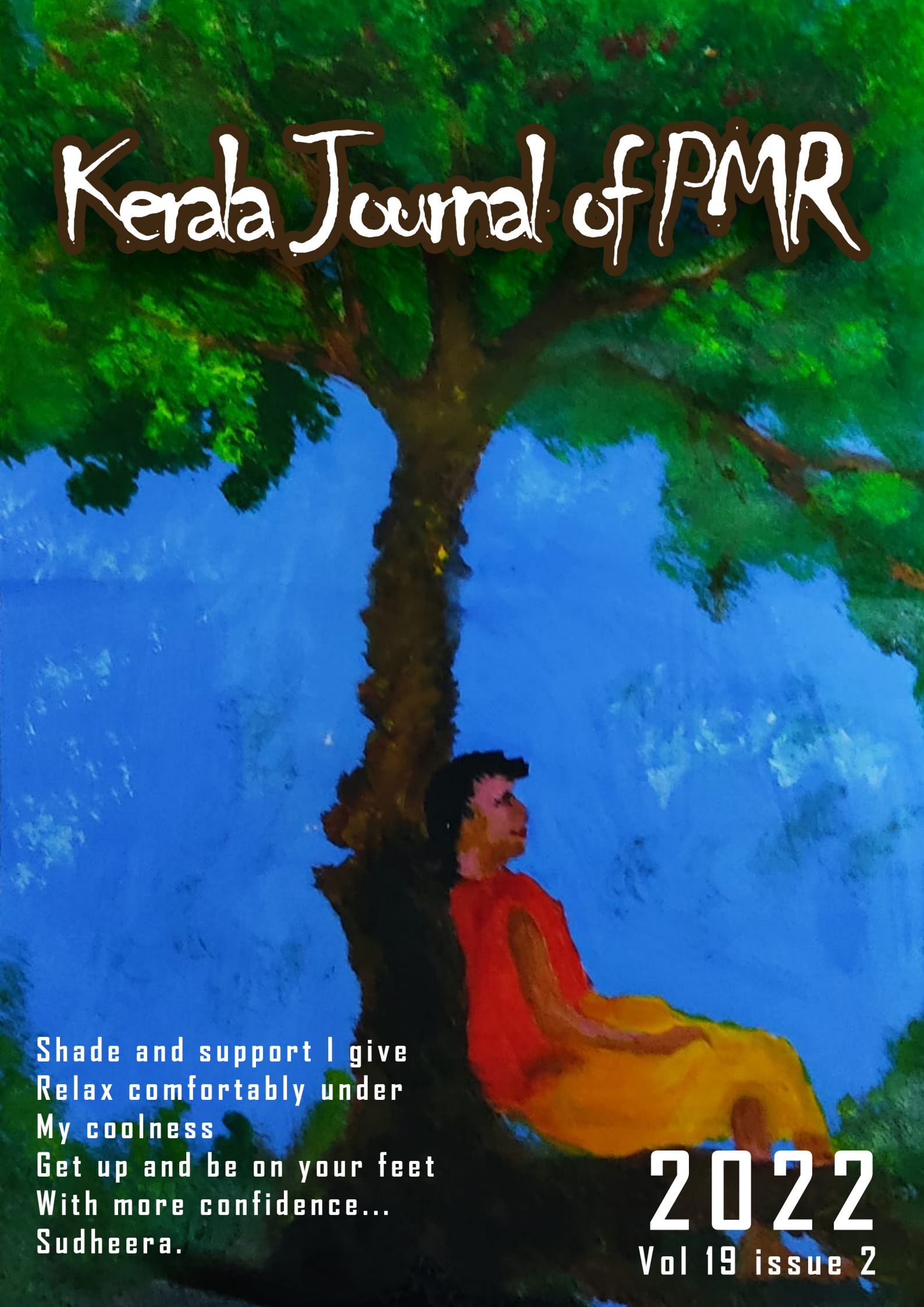
Kerala Journal of PMR



Shade and support I give
Relax comfortably under
My coolness
Get up and be on your feet
With more confidence...
Sudheera.

2022
Vol 19 issue 2

FROM THE EDITOR'S DESK

It looks like the great pandemic is over. Two years of social isolation is ending and the world as whole is opening up. We can see the effects of prolonged isolation in our clinics and the daily news. Another virtual national conference is over and with it many great speakers came to the stage to share their knowledge and wisdom. Our state conference is coming up later this month, and it's a physical meeting!

As per the publication cycle Prosthetics and Orthotics is the theme of this issue. Dr Lakshmi Nair is in the spotlight along with Dr Sreeja KS and Mrs Kavitha Panchal a Prosthetist. Dr.Bineesh is back with quizzes, and a history article. We have a special article made by many senior members regarding our recently honored Dr George Joseph. There is also an article by Dr Vipin about setting up a limb center.

As two years of steady releases is complete we now meet the requirements for getting indexed. I was invited to join the Indian Journal of PMR editorial board last November and am inundated with the new duties. I'll be passing on the torch to Dr Bineesh Balakrishnan. It's been fun publishing this journal with all of you. Please keep in mind the success of KJPMR is not in the chief editor, or editorial board. The power is yours. Each of you reads and writes for this keeps its heart beating. It remains with you to hold up the spirit that has carried us to this point.

TABLE OF CONTENTS

"Articles are the responsibility of the Authors"

Practical points for amputee rehabilitation

Dr. Lakshmi Nair
MD PMR, Fellowship in Rehabilitation Medicine (Aus)
Consultant Rehabilitation Physician
Kauvery Hospital and Hamsa Rehab
Chennai

Each small step that you take improve the quality of your care might end up making a big difference in the life of your patient. I would like to suggest few tips that might help to improve the outcome of your amputee rehabilitation services.

While the patient is still in the acute care setting

1. Pre Operative

- Try to do pre amputation counselling in all elective amputations, to build a rapport with the patient, and help reduce their anxiety pre operatively by explaining the possible prosthetic options for good quality of life post amputation.
- Work on balance, strength and endurance if possible.

2. During surgery

- Request for nicely bevelled bones (anterior tibia and fibula at a higher level) and less redundant tissue.
- Achilles tenotomy for transmetatarsal amputations. Achilles tendon lengthening, gastrocnemius resection and split tibialis anterior tendon transfer might improve ankle stability after chopart amputation[3]

3. Post operatively

- Removable rigid dressings for BK amputees immediate post op is recommendedhttps://www.enable.health.nsw.gov.au/__data/assets/pdf_file/0019/262252/removable_rigid_dressings_final_web.pdf
- BK slab for trans metatarsal amputation and offloadingfor Lisfranc and Chopart amputations early post op helps to prevent equinus deformity[3].
- mobilise early with walking aid
- Ensure adequate pain management

Once the patient enrols our rehabilitation program

1. Earlier the better- Start applying tubifast followed bystump shrinkersonce the wound has healed well.
2. Teach skin care and desensitisation techniques to prevent phantom pain.
3. Do not delay prosthetic rehabilitation- try starting prosthetic rehabilitation with basic modular components in few weeks after stump bandaging.
4. Be generous with analgesics and take extreme care to reduce shear and skin breakdown if you are starting early.
4. DO NOT go for expensive componentry in the beginning. Frequent socket change is expected and do not waste patient's

money. Start training with an interim prosthesis and better to prescribe the definitive prosthesis after 8 months to 1 year.

5. K levels to be assessed with Amputee mobility predictor (AMPPRO) scale. https://www.physio-pedia.com/images/f/fa/AmpNoPro.pdf
6. Encourage patient to set realistic goals for rehab.
7. Never underestimate your patient- many of our patients are affordable, learn about the different prosthetic componentry and prescribe each component as per the patient's goals and K level. Make sure that they are not financially exploited by the vendors.
8. Never underestimate Jaipur foot-Stanford knee joint (developed in collaboration with Stanford University US)is a good alternative foractive trans femoral amputees who can't afford costly knee joints.
9. For check out- Keep a check list to fill and use appropriate equipmentto check the alignment.
10. Gait training for above knee amputee- make sure that your team is working on pelvic stability and hip flexors to prevent circumduction gait. Make sure the heel – toe pattern and smooth knee flexion is achieved.
11. May use Berg balance scale, 10 meter walk test/ 6 minute walk testand timed up and go as outcome measures for the gait training. FIM for functional assessment.
12. Don't forget to suggest home modifications at discharge. Return to work and driving need to be addressed.

5. Upper limb amputees- appropriately moulded body powered prosthesis might be the best optionfor our patients and has better patient compliance- make use of the casting videos available online.
6. Make sure you keep following up your patients every 1 month, 3 month and 6 months after fitment. It takes around 18 months to become an established prosthetic user, be there for them till then.

Conclusion:

Evidence based rehabilitation services help to improve quality of life and reduce expenses for the patient.

I would like to recommend these references for your further reading.

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Gait related orthotics in children with cerebral palsy

Dr Sreeja KS
MBBS DNB PMR MNAMS
Specialist Dept of PMR
Aster Medcity

The aims of Lower limb orthotic management of Cerebral Palsy are :

1. To correct and/or prevent deformity
2. To provide base of support
3. To facilitate training in skills
4. To improve the efficiency of gait

Biomechanical theories involved in functioning of orthosis

3 point pressure control (3PP control) stabilizes the joint in all phases of gait and does not depend on the inclination, position of foot and type of shoe.

