PAEDIATRIC PROJECT REPORT 2004/2005

Twelve month Review of the use of Silicone Ankle Foot Orthoses (SAFOS)

Five patients were assessed and cast for SAFOs by Matthew Hughes, Orthotist at Dorset Orthopaedic Co Ltd, Ringwood, Hampshire on 5th October 2004. SAFOs were supplied on 27th October 2004.

Video recordings, as assessment tools, have been made by parents of their individual children at quarterly reviews, held at Dorset Orthopaedic with Matthew Hughes and myself. These are now being collated into a video.

Observations of individual users at final review on 1st November 2005

1. **Spastic Diplegia** – age 7 years
   Previous orthoses: DAFOs and 2nd skin bilaterally. Now wearing SAFOs bilaterally.

   a) Range of movement. Previously passive dorsiflexion 5° (Off 90), active 15° (Off 90), now 10° (Beyond 90) passive and 5° (Off 90) active.
   b) Posture. Improved in standing and walking with decreased anterior tilt of pelvis. Improved symmetry.
   c) Gait. Now achieving heel strike and can now run.
   d) Balance. Now able to stand on one leg also can jump and land on both feet without falling over.
   e) Walking speed and endurance both improved, does not tire so rapidly able to play football and swim competitively.
   f) Skin condition good no pressure problems or discomfort.

2. **Diplegia (low tone)** - age 12 years
   Previous orthoses: bilateral hinged AFOs with severe problems with bad pressure areas and calluses on naviculars and malleoli which required repeated visits to orthotics department at YDH for adjustment and new AFOs required 2 to 3 times a year. Often fit not satisfactory and need for recasting also provided with orthopaedic footwear. Now wearing bilateral SAFOs and rigid polyprop heel cups. No longer requiring orthopaedic footwear.

   a) Range of movement no change 20° passive dorsiflexion and 10° actively. Muscle power has improved in Tibialis Anterior and posterior crural muscles. Previously calf muscles were very wasted and measurement now shows there is 6cm increase in circumference. Decreased pronation in barefoot standing of both feet.

b) Posture. Now able to stand with knees fully extended and reduced anterior tilt of pelvis and reduced hip flexion.
c) Gait. Reduced trunk-side flexion and increased hip and knee flexion on swing phase. Improved pelvic stability, less involvement of upper trunk when walking.
d) Balance. Able to stand for 5 seconds on each leg unsupported for the first time in his life. Markedly less involvement in his intrinsic muscle when standing with his toes remaining on the floor. He can now skip sideways, run and kick a ball when playing football.
e) Walking speed and endurance. Both improved, not so tired at the end of the day.
f) Skin condition. Totally recovered. No pressure sores and no calluses.

3. **Hemiplegia (flaccid foot)** - age 12 years.

Previous orthoses tried AFO and DAFO. Problems with pressure areas and great toe catching in swing phase. Now wearing SAFO (with valgus insole for 6 months).

a) Range of movement. Passive dorsiflexion previously 5° (Off 90), now 5° (Beyond 90). Active dorsiflexion initially zero, now Tib Ant has a flicker of activity.
b) Posture. Has shoe raise of 1.5 cm on Rt shoe. Improved symmetry. Improved muscle power in Quads and Hip Abductors.
c) Gait. Better heel strike. No longer catching great toe. Negotiates stairs without using handrail. One foot on each tread.
d) Balance. Can stand on R leg for ½ minute, improved stability. Generally increase in confidence.
e) Walking speed and endurance. Both improved. Now able to run and side skip. Playing football.
f) Skin condition. No problems previously had problems with rigid splints.

4. **Hemiplegia (High Tone)** - age 13 years.

Previously wore Rigid Polyprop AFO. Non-compliant due to pressure problems on navicular and malleoli. Had Botox (aged 5 years) to T.A. The patient has a 2.1cm shortening on the right side. Now wearing SAFO all day in conjunction with EVA total contact heel cup/valgus insole and raise to Rt footwear. Muscle power Tib Ant previous 0 now 2 – 3. Patient is now also tolerating wearing a night splint to stretch TA.

a) Range of movement. Previously 10° (Off 90) passive and nil active. Now 5° (Beyond 90) passive and 10° (Off 90) active. Reduced tone in Posterior Calf muscles and Rt arm and trunk.
b) Posture. Pelvis more symmetrical (Rt leg) 2.1cm shorter than L leg. Previously had marked internal rotation of Rt Hip 15° and knee flexion with hitched Rt pelvis. All now improved. And can now stand with R foot plantagrade.
c) Gait. Now achieving heel strike. Still has 10° internal rotation of Rt hip but managing to extend knee during stance phase. Improved hip and knee flexion on swing phase with less asymmetry at pelvis.
d) Balance. Now able to stand on Rt leg with knee fully extended and foot plantagrade.
e) Walking speed and endurance. Both improved but her gait deteriorates when her speed increases. Swimming competitively – improved timed swimming, as she is more symmetrical. Joining in PE at school and trampolining.
f) Skin condition. No pressure problems. Total compliance with SAFO.

5. **Hemiplegia** - age 17 years.
Previously supplied with AFO. Non-compliant. Now wearing SAFO and 10mm heel wedge, now compliant.

a) Range of movement. Passive dorsiflexion was 5° (Off 90) now 5° (Beyond 90). Active movement 10° (Off 90) now can achieve 90°.
b) Posture. Improved. Now weight bearing symmetrically. Rt foot plantagrade and knee extended.
c) Gait. Still hyper-extending knee in stance phase. Achieving consistent heel strike.
d) Balance. More stable.
e) Walking speed and endurance. Both improved. Playing football as striker.
f) Skin condition. No problems.

General conclusions

Functional activities

All users reported improved functional activities i.e. 2 able to go up and down stairs one foot at a time, which was not possible before. All are now able to wear SAFOs for sport/PE.

Comfort / compliance

All reported improved comfort as SAFOs are flexible.
Reduced pressure sores from SAFOs for 3 users.
All are totally compliant wearing SAFOs in school/college.
4 are wearing them all the time.
1 not at weekends but improving.

Users' and Parents' observations

All reported: Improved compliance and comfort.
Easier application of orthosis.
Improved gait pattern and speed of walking as well as endurance.
Improved posture and balance.
Improved confidence and self esteem.

Conclusion

The SAFOs have had overall great success with all users in all aspects of their physical capabilities. There have been marked improvements in compliance with the SAFOs. The initial higher cost of provision of the SAFOs has proved to be cost effective and very well justified as shown by the outcome. All SAFOs have been worn for a year. Four of the SAFOs are now needing to be replaced as the users have grown**.**

Please note their previous orthoses, (whether AFO, DAFO or 2nd skin) would have required replacement much earlier usually quarterly.