Low Cost Orthosis – A Follow-up Study

DR. A. K. AGARWAL*, M.S.(ORTH.), DR. S. RASTOGI, M.S.(ORTH.), DR. V. P. SHARMA, M.S. (ORTH.), MR. J. DAS, MR. A. K. NIGAM, DR. P. C. AHUJA, M.D. (S.P.M.) AND (MISS) S. VARMA, M.S. (ORTH.)
Rehabilitation & Artificial Limb Centre, Lucknow.

Seventy nine cases out of one hundred cases fitted with low cost orthosis were followed up for a period of 14 months, to consider the suitability and acceptability of this type of orthosis among the children of 2-8 years of age. Only 6% cases rejected the orthosis and 44.5% cases needed either adjustment of height or change of the orthosis. Minor wear and tear in the tyre sole sandals could easily be repaired at village level by the local artisans. Parents of the children found it quite convenient to afford new set of orthosis after a period of 6 months at such low cost.

On the eve of the 21st Century, Poliomyelitis is still an endemic disease in various developing and under developed countries. Inspite of the mass immunization programme by UNICEF and Local Bodies and the different government agencies, a large number of cases of Poliomyelitis are being reported daily. It is being envisaged that by the year 2000 A. D. Poliomyelitis will be no more a problem. However most of them are using different kinds of orthosis for ambulation and support etc. Orthosis which is often out of reach to a common man, due to its cost, non-availability even in the cities, frequent repairs, inability of persons to travel to district or regional centres for the repairs and long waiting time for its finalization.

Considering the magnitude of problem and past experiences of rural camps in which about 20,000 cases have been examined by our Rural Rehabilitation programme team, we have designed a low cost orthosis for the children suffering from poliomyelitis (Agarwal et al., 1984). In the present study we wish to present the follow-up of these cases who are using the low cost orthosis for one year and an endeavour has been made to know its suitability and acceptability of the low cost orthosis in Polio affected children.

METHODS AND MATERIAL

Old worn out tyres of heavy vehicles were used for making the foot-wear i.e. sandals and the uprights were made up of locally available ironstrips (Agarwal et al., 1984), the total cost of the one HKAF Orthosis was approximately Rs. 45 and KAF Orthosis Rs. 30 only. (Including the cost of raw material, padding and labour charges etc.)

The children fitted with these types of orthosis were called for regular follow-up at the interval of 8 weeks and points of wear and tear were noted. Assessment regarding the utility and acceptability of the orthosis was also considered and accordingly further modifications were done.

OBSERVATIONS

These low cost orthosis were fitted to 100 children in a period of 6 months and all the

*Senior Medical Officer, Rehabilitation & Artificial Limb Centre, Lucknow-226018.
The paper was presented in Annual Conference of IAPMR at Coimbatore, 1985 and ALIMCO Award was given.

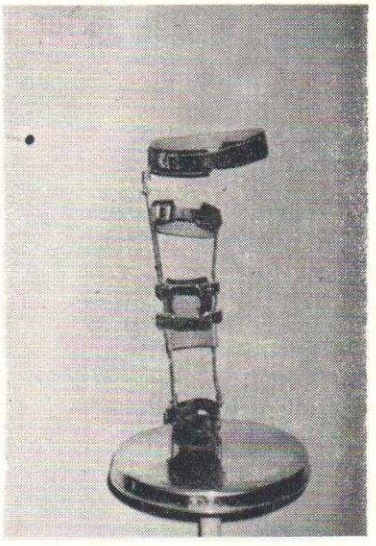

Fig. 1. Low Cost Orthosis.

Fig. 2. Polio affected child wearing Low Cost Orthosis.

Fig. 3. Child is trying to ambulate with Low Cost Orthosis.

Fig. 4. Side view of the same case.

cases were followed up as described above.

The table I shows that maximum number of children fitted with orthosis were in the age group of 2-8 years of both sex.

Table I. Age-sex distribution of patients fitted with low cost orthosis

Age Group (Yrs.)	Male	Female	Total
Less than 2	16	4	20
2 to 3	35	17	52
3 to 5	11	4	15
5 to 8	10	3	13
Total	72	28	100

Maximum number of cases had unilateral involvement of the lower limb who needed full bracing of the limb and were fitted with HKAF Orthosis. KAF Orthosis were fitted in only 4 cases (Table II).

Table II. Types of orthosis

Type	Fitted
H. K. A. F.	67
Bil. A. K. with P. B.	29
K. A. F.	4
Total	100

All the cases were followed up as patients reported for check up every 2 months. The maximum follow-up was 14 months and minimum for 4 months. Only 79 cases were followed up (Table III).

Table III

Total cases	79
Minimum follow-up	4 Months
Maximum follow-up	14 Months

Maximum wear and tear in the orthosis was at the ankle stirrup, fitted with the sole of the sandals, 5 cases had breakage of the orthosis at the Hip Joint (3 Bilateral and 2 unilateral HKAF Orthosis) (Table IV).

Table IV. Site of wear and tear

Site	No. of cases
Hip Joint	5
Knee Joint	Nil
Ankle stirrup	15

Adjustment of the height of the orthosis and change of orthosis were essential in 35 cases after a period of 6 months (Table V).

Table V

Adjustment of height	15 cases
Change of Caliper in six months	20 cases

About 94% cases accepted the brace and used it regularly till the follow-up and the rejection rate was only 6%.

DISCUSSION

It is a long cherished desire of every worker in the field of Rehabilitation to provide aids to the disabled persons at a minimum cost and the aid should be simple, strong, durable and easily repairable. The conventional orthosis are expensive and need trained man-power, big establishment and the fabrication takes longer time. For a poor child who is in growing age, it is not possible to change the orthosis frequently as well as travelling to distant district or regional rehabilitation centres for the repairs etc. This is one of the greatest cause of the rejection of orthosis.

Reported incidence of Polio cases in a Rehabilitation set up is 14% and the commonest age group involved is between 1-3 years in both the sexes (Rastogi et al., 1983).

Most of these cases need long leg bracing

for the ambulation. The different joints in an orthosis are the common sites for wear and tear. These joints are also responsible for increased cost of the orthosis. The knee joint was not provided till age of 5 years and in every case limited ankle motion was provided irrespective of the type of dynamic deformity. This limited ankle motion gave good results inspite of minor varus or valgus imblance. The commonest site for wear and tear was at the ankle stirrup for which we found it difficult to anchor with tyre sole, but later this problem has been overcome by putting additional layer of tyre sole in these sandals. It also prevented the forefoot drop. The buckles and the rivets used in these sandals were the other sites of wear and tear, but this was easily repairable in the villages, as this is the commonest foot-wear used in our villages. The orthosis broke at the hip joints after 6 months use in only 5 cases. In 3 cases who were fitted with bilateral HKAF Orthosis and 2 cases with unilateral HKAF Orthosis, the breakage was at the level of screws and all these cases needed the replacement.

Since all the children were in the growing age, 15 cases needed adjustment of height after 6-8 months of use of orthosis and 20 cases needed replacement of the orthosis after 12-14 months.

Out of 79 cases followed up, 96% cases continued to wear the orthosis which is quite encouraging response. The added advantages are given in Table VI.

Table VI. Advantages

Cheap
Short duration in assembling
No trial hangup
Light
Comfortable
Easy Maintenance

The only disadvantage with the orthosis was that it could only be used successfully in younger children i.e., upto the age of 8 years or before school going age. This orthosis cannot be used for spastic cases and in cases with gross foot and ankle deformities.

To conclude, this orthosis is a simple, cheap, locally repairable, comparatively lighter in weight and requires not much time for fabrication and can be easily fabricated in the rural environment with locally available materials only.

REFERENCES

1. **Agarwal, A. K., Sharma, V. P., et al.,** "Simple shoes to go with calipers", Aids For Living, AHRTAG, London, 1984.
2. **Rastogi, S., Agarwal, A. K., et al.,** "A Clinical Study of Post Polio Infantile paralysis", Prosthetics and Orthotics International, 7, 29-32, 1983.
3. **Huckstep, R. L.,** "Poliomyelitis—A Guide for developing Countries including appliances and Rehab. for the disabled", Churchill Livingstone, Edinburgh, 1979.