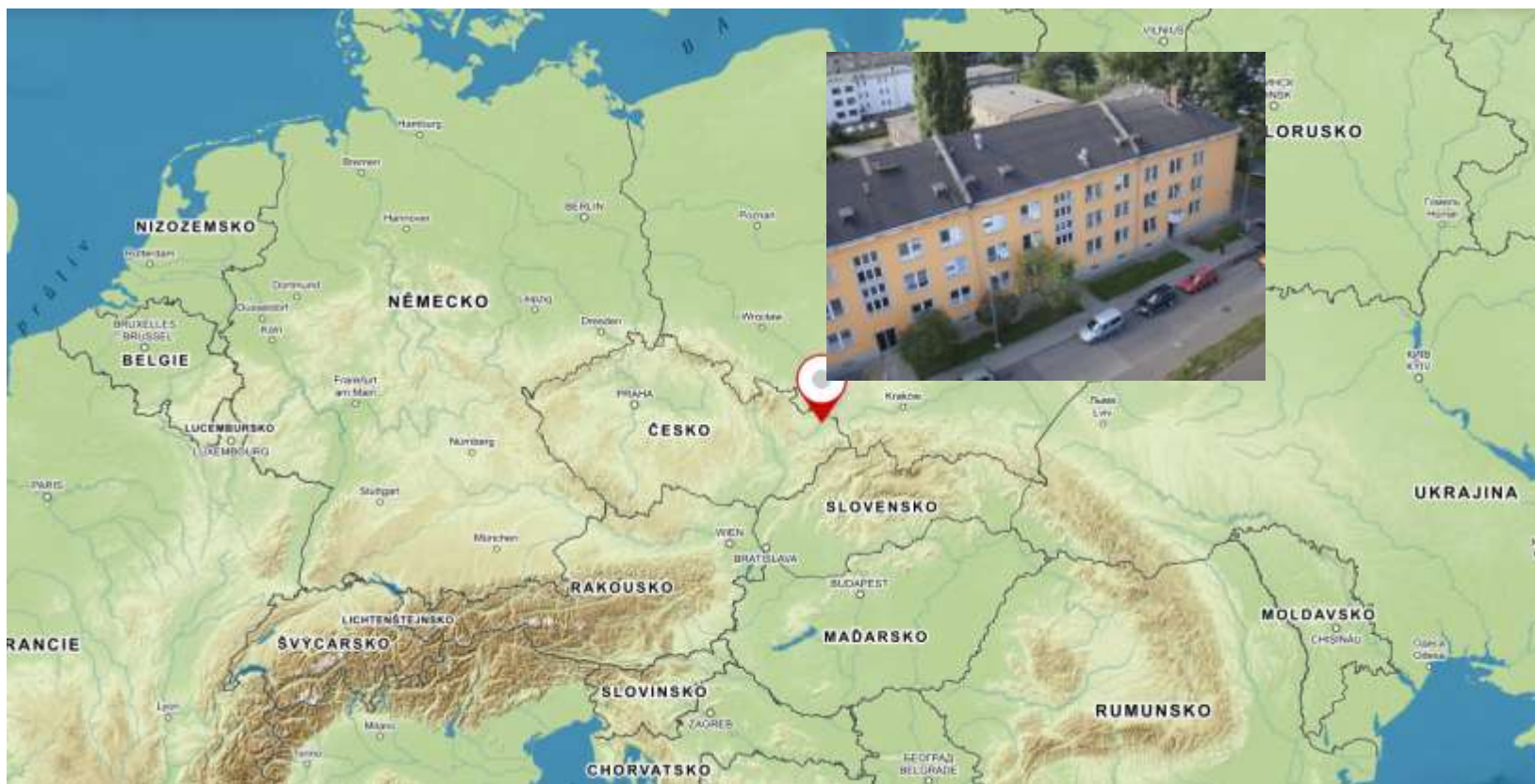


Possibilities of orthotic treatment in children with cerebral palsy.



Petr Krawczyk, MD

PROTEOR CZ s.r.o., Ostrava, Czech Republic



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Content

- **Procedure for the indication of orthoses**
- **Indication of lower limb orthoses**
- **Indications of orthoses upper limb**
- **Indications trunk orthoses**
- **Shortcomings in prescribing**
- **Conclusion**

Functional indications for orthoses

How we proceed in this indication and prescription orthoses:

- Determining **functional requirement** orthosis
- **Structural requirement** orthosis
- **Specifying individual** orthosis
- Use the international **classification** of orthoses

Interdisciplinary care
(neurology + rehabilitation + orthopedics + orthotics)

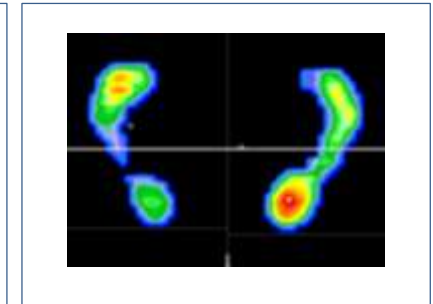
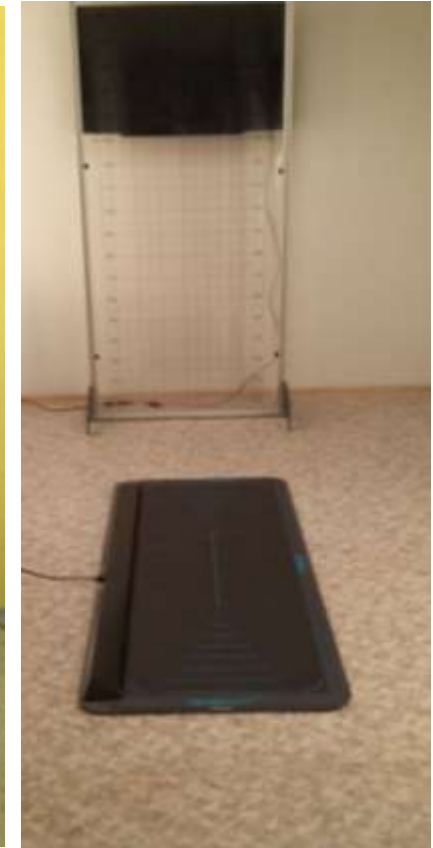
we indicate the orthoses together
doctor + physiotherapist + orthotic technician

Indications of lower extremity orthoses

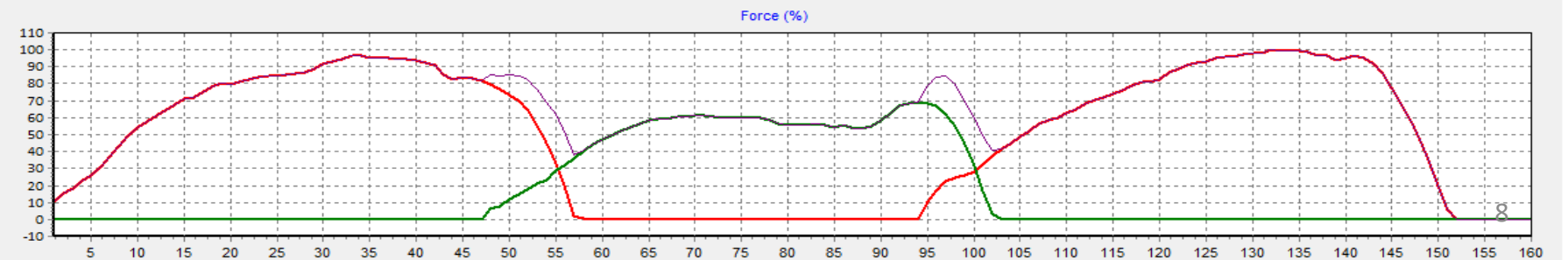
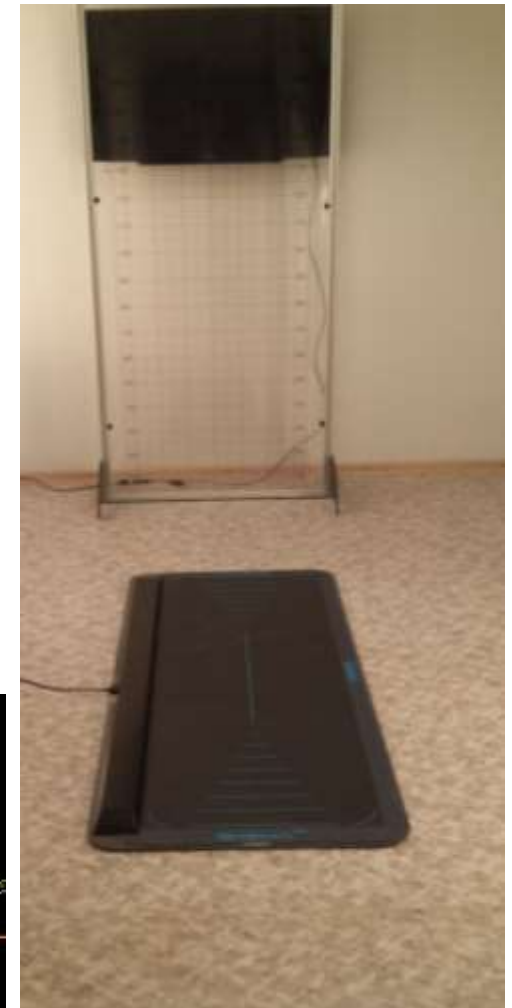
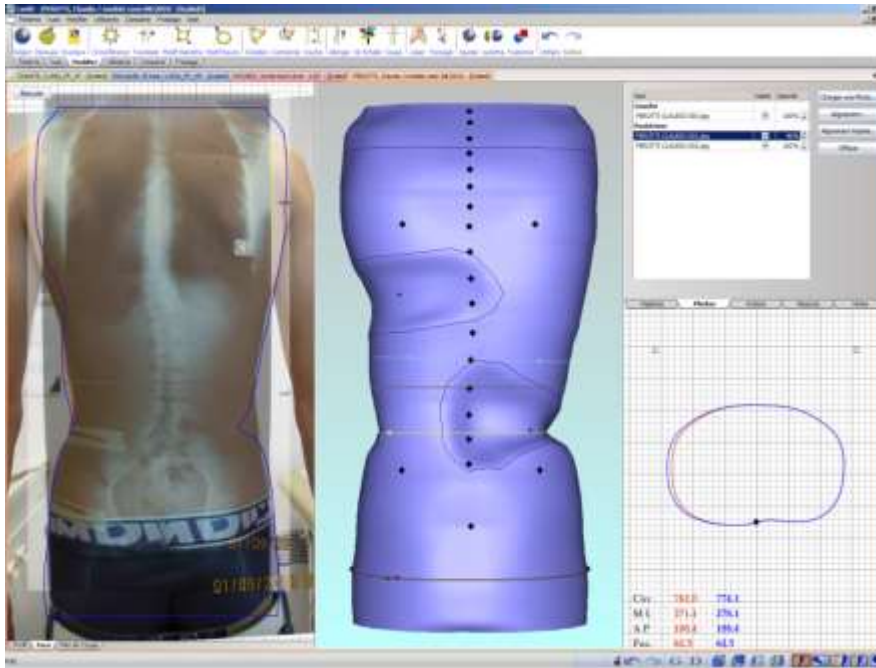
Determination of the functional requirement of orthoses

- **Corrective action** - a requirement for the influence acquired and congenital deformities of limbs or torso when we try to redres to certain morphological or functional status with gradual correction.
- **Immobilization** – extremity fixation following trauma or inflammation.
- **Mobilization of the joint** - refers to the requirement, in which we try to achieve magnification of the range of the motion, such as influencing contractures, conditions after surgery on tendons.
- **Stabilization** - it provides the movement of the joints in the acute or chronic articular instabilities that the joint.
- **Support function** - support of muscle function, segment derotation, etc.
- **Retention function** - requiring correction of the limbs
- **Unweighting function** – compensation or support of extremity weightbearing funktion

Examination before indication of orthotic treatment



Examination before indication of orthotic treatment



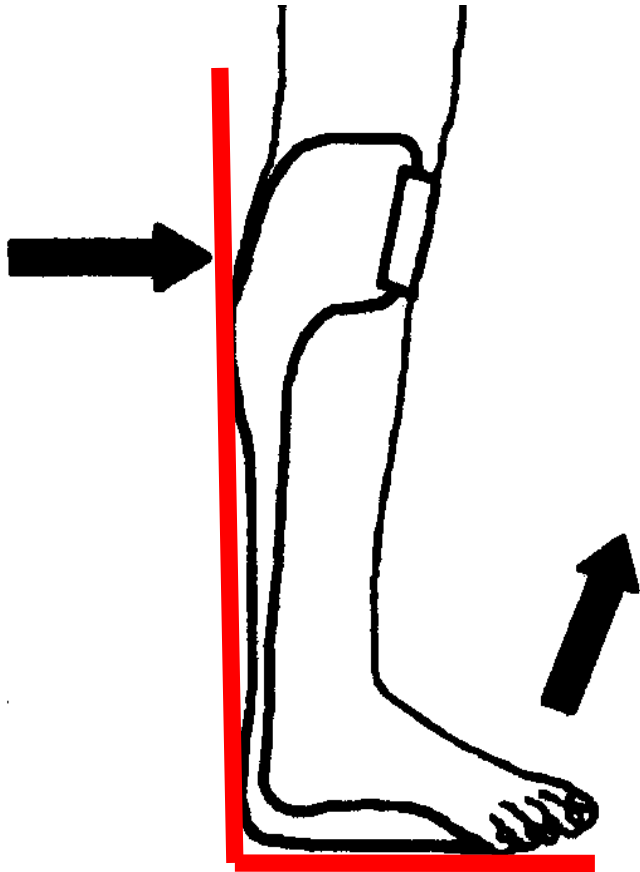
Indications orthosis – principles action

Constructional solutions AFO

- The height of the orthosis
- The angle of dorsiflexion in articulatio talocruralis

The function of the orthosis

- Preventing pes equinus
- Influence genu recurvatum



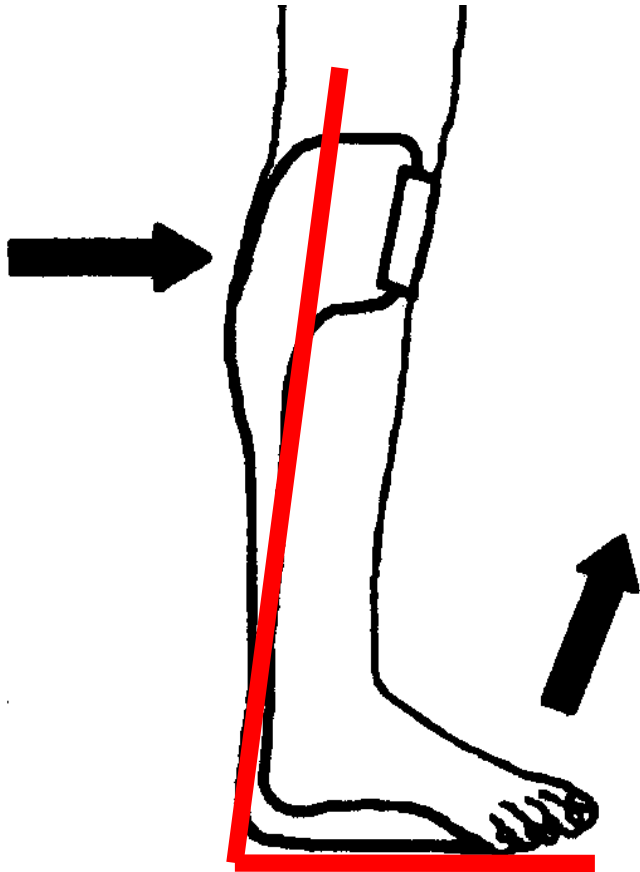
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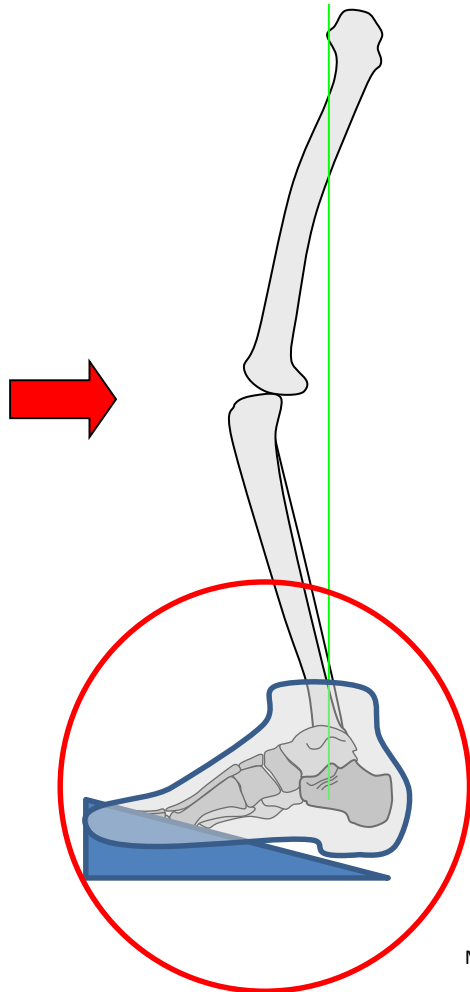
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Musil, Pohlig Austria

Indications orthosis – principles action



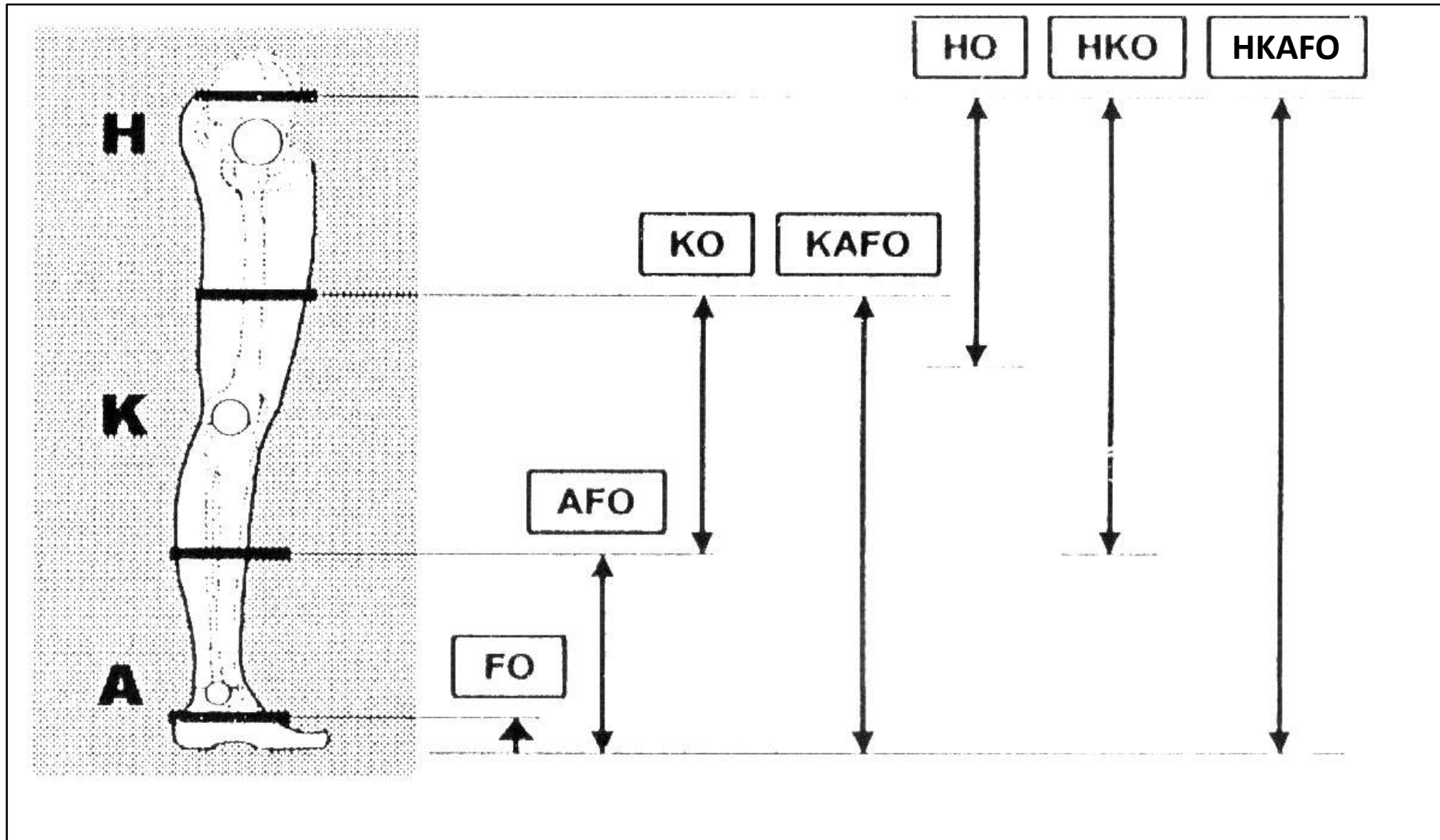
Constructional solutions AFO

- The height of the orthosis
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The function of the orthosis

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International classification of lower extremity orthoses



Abbreviations indicate the extent of the orthosis

Foot orthosis influencing forefoot adduction



Correction adduction of the forefoot and the heel position

FO – Foot Orthosis



Talus Repositioning Orthosis

RING orthosis



- Reposition the ankle brace
- Necessary possibility of manual supination and pronation in relief
- Possibility position of the foot to the middle position in the ankle joint in maximum forefoot supination in full extension of the knee
- It is not possible using the effective correction orthopedic inserts application AFO orthosis

AFO – supramalleolar orthosis (dynamic AFO - DAFO)



Description orthosis:

- The inner, flexible container controls the heel, middle and the forefoot
- External hard cover serves as a support for the heel and stabilizes it in the axis of the limb
- The open proximal part of the orthosis without clamping strips allows plantar and dorsal flexion



The effect of orthoses:

- Fully corrected position of the foot
- Preservation of free plantar and dorsal flexion

Indications orthosis:

- Heavy flat foot, hypotonia
- Only when manually correctable deformity

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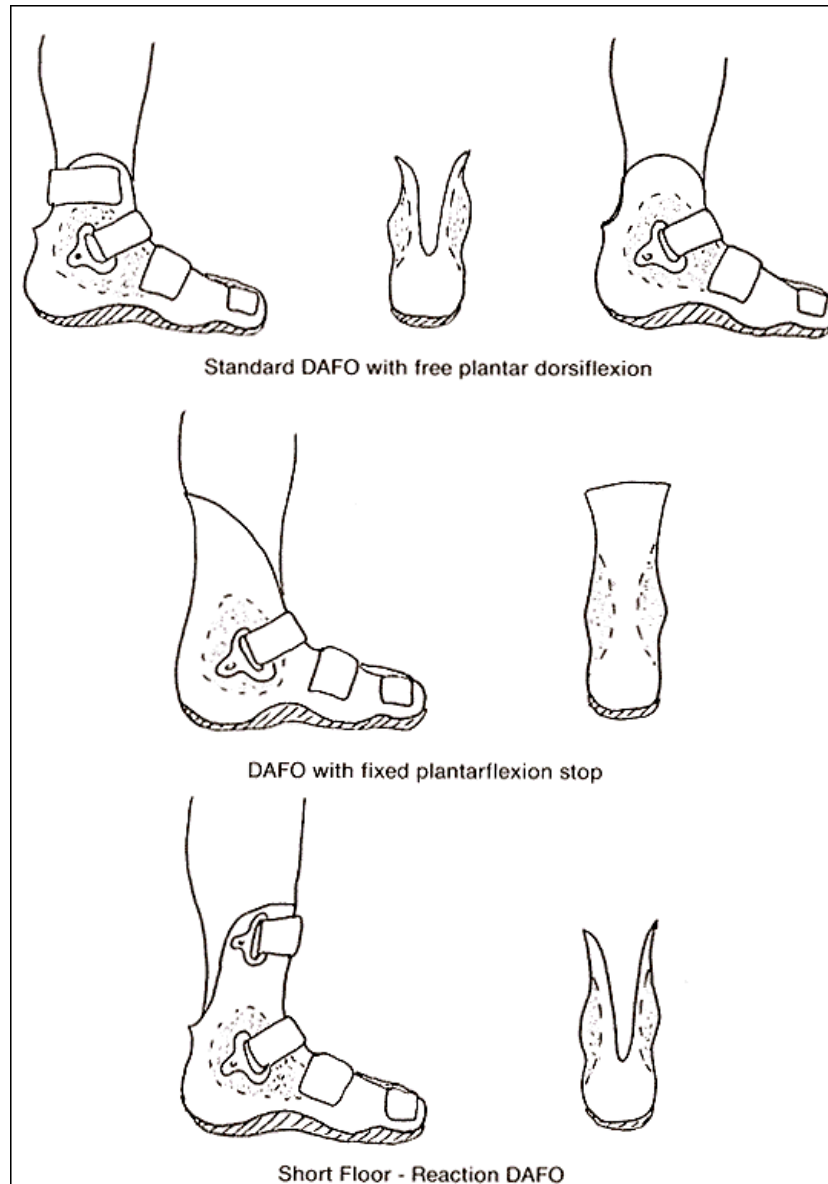
DAFO – Dynamic AFO

DAFO - Nancy Hylton Orthese



http://www.oandp.org/jpo/library/1990_01_040.asp

DAFO – constructional solutions



http://www.oandp.org/jpo/library/1990_01_040.asp



Brace description:

- Leather AFO
- Styropor sole
- It replaces home shoes

Effect of brace:

- Articulation stabilization
- Planovalgosity correction

Brace Indication:

- Hypotonic syndrome
- Myopathy

Functional requirement brace:

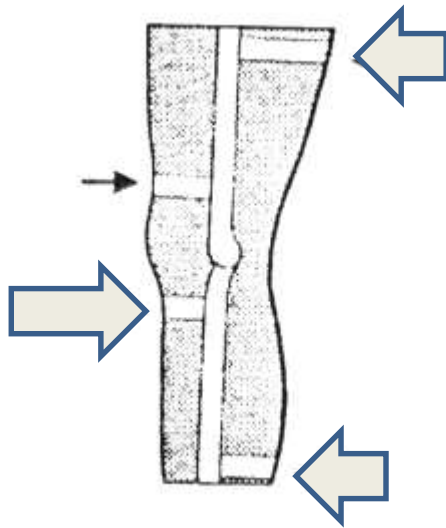
- Corrective action
- Stabilization
- Correction status in the hip or ankle joints

Design requirement brace:

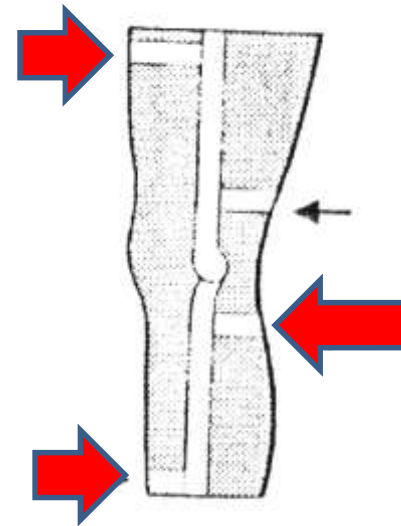
- Simple bandages
- Frame knee orthosis
- KAFO orthosis
- HKO orthosis

KO - Genu recurvatum

The principles action



Genu flexum



Genu recurvatum

KO - Genu recurvatum

Simple bandages



KO - Genu recurvatum

Frame knee orthosis



KO - Genu recurvatum

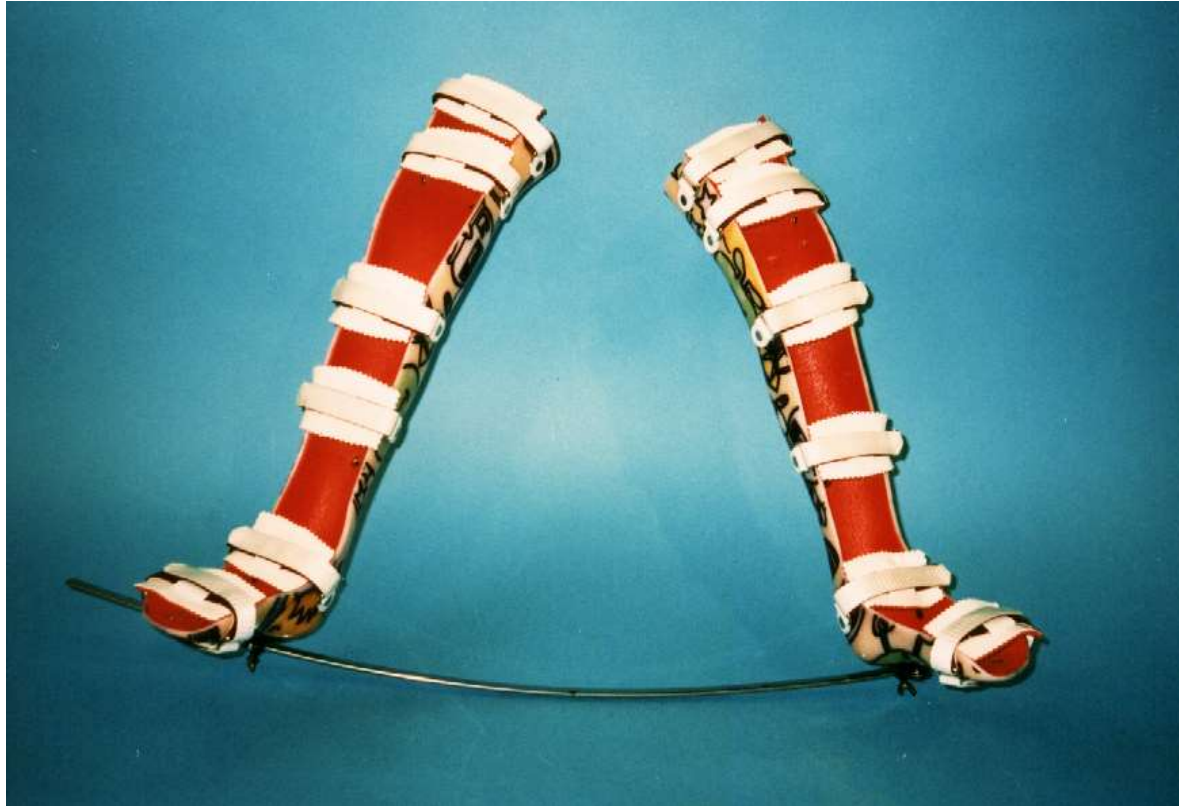


HKO (Hip Knee orthosis)

When the need for stabilization of the hip and knee joints

Indications KAFO orthoses for patients with cerebral palsy

Postoperative positioning brace



Abduction and derotation positioning orthosis

Poul et al.

HO - Hip Orthosis



The **hip orthosis** - positioning postoperative orthosis



Ensure muscle balance after surgery and proper post-operative extremity position

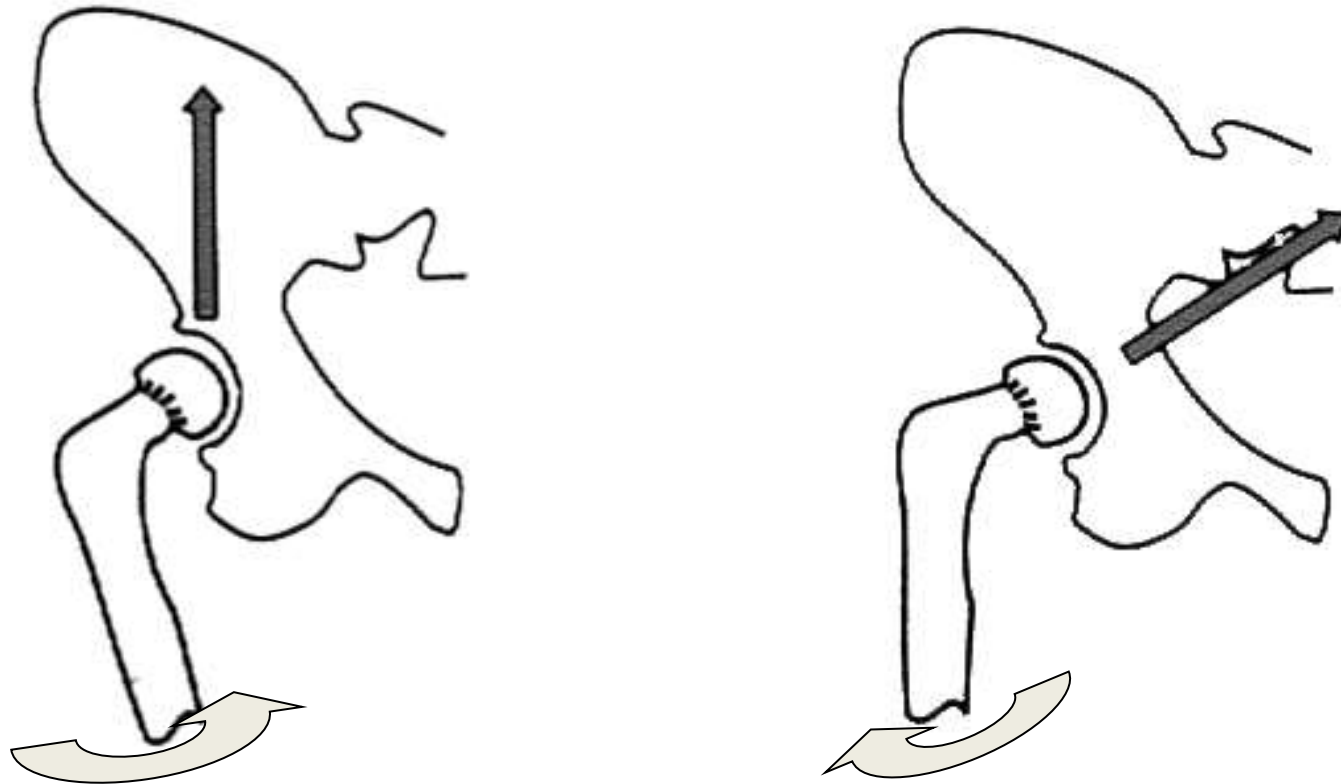


SWASH orthosis

Allowing brace:

- Stand corrected
- Corrected gait
- Adjusted session

The hip orthosis for children with cerebral palsy during verticalization



SWASH orthosis – the principle of action

The hip orthosis for children with cerebral palsy during verticalization



SWASH orthosis



The hip orthosis for children with cerebral palsy during verticalization



SWASH orthosis

Indications SWASH orthosis

- 9 months - 5 years
- The risk of hip decentralization
- Spastic diparesis, quadraparesis
- After application BTX
- Postoperative application to maintain hip abduction
- For application during the day
- Night positioning splint

Contraindications SWASH orthosis

- Dislocation of the hip joints
- Flexion contractures of the hip more than 20 degrees
- Heavy adductor contracture in children over 9 years
- Dyskinetic cerebral palsy

HKAFO - Positioning postoperative orthosis



HKAFO

- Ensuring the abduction hip joints and achievable extension the knees
- Adjustable range motion

HKAFO - Positioning postoperative orthosis



HKAFO

- Ensuring the abduction hip joints and achievable extension the knees
- Adjustable range motion in the joints

The **HKAFO** orthosis for children with cerebral palsy during verticalization



Beckers orthosis - walking with inner leg rotations

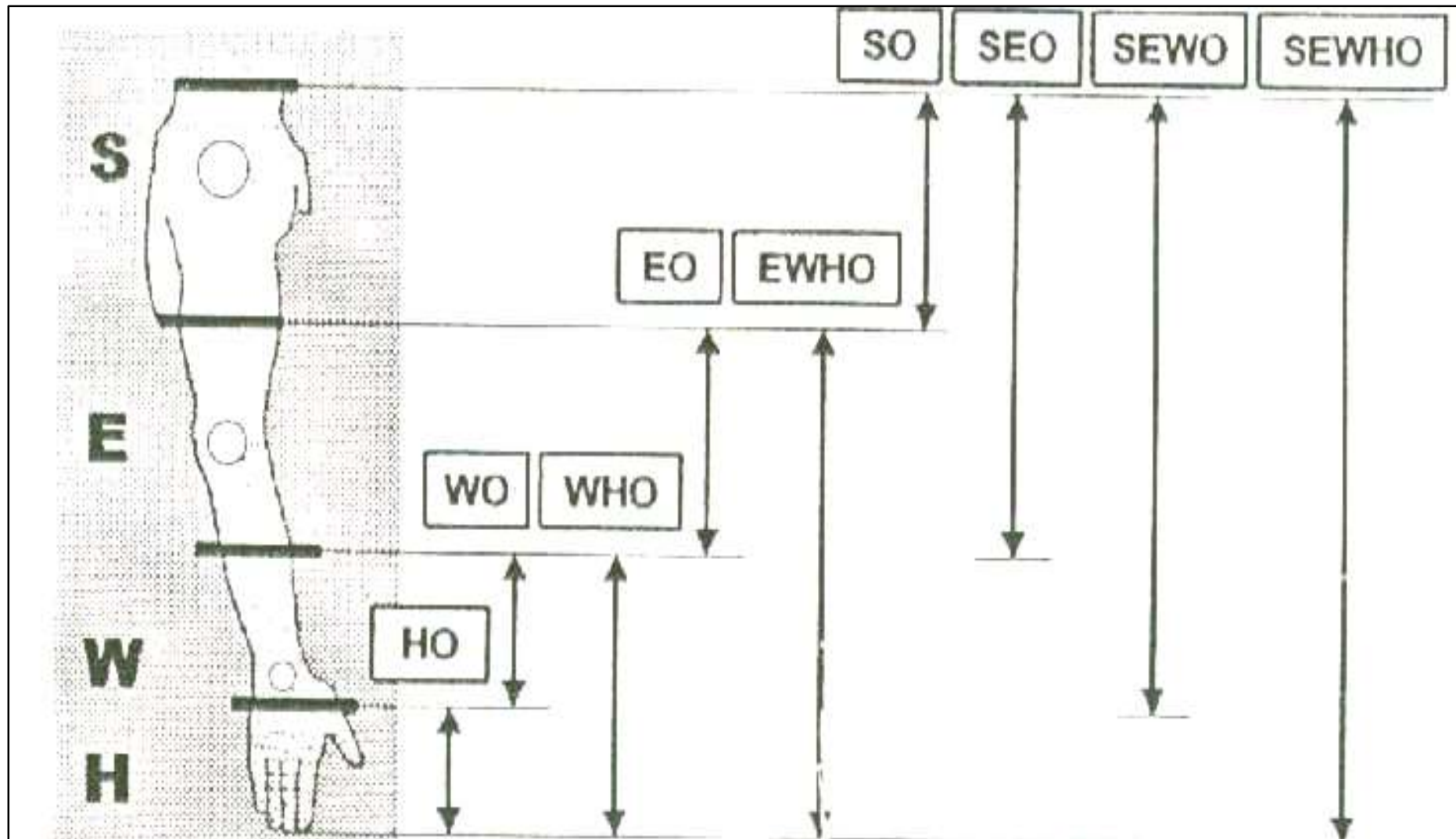
The **HKAFO** orthosis for children with cerebral palsy during verticalization



Lower limb toning bandage to reduce the inner rotation of the lower limbs

Indications of upper extremity orthoses

International classification of upper extremity orthoses



Abbreviations indicate the extent of the orthosis

International classification of upper extremity orthoses



HO – Hand Ortosis



WHO – Wrist Hand Ortosis



EO – Elbow Ortosis



EWHO
Elbow Wrist Hand Ortosis

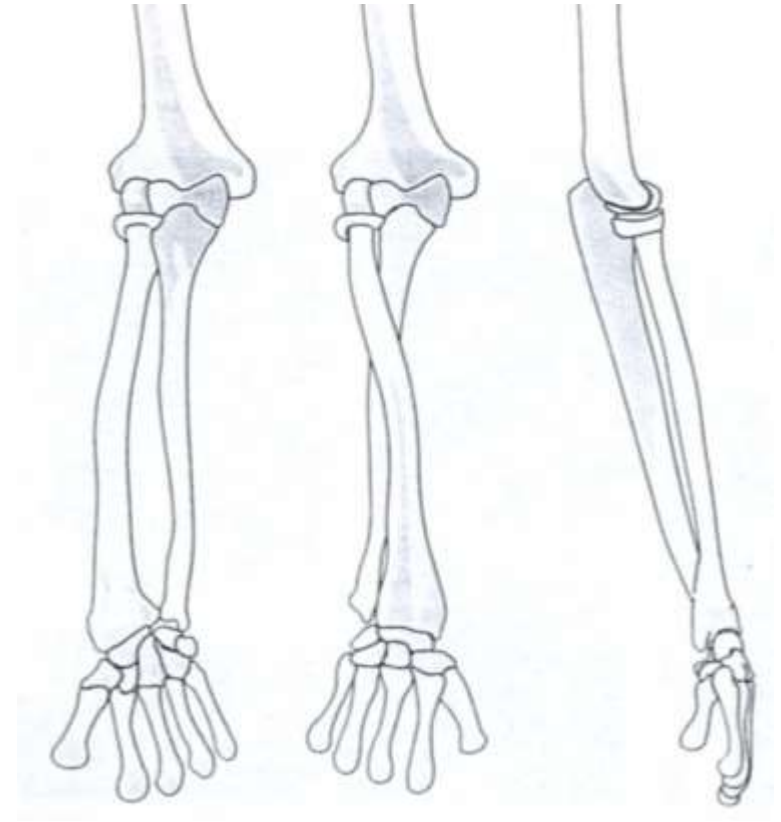
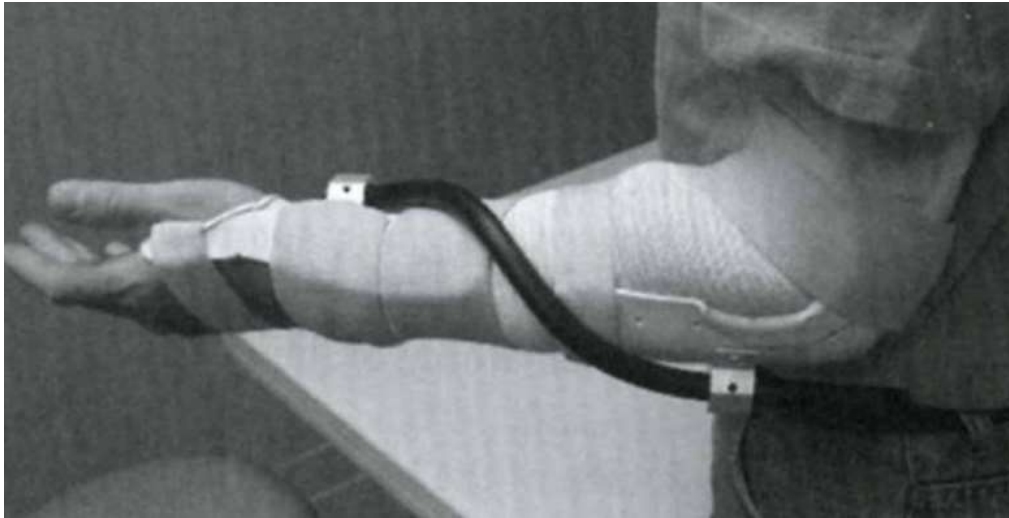


SO – Shoulder Ortosis



SEWHO - Shoulder Elbow
Wrist Hand Ortosis

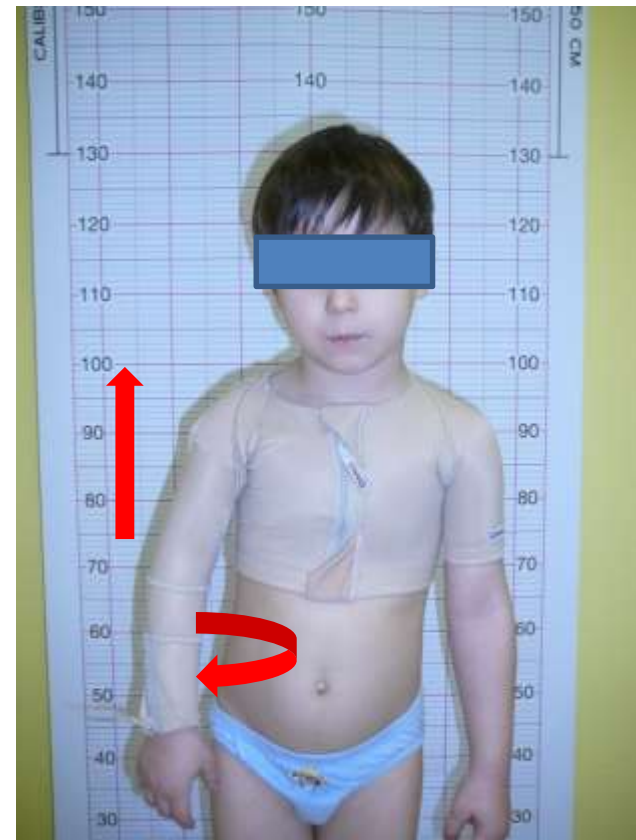
Dynamic derotation (supination) orthosis



Indications:

- Support for forearm supination
- After transposition tendon reconstruction in spastic patients

Dynamic movement orthosis (DMO)



Boy with postpartum brachial plexus palsy right

Indications of trunk orthoses

Indications orthoses

Determine the mode of application

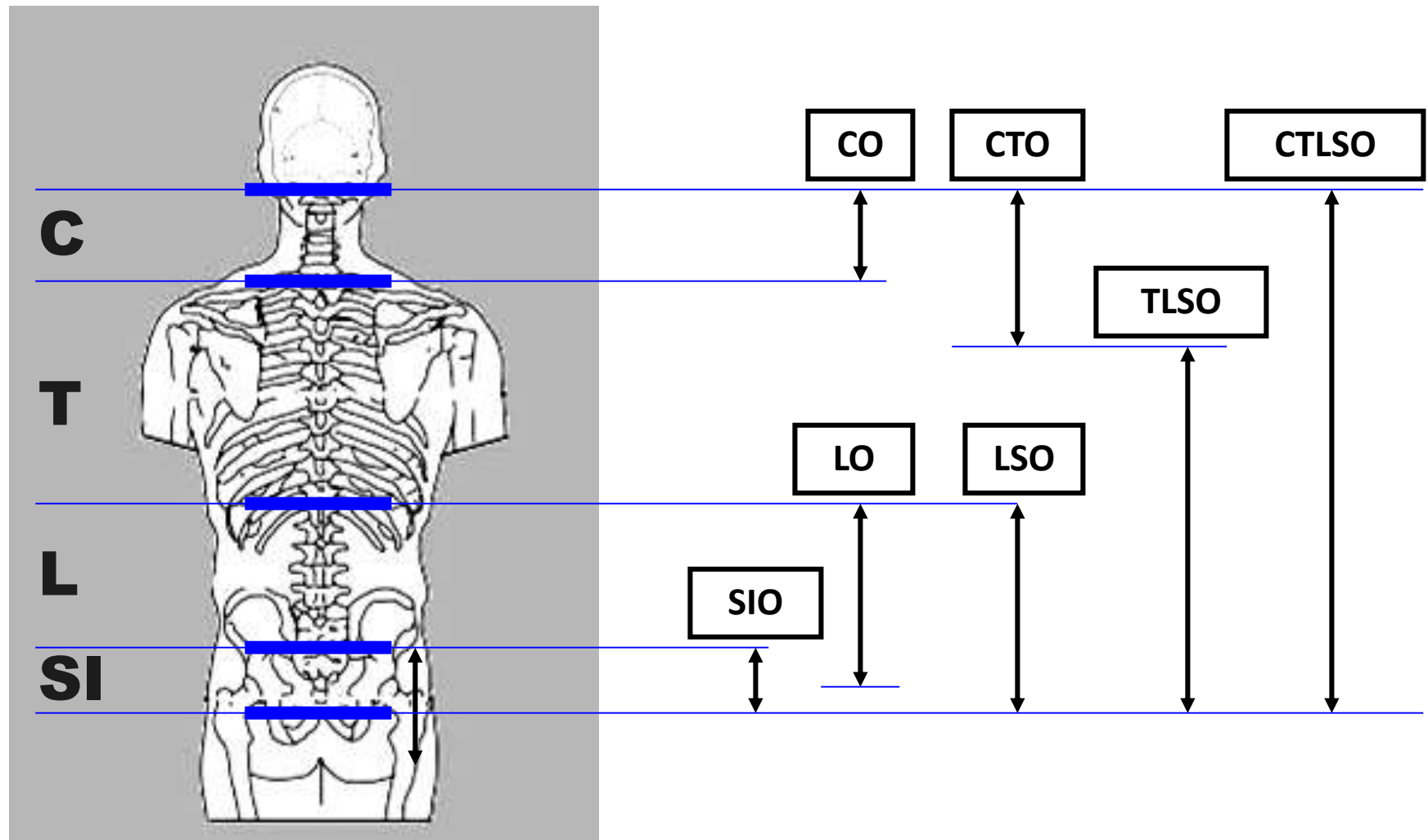
Educate the patient and family members

Failure to follow this procedure



Damage to the patient

International classification of trunk orthoses



Abbreviations indicate the extent of the orthosis

International classification of trunk orthoses

Traumatologie páteře – aplikace ortéz dle lokalizace a rozsahu postižení



CO



CTO



LO



CTLSO



TLSO

Indications trunk orthosis for the treatment of scoliosis

Adolescent idiopathic scoliosis.

Newly recommended by the corset from 25 ° to 50 °.

<http://www.srs.org/patients-and-families/conditions-and-treatments/adolescents/treating-scoliosis>



Infantile and juvenile idiopathic scoliosis.

Progression, while the expected progression, reducing the curvature of scoliosis curve.

<http://www.srs.org/patients-and-families/conditions-and-treatments/parents/scoliosis/early-onset-scoliosis#bracing-casting>

Trunk orthosis for the treatment of scoliosis



Milwaukee



Cheneau



Stagnara – Lyon



CBW orthosis

Trunk orthosis for the treatment of scoliosis

CAEN orthosis - Night hypercorrective brace

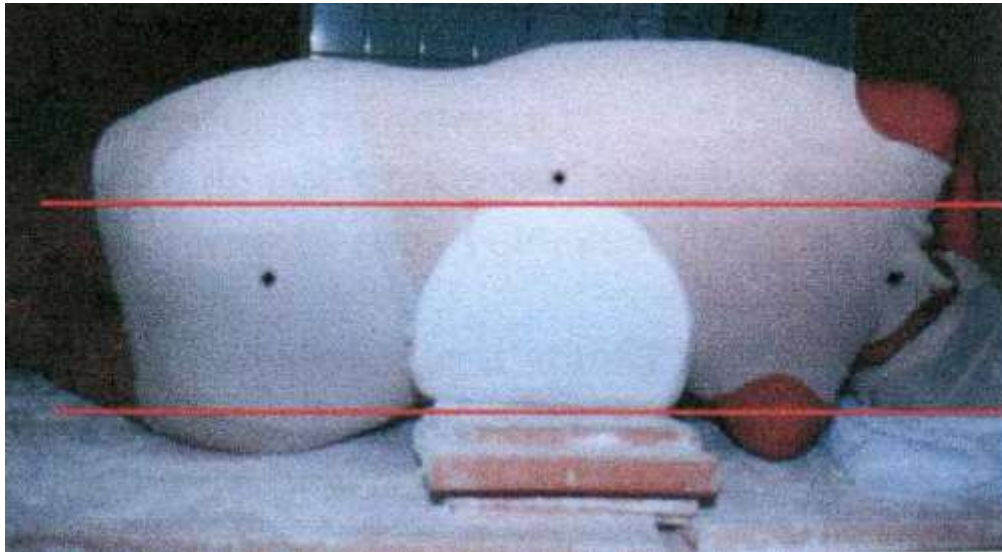


Indications for **lumbar and thoracolumbar** curves flexible

- Hyperkorektion principle based on the principle corset Charleston

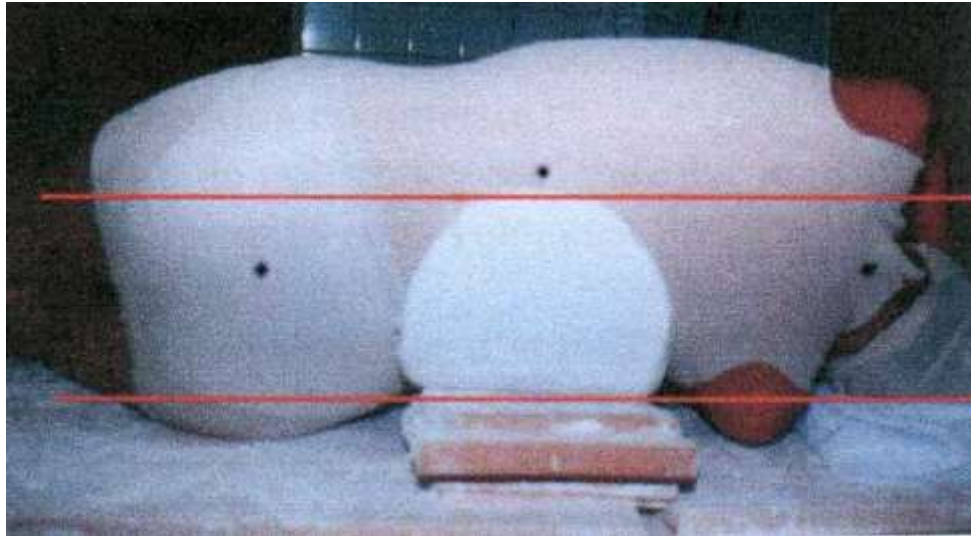
CAEN orthosis - night hypercorrective brace

Hyperkorektion principle of the hypercorrective brace



CAEN orthosis - night hypercorrective brace

Hyperkorektion principle of the hypercorrective brace



Trunk orthosis for children with cerebral palsy



Brace description:

- TLSO plastic brace with soft bandage

Effect of brace:

- Reclining, application of reclining and rotationally stabilizing pelots

Brace Indication:

- Influencing kyphotic posture, influencing scoliotic curve

Trunk orthosis for children with cerebral palsy



Trunk orthosis for children with cerebral palsy



Trunk orthosis for children with cerebral palsy



Trunk orthosis for children with cerebral palsy

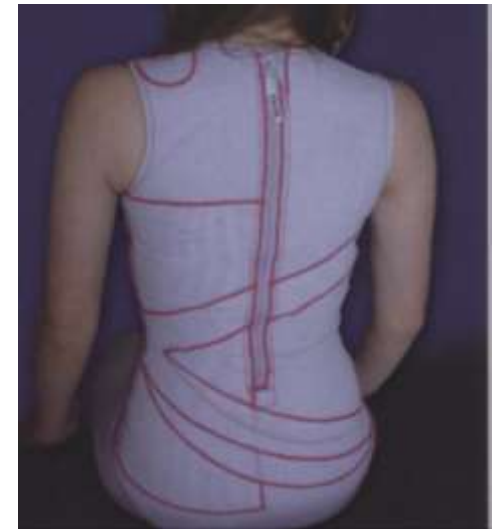
Applications elastomeric trunk orthosis

SPIO vest - **S**tabilizing **P**ressure **I**nput **O**rthosis

TheraTogs

Second skin

Dynamic **m**ovement **o**rthosis (DMO)



physician + physiotherapist + orthotic technician

Dynamic movement orthosis (DMO)

DMO - Dynamic movement orthosis

- Special individual orthosis made of lycra
- Correction and stabilization elastic reinforcements incorporated
- Team training (orthotics, physiotherapist, physician, parents) is required when applying elastomeric orthoses

Indication:

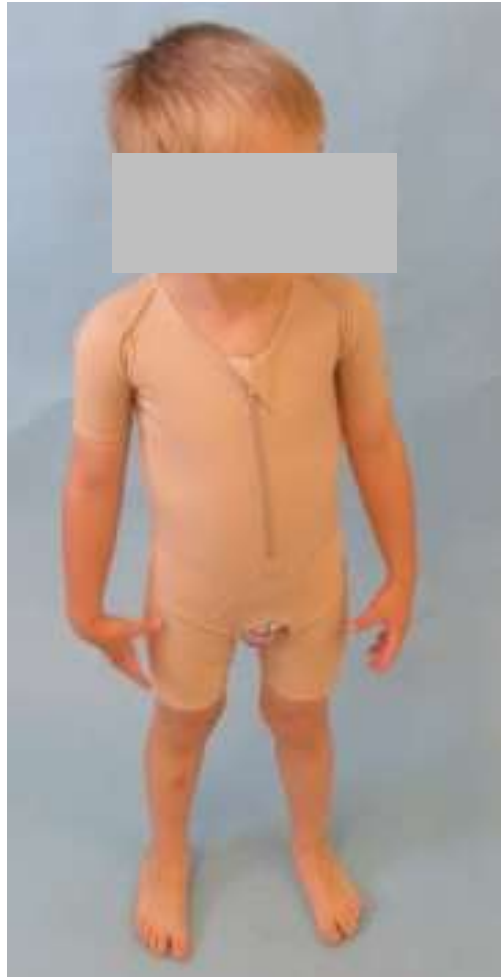
- Cerebral palsy (atetoid, hypotonic, less spastic dyskinetic form)
- stroke (upper limb paresis)
- Brachial plexus lesion (shoulder centering)
- Multiple sclerosis
- Hypermobility (Ehlers Danlos syndrome, etc.)

Dynamic movement orthosis (DMO)

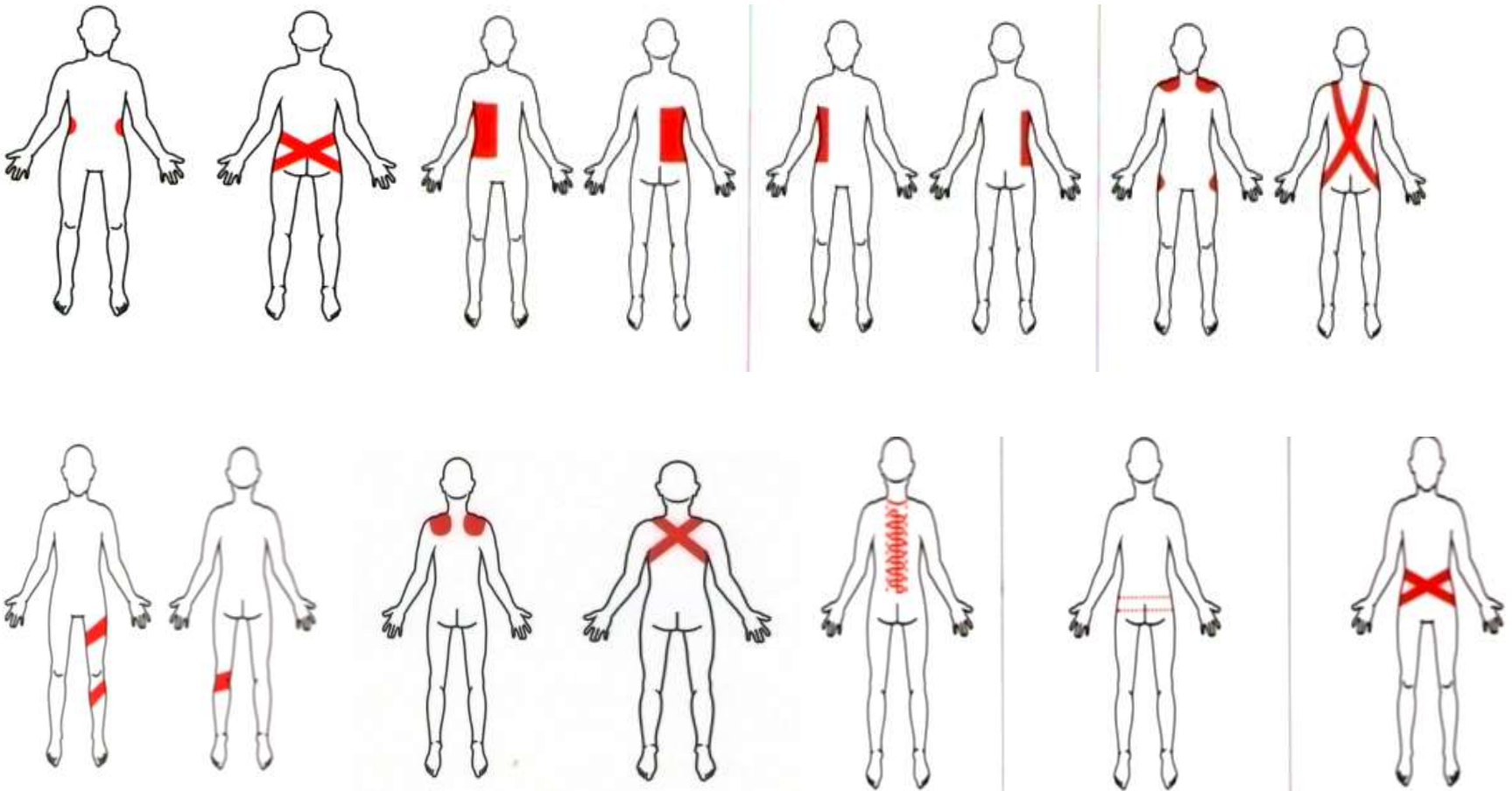
Principle of action:

- **Proprioceptor Stimulation**
- **Affecting the area of muscle imbalance caused by abnormal muscle tension**
- **Utilization of strengthening thrusts supporting hull reclining**
- **Securing the centering of the joints by derotation strokes mechanism**
- **Trunc support against convexity of scoliotic curve**

Dynamic movement orthosis (DMO)



Dynamic Movement orthosis



The technician, along with the physiotherapist, chooses the types of lycra brace reinforcement

Dynamic Movement orthosis



Demonstration of worked thrust - double layer knit

Trunk orthosis for sitting



Plastic orthosis



Foam orthosis



Dynamic orthosis SIDO

Description orthosis:

Plastic brace made on the basis of the cast

Foam brace made based on sampling using air bags

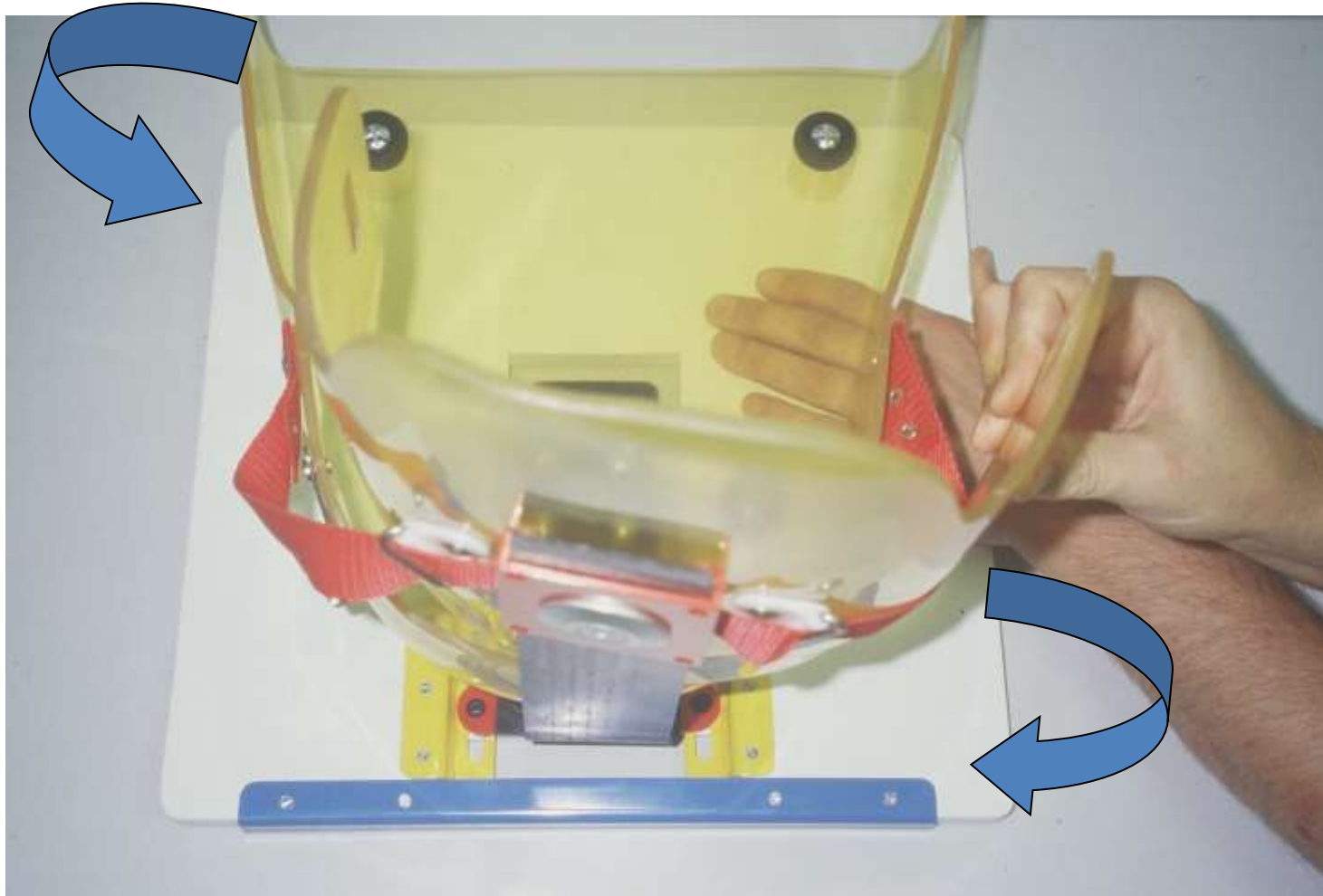
The effect of orthoses:

Ensuring an upright sitting position, facilitating breathing functions

Indications orthosis:

For non- walking clients with progressive deformity (kyphosis, scoliosis)

Enabling rotation



Trunk orthosis for sitting



Orthosis for standing



Parapodium

Individually made tool

Providing the necessary extension in the knee joints

Fixation of the foot, kness, pelvis, trunc

Conclusion

- **Interdisciplinary cooperation**
- **Determination of correct functional requirement for orthosis**
- **Compliance with biomechanical principles in orthosis construction**
- **Follow-up rehabilitation**
- **Timing of surgical, orthotic and rehabilitation treatment**
- **Cooperation with parents**



Thank you for your attention