

ORTHOPÄDIE TECHNIK

O&P · REHABILITATION · HOME HEALTH CARE

English Edition
Quarterly

Calendar

March 4-6, 2011

BAPO British Association of Prosthetists and Orthotists, Annual Conference, Harrogate, North Yorkshire, United Kingdom. Info: www.bapo.org

March 16-19, 2011

American Academy of Orthotists & Prosthetists, 37th Annual Meeting and Scientific Symposium, Orlando, FL, USA. Info: www.oandp.org

March 29-31, 2011

14th South-East Asian Healthcare and Pharma Show, Kuala Lumpur Convention Center, Kuala Lumpur, Malaysia. Info: <http://www.biztradeshows.com/southeast-asian-healthcare>

April 7-9, 2011

Advanced Rehabilitation for the Patient with a Lower Extremity Amputation, Rehabilitation Institute of Chicago, Chicago, IL, USA. Info: www.ric.org

May 5-7, 2011

International African American Prosthetic Orthotic Coalition, 21st Annual Meeting, Charlotte, NC, USA. Contact: rondell@iprosthetics.com

Imprint

Published by Bundesinnungsverband für Orthopädie-Technik / Verlag Orthopädie-Technik
Reinoldstr. 7-9
44135 Dortmund, **Germany**
Tel.: +49 (0)231 / 55 70 50-50
Fax: +49 (0)231 / 55 70 50-70
E-mail: boecker@ot-forum.de

Edited by Dirk Böcker

Published quarterly providing articles from Orthopädie-Technik, German edition, © OT Medien, 2011

<http://www.ot-forum.de>

IPC

Sir Philip Craven: "Paralympic sport is about fun!"



Bonn, Germany: at his IPC desk.

On January 12th, the IPC (International Paralympic Committee) invited all friends, media and those interested in paralympic sports to its annual new year's reception in Bonn. Shortly before the event, ORTHOPÄDIE-TECHNIK SPORT talked to IPC President Sir Philip Craven about the IPC's greatest successes in 2010, its strategies and tasks for 2011 and other things. The 60-year old Briton also revealed what Paralympic Sport means to him and which sport he favours the most...

OT: Sir Philip, looking back on 2010: Which were – from your point of view – the most interesting and thrilling events in the Paralympic year?

Sir Philip: Well, there were many of them! At first, the Paralympic Winter Games in Vancouver and Whistler, which went really, really well, following the phantastic Summer Games in Beijing in 2008. Then there were several World Championships I attended. For example, we had the great IPC Shooting World Championship in

Zagreb. Besides, in Eindhoven we had the IPC Swimming World Championship. That was the largest event apart from Vancouver, with 649 swimmers from 53 countries and around 8000 spectators.

Another exciting thing was that the board concluded the strategic review of the IPC and fixed the strategic plan in December on our meeting in Ghuangzhou, China. So we're all set out for the next four years concerning the organisation of the upcoming Paralympic Games as the next major event, and secondly, we concluded on the development of new athletes and how to support them.

Philip Craven – Living for Paralympic Sport

The IPC's boss was a successful sportsman in his own time, especially in wheelchair basketball, swimming and table tennis. In the years from 1972 to 1988, he took part in paralympic competitions, winning six medals in basketball and one in 1972 for his achievements in swimming.

In 1973, Craven was part of the British National Wheelchair Basketball Team which got a gold medal in the World Championships. Throughout the Seventies, Craven won several more medals in Basketball European and World Championships.

He was born in Bolton, North England, in 1950. From 1969 to 1972 he studied geography in Manchester, finishing his studies

very soon. Soon, the Main Press Centre and the Olympic/Paralympic Village will be built, it's really amazing. We are pleased to report that it's a great experience to be on the board and that it's a tremendous team we developed which will surely enable great Paralympic and Olympic Games in London.

OT: The Paralympics will take place in the same venues as the Olympics and both events have been planned together by the IPC and the IOC (International Olympic Committee). Does this happen for the first time?

Sir Philip: No. I know that every Organizing Committee claims

with a Bachelor of Arts Degree.

During the 1960ies, Craven took part in a climbing tour where an accident happened. He has been paraplegic since then.

In 2001 he started in the function as the IPC's president; since 2003 he has also been part of the IOC (International Olympic Committee). Apart from that he is executive in several sports associations worldwide, amongst them the English Wheelchair Basketball Association. For his achievements in Wheelchair Basketball, he was awarded an MBE by Queen Elizabeth II in 1991. In 2005, the Queen made him Knight Bachelor, which entitles him to call himself „Sir Philip“ and his wife „Lady Jocelyn“.

OT: Talking about plans for the future: The Summer Paralympics in London 2012 (in August) are eagerly awaited as they promise to be another highlight. What is the current status, are you on schedule with all the preparations?

Sir Philip: Yes, we are well on schedule and are very proud also – because of my Olympic contacts in the board for London 2012 – and generally things are going extremely well. The building programme is absolutely on track, you can see, when you pass the Olympic and Paralympic Park where the main stadium is nearing completion, that it's already completed on the outside. The Velodrome and the basketball arena will be completed

that, but we're looking back to the Salt Lake City Winter Games in 2002 where we joined the organizing committee already. You know, we're having the intention to be fully integrated. But to be fully integrated can be two different things. I think that with the help of hindsight viewing previous organizing committees for the summer games – such as Athens, such as Beijing – that London sent a massive team out at the Paralympics in Beijing to learn, which included putting that learning into action – then, I would say, it's the most integrated organizing committee so far. It has been done before, but it's getting even more professional.

OT: I guess on an organizational basis there would be a lot of synergy effects of the IPC working together with the IOC and vice versa.

Sir Philip: There are obviously massive benefits from that. We have a good relationship with the IOC. Our former agreement with them was ten years old and three months ago, we were looking – jointly with them – how we move forward for the next ten years in our relationship. It's just fantastic to have such a major event with London 2012, the Olympics prior to the Paralympics. So many things can be tested out and prepared beforehand when there is proper integration within the organizing committees. So, the synergy is fantastic and there is a general good cooperation and great benefits.

OT: In December 2010, the Asian Para Games in Guangzhou, China, presented more than 2500 athletes from 41 countries. Did the Asian Para Games turn out to be the success that was expected beforehand and was it still possible to top the atmosphere from Beijing 2008?

Sir Philip: I don't think it would probably be possible to top the specific atmosphere of Beijing. But if you want to do this, you would possibly have to do this in China because of its culture. And Guangzhou was a brilliant experience. Especially the opening ceremony was so spectacular, particularly the way that the torch was lit by the two amputee athletes climbing a wall and passing the torch between them. That included a very strong message and I told this to the current vice premier of China (Name?) [EW1] and congratulated him on it. And it was also said by the president of the Asian Paralympic Committee (APC), Dato' Zainal Abu Zarin, that these were the best Asian Para Games ever – the best games in Asia so far.

OT: When one says “the best ever”, does that include the successes and the medals won or also the atmosphere and the overall feeling?

Sir Philip: The atmosphere is the most important thing. It was really tremendous! We see that the Paralympic spirit is so strong at the Paralympic Games, it's quite amazing. You have to be there to experience it. And more and more people want to come and watch it.

OT: Paralympic sports seems to be beginning to appeal to more and more people that have not been in contact with it before – due to some media coverage on TV, print and on the web. On the other hand, we still hear complaints from organizations as the German NPC that Paralympic Sport is known to people inside it, but that media coverage overall could be greater. Now what is the truth? Is it all a media hype or are people really getting more interested?

Sir Philip: That's hard to tell, but I think that word or label "handicapped sports" – which I would'n't even use! – was the major problem in the past. Because people saw that word and said "We don't understand". That word marginalized people and indicated that some people were lesser people than others. I can remember the first interview I ever did as President of the IPC, on January 4th 2002 – here in this office. This sports reporter from a German newspaper whose name I cannot remember came to me and said: "You know, none of my colleagues will come and speak to you because they don't think of you as sport." But at last, he pulled difficult questions. Yes, there are some ignorant people at the media who don't recognize and realize what true sport is anyway. But the more intelligent ones and the more informed ones realise that Paralympic Sport is true sport and that it's fantastic to get involved with. And if they take the efforts – or should I say their bosses permit them to travel or give them the resources to travel for Paralympics – they will just be convinced!

The real spirit of Paralympic Sport

OT: Great Paralympic competitions and events are visited by thousands these days. But smaller competitions or even trainings are not attended by many people...

Sir Philip: Well, Mr. Beucher is right when he says there should be more visitors. Together we have to work as hard as we can to encourage people to come and see our athletes in competition and in training. Our task is also to inform people about the real spirit of Para-

lympic Sport. First, we will have to get rid of that terrible word "handicapped sports". This word marginalizes and collectivises this mythical group of people which doesn't exist in reality. So you have to remove that from people's minds first. In our context, we much prefer to talk about real sport, and sport for all which means including everyone who wants to do it.



OT: I heard of some paralympic sportsmen that they would like to practise together with olympic sportsmen and do competitions together.

Sir Philip: I don't really understand that. Well, if an athlete says that (pauses) – what I remember, since I used to be an international wheelchair basketball player – is, I didn't have to train with an olympic basketball player to feel OK. I would do it if they could teach me anything. But I was absolutely fulfilled training with other wheelchair basketball players.

OT: So for you as an active sportsman it was more important to improve yourself and to compare your latest performance to the ones you delivered before?

Sir Philip: Well, that's the whole idea of being an athlete! You want to improve yourself and perform better and then maybe win. I was pretty ruthless when I was competing – I am not like that anymore, I have learned (laughs). So why should a Paralympic sportsman want to do that? There is no way of getting better by training with

Olympians. It's not about: "I want to train with somebody with two legs, because I've lost mine!" There is no comparison and no connection so that wouldn't make any sense. We're all athletes!

OT: I get your point. Meanwhile, there is a whole range of different paralympic sports. Which sport do you personally prefer the most?

Sir Philip: I could say it's wheelchair basketball, because that's my sport. But since I became President – and this is true, it's not just a presidential state – I can say that I love each sport equally. I really do enjoy watching each Paralympic Sport individually. And that's not because it's my duty to do so. But I think if you just look at the difficulty of performance and the brilliance of the performance then each sport has it's own appeal. I was at the wheelchair dance world championships in Hannover last month and it was just so fantastic. Besides, I am a big Cricket fan, so this is probably one of my favourite non-Paralympic sports.

OT: We now mostly talked about high performance sports of international top athletes. What is your opinion of sports for all which also includes rehabilitational sports and sport helping feel people better?

Sport is for everyone and it's fun

Sir Philip: That is also a great passion of mine! We're not only interested in great high-level performances, but also in sport and its advantages for everyone. There is one important word what describes what sport is all about: FUN. The most impressive thing I hear from any sportsman is: "It's my job." How boring that is! Sport should not be a job, it should be a wonderful passion. If you get paid for it as well, then that's fine, but without passion, it wouldn't work.

OT: You are member and president of several foundations and organizations and therefore crucial to the Paralympic Movement. Therefore you will have to travel a lot and meet a lot of people. How would you describe a typical working day of yours?

Sir Philip: Well, that depends due to the schedule. If I am in my

office at home, then I start at about half past 8 that I open my computer and look at my emails. Depending on how many there are, this might take half an hour or even an hour and a half. Then we get on to do the office work, fix my flights and so on. By the way, having so much to do with flying, I always have to deal with inaccessible forms of transports as well. At the moment, aircrafts and many airports are amongst the things we are very keen to change at the IPC, because this inaccessibility affects our athletes very much. And if I have a location where events are taking place and were I am invited to speak, of course I am the IPC and therefore, you have to be on top form all the time, just like an athlete, so you have to be in a pretty good condition.

OT: But do you actually find the time to exercise in sports?

Sir Philip: I do. Whether it is raining or not I still take the time

to do a couple of kilometres in my wheelchair. Not quite as fast as I used to, but I still manage to play together with our local wheelchair basketball team.

OT: Do you meet on a regular basis?

Sir Philip: No, I don't have to do all the dates they have to follow. I just turn up sometimes and play with them. You know, I am an old guy (laughs), I am 60 years old and most of the players there are under 30. But I keep myself fit and that's important, because you have to be in a reasonable condition to do this job. I could not be the President of the IPC if I did not work out physically. I have now been doing twelve years in this job, travelling a lot. The most arduous thing for a wheelchair driver is travelling by air. This needs to be improved. And there are certain actions we take to make sure that that happens.

OT: After a major Paralympic

event has taken place, a city is often provided with more barrier-free accesses to all sites. This is what people are hoping to happen to Garmisch-Partenkirchen, the city that is applying for the Winter Games 2018.

Sir Philip: Munich is one of the best airports in the world concerning barrier-free accessibility. And we intend that Heathrow in London will become one of the best. And this should happen way before the games 2012. We had a meeting yesterday with senior people about this and the possibilities are quite good. What we are talking about is accessibility for all: children, elderly people, just everyone. Because someone in a wheelchair needs very different things than someone who is blind or someone who is deaf. Accessibility for all means thinking about what is needed so that no-one is left out. We try to find out what different individuals need, that's our task. □

Prosthetics

S. Bergande, M. Ortiz

The M.A.S. socket – suited for everybody?

This article describes the differences between the M.A.S. socket that has already successfully been established in orthopedic technology and the newly developed M.A.S.soft socket. In cooperation with the proluptions company, Marlo Ortiz has developed this modified version especially for amputees with a weaker muscle status and/or stump volume changes. The application and the benefits of the M.A.S.soft are described in the following. Additionally, an example of a transfemoral patient who was equipped with the new socket technology is presented.

The M.A.S. socket technology has become an inherent part in fitting of transfemoral amputees. The control, the comfort, the range of movement and the cosmetic aspects are the advantages for the users. The

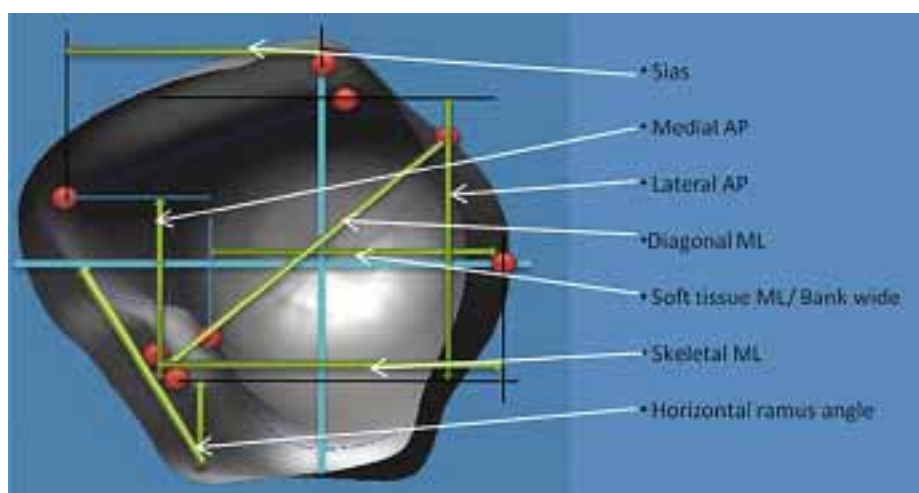



Fig. 1 Vectors, angles and diameters which are of importance for the M.A.S. brim.

benefits for the prosthetist are the structured and remeasurable analyses during the socket fitting. But is the M.A.S. suited for all types of amputees? Volume changes of the stump during the day and a weak

musculature status could effect pressure peaks in the socket, in particular in the Ramus and Ischium area. To overcome this problems Marlo Ortiz and Prolutions have developed the M.A.S.soft.

Otto Bock®

QUALITY FOR LIFE



Learn more about
the liner shape of
the future at
[www.ottobock.com/
Anatomic3D](http://www.ottobock.com/Anatomic3D)

PUR

SIL

TPE

Shape of the future

6Y512 Anatomic 3D PUR Liner

- Thanks to the innovative Anatomic Specific Geometry (ASG), this liner sets a new standard.
- The liner features different wall thicknesses. The material is thicker in sensitive areas to provide protection, and thinner in other areas to increase wearer comfort.
- Increased Pre-Flexion (20°)
- Soft with a great connection between limb and liner: moisture is wicked away by the special liner texture, for better cohesion.

Otto Bock HealthCare GmbH

Max-Näder-Straße 15 · 37115 Duderstadt/Germany · Phone +49 5527 848-1424 · Fax +49 5527 72330 · export@ottobock.de · www.ottobock.com

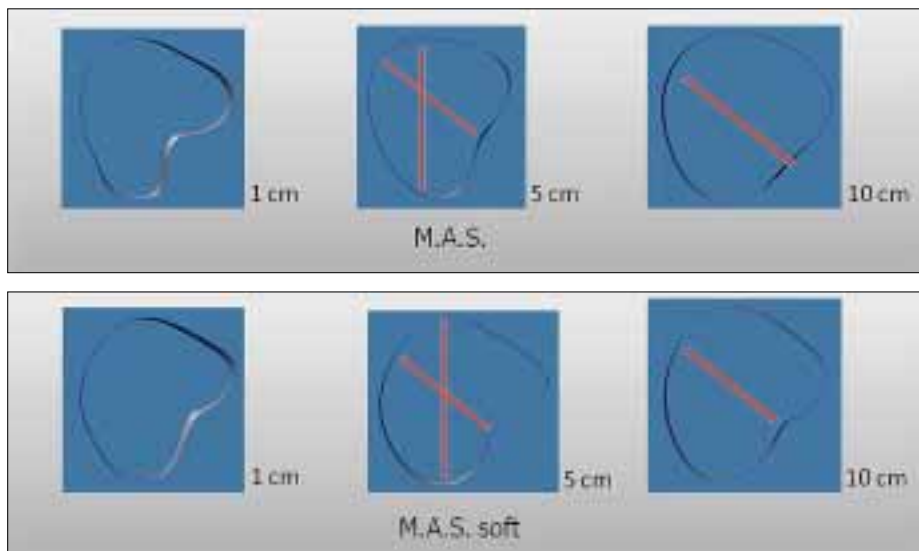


Fig. 2, 3 The cross sections one, five and ten cm show the differences below the ischium in the M.A.S. (top) and in the M.A.S. soft (bottom).

To achieve an optimum in the manufacture of the socket according to the existing knowledge, it is necessary to consider all vectors, angles and diameters in the socket design. These measures are not M.A.S. specific, they are anatomical facts and should be taken into consideration in all kinds of Ischial/Ramus containment sockets.

When using the measurements correctly (mixed with the necessary anatomical understanding) the result will automatically be an M.A.S. socket (Fig. 1).

But is every amputee suited for an M.A.S. socket? Basically Yes. Of course, it is necessary to individualize the shape, but without losing one of those important and vectors, angles or diameters.

Hybrid types missing one or more of the vectors will automatically lead to a loss of control and/or comfort in the socket.

The M.A.S. shape below the brim (vector level) is caused by adduction, flexion and „quasi hydrostatic“ load bearing, through the existing vectors, with and angles compared to this the M.A.S.soft is characterized by fine but effective differences.

The development aim of the M.A.S.soft was to enable patients with weak muscular status and /or volume changes to use the advantages of a M.A.S. socket. Because of the high percentage of vascular amputees, which are suffering from the described problems, the clientele for the M.A.S.soft is relatively high.

The new socket shape is using the existing musculature more extensively in comparison to the classic M.A.S. The peculiarity is the interaction of the muscle groups against each other. The important muscles are in this context the Mm. adductor magnus and rectus femoris.

To avoid pressure peaks on muscle bulges and to minimize rotation problems the correct compliance of certain angles is of major importance. It took more than one year to define the correct angles, the shape structures and the relationship between them.

To prevent pressure points in muscles and rotation problems it is very important to follow decided angles. It was more than one year development to define the correct angles, the structure of the shape and the proportion to each other.

The M.A.S.soft is already integrated into the library of Prolutions. After a longer field tests the M.A.S.soft is now officially available. The cross section approximately one cm, five cm and ten cm below ischium shows the difference in the shape of the M.A.S. and the M.A.S.soft. A patient will be described later in this article (Fig. 2 and 3).

Important is that all vectors

of the classical M.A.S. are also present in the M.A.S.soft. Only the bank wideness is replaced by a medial measure of 4 cm below the ischium. Only the shape provides more stability in the socket. This increases the load inside the socket which on the other allows a certain flexibility for volume changes, as the distal part of the ramus has not immediately contact to the tendon support.

However, the M.A.S.soft is not simply a replacement for the classic M.A.S. Important is that the higher initial load on the medial tendon/muscle parts, users with good muscular status could cause too much pressure in this area. Also the different shape could cause rotation problems.

Fitting example

The Patient described in the following is 48 years old, prosthetist himself and because of this an active user of his prosthesis. The good control and the range of movement of the M.A.S. socket are the main benefits for him in his daily activities.

The muscular status is relatively good, however the adductors are relatively weak. This required bank wideness is more than three cm in the conventional M.A.S.. The status of the M. rectus femoris is good. The overhanging soft tissue at the distal end and a stump length of 32 cm forced to use a liner. On one hand this gives the residual limb a more compact condition, and on the other hand stump length and volume changes.

In this case a Seal In liner was selected, because locking systems need some kind of elongation (to avoid pistoning) and make it very difficult to create a „quasi hydrostatic“ load transmission. Vacuum based

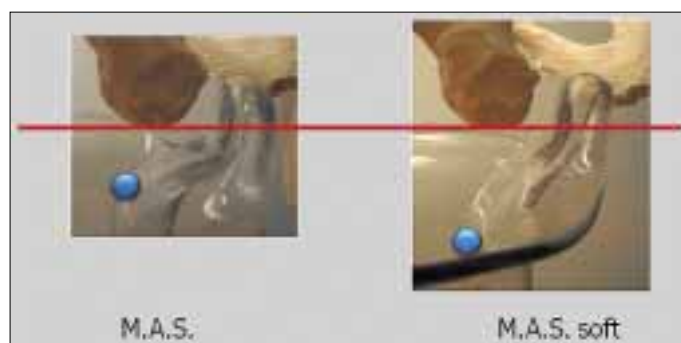


Fig. 4 It shows the differences of the bank shape and the tension of the M. adductor magnus.



Fig. 5-7 To achieve a more compact stump and to minimize the stump length, a Seal-In-Liner was chosen as locking systems do in most cases not permit a „semi-hydrostatic“ loading.

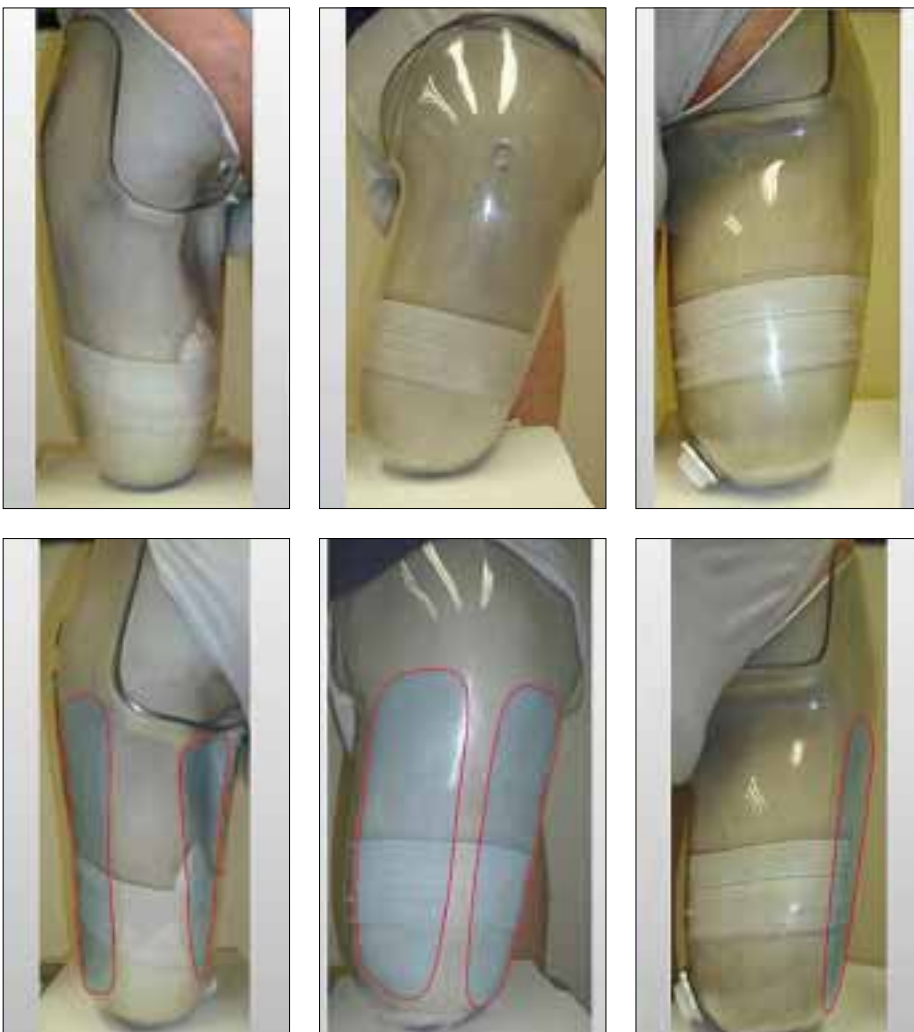


Fig. 8-13 Differences between the M.A.S. and the M.A.S. soft socket. The relevant deviations are marked on the M.A.S. soft.

systems also allow a better control of the prosthesis (Fig. 5 to 7).

The patient also has daily volume changes of minus 2 cm concerning the circumference. These generates pressure between ramus and the bank in the afternoon. He tries to compensate this by socks, but they have also effect on the vectors and he is loosing comfort and control.

The best decision was therefore to fit him with a M.A.S.soft. The pictures on left show the differences between M.A.S. and M.A.S. soft. The prominent differences are market on the M.A.S. soft (Fig. 8 to 13).

The patient can use now the advantages of a M.A.S. socket during the whole day, without using compensation socks for volume changes. The donning of the socket with the Seal In liner in the morning is a bit more difficult, because of the smaller diameter between M. rectus- and M. adductor support.

Conclusion

To fit a patient with a socket at a high amputation level (should be the goal) requires endurance and the decision of the patient to use this kind of socket, and finally the knowledge of the prosthetist to be successful. The control of all vectors and the volume are essential in the phase analysis. The phase of an analyses should be at minimum three weeks, especially when there is a changeover to a „quasi hydrostatic“ system.

The logical analysis of an M.A.S. socket gives not much space for „wrong“ evaluations of the problem. The relationship between vectors and volume are an important fact determining success and non success.

However this problem becomes even more difficult when patients have a poor muscular condition. In this case the M.A.S.soft is a good alternative to control the vectors and to be more flexible in volume and volume changes at the same time.

Author contact information:

Stefan Bergande
 proluptions
 Am Wasserturm 35d
 29223 Celle
 Germany

Evaluation of posture systems in neuromotor pathologies in children

Multi-centre¹ collection of case studies on the effectiveness of the „Squiggles“ and „Mygo“ systems

This multi-centre study involved five rehabilitation centres that documented the effectiveness of specific modular posture systems („Squiggles Seat“ and „Mygo“ from Leckey, Ireland) for children with neuromuscular disease and developed a protocol that allows for quantifying the results achieved in predefined functional categories. 43 children affected by a neuromotor pathology (cerebral palsy, neuromuscular diseases, and others) with impairment of the capacity of postural control were enrolled. Several clinical and functional assessment tools (seating clinic, LSS) as well as Goal Attainment Scaling (GAS) were chosen to evaluate the results and the clinical effectiveness of the two seating systems.

Each subject was assessed at baseline, after 3 months, and after 6 months of use of the device. Statistically significant improvements for the postural alignment variables of well-being, interaction and feeding were found after 3 months and sustained after 6 months. For caregivers, significantly positive results were the variables of well-being, increase in the period of maintained seated posture, interaction, relationship, and distress reduction. This study demonstrated that the posture systems Squiggles Seat and Mygo may improve functional variables and quality of life of children with neuromotor pathologies and that of their caregivers.

The study also produced a protocol for the assessment of the clinical

and functional effectiveness of paediatric seating systems, defining an outcome measurement model that may be utilized in future studies in a clinical rehabilitation setting.

Introduction

Children with neuromotor pathologies often present difficulties in achieving and/or maintaining an intended seated position in an independent and lasting way and frequently need adjustments, aids and/or orthoses for the seated posture. One of the objectives of rehabilitation professionals is to obtain the seated position with “the best alignment possible” that also allows for utilizing residual functional skills. Over the past 10 years studies have focused not only on investigating the most suitable seated posture and on the adjustments needed to achieve it, but in particular also on the residual functions that the patient can use in this position

Controlling posture may be defined as “the use of any technique to minimise abnormal postures and implement function” [1]. “For children with neuromotor pathologies postural solutions can be used as a therapeutic means of improving ability in the performance of functions” [2] and the achievement of the maximum possible independence.

The postural solutions include aids and orthoses. The aids include posture systems understood as those assemblies formed by a seat-

ing surface and a mobile or fixed base to which they are connected [3]. The posture systems can be used in association with physical therapy to increase postural control [4] and can improve involvement in a social setting (school, home, work) [5].

Posture systems understood as “assistive technology” have developed over the past 20 years [6] leading to the production of special posture systems known as “modular”. These are made of components that can be assembled and adapted to an individual’s requirements and give the child with serious neuromotor disorders a stable posture and, above all, one that can be personalised. The researchers were interested in verifying the influence of the changes in the system on the control of posture and the impact on the functions.

The purposes of a posture system that can be personalised are numerous: guaranteeing postural stabilisation [7], reducing the influence of pathological schemes on body areas [6], performing a function similar to an orthosis in rehabilitative treatment [8], preventing, delaying or accommodating deformities or musculoskeletal disorders [9], redistributing pressures, balancing the weight of the various body areas and reducing the incidence of cutaneous lesions [6], guaranteeing safety, comfort and reducing fatigue [3], facilitating control of the head useful for orientation, socialisation, development of cognitive and communicative skills [1], guaranteeing a functional position for feeding, breathing, digestion [6]. Hulme et al. [10] have verified the improvement in control of the seated posture and the grasp-

¹Otto Bock Competence Centre, Budrio; Unità di Riabilitazione delle Gravi Disabilità dell’Età Evolutiva Ospedale S. Maria Nuova, Reggio Emilia; Servizio di Neuroriabilitazione Età Evolutiva, Padova; IRCCS Fondazione S. Lucia, Roma; Centro Spina Bifida, Ospedale di Parma; Italy



GenuTrain® NEW

Motion is Life.

Ω The new generation with
Omega pad.



- improved joint stabilization through new Ω pad and Train active knit
- reduction in pain through friction massage of the front parts of the meniscus
- pressure relief for the patella through pressure on the infrapatellar fat pad
- faster mobilization through stimulation of the sensorimotor system

ing in 19 children with postural control impairments (PCI). Miedaner [11] has shown the effectiveness of the active extension of the trunk by fitting the subjects in a modular system with the opportunity of tilting the seat beforehand and inserting knee blocks.

Posture systems may prove useful in terms of improving feeding ability, swallowing liquids, and the retention of food in the mouth [12], improving the respiratory function in children with PCI [13], improving the cognitive ability [14], improving the relationship with the surrounding environment [15], preventing deformities of the hip and reducing pain [16, 15].

Literature based on the evidence is however still scarce on this topic. A systematic review of the literature by Farley et al. [1] has assessed the levels of evidence of studies on the effectiveness of the management of posture: the 56 items in which the physiological functions were assessed (e.g. cardiopulmonary variables) showed average levels of evidence of 1.6. On the other hand, for those studies in which the functional variables were measured, evidence levels ranged from 2.3 to 4.4, with levels of scientific evidence remarkably lower (studies not randomised and not controlled).

This study is observational research of a series of individual cases; no control population was selected and each subject served as his/her own control. At the start of this project three main targets were:

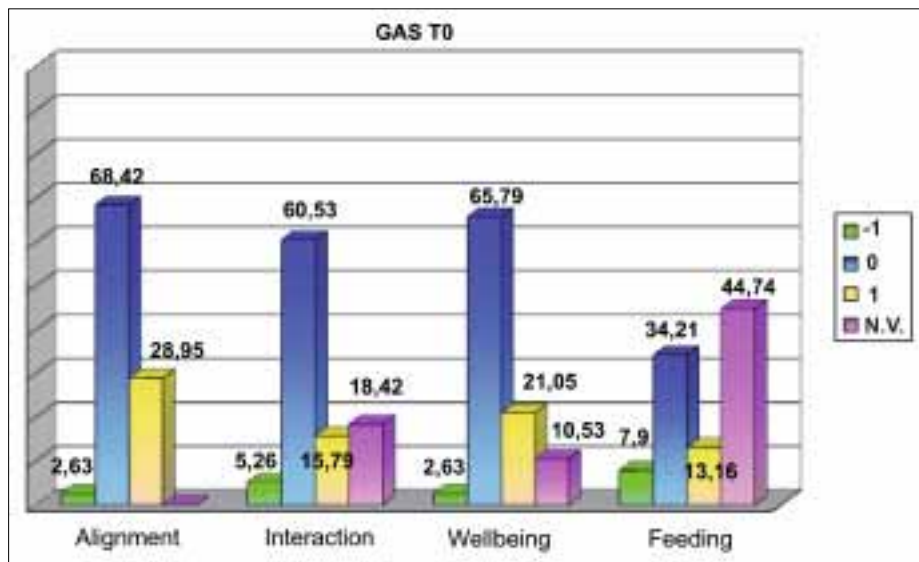


Fig. 1: Goal Attainment Scaling (GAS) at baseline (T0) for alignment, interaction, well-being, and feeding. Score 0 means achievement of the predefined rehabilitation goal, -1 goal achievement below expectations, +1 goal achievement above expectations. N.V.= not assessable.

- to investigate the clinical and functional effectiveness of two modular posture systems for children (Squiggles Seat and Mygo)
- to develop an assessment and verification protocol for the rehabilitation results achieved that may be used in subsequent studies and regular clinical practice
- to demonstrate that it is possible to measure personalised functional variables, a substantial objective in rehabilitative practice where treatment is essentially aimed at inducing modifications in the functioning of the person rather than modifying biological or laboratory parameters

Materials and methods

The study started in January 2007 and ended in May 2008. It involved five Italian rehabilitation centres located in various regional settings. The selection of centres which usually do not cooperate on a regular basis was designed to give the researchers the opportunity to compare rehabilitation guidelines, operating methodologies and different assessment systems and jointly define a harmonised protocol. The study used the support of orthopaedic technicians from Italian O&P companies that provide the two studied seating systems and offered their skills in designing, adapting and delivering the aids.

The two devices studied are modular posture systems: Squiggles Seat for children from 0 to 5 years, and Mygo for children from 5 to 12 years. Both devices have a seat; planar, adjustable back; 20° tilt-in-space; bases for inside, outside and electronic; lateral and central containment for lower limbs; postural unit for the head; tray with recess; and height adjustment of the seat. Mygo also offers a flexible sacral support, and separate containment of the lower limbs.

Subjects

The population studied was selected from the children patient base of the 5 rehabilitation centres that were considered candidates for a modular seating system.

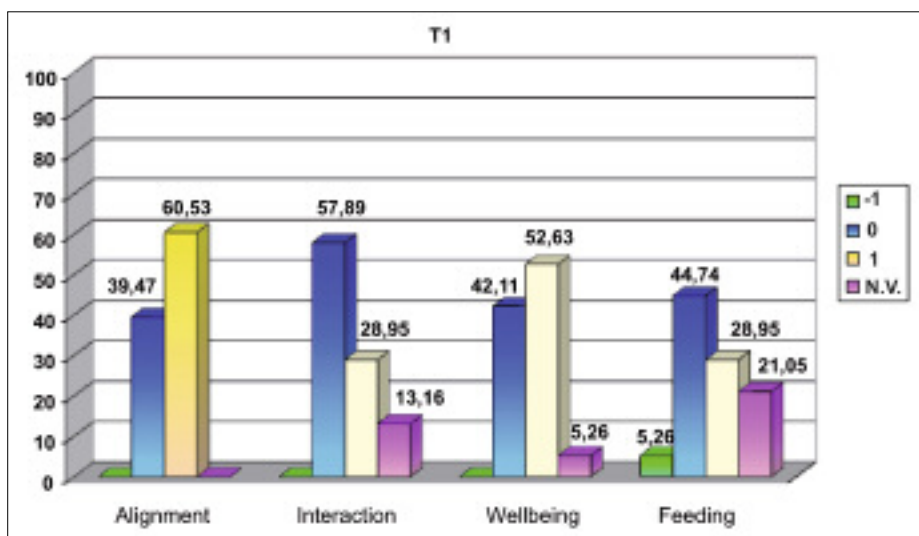


Fig. 2: Goal Attainment Scaling (GAS) after 3 months (T1) for alignment, interaction, well-being, and feeding. Score 0 means achievement of the predefined rehabilitation goal, -1 goal achievement below expectations, +1 goal achievement above expectations. N.V.= not applicable (not measurable).

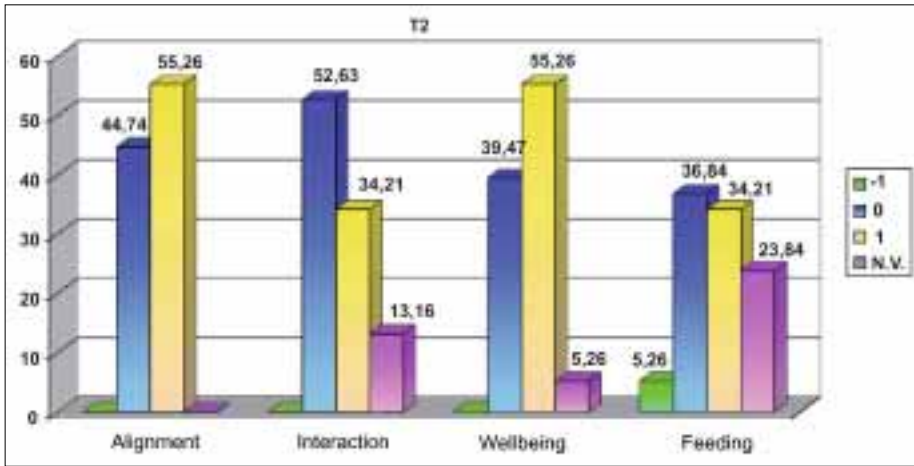
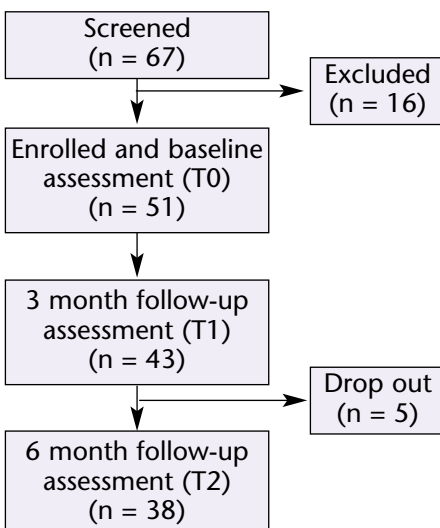


Fig. 3: Goal Attainment Scaling (GAS) after 6 months (T2) for alignment, interaction, well-being, and feeding. Score 0 means achievement of the predefined rehabilitation goal, -1 goal achievement below expectations, +1 goal achievement above expectations. N.V.= not applicable (not measurable).

Out of the 67 children screened 16 were excluded prior to the start of the study for the following reasons: the therapists chose another aid (4), they had already received an aid for the seated posture (8), the parents would not accept the aid (2), the aid was not compatible with the size of the body (2).

Out of the 51 patients enrolled and assessed at baseline (T0), only 43 received an approval of the aid by the Italian National Health Service and could be re-assessed after 3 months (T1). 38 patients completed the final assessment after 6 months (T2).

The age range of the 43 patients included was between 9 months and 14 years with an average age of 4.9 years. The underlying diagnoses were 74% postural control impairment (PCI), 5% neuromuscular pathologies, 9% encephalopathies, and 12% genetic syndromes. 54% of patients used the Mygo and 46% the Squiggles.



Assessments instruments

The determination of assessment tools to be used required the active involvement of the researchers and a series of analyses and



Fig. 4 Squiggles seat.

discussions that were extremely useful for the process of the subsequent study.

For the purpose of making the outcome homogeneous and comparable an assessment sheet was drafted and completed to be applied in each patient. The sheet comprised three parts:

- For the clinical assessment part, reference was made to the Seating Clinic (SIVA) [17] sheet in which the characteristics of the subject are assessed (anthropometric measurements, deformity of lower limbs, deformity of the vertebral column, pathological movement patterns, etc.). The sheet was adapted by adding

some variables such as the functional ability of the upper limbs, emotional and relationship aspects, initiative, attention, adaptation and other parameters.

- Level of Seating Scale – LSS [18] is a means of assessing the capacity for control of the seated posture in 7 categories. The scale is quick and easy to apply and can be used regardless of the subject's basic pathology. A measurement is taken of the ability to maintain the seated posture in conditions of comfort and safety without a foot support for 30 seconds.
- Goal Attainment Scale – GAS [19]. This is a 5-point scale in which an assessment is carried out to see to what extent individual rehabilitation goals set prior to the study have been achieved. The scale was modified and adapted to a 3-point scale in which the value of 0 represented the achievement of the expected goal(s), -1 represented a goal achievement below expectations and +1 a goal achievement above expectations.

Significant functional objectives were identified in terms of increasing the quality of life and independence considered from the point of view of investigators and clinicians as well as parents.

Objectives of the investigators/clinicians:

1. postural alignment
2. interaction-relationship
3. well-being of the child
4. feeding
5. handling
6. respiratory function
7. containment of the deformities
8. increased sitting times
9. ease of transport
10. communication

Out of these, the first four were selected to undergo statistical analysis. Objectives of the parents:

1. Reduced physical distress for the care giver
2. Ease of positioning
3. Nice appearance
4. Interaction-relationship
5. Well-being of the child
6. Increase in the times of maintenance of the seated position
7. Transport

8. Feeding
9. Communication

Protocol

The study was structured around 3 time points: each subject was assessed at baseline upon delivery of the aid (T0), after 3 months (T1) and after 6 months (T2) of use of the seating system.

The procedure of data collection was as follows. At baseline (T0):

1. Video observation of the child without a posture system
2. Clinical and functional grading using the determined assessment scale
3. Test and adaptation of the seating system in relation to motor organisation and the functions to be implemented
4. Video observation of the child in the posture system
5. Identifying functional goals – investigator and family

Step 5 was the phase in which the individual functional goals and expectations were defined and described. For each subject and for each goal there was a description of what level of goal achievement was expected for the scores of 0, +1, and -1. The -1 score was usually identified as the baseline level of ability of the subject prior to using the new aid. This part required greater commitment from the researchers as an attempt was made to describe the goals as detailed and quantifiable as possible in order to base the evaluation on objective facts rather than on subjective impressions.

After 3 months (T1) and 6 months (T2):

6. Evaluation of goal attainment (GAS) by investigators and care givers
7. Processing and analysis of data – after T2

Results

At baseline (T0) the alignment goal was achieved in 68.42%, the interaction goal in 60.53%, and the well-being goal in 65.79% of cases. There were low scores for feeding with 0 in 34.21% of patients due to the high percentage of not assessable cases (44.74%). Quite a number of the patients not

assessable for feeding had a PEG which resulted in a lack of modifiable feeding variables.

After 3 months (T1) there is an increase in the number of patients with +1 scores, i.e. the results were above expectations in all 4 functions.

After 6 months (T2) the level of achievement of the alignment goal was basically sustained while the number of patients with +1 (above expectations) scores further increased for the interaction and well-being function. The percentage of subjects not assessable for the feeding function still remained high.



Fig. 5 Mygo.

Statistical analysis

The differences between the GAS scores for the 4 functions (goals) postural alignment (A), interaction/relationship (B), well-being (C), feeding (D) obtained at T0-T1, T0-T2, and T1-T2 were statistically analysed using the Wilcoxon test. The parameters used for the analysis were mean, standard deviation, median and interquartile deviation (IQR).

Postural Alignment

The interventions produced a significant improvement in postural alignment after 3 months ($p=0.0007$), which was sustained but did not further improve after 6 months ($p=0.0033$).

Interaction/relationship

The interventions produced a significant improvement in the interaction-relationship function after 3 months ($p=0.0117$), which was sustained but did not further improve after 6 months ($p=0.018$).

Well-being

The interventions produced a significant improvement in the well-being function after 3 and 6 months ($p=0.0033$). No comparison was made between T1 and T2 due to the reduced amount of data, as the number of non-assessable subjects was high.

Feeding

The interventions produced a significant improvement in the feeding function after 3 months ($p=0.0431$). Between the 3 and 6 months follow-up the absolute percentage of patients with +1 GAS scores for feeding (above expectations) further increased from 28.95% to 34.21%, but marginally failed to reach statistical significance vs. baseline ($p=0.0587$). This is due to the fact that the number of patients reduced by five drop outs between T1 and T2.

Discussion

At the start of the study, we set three objectives:

The first objective was to investigate the effectiveness of the two posture systems Squiggles and Mygo. The results demonstrated a statistically significant improvement of postural alignment, interaction-relationship, and well-being after 3 months, which were sustained but not further improved after 6 months. Feeding was significantly improved after 3 months. After 6 months the percentage of patients with above expectation feeding function further increased, but the difference between baseline and 6 months follow-up only marginally failed to reach statistical significance due to five drop-outs. With these results the two posture systems Squiggles and Mygo may be considered clinically effective.

A limitation of the study were the adaptations made to the system for each child, given the numerous possible combinations of degrees of tilt-in-space, variation in angles of the different regions (pelvis, ankle-foot, vertebral column, head), possibility of even single abduction of the lower limbs, individual adjustments of the various types of support to the lower limbs, to the pelvis, trunk and head. These adaptations were not considered in the statistical analysis.



OHIO WILLOW WOOD®
free the body...free the spirit®

An Alpha® Select Cushion Liner used with LimbLogic® VS and an Alpha Flex® Sleeve is more than a liner, sleeve and suspension device working together.

It's a whole new generation of comfort and performance from a prosthesis.

The liner's thin proximal edge adds little bulk to the brim line for attaining an airtight seal

A flexible knee panel allows a greater range of knee motion — even under vacuum suspension

Only 2.5 mm of gel behind the knee delivers comfort when the knee is bent for extended time periods

The liner's fabric stretches circumferentially making it easy to don — no lubricants or lotions are needed



Level	Definition	Description
0	Cannot position	The child can not position itself to sit and can not maintain the seated position even with assistance
1	Supported from the head down	The child requires support for the head, the torso and the pelvis to maintain the sitting position
2	Supported from the torso down	The child requires support for the torso and the pelvis
3	Supported at pelvic level	The child requires support at pelvic level
4	Maintains the position without moving	The child is seated independently if it does not move torso and limbs
5	Moves its torso forward and gets up	Inclines the torso forward by at least 20° in relation the vertical plane, without using hands and gets up
6	Moves the torso laterally and gets up	Moves one or both hands laterally and improves balance after inclining the torso by at least 20° on one or both sides vis-à-vis the median line. Does not use its hands to help

Tab. 1 LSS.

sis. Despite the fact that these are very important factors and were documented for each individual case, it was not possible to corre-

late the individual outcome with the individual adaptations. Thus the result of each individual assessment should be considered "unique"

and not necessarily transferable to other circumstances or to other similar posture systems.

Another limitation is the lack of a control group and the characteristics of the studied population. Enrolled children were those who did not have any aid for their posture and others who were already using an aid that did not fully meet their needs. These should be seen as two different populations, whereas in our study they were grouped together.

The second objective was to develop an assessment sheet. We can say that our sheet could be applied without any difficulty and allowed a range of information to be collected that was adequate in terms of the selection, production and adaptation of the aid.

We believe that this objective

References:

- [1] Farley R, Clark J, Davidson C, Evans G, MacLennan K, Michael S, Morrow M, Thorpe S (2003) What is the evidence for the effectiveness of postural management? *International Journal of Therapy and Rehabilitation*, 10(10), 449-455.
- [2] Wandel JA (2000) Positioning and handling. In JW Solomon (Ed) *Pediatric Skills for Occupational Therapy Assistants*. St Louis: Mosby.
- [3] Healy A, Ramsey C, Sexsmith E (1997) Postural support systems: their fabrication and functional use. *Developmental Medicine and Child Neurology*, 39, 706-710.
- [4] Pountney TE, Mulcahy CM, Clarke SM, Green EM (2000) *The Chailey Approach to Postural Management*. Birmingham: Active Design Ltd.
- [5] Trefler E, Taylor SJ (1991) Prescription and positioning: evaluating the physically disabled individual for wheelchair seating. *Prosthetics and Orthotics International*, 15(3), 217-224.
- [6] Cook AM, Hussey SM (2002) Seating systems as extrinsic enablers for assistive technologies. In *Assistive Technologies Principles and Practice*. St Louis: Mosby.
- [7] Green EM, Nelham RL (1991) Development of sitting ability, assessment of children with a motor handicap and prescription of appropriate seating systems. *Prosthetics and Orthotics International*, 15, 203-216.
- [8] Herman JH, Lange ML (1999) Seating and positioning to manage spasticity after brain injury. *Neurorehabilitation*, 12(2), 105-117.
- [9] Trefler E, Taylor SJ (1991) Prescription and positioning: evaluating the physically disabled individual for wheelchair seating. *Prosthetics and Orthotics International*, 15(3), 217-224.
- [10] Hulme JB, Gallacher K, Walsh J, Niesen S, Waldron D (1987a) Behavioural and postural changes observed with use of adaptive seating by clients with multiple handicaps. *Physical Therapy*, 7, 1060-1067.
- [11] Miedaner J (1990) The effects of sitting positions on trunk extension for children with motor impairment. *Pediatric Physical Therapy*, 2, 11-14.
- [12] Hulme JB, Shaver J, Acher S, Mullette L, Eggert C (1987b) Effects of adaptive seating devices on the eating and drinking of children with multiple handicaps. *The American Journal of Occupational Therapy*, 41(2), 81-89.
- [13] Nwaobi OM, Smith PD (1986) Effect of adaptive seating on pulmonary function of children with cerebral palsy. *Developmental Medicine and Child Neurology*, 28, 351-354.
- [14] Miedaner J, Finuf L (1993) cited in Roxborough L (1995) Review of the efficacy and effectiveness of adaptive seating for children with cerebral palsy. *Assistive Technology*, 7, 17-25.
- [15] Clarke AM, Redden JF (1992) Management of hip posture in cerebral palsy. *Journal of the Royal Society of Medicine*, 85, 150-151.
- [16] Scrutton D (1991) The causes of developmental deformity and their implication for seating. *Prosthetics and Orthotics International*, 15, 199-202.
- [17] SEATING CLINIC guidelines for the assessment of posture in motor disabilities by Antonio Caracciolo and Massimo Ferrario, *Fondazione Don Gnocchi IRCCS-ONLUS*, Milano 1998 ISBN 88-85936-22-9.
- [18] Fife SE, Roxborough LA, Armstrong RW, Harris SR, Gregson JL, Field D. Development of a clinical measure of postural control for assessment of adaptive seating in children with neuromotor disabilities. *Phys Ther*. 1991 Dec; 71(12): 981-93. Erratum in: *Phys Ther* 1992 Jan; 72(1):41. PMID: 1946630.
- [19] Kiresuk TJ, Lund SH, Larsen NE. Measurement of goal attainment in clinical and health care programs. *Drug Intell Clin Pharm*. 1982 Feb;16(2):145-53. PMID: 7075465 [PubMed-indexed for MEDLINE].
- [20] Palisano J. Robert (1993). Validity of Goal Attainment scaling in infants with motor delays. *Phys. Ther*. 1993; 73.651-658.
- [21] Steenbeck D., Ketelaar M, Galama K, Gorter J W (2007) Goal attainment in paediatric rehabilitation: a critical review of the literature. *Developmental Medicine and Child Neurology*, 49:550-556.

T ₀		Less than expected -1	Description expected objective 0	Better than expected +1
X	Postural alignment	Head falling ■ □	containment of the head with controlling headrest ■ □	Head controlled without controlling headrest ■ □
X	Interaction-relationship	■ □	■ □	■ □
X	Well-being of the child	Maintains the posture without crying for less than 1 hour ■ □	Maintains the posture without crying for 1 hour ■ □	Maintains the posture without crying for more than an hour ■ □
X	Feeding	Consumes 1 meal in the posture system ■ □	Consumes 2 meals in the posture system ■ □	Consumes all meals in the posture system ■ □
	Visual function			
	Handling			
	Respirator function			
	Containment of deformities			
	Communication			
	Increase in times of maintenance of seated position			
	Transport			

Tab. 2 GAS example.

was achieved. The acceptance and the use by other rehabilitation professionals or researchers will show whether this assessment sheet is adequate.

The third objective was to show that it is possible to measure per-

sonalised functional variables. For this purpose we used the GAS, which proved able to measure the level of achievement of individual patient goals in relation to expectations defined prior to the intervention. In order to reduce the possible

risks of subjectivity, we tried to describe the goals as detailed and quantifiable as possible, introducing numerical variables (time, number of episodes, number of meals, etc.) as suggested by previous scientific work relating to the use of this tool [20, 21] which made the judgement more reliable.

To get greater confirmation of the reliability of the results, we asked a therapist not involved in the study, but with more than 10 years experience in children rehabilitation, to assess the videos of the children and complete the investigator GAS independently. The result was a complete match in 75%, and partial match in 25% of cases. We believe that this supports the reliability and validity of the study results.

Author contact information:
 Francesco Fochi, Physiotherapist
 Otto Bock Competence Center
 Via Filippo Turati 5-7
 40054 Budrio
 Italy

News

German Day of P&O in Kuala Lumpur, Malaysia

The SE-Asian Healthcare & Pharma Show, which is the leading specialist trade show for medical technology, health, diagnostics and hospital supplies, will take place in Kuala Lumpur, Malaysia, from 29th to 31st March 2011. The trade show organiser ABC Exhibitions has invited Confirmed GmbH, as a subsidiary of the German Association of Orthopaedic Technology (Bundesinnungsverband für Orthopädie-Technik), to organise a special advanced training programme for orthopaedic technology.

During the course of the 14th SE-Asian Healthcare Show to be held at the excellent trade show and congress centre facilities KLCC at the foot of the well-known Petronas Twin Towers, the third edition of a German Day will be conducted as a showcase for German technical orthopaedics.

After two successful German Days held during the annually conducted National Assembly of the AOPA American Orthotic & Pros-

thetic Association in Seattle (2009) and Orlando (2010), the successful concept is now being exported to Southeast Asia. In the multi-ethnic nation of Malaysia the requirements for medical care are steadily growing, and the government of Malaysia has given health-care a high priority and is increasingly implementing new projects. As the largest event of this kind in the Southeast Asian area the event also clearly radiates across the national frontiers into the neighbouring countries to Malaysia. With the visit by the Malaysian health minister the German Day will confer a highly official and exceptional importance to the event.

The German Day on 29th March 2011 stands under the theme "Modern prosthetic treatment". As chair for the German lecture pro-



gramme it was possible to invite Dr. Sebastian Wolf, director of the gait assessment laboratory at Heidelberg University Clinic, who is an internationally known expert in the field. Together with Michael Guenther, Guenther Bionics, Ralph Parlesak, Otto Bock, Wolf will present a lecture programme for the Asian specialist visitors, which will bridge the gap between the technical orientation and the clinical care in prosthetic treatment. □

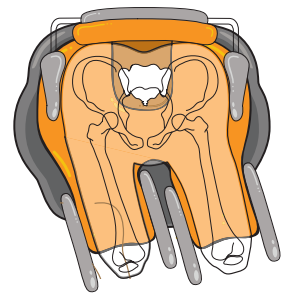
Otto Bock®

QUALITY FOR LIFE

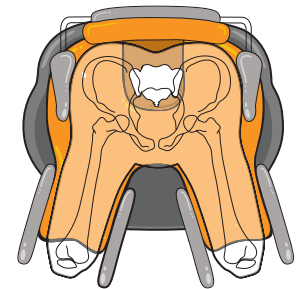


The benefits of Mygo:

- Unique setting options
- Seating unit can be adjusted to grow with the child
- Innovative pelvis fixation system



Windswept deformity



Hip abduction position

Individual, Versatile, Suitable for Daily Use

Mygo 2010

Mygo 2010 is an individually adjustable seating system that promotes the development of the child. It offers ultimate stability and counterbalances orthopaedic postural deformities. Mygo 2010 is suitable for children aged 3 to 14 years and can be adapted to various mobility bases. The seating system combines the best possible therapeutic benefit with suitability for daily use, comfort, and a child-friendly design.

Otto Bock HealthCare GmbH

Max-Näder-Straße 15 · 37115 Duderstadt/Germany · Phone +49 5527 848-1590 · Telefax +49 5527 848-1676 · reha-export@ottobock.de · www.ottobock.com