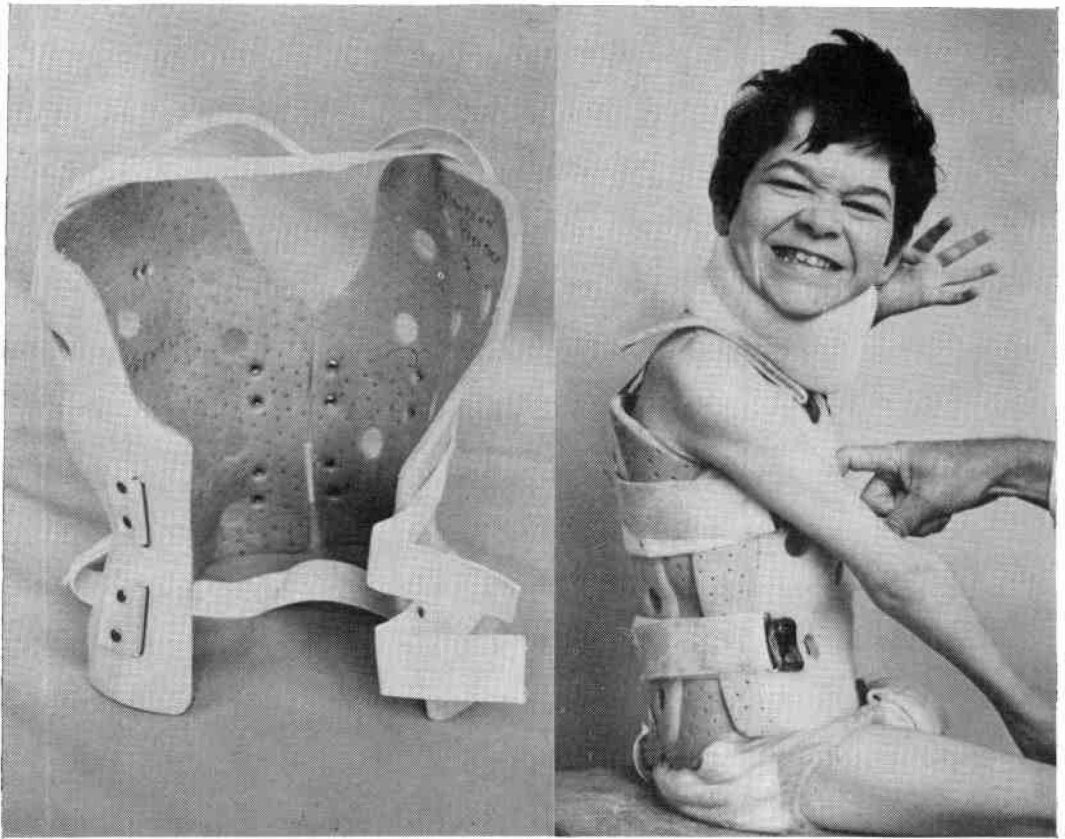


Fig. 1. Plastazote-lined polyethylene brace used at Musgrave Park Hospital.

We do not claim that this is the best support available, but it is quickly made, satisfactory, and cheap. It has permitted children with atonic cerebral palsy to sit up and, as a consequence of the increased stimulation, has improved their mental outlook. It has provided the opportunity

for the children to learn to balance and in some it has permitted walking. None of the children has, as yet, developed any fixed spinal deformity, but further time is needed to see whether this will occur.