The Ground Reaction Force (GRF control) uses contact with the ground to control the lower extremity and therefore is only effective during stance phase.

SHOE MODIFICATION

Sturdy construction of the upper and anterior closure of the shoe (ideally laces) maintains the foot in the orthosis and prevents the shoe from slipping off.

A wide toe box creates space for the orthosis and forefoot in the shoe.The solecreates a non-slip surface for the orthosis during stance phase.

External shoe modifications – help in stance phase (GRF control):

Shoe lifts accommodate for leg length discrepancies and ensure that the pelvis is level during stance phase.

A heel lift accommodates for a plantar-flexion contracture This allows forward progression and minimizes knee hyperextension through midstance.

Medial or lateral wedges accommodate for fixed varus or valgus respectively during stance phase.

Flares or buttresses increase medial or lateral control of the foot during stance phase.

FOOT ORTHOSIS

Uses In mediolateral instability of subtalar joint- Forefoot abduction/adduction, forefoot valgus/ varus.

For mild hypertonic reflex activity seen clinically as mild toe clawing with stable subtalar and ankle joints

Contraindicated lack of voluntary dorsiflexion control moderate to severe spasticity (not controllable by the GRF control) - fixed equinus

Articulated (Single axis Ankle Foot Orthosis)

Use- more functional gait pattern achieved with variable amounts of ankle motion

Plantar flexion stop

1. prevent PF of toe walkers in stance
2. knee hyperextension from foot flat to toe off
3. prevent PF in swing phase

Dorsiflexion stop

Use- It resist knee flexion for mild crouch pattern

Hinged AFOs

Uses

To control moderate to severe spastic deformities of the subtalar joint. .

Midfoot instabilities - forefoot abduction or adduction, forefoot valgus or varus, forefoot dorsiflexion.

Contraindications

1. hamstring muscle contractures and/or moderate to severe loss of ankle, knee and hip extensors resulting in a crouch gait pattern.
2. when ankle dorsiflexion during gait is completely restricted by severe triceps surae spasticity.
3. fixed plantarflexion contractures or fixed equinovarus deformity

Hinged AFO

Supra-malleolar AFOs

Supra-malleolar AFOs – provide functional control of foot during gait. Their medial and lateral trim lines extends to just proximal to the malleoli; a posterior trimline cut down to just proximal to the calcaneus to allow free plantarflexion; an anterior opening at the malleoli level for free dorsiflexion; and a circumferential design.

University of California Biomechanics Laboratory orthosis (UCBL)- For hind and midfoot instability. Medial side is higher than lateral, holds calcaneus and support longitudinal arch.

Rigid Ankle Foot orthosis

Indications

1. maximum stability and immobilization required for ankle, subtalar and midfoot joints in all planes during swing and stance phase.
2. when closed chain motion control of knee and hip position is needed- to prevent knee hyperextension in stance phase (GRF control)
3. to prevent crouch gait pattern in stance phase for patients with moderate to severe loss of knee and hip extensors (GRF control).
4. to protect an unstable midfoot from the closed chain effects of ankle dorsiflexion when a spastic triceps surae is active during stance phase.

Functional indications

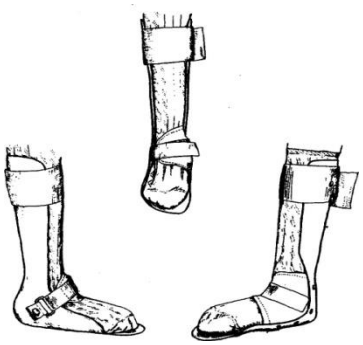
1. child is ready to stand but unable to balance on feet which are in pathological position (equinus, equino-valgus, varus, equinovarus).
2. child stands on heels but walks on toes.
3. child pulls up to standing on toes and stays there.

Un wanted effects in functioning with Rigid AFO.

1. W - sitting produces excessive internal/external rotation force at knee.

2. Restricted dorsiflexion interferes with a normal reciprocal crawling action.

3. Toeing-in during gait becomes more evident when an AFO is applied due to blocking of the compensatory action of the subtalar joint.



Rigid AFO

The position of the orthosis (degrees of dorsi/plantarflexion) produces different effects on various parts of the gait cycle:

1. A dorsiflexion stop at 0-4 degrees dorsiflexion prevents knee flexion in a crouch gait pattern. Increased ankle dorsiflexion may be needed to accommodate for knee flexion contractures sometimes associated with a crouch gait.

2. A plantarflexion stop in 5-7 degrees dorsiflexion prevents knee hyperextension from heel strike to midstance and allows forward progression from midstance to heel off.

3. Greater than 7 degrees of dorsiflexion may be needed to accommodate for knee and hip flexion contractures.

The use of rigid AFOs produces a more stable gait pattern (increased velocity and stride length).

Posterior Leaf Spring AFO

Swing phase orthosis trimmed behind malleoli which provide flexibility at ankle. .Ideal choice in mild spastic equinus. It maintain foot and ankle in plantigrade position during swing to permit foot clearance, permitting plantar flexion and dorsiflexion during stance phase.

Floor reaction orthosis

Indications

1. overactive hamstrings (with weak quadriceps) which leads to over-flexed knees.

2. surgically overcorrected heel cord.

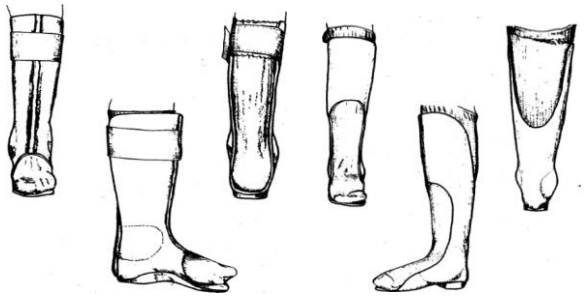
3. over extended heel cord due to poor protection after surgery.

4. over lengthened heel cord from long term flexion pattern.

2 types

Posterior Entry Design: A plastic shell extends from mid-patella to the proximal edge of the metatarsals and completely surrounds the lower leg and foot except for a posterior opening to allow entry of the leg.The proximal anterior shell in combination with the shoe over the posterior calcaneus provides an effective force couple to prevent forward angulation ofthe tibia (crouch gait) in stance phase.

Proximal Entry Design :From mid-gastrocnemius up the plastic curves around to enclose the leg anteriorly up to and including the PTB. The posterior aspect of the shell is cut down to allow entry to the foot. The force couple to prevent dorsiflexion isprovided by the proximal anterior shell and the contact point at the posterior calcaneus.



FRO- Posterior entry design FRO- Prodromal entry design

At foot flat with the shoe on, an anterior tilt of the tibia of 3-5 degrees is the typical dorsiflexion angle of the orthosis to allow forward progression of the body past midstance. The dorsiflexion angle set in the orthosis may decrease to protect weak quadriceps or increase to accommodate for knee contractures.

Tone reducing or inhibiting orthosis

Similar to rigid AFOs with inhibitive modifications of the foot plate

1. Increased pressure from the proximal medial calcaneus to under the talus relieves weight bearing on navicular and promotes dorsiflexion during weight bearing - increased pressure on the lateral aspect of plantar surface at the cuboid promotes peroneal activity as well as a stabilising effect on the gluteus medius.

2. A metatarsal pad or bar along with relief of the metatarsal heads inhibits toe grasp. Extension of the digits is also used to inhibit toe grasp.

KAFOs are not useful for children with CP as they disturb gait pattern by locking the knee in extension in the swing phase.

CONCLUSION

Apt orthosis minimizes the impact of pathological gait, improving the kinematic, kinetic and spatio-temporal parameters. A standardized protocol for use of orthosis would help clinicians in correct prescription of orthosis.

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Latest Developments in Prosthetics and Orthotics

Kavitha Panchal. BPO(AIIPMR), CPO (Dubai Health Authority) Gold Medalist. Senior Prosthetist and Orthotist, Hope Prosthetic and Orthotic Rehabilitation Center, Kakkanad.

Change is an essence of life. Change is happening all around the globe in all wakes of life. The field of Prosthetics & Orthotics is no different. The continually changing technology has brought about tremendous difference in the healthcare field as also In Prosthetics and Orthotics.

Bionic Arm

Bionic limbs and Prosthetic technology connect the mind to the Prosthesis through sensors that detect muscle's electrical signals and translate those contractions and signals to various movements

Emerging technology further connects the brain to the nerves under the skin. This more intuitive bionic technology requires less training and provides a more natural feel.

The process of Osseo integration is worked upon by scientists to further enhance and optimize output by connecting the Prosthesis directly to the bone, eliminating the need of a socket.

- Advancement in partial hand amputations-

Partial hand loss comprises about 90% of all upper extremity amputations and the Prosthetic solutions to this level of amputations has been quite limited. But off late a variety of body powered and electrically powered options have emerged.

The Body powered prosthetics are very durable and generally have a very high-tech appearance. One of the biggest functional benefits is that the force exerted by the prosthesis is directly controlled by a person's wrist or the remaining portion of their hand, (for example - use of tenodesis effect) which makes movement and control feel very natural.

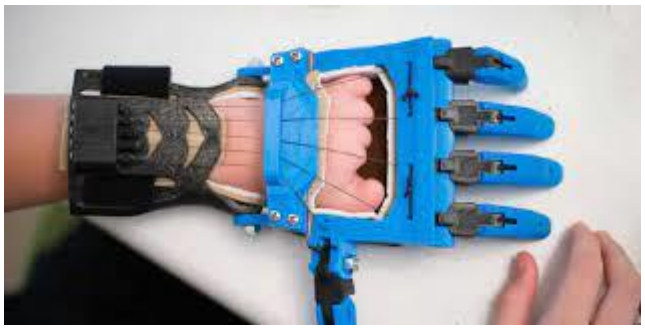
Electrically powered fingers have tiny motors inside each finger to create motion which are myoelectrically controlled by strategically placed surface electrodes.

There is much more functional alternative to the commonly available cosmetic options.

- 3D printing and Prosthesis-

The technology of 3D printing has opened the door to a whole new world in Prosthesis and Orthotics.

It has now become easy to print rapid prototypes and actual components of many prosthetic devices. There printers are comparatively quite economic and many small organizations can easily print these parts anywhere and everywhere.



Custom hand Orthotics can also be printed at the click of a button with the right selection of raw material, good quality and strong Orthotics can be printed at a very affordable price.

Many lower limb Prosthetic covers are also printed and used for cosmesis.

- Microprocessor powered lower limb Orthotics-

The microprocessor-controlled leg orthosis like the C-BRACE from Ottobock opens up entirely new possibilities for freedom of movement. The new sensor technology makes the entire gait pattern even more dynamic and responsive by computerized controlling of both stance phase and swing phase.

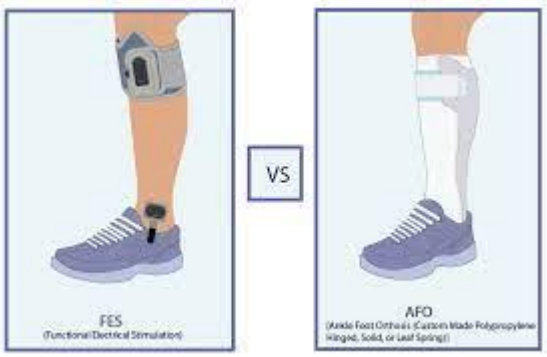
These Orthotics give real time response for ease of walking. Modes can also be changed for e.g., from walking mode to cycling mode, through an app installed in the user's smartphone.

- Functional Electrical Stimulation in Orthotics-

FES is a technique that uses low energy electrical pulses to artificially generate body movements in individuals who have been paralyzed due to the injury to the central nervous system. FES can be used to generate muscle contraction in otherwise paralyzed limbs to produce functions such as grasping and walking.

FES is being actively used to help patients with Peroneal Nerve Palsy to eliminate foot drop. Electrodes are placed on quadriceps muscles and Peroneal nerves. At the moment just before the heel off phase of gait, the stimulator delivers a stimulus to the

common peroneal nerve which results in the contraction of the Tibialis Anterior, exterior digibrum longus, exterior hallucis longus, and peroneus Tertius thereby bringing about dorsiflexion and subsequently uninterrupted swing.



This Orthosis is essentially a small cuff that ties at the calf muscles thus eliminating the requirement of an Ankle Foot Orthosis.

- Pattern Recognition System in Myoelectric Prosthesis-

The terminal device in a Myoelectric Prosthesis is controlled using Artificial Intelligence. Up to eight surface electrodes are strategically placed on the forearm to measure the incoming signals and derives patterns that are characteristic for individual movements.

Complex mathematical algorithm transforms and amplifies these signals and patterns so that a prosthetic hand can translate them into the corresponding movement. This results in different kinds of grip patterns, which were earlier not possible.

Many of these changes and developments are yet to be implemented widely in India, cost being the biggest barrier for the same. Many upcoming Startups are trying to develop better technologies at affordable prices. Hope to see Indian practitioners ahead in the race soon!!!

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Adolescent Idiopathic Scoliosis Case Studies

Dr.V.T Sudheera
Consultant Physiatrist
Kozhikode District Cooperative Hospital

Introduction

Scoliosis is a three dimensional deformity of the spine defined as a lateral curvature of the spine in the coronal plane of more than 10°.1 It can be categorised into three major types—congenital, syndromic, and idiopathic. Congenital scoliosis refers to spinal deformity caused by abnormally formed vertebrae. Syndromic scoliosis is associated with a disorder of the neuromuscular, skeletal, or connective tissue systems; neurofibromatosis; or other important medical condition. Idiopathic scoliosis has no known cause and can be subdivided based on the age of onset—infantile idiopathic scoliosis includes patients aged 0-3 years, juvenile idiopathic scoliosis includes patients aged 4-10 years, and adolescent idiopathic scoliosis affects people aged >10 years.

Adolescent Idiopathic Scoliosis (AIS), the most common form of scoliosis, is a structural three-dimensional deformity of the spine and trunk, occurring in otherwise healthy children during puberty.Curvatures < 10° are viewed as a variation of normal, as those curves have little potential for progression.

Observation for AIS is the most common approach used for patients with mild deformity (such as a Cobb angle measurement <25°.Depending on the degree of skeletal maturity, patients are assessed every four to six months at a specialist clinic to watch for curve progression. The interval of follow-up will be determined on an individual basis, based on the age of the patient, degree of curve, and skeletal maturity. Posteroanterior radiographs only are taken during each follow-up visit in order to minimise the exposure to radiation. Braces are traditionally recommended to stop curvature progression in some countries and criticized in others. They generally need to be worn full time, with treatment extending over years. So we present a series of cases treated conservatively with bracing.

Case reports

7 cases If AIS were seen .5 came in adolescent age and 3 in 20- 21 year old.Those who came in adult age had neurological symptoms.Those in adolescent age diagnosed accidentally with no symptoms.

Case report 1

13 year old pretty girl was brought to the OPD by her parents.
She was referred from surgery department discharging after 2 days admission.
She was admitted in surgery after accidentally swallowing a metal pin
During the procedure in the surgery department, X-ray was taken and the

parents and the child came with the X-ray to the PMR OPD.They had no complaints except to show the X-ray as advised.(Fig 1)

Figure 1 – Showing the X ray

On taking the history, the parents or the girl had no particular complaints.The parents were not aware of the condition that the girl has and they don't remember such symptoms for the two other siblings also .An interesting point in the history was, the girl was with her aged grandparents till she completed her 7th standard (pubertal age).This may be the reason why the whole thing was un noticed. No history of any trauma or any systemic illness.

On examination, the child appeared to be normal with the clothes on and when the clothes were removed and the back viewed. The shoulders were not at the same level, right shoulder was at a higher level, right scapula was protruding.On palpation the sideways curvature of the spine was evident. The waists were uneven and the right side pelvis was tilted up. There was no leg length discrepancy. No other abnormalities like breathing difficulty, sensory impairment, muscle weakness were noticed. The girl appeared to be intelligent and co-operative .Routine investigations were normal.(Fig 2)

The diagnosis was made as adolescent idiopathic scoliosis. The child was admitted and the case was discussed with the orthopedic department.A cobbs angle of 35 degrees was measured .On discussion a conservative treatment was planned.Exercises for scoliosis were started.The child was admitted for more than 2 weeks giving exercises from the physiotherapy unit and was advised to repeat it in the room .

A thoraco lumbar bracing was planned to be given.With the child sitting and with mild cervical traction ,the mould for the brace has to be taken.This could not be done as the girl and parent were not accepting such a brace.The consequences of not wearing a brace in between exercises were explained.Alumbosacral corset was given and the girl was taught exercises to do in between bracing and the chlid was discharged .Follow up X-ray was taken and

Cobbs angle was found to be 30 degrees.(Figure 3)

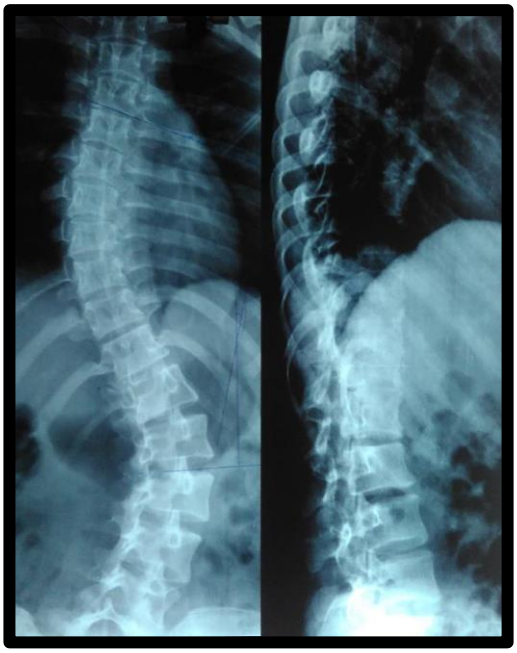


Figure 3 – Follow up x ray

Then we designed a thoraco-lumbar brace made of light weight thermo plastic .Comfortable to wear under clothes .Child is been reviewed regularly.Girl is doing regular exercises,wearing brace in between, and carrying out all the day to day activities .Child has to be reviewed till adulthood or up to 20years.

Case 2

14 year old girl came to the PMR OP, referred from orthopedics department.Her mother noticed a hump in the upper back on the right side when she was made to wear a cloth with very thin material brought by her father from gulf.For this they consulted orthopaedic department , from where X ray was taken.(Fig 4)

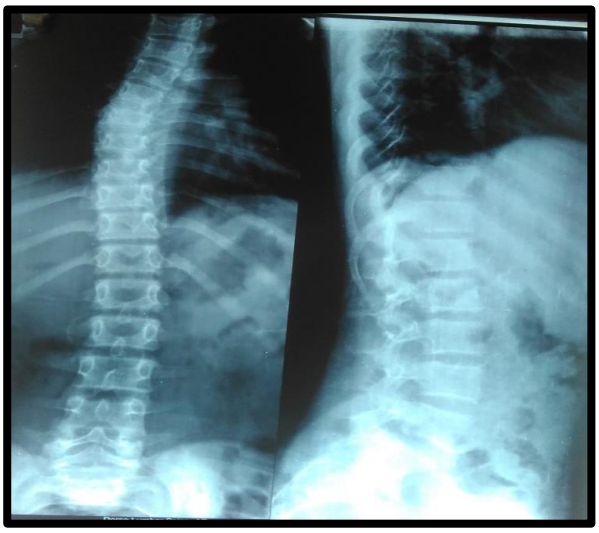


Figure 4 – X ray

She was designed a brace made of light weight. Child is been reviewed regularly for the progression of the cobs angle and progression of deformity.

Discussion

Bracing in AIS is controversial, with treatment effectiveness remaining questionable based on available evidence, with most published studies being of low methodological quality. The rationale for the use of braces has been that external forces can guide the growth of the spine. Brace treatment is not necessarily benign in terms of the psychosocial and body image concerns it causes for many patients and their families. Advocates of bracing quote level 2 evidence based information from prospective controlled studies as well as other studies with level 3 and 4 information in support of bracing efficacy.

The primary goal of bracing for scoliosis is to halt curve progression. The most widely accepted practice for brace treatment suggests that patients with curves of 25°-45° and in the most rapidly growing stage (Risser stage 0 or 1) should be offered a brace on initial evaluation. Curve progression is defined as an increase in the magnitude of the deformity by more than 5° at consecutive follow-up appointments of between four and six months. Various factors can hinder successful brace treatment. Poor adherence is common. A meta-analysis reported that a protocol of 23 hours/day was more successful than protocols of 16 hours/day or night time use. A multidisciplinary team approach involving the patient's general practitioner, surgeon, orthotist, physiatrist.,, and parents is needed to improve adherence. Families must be counselled that there is a risk that bracing may not be successful, but that the chances of success are improved with discipline and adherence to wearing the brace for the recommended time. Patients who have passed the peak height velocity, are within a year of skeletal maturity, or are a year or more after menarche are unlikely to benefit from use of a brace.

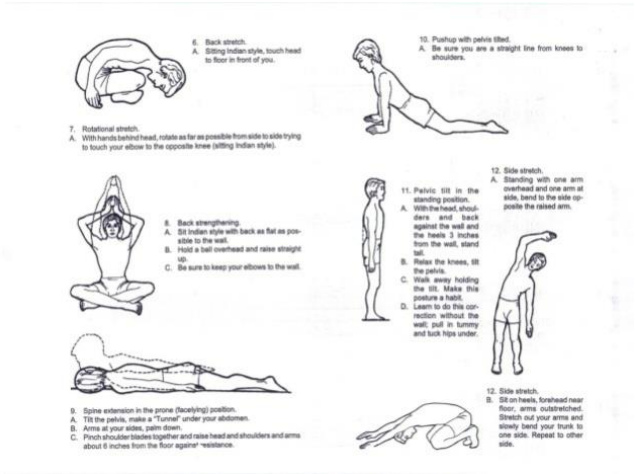
Job of a brace is to halt or slow progression of the curve .Goal is to avoid spinal fusion surgery.Exercises are prescribed along with bracing

Bracing can stop curves from progressing up to 50 degrees.Problems of bracing are atrophy of muscles and nerves ,leading to permanent damage, leaving the spine even less capable of realigning itself than before,breathing problems may occur due to compression of abdominal muscles and chest, vital capacity shows a 30% less due to bracing .Bracing can also cause anxiety, headaches, cognitive dysfunction and sleep disturbance.All Patients were given Custom made braces .Measurement taken in our Hospital .They are comfortably worn by the Patients as advised

Exercises for scoliosis

<u>Schroth method of physical therapy</u>

These exercises are meant to strengthen certain muscles around the spine .Stretching and lengthening other muscles.The goal is to reverse the abnormal curvatures and associated pain .Method of exercises are coordinated in 3 dimensions -Sagittal (Side to side),Frontal (front to back),Transverse (top to bottom), they include breathing techniques, pelvic corrections, Isometric contractions also posture practices that can be implemented in daily life.



Surgical options

Fusion surgery -This permanently fuses 2 or more adjacent vertebrae with rods screws and hooks or wires placed in the spine,It has a long term record of safety and efficacy for treating scoliosis.

Drawback is the fused vertebrae might lose mobility, which can limit bending and twisting of spine.

PROGNOSIS

Curves up to 10-20 degree if observed after teaching exercises usually don’tprogress.More than 20 degrees with evident features of scoliosis on examination,bracing and regular exercises in between will prevent the progression of the curve .The children has to be observed regularly till adulthood or even aft

er that.The curves which continue progress with symptoms appearing, surgery has to be considered.

SCREENING

Many of the AIS go un-noticed in the adolescent stage.So a regular screening for scoliosis in the schools for children after the age of 10 years is necessary .By the screening scoliosis can be detected early and effective management can be given.Unfortunately it is not being followed in the routine medical checkup.

Living with scoliosis

AIS should not restrict a patient of his/her physical activities.

They should be allowed to perform all activities without any risk of injury. Patients who are undergoing brace treatment, all physical activities are allowed, while braces are not being worn. Patients who had surgical treatment, surgeon will provide information as to what activities are allowed following treatment.If diagnosed with scoliosis can still live a healthy active life.Take part in sports and physical activities.Teens with scoliosis can do pretty much everything that teens without scoliosis can.

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Orthoses- A Short History

Dr Bineesh Balakrishnan

"If you would understand anything, observe its beginning and its development."—Aristotle

When did mankind start using orthoses? Well, the development of orthotics &prosthetics as a health care profession is closely related to three significant events in world history- World War I, World War II, & the onset & spread of polio in the 1950s. The term orthosis originated in the mid-twentieth century[1]. In this short article we'll discuss the oldest orthoses discovered by excavation, the changes in shoe designs (the oldest orthoses used globally), contributions of two great personalities to this field, about 'the bonesetters', & changes in the materials used for making orthoses…

Orthoses in Ancient Egypt

An expedition, led by Dr George Reisner between 1903 and 1904, andfunded by Mrs. Phoebe Hearst, wife of the American press magnate, William Randolph Hearst, excavated a site atNaga- ed-der, 100 miles north of Luxor. The archaeological finds of the digincluded a number of human specimens with definite fractures, two ofwhich had been treated with splintage. These devices were supposedly used on compound fractures. In one case of a compound fracture of the mid-femur, in a girl around 14 years of age, the broken limb was set with four splints passing from just above the fracture to a point well below the knee.

Each of these splints consisted of a rough slender strip of wood which was wrapped in carefully applied linen bandage. In the other case compound fractures of the radius & ulna were splinted to promote healing[2]. Tutankhamun who ruled Egypt from 1333 B.C to 1324 B.C also apparently used walking staffs, as two ornate staffs were recovered from his tomb[3]. At least three pairs of shoes found in King Tut's tomb have horizontal strapsproximal to the toes. The strap mighthave been a solution to hold the sandal toKing Tut's malformed feet[4].

The Shoe Must go on…

People have been wearing shoes for centuries, & shoes were most likely the oldest orthoses used globally. Early shoe designs dating back thousands of years shed light on the fact that even then appearance was as important as comfort. In the early days only the rich could afford shoes. As materials & artisans became more plentiful shoes became more affordable. Early innkeepers provided travelers with matted animal hair for foot covering, and eventually, artisans began specializing in making shoes. These early cobblers added leather and felt. Responding to customers' need for adaptations, they began to make pads and inserts to provide more comfort. Early arch supports were made by laminating layers of leather strips together, molding them to shoe lasts, and shaping the arch support by hand for wearing inside shoes. A variety of shoes and shoe

adaptations followed with the advent of electricity and new equipment. New materials were developed and universal lasts for different sizes became available for mass production. Cobblers continued to be in demand to make adaptations for comfort and accommodation of deformities. Concomitant with the development of more sophisticated and adapted shoes came the development of splints and braces to support damaged limbs. Skilled metal workers, not only made prosthetic devices for those who had lost a limb but also made supportive devices for people with fractures and other injuries[5].

Ambrose Pare' (1510-1590)

Ambrose Pare' was one of the most prominent surgeons of his time. Though a trained barber-surgeon, he broke new ground with innovative techniques in military operations, bandaging, wound healing &even caesarian section. As far as we Physiatrists are concerned his most important contributions are pertaining to the treatment of spinal deformities. He advocated use of braces, which he had invented, for correction of scoliosis. These holed braces made of iron or steel were used to correct scoliosis, & had to be changed when growth imposed it. Pare' also emphasized that exercise has a role towards the development of a physically correct spine & in the correction of spinal deformities.

For the correction of foot deformities he designed specially made boots & for pain in the stance phase & limping he recommended the use of crutches. In his book entitled "Anatomie Universelle du corps humain", he described fracture treatment with braces, & gave guidelines for treating fractures, especially when fractures were accompanied by open wounds[6].

Nicolas Andry(1658-1742)

In the 18th century, the French physician Nicolas Andry suggested that a body's misshape did not have to be permanent, particularly in children. His book 'Orthopaedia: Or the Art of Correcting & Preventing Deformities in Children' was a trailblazing work, in Paediatric Orthopaedics &it also touches upon the use of orthoses in deformity correction, in it's two volumes. In this book he suggests use of a padded brace to correct scoliosis, which should be changed every 3 months. For a curved tibia he suggested a gradual straightening by bandaging the curved limb to an iron plate. Considering that this book was written at times when barber surgeons were carrying out surgeries, it just goes to show how way ahead of his times Nicolas Andry was!! More proof for the same, is the fact that he suggested that club foot should be treated early & without surgery. He also recommended bandaging & shoes for the same. If you haven't figured it out from the title of his book, this Physician is credited with crafting the name 'Orthopaedics', which has since then gone onto become a flourishing speciality[7]…

The Bonesetters….

Early "bracemakers" were also artisans such as blacksmiths, armor makers, and patients who used many of the same materials as the prosthetist: metal, leather, and wood. By the 18th and 19th centuries, splints and braces were also mass produced and sold through catalogs. These bracemakers were also frequently known as "bonesetters" until surgery replaced manipulation and bracing in the practice of orthopaedics. "Bracemaker" then became a profession with a particular role distinct from that of the physician.The growth of Physical therapy received a major impetus for growth during World War I. World War II and the period following were also times of significant growth for the professions of physical therapy, prosthetics, and orthotics. The number of soldiers who required braces or artificial limbs during and

after the war increased the demand for prosthetists and orthotists as well. Following World War II the clinical engineer, the physiologist, & the Rehabilitation Specialist entered the field, & the bracemaker metamorphosed into an Orthotist.

Materials

Although progress can be documented throughout human history, the most significant contributions to orthotics and prosthetics were made in the 20th century, stimulated by the aftermath of the world wars, as stated earlier. A formal research directive in orthotics did not begin until 1960, in the USA. Biomechanical principles developed for the PTB prosthesis were immediately introduced in orthotics at the Veterans Administration Prosthetic Center in the USA, with the PTB orthosis to unload the foot-ankle complex axially. The concept of fracture bracing or cast bracing began at approximately the same time and is commonly practiced now. Nomenclature to describe orthoses and their functions was standardized to identify the body segments they encompassed with the desired biomechanical control mechanisms. Introduction of new materials after the second world war led to more rapid developments in this field. The use of thermosetting plastics is a case in point in support of the previous statement. In orthotics, the addition of thermoplastics led to numerous innovative designs of ankle-foot orthoses (AFOs) in the 1960s and 1970s. The custom plastic AFO was an important technologic advance in lower extremity orthotics. The physical characteristics of thermoformable plastics allowed biomechanical controls to match the prescription for improved function. The mechanical properties of an orthosis could be controlled by the layout of the trimlines of a device or structural reinforcements through specially placed corrugations that could be incorporated into its surface geometry. Advances have been steady in the area of material engineering and continue to have an impact on orthotics and prosthetics. The development of computer-aided design/computer-aided manufacture (CAD/CAM) systems for orthotics and prosthetics, which began in the 1970s, was another major technologic advance, considering the long tradition of custom hand-crafted devices in the profession. In the late 1980s and early 1990s, as computers became more economical, facilities began to integrate CAD/CAM systems into their practices. CAD/CAM systems have now been designed for most orthotic and prosthetic applications, often with specialized digitizers, scanners, and milling equipment to accommodate the unique needs of a particular device[8].

So with that I end this short history of orthoses, hope you enjoyed reading it….

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ORTHOTICS AND PROSTHETICS

Dr Noufal Ali, Consultant, Meitra Hospital

Targeted Muscle Reinnervation Technique in Below-Knee Amputation

J Byers Bowen [1], Daniel Ruter [1], Corinne Wee [1], Julie West [1], Ian L Valerio [1]

Approximately 25 percent of major limb amputees will develop chronic localized symptomatic neuromas and phantom limb pain in the residual limb. A method to treat and possibly prevent these pain symptoms is targeted reinnervation. Previous studies prove that targeted reinnervation successfully treats and, in some cases, resolves peripheral neuropathy and phantom limb pain in patients who have undergone previous amputation (i.e., secondary targeted reinnervation). This article seeks to share the authors' clinical indications and surgical technique for targeted muscle reinnervation in below-knee amputation, a surgical description currently absent from our literature. Targeted reinnervation for the below-knee amputee has been performed on 22 patients at the authors' institution. Each patient has been followed on an outpatient basis for 1 year to evaluate symptoms of neuroma or phantom limb pain, patient satisfaction, and functionality. All subjects have denied neuroma pain following amputation. The majority of subjects reported phantom pain at 1 month. However, at 3 months, all patients reported resolution of this pain. Dumanian et al. first noted the improvement of symptomatic neuroma and phantom limb pain in patients undergoing targeted reinnervation to provide intuitive control of upper limb prostheses. These findings have been substantiated by multiple previous studies at various amputation levels. This study extends the success of

targeted muscle reinnervation to below-knee amputations and provides a description for this technique.

PlastReconstr Surg. 2019 Jan;143(1):309-312.

Advances in Prosthetics and Rehabilitation of Individuals with Limb Loss

Mary S Keszler [1], Jeffrey T Heckman [1], G Eli Kaufman [2], David C Morgenroth

Amputation results in a wide range of functional limitations; advances in surgical, rehabilitative, and prosthetic care are aimed at optimizing functional quality of life for the spectrum of individuals with limb loss. This article initially focuses on advances in surgical and rehabilitative care, followed by noteworthy advances in prosthetics, including potential advantages and disadvantages. Although prosthetics tend to dominate attention in the field, it is important to remember that optimizing surgical and rehabilitative care are vital components of enhancing functional recovery and quality of life in people with limb loss.

Phys Med RehabilClin N Am. 2019 May;30(2):423-437.

Management of lower limb amputations

Alifa Isaacs-Itua [1], Imad Sedki [2]

The most common reason for lower limb amputations in the UK is peripheral arterial disease. A thoughtful approach to surgery, with consideration of optimal amputation level and residual limb shape, can improve prosthetic use and functional outcomes. Prosthesis socket design and fit, as well as use of appropriate components, must be considered in accordance with the patient's activity level and potential. Major developments in prosthetics over the past 20 years, particularly in the area of joint design, including microprocessor knees, have increased options to improve ambulation. This is particularly significant among those with more proximal amputations, for whom energy expenditure on walking is even greater. Management of post-amputation pain syndromes including phantom limb pain can prove challenging, although there are novel options for pain control. Long-term care of both the residual and contralateral limbs is paramount to reduce risk of further amputation surgery, and optimize longer term function and quality of life.

Br J Hosp Med (Lond). 2018 Apr 2;79(4):205-210.

Assessment of the care process with orthotics, prosthetics and special materials

Clayton Dos Santos Moraes, Eliane Goldberg Rabin , Karin Viégas

The study’s objective was to assess potential failures in the care process with orthotics, prosthetics and special materials in a high-complexity hospital. It was conducted from March to October 2013. This process was assessed with the Failure Mode and Effects Analysis (FMEA) service tool. The data were analysed according to the risk and the corrective measures were defined.

No failure was classified as high risk and the corrective measures indicated as low and moderate risk had the following improvement initiatives suggested: standardize the material records in the information system; create a specific form to require materials; hire specialized technical personnel and create a continuous education program. All the suggested initiatives were implemented and helped to reduce the assistance risks for patients due to failures in this process. The actions increase safety levels and provide higher quality of service.

Rev Bras Enferm. 2018 May;71(3):1099-1105.

Proper Education on Spinal Orthotics: A Way to Minimize Associated Complications

Christopher Elia, Katie Huynh, Fanglong Dong, Dan Miulli

Spinal orthotic bracing is a common modality for treating nonoperative spinal fractures with risks. This study aimed to assess the effect of an intervention on critical care nurses to improve their clinical knowledge and comfort level of managing patients. A literature review was conducted regarding common complications associated with spinal orthotics. This information was compiled and used to create a questionnaire and spinal orthotic course for nurses. Pre- and postassessments of nurses' knowledge regarding spinal orthotics were conducted. A total of 197 nurses completed the presentation. The ability to correctly identify thoracolumbosacral orthotics (TLSO), lumbosacral orthotics (LSO) and cervico-thoracic orthotics (CTO) all significantly increased. Regarding the clinical knowledge, the right answer to the question whether or

not halo vest needed to be removed for cardiopulmonary resuscitation increased from 45.2% to 100% (p < .0001), and the correct answer to the question whether or not TLSO braces need to be worn at all times in patients with spinal precautions increased from 62.4% to 100% (p < .0001). Nurses reported that their comfort level of taking care of patients with spinal precautions increased from 94.4% before the presentation to 100% after the presentation. The quality improvement project seemed to improve the critical care nurses' ability to correctly identify different type of braces and their comfort level of managing patients with spinal precautions.

J Trauma Nurs. Jan/Feb 2018;25(1):45-48.

Non-surgical management of posterior positional plagiocephaly: orthotics versus repositioning

J Paquereau

The study evaluated from the literature, the evidence of comparative efficiency of non-surgical treatments (orthotics or head repositioning therapy) in posterior positional plagiocephaly.Systematic review from scientific articles (original cohort studies and review of literature), published in French or in English, searched on five online literature data bases, comparing non-chirurgical treatments (repositioning and orthotics therapy) for deformational plagiocephaly. A standardized method guidelines (Critical Review Form-Quantitative Studies) has been used.Only 11 cohort studies met the inclusion criteria and six reviews of literature were analyzed. Many biases have been identified, most of the time, favoring the repositioning groups (older infants and plagiocephaly more severe).Several different orthotics seem to correct head deformities better and faster than repositioning protocols. Evaluation methods, treatment indications and long-term efficacy should be clarified. Studies about treatment risks are warranted.

Ann Phys Rehabil Med. 2013 Apr;56(3):231-49.

3D-Printing and Upper-Limb Prosthetic Sockets: Promises and Pitfalls

Jennifer Olsen, Sarah Day, Sigrid Dupan, KianoushNazarpour, Matthew Dyson

Modernising the way upper-limb prosthetic sockets are made has seen limited progress. The casting techniques that are employed in clinics today resemble those developed over 50 years ago and there is still a heavy reliance on manual labour. Modern manufacturing methods such as 3D scanning and printing are often presented as ready-to-use solutions for producing low-cost functional devices, with public perceptions being largely shaped by the superficial media representation and advertising. The promise is that modern socket manufacturing methods can improve patient satisfaction, decrease manufacturing times and reduce the workload in the clinic. However, the perception in the clinical community is that total conversion to digital methods in a clinical environment is not straightforward. Anecdotally, there is currently a disconnect between those developing technology to produce prosthetic devices and the actual needs of clinicians and people with limb difference. In this paper, we demonstrate strengths and drawbacks of a fully digitised, low-cost trans-radial diagnostic socket making process, informed by clinical principles. We present volunteer feedback on the digitally created sockets and provide expert commentary on the use of digital tools in upper-limb socket manufacturing. We show that it is possible to utilise 3D scanning and printing, but only if the process is informed by expert knowledge. We bring

examples to demonstrate how and why the process may go wrong. Finally, we provide discussion on why progress in modernising the manufacturing of upper-limb sockets has been slow yet it is still too early to rule out digital methods.

IEEE Trans Neural SystRehabil Eng. 2021;29:527-535.

Motorized Biomechatronic Upper and Lower Limb Prostheses-Clinically Relevant Outcomes

Knut Lechler , Bertrand Frossard , Lynsay Whelan , David Langlois , Roy Müller , KristleifurKristjansson

People with major limb amputations are severely impaired when it comes to activity, body structure and function, as well as participation. Demographic statistics predict a dramatic increase of this population and additional challenges with their increasing age and higher levels of amputation. Prosthetic use has been shown to have a positive impact on mobility and depression, thereby affecting the quality of life. Biomechatronic prostheses are at the forefront of prosthetic development. Actively powered designs are now regularly used for upper limb prosthetic fittings, whereas for lower limbs the clinical use of actively powered prostheses has been limited to a very low number of applications. Actively powered prostheses enhance restoration of the lost physical functions of an amputee but are yet to allow intuitive user control. This paper provides a review of the status of biomechatronic developments in upper and lower limb prostheses in the context of the various challenges of amputation and the clinically relevant outcomes. Whereas most of the evidence regarding lower limb prostheses addresses biomechanical issues, the evidence for upper limb prostheses relates to activities of daily living (ADL) and instrumental ADL through diverse outcome measures and tools.

PM R. 2018 Sep;10(9 Suppl 2):S207-S219.

Three-dimensional printing in prosthetics: Method for managing rapid limb volume change

Eric Nickel, Kyle Barrons , Barry Hand , Alana Cataldo, Andrew Hansen

During post-amputation recovery or rapid body mass change, residual limb volume can change quickly, requiring frequent adjustments or replacement of the socket to maintain fit. The aim of this pilot test was to evaluate the feasibility of using a three-dimensional-printed insert to extend the service life of a prosthetic socket after substantial residual limb volume loss.One research subject with a well-fitting transtibial prosthetic socket had an oversized socket fabricated to simulate substantial limb volume loss. The digital shapes of the oversized and well-fitting sockets were used to create a three-dimensional-printed insert to restore fit.Two-minute walk test distance decreased when using the oversized socket without the insert, but not when using the socket with the insert. Socket comfort score was 8+ under all conditions. These results suggest that three-dimensional-printed inserts may be an effective method of extending the service life of prosthetic sockets when rapid limb volume loss occurs.Sockets can be fabricated in anticipation of volume gain/loss, using replaceable 3D-printed inserts to maintain fit and comfort.

ProsthetOrthot Int. 2020 Oct;44(5):355-358.

A narrative review: current upper limb prosthetic options and design

Lauren Trent , Michelle Intintoli, Pat Prigge, Chris Bollinger , Lisa Smurr Walters , Dan Conyers , John Miguelez , Tiffany Ryan

This review was conducted to provide an overview of current literature as it relates to upper limb difference, available componentry, and prosthetic options and design. Emerging technologies combined with an increased awareness of the limb difference community have contributed to recent advancements in upper extremity prosthetics. A search of five major clinical databases utilizing keywords relating to upper limb prostheses, component and limb difference levels resulted in over 1200 articles. These articles were subjected to inclusion and exclusion criteria in order to identify current peer reviewed research relevant to this topic. Fifty-five applicable articles and sources of standards were reviewed based on the inclusion and exclusion criteria, presenting five general options for prosthetic intervention. This information was assimilated and categorized in this article, which provides an overview of the aforementioned options. While a noteworthy amount of research focuses on technological advancements, the five options for prosthetic intervention are inherently represented in the current literature. For individuals with upper limb difference, as well as their care team, successful rehabilitation hinges on awareness of new components, the functional efficacy of these components, and the evolved techniques used in prosthetic design and fabrication. It is noted that the rapid evolution of upper limb prosthetics consistently outpaces research and publication of information.

DisabilRehabil Assist Technol. 2020 Aug;15(6):604-613.

Walking and balance in children and adolescents with lower-limb amputation: A review of literature

ArezooEshraghi, Zahra Safaeepour , Mark Daniel Geil , Jan Andrysek

Children with lower limb loss face gait and balance limitations. Prosthetic rehabilitation is thus aimed at improving functional capacity and mobility throughout the developmental phases of the child amputee. This review of literature was conducted to determine the characteristics of prosthetic gait and balance among children and adolescents with lower-limb amputation or other limb loss.Both qualitative and quantitative studies were included in this review and data were organized by amputation etiology, age range and level of amputation.The findings indicated that the structural differences between children with lower-limb amputations and typically developing children lead to functional differences. Significant differences with respect to typically developing children were found in spatiotemporal, kinematic, and kinematic parameters and ground-reaction forces. Children with transtibial amputation place significantly larger load on their intact leg compared to the prosthetic leg during balance tasks. In more complex dynamic balance tests, they generally score lower than their typically developing peers.There is limited literature pertaining to improving physical therapy protocols, especially for different age groups, targeting gait and balance enhancements. Understanding gait and balance patterns of children with lower-limb amputation will benefit the design of prosthetic components and mobility rehabilitation protocols that improve long-term outcomes through adulthood.

ClinBiomech (Bristol, Avon). 2018 Nov;59:181-198.

Sensory feedback in upper limb prosthetics

Christian Antfolk, Marco D'Alonzo, BirgittaRosén, GöranLundborg, Fredrik Sebelius, Christian Cipriani

One of the challenges facing prosthetic designers and engineers is to restore the missing sensory function inherit to hand amputation. Several different techniques can be employed to provide amputees with sensory feedback: sensory substitution methods where the recorded stimulus is not only transferred to the amputee, but also translated to a different modality (modality-matched feedback), which transfers the stimulus without translation and direct neural stimulation, which interacts directly with peripheral afferent nerves. This paper presents an overview of the principal works and devices employed to provide upper limb amputees with sensory feedback. The focus is on sensory substitution and modality matched feedback; the principal features, advantages and disadvantages of the different methods are presented.

J Rehabil Med. 2012 Jul;44(8):702-7.

Quiz 1

1. There are ___ basic types of hand grips..?

   (a) Four (b) One (c) Three (d) Two

2. The objectives of upper limb orthotic applications can be classified into ___ major areas?

   (a) Five (b) Four (c) Three d) Two

3. The WHO used for splinting Carpal Tunnel Syndrome should be worn for _____ weeks with weaning from the orthosis & gradual return to activity & workstation modifications.

   (a) 1-2 (b) 2-3 (c) 4-6 (d) 7-8

4. Splinting in the 'open palm' position or 'pancake' position is done for burns on the _____ aspect of the hand….?

   (a) Palmar (b) Dorsal (c) Radial (d) Ulnar

5. The World Health Organization estimates that only _____of people with disabilities in Third World countries have access to assistive devices…?

   (a)1-5% (b) 5-15% (c) 20-30% (d) 30-40%

6. A rocker bottom shoe helps to decrease force on the metatarsals during _____ during the gait cycle by allowing the body's center of mass to passively roll over the base of support rather than requiring active ankle plantar flexion.

   (a) Push off/ Terminal stance (b) Initial contact (c) Mid stance (d) Loading response

7. __ percent of the population has some degree of leg length discrepancy, with an average discrepancy of 5.2 mm…?

   (a) 60 (b) 70 (c) 80 (d) 90

8. The metal in the posterior area of the calf band, in a metal AFO should be between _____ inches for enough weight distribution to allow for comfort and prevent skin irritation or breakdown.

   (a) 0.5 to 1.2 (b) 1.5 to 3 (c) 4 to 5 (d) 5 to 6

9. There are ___ traditional types of knee joints in KAFOs..?

   (a) 3 (b) 4 (c) 5 (d) 6

10. Paralysis of ___muscles is one of the most common reasons for prescribing HKAFOs.

    (a) Hip flexor (b) Hip abductor (c) Transversus abdominis (d) Oblique abdominis

Key

1. (d)

There are *two* basic types of hand grips: *power and precision*. *For power grip, the wrist is held in dorsiflexion with the fingers wrapped around an object held in the palm (as in holding a screwdriver with a cylindrical grip)*. The spherical grip is useful for holding a ball. *For precision grip, the thumb is held against the tip of the index and middle fingers.* The hand is used during functional activities through basic prehension patterns: to pinch, to grasp, or to hook objects. *There are three types of pinch: (1) oppositional pinch (three-jaw chuck), (2) precision pinch, and (3) lateral key pinch.*

It is best to splint toward oppositional pinch. This allows the best compromise between fine precision pinch and strong lateral pinch. *No practical orthosis can substitute for or improve thumb adduction.*

2. (c)

The objectives of upper limb orthotic applications can be classified into three major areas: protection, correction, and assistance with function.

- *Protection*: Orthotic devices can provide compressive forces and traction in a controlled manner to protect the impaired joint or body part. Restricting or preventing joint motion may correct alignment and prevent progressive deformity. Protective orthoses can also stabilize unstable bony components and promote the healing of soft tissues and bones.

- *Correction*: Orthoses help in correcting joint contractures and subluxation of joints or tendons. They assist in the prevention and reduction of joint deformities.

- *Assistance with function*: Orthoses can assist function by compensating for deformity, muscle weakness, or increased muscle tone.

3. (c)

A word of caution is in order with regard to using a prefabricated wrist orthosis for carpal tunnel syndrome. *Many of these orthoses have an angled metal bar to hold the wrist in 45 degrees of extension*. *This angle far exceeds the recommended zero to 5 degrees of extension needed to decrease pressure in the carpal tunnel*. *Patients should be instructed to remove the metal spline, flatten it, and then replace it in the fabric sleeve*. Usually, this type of orthosis should be worn for 4 to 6 weeks, with gradual weaning from the orthosis and return to activity with workstation modifications.

4. (a)

After burn injuries, body parts should be positioned to prevent the development of expected deformities. For example, in *burns of the dorsal surface of the hand, the wrist is placed in 15 to 20 degrees of extension, the MCP joints in 60 to 70 degrees of flexion, the PIP and DIP joints in full extension, and the thumb between radial abduction and palmar abduction*. *If*

tendons are exposed, the flexion of the MCP joints should be decreased to 30 to 40 degrees to keep some slack in the tendons until there is wound closure. Palmar hand burns require maximal stretching to control the contracting forces of the healing burn. *The antideformity position of a palmar burn consists of 15 to 20 degrees of wrist extension, extension of the MCP and IP joints, digital abduction, and thumb abduction and extension*. This has been *referred to as an "open palm" or "pancake position." For the prevention of a shoulder adduction deformity after axillary burns, the shoulder should be held in abduction with an airplane orthosis.* The tendency toward hypertrophic scarring after a burn is addressed with a selection of compression garments, elastomer molds, facial splints, gel-shell orthoses, and silicone gel sheeting.

5. (b)

People with a disability are often caught in a vicious cycle of poverty and disability. The World Health Organization estimates that only 5% to 15% of people with disabilities in Third World countries have access to assistive devices. *Low-income countries deliver assistive technology (including orthotic devices) differently because of cost, availability, materials, required skilled craftsmanship, health care access, and infrastructure issues*. These factors represent the biggest and most difficult challenges to delivering orthotic devices to people in need. Training and retaining professionals in current orthotic principles, materials, and fabrication techniques is challenging. *The goal is to fabricate a "universal" orthosis that has broad applicability and requires minimal adaptations. This same device can go on to benefit another person at another time.*

6. (a)

Pes planus may be caused by increased internal rotation of the tibia (contributingto foot pronation) or abnormal alignment of the calcaneus. *The interaction between the tibia and the subtalar joint is what allows nonintrinsic foot abnormalities to cause excessive pronation of the foot*. *Excessive pronation of the foot leads to altered distribution of forces and potentially to pain*. Pain relief may be achieved by holding the subtalar joint and calcaneus in proper alignment, thereby reducing the degree of pronation. *The subtalar joint should be held in a neutral position for the custom-molding process. This prevents rotational deformities present in hyperpronation or supination. With the orthosis elevating the anteromedial calcaneus, an upward force is transmitted to the sustentaculum tali, thereby preventing inrolling. By extending the orthosis beyond the metatarsal heads, one obtains increased leverage to control the foot deformity. The orthosis should also extend proximally to cup the calcaneus and help to control the subtalar joint. A custom-molded foot orthosis of this type, designed to control excessive pronation, is deemed a UCBL*, or UCB, orthosis, named after the University of California Biomechanics Laboratory, where this design was researched during the 1940s.

In contrast to pes planus, pes cavus is an abnormally high-arched foot, which can cause pain due to excess pressure placed on the metatarsal heads. *To prevent this, weight bearing should be equivalent across the metatarsal heads*. In addition, increasing the height of the longitudinal support of the shoe in between the shank of the shoe and the arch of the foot serves to better distribute weight to help prevent excess pressure over the heads of the metatarsals. *A pes cavus foot tends not to pronate like a pes planus foot, so the arch of the*

foot is located at the talonavicular joint. A foot may appear high-arched if the tibia is externally rotated and the foot supinated. A custom foot orthosis that holds the subtalar joint in neutral position helps to prevent inordinate supination and prevents increased pressure being exerted on the lateral aspect of the foot.

In metatarsalgia, to help relieve pain on the metatarsal heads, modifications must be made to distribute pressure to other areas. Internal or external modifications can be used to redistribute forces to other areas, typically proximal to the heads of the metatarsal bones. *A metatarsal pad is placed inside the shoe just proximal to the heads of the second through fourth metatarsals. A metatarsal bar can also be used when the foot is unable to tolerate a pad within the shoe. This is a wide band of material applied externally to the sole of the shoe just proximal to the metatarsal heads. A rocker bottom shoe helps to decrease force on the metatarsals during push-off during the gait cycle by allowing the body's center of mass to passively roll over the base of support rather than requiring active ankle plantar flexion. Shoes with high heels and/or pointed toes place excessive stress on the metatarsal heads*. It is important to educate patients about this fact because selection of appropriate footwear can help to prevent the development of pain.

7. (d)

There are two types of leg length discrepancies: true leg length discrepancy and apparent leg length discrepancy. *A true leg length discrepancy may result from an acute trauma such as a femur fracture, or after a hip or knee replacement surgery. To obtain this measurement, with the patient supine on the exam table, measure from the distal tip of the anterior superior iliac spine to the distal tip of the medial malleolus*. *An apparent leg length discrepancy may be seen when the true leg length is equal, but anatomic factors such as muscle imbalance, scoliosis, or pelvic fracture create a pelvic obliquity. This measurement is obtained by measuring from a midline landmark, generally either the umbilicus or pubic symphysis, to the distal tip of the medial malleolus*. Leg length can also be assessed radiographically. This is often asymptomatic with smaller differences, but a difference in leg length of greater than half an inch is generally considered clinically significant. *There is a higher incidence of low back pain when the discrepancy is greater than 12 mm (or approximately half an inch)*. If pain improves after a trial of shoe modifications, then the leg length discrepancy can be reasonably assumed to have been a contributing factor.

If the leg length discrepancy is greater than half an inch, the first half inch may be corrected with a heel pad; anything more than this requires external buildup of the heel. Even then, only 75% of the discrepancy should be corrected. The sole of the rest of the shoe must be built up in proportion to the heel.

8. (b)

Metal AFOs are composed of metal uprights, a footplate or other interface between the brace and the shoe, and leather straps. The ankle joints of these types of braces have pins or springs for adjustments that are adapted to various pathologies and needs. *The metal in the posterior area of the calf band should be between 1.5 and 3 inches for enough weight distribution to allow for comfort and prevent skin irritation or breakdown*. *The top of the calf*

band should rest at least 1 inch below the fibular neck to avoid compression on the peroneal nerve. The interface with the shoe consists of either a plate with medial and lateral uprights for the ankle joints or a split stirrup which fits into the side of the shoe. The single plate is fixed firmly to the shoe and can extend to the metatarsal heads or further. *The split stirrup* can be adapted to fit into different shoes but *lacks the support provided by the single plate. The pins on the joints can be tightened or loosened to provide restriction to dorsiflexion or plantarflexion. There are anterior and posterior stops on the medial and lateral joints. The anterior stop limits dorsiflexion while the posterior one limits plantarflexion. Straps can be attached near the joints to limit either a tendency toward varus or valgus. A medial T strap will apply pressure over the medial malleolus and buckle around the lateral upright. A lateral T strap will apply pressure over the lateral malleolus and buckle around the medial upright. In general, metal AFOs have been replaced by plastic and other materials*, but metal AFOs still have utility and are prescribed in certain circumstances. For example*, an individual may have grown accustomed to a metal brace and thus despite the advantages of newer types may not want to change. In other instances, the weight of an individual may require the sturdiness that a metal AFO can provide. Skin conditions such as sores or weeping or exudative lesions can necessitate the use of metal AFOs as well.*

9. (a)

There are three traditional types of knee joints. *The straight single axis knee joint* provides rotation about a single axis. It allows free flexion but prevents knee hyperextension. Free-swinging knee joints are indicated when medial-lateral support is required but adequate knee extensor strength is present. This type of knee joint can be used in combination with a drop lock if needed to keep the knee locked in extension during all phases of gait*. The polycentric knee joint* uses a double-axis system to simulate the flexion-extension and gliding motion of the femur across the tibia. Although this type of joint provides more physiologic motion, it is not used as commonly as the other types of joints. *The third type of knee joint is the posterior offset knee joint*. This joint allows free flexion and extension of the knee during the swing phase of gait. During stance phase, the posterior offset of the joint helps to keep the orthotic ground reactive force in front of the knee axis for stability. The posterior offset knee joint should have a hyperextension stop to help prevent genu recurvatum.

10. (b)

HKAFOs are normally KAFOs (usually bilateral) that are attached to a hip device (pelvic band, lumbar sacral orthoses [LSOs], or thoracic lumbar sacral orthoses [TLSOs]) for medical conditions warranting hip control. *Paralysis of hip abductor muscles* is one of the most common reasons for prescribing HKAFOs. *HKAFOs are usually fabricated using mechanical hip joints, most commonly made of metal.* They can incorporate flexion-extension and abduction-adduction control and have free or locking joints. There are many types of HKAFOs that range from the conventional style of metal and leather components attached to shoes to the more complicated total contact, molded plastic reciprocating gait orthosis (RGO)
.

Quiz

1. The limb bud appears at __ days' gestation..?

   (a)12 (b) 14 (c) 26 (d) 36

2. _____ is the most common type of amputation..?

   (a) Finger tip (b) Radial (c) Thumb (d) Ulnar

3. The mangled extremity syndrome is defined as significant injury to at least _____tissue groups…?

   (a) 1 of 2 (b) 3 of 4 (c) 4 of 5 (d) 5 of 6

4. If the serum potassium level is higher than ___ mmol/L in the amputated segment, replantation should be avoided.

   (a) 4 (b) 5 (c) 6 (d) 6.5

5. Unlike the Muenster socket, the _____ socket uses medial-lateral compression of the arm above the epicondyles and less restrictive anterior-posterior compression.

   (a) Northwestern (b) TRAC (c) Elbow disarticulation (d) Medium length transhumeral

6. An advanced amputation surgical technique referred to as agonist-antagonist myoneural interface (AMI) or the Ewing amputation procedure has been trialed in individuals with _____ level amputations.

   (a) Transfemoral (b) Transhumeral (c) Transradial (d) Transtibial

7. A hip flexion contracture greater than _____degrees makes prosthetic fit difficult, and appropriate alignment modifications to the prosthesis are required.

   (a) 5 (b) 10 (c) 15 (d) 20

8. 'Ability or potential to exceed normal ambulation activities and use a prosthesis for activities exhibiting high impact, stress, or energy levels'- the Functional Index Level defined above is..?

   (a) K3 (b) K4 (c) K5 (d) K6

9. Among the most proximal amputation levels of Paediatric transfemoral and hip disarticulation, there is a ____ % reduction in self-selected walking speed.

   (a) 20-30% (b) 30-40% (c) 40-50% (d) 50-60%

10. Studies have shown that up to ___% of unilateral dysvascular amputees will become bilateral amputees over a 5-year period.

    (a) 30 (b) 40 (c) 50 (d) 60

Key

1. (c)

An estimated 4.1 per 10,000 babies are born each year with all or part of a limb missing, ranging from a missing part of a finger to the absence of both arms and both legs. *Congenital deficiencies in the upper limb are more common (58%), and they occur slightly more often in boys*. *The most common congenital amputation is at the left short transradial level*. Most cases of congenital upper limb deficiency have no hereditary implications. Congenital limb deficiencies occur because of the failure of part or all of a limb bud to form. The first trimester is the critical time for limb formation. *The bud appears at 26 days' gestation, and differentiation progresses through the eighth week of gestation*. The etiology often is unclear, but *teratogenic agents* (e.g., medications and radiation exposure) and *amniotic band syndrome* are *two common causes*.

The ISPO terminology divides the limb amputations into transverse or longitudinal. *By definition, a child who has a transverse deficiency has no distal remaining parts. For example, a child with a transverse radial deficiency has a normal upper arm and a portion of the radius but is missing the hand and fingers. Longitudinal deficiencies have distal portions present with a partial or total absence of a specific bone. The most common congenital limb deficiency in the upper limb is a longitudinal partial or complete lack of the radius*. Longitudinal hand reductions represent half of all congenital upper limb reductions, and multiple limb reductions are found in less than 20% of live births.

2. (a)

Radial amputations involve the thumb and index finger and compromise grasp. *Fingertip amputation is the most common type of amputation. The thumb is the most functionally critical digit*. Thumb amputation, partial or complete, results in loss of palmer grip, side-to-side pinch, and tip-to-tip pinch. Amputation of one of the other digits causes less functional loss. *Transverse digit amputations occur at one or more digits and can be fit with functional finger prostheses*. *Ulnar amputations involve digits IV and V with resultant loss of hook grasp. The loss of digit V is functionally underestimated because of this powerful grasp. Central amputation involves digits III and IV, and reconstruction is usually not attempted*. *A cosmetic substitute is used instead*. The residual limb refers to the remaining part of the amputated limb. The sound limb refers to the nonamputated limb. Wrist disarticulations are rare but are preferred over more proximal amputations because maximal pronation and supination are preserved.

Proximal to the hand, amputations are divided into the following categories: transradial, elbow disarticulation, transhumeral, shoulder disarticulation, and forequarter amputation. Depending on the percentage of the limb remaining compared with the sound side, further categorizations can be made, such as "short" and "long," to define the residual limb. These categorizations have functional implications. *For the transradial residual limb, the longer the length, the more pronation (normal, 120 degrees) and supination (normal, 180 degrees) is preserved. Of the pronation and supination preserved, 50% can be transmitted to the prosthesis.*

3. (b)

Injury scores were developed for severe trauma-related limb injuries, to help determine which vascular injury patients would benefit from primary amputation versus an attempt at limb salvage. Their validity has been questioned. *The mangled extremity syndrome is defined as significant injury to at least three of the four tissue groups (skin/soft tissue, nerve, vessel, and bone).*

4. (d)

Hand replantation (HR) of traumatically amputated limbs is currently possible, especially in children, because of the potential for successful neurologic recovery. *Effective treatment of the patient and the ischemic, detached body part requires appropriate early cooling and prompt replantation within the initial 12-hour window*. *The success of digital replantation is well documented, whereas successful hand and distal forearm replantation is less common*. The decision to replant is based on evidence that the function and overall well-being of the patient will be better than with a prosthetic device. *All indications for replantation must take into account the patient's general health, the ischemia time and the level, and type and extent of tissue damage*. It requires prolonged recovery periods, multiple procedures, and motivated patients to achieve optimal outcomes. Predictors of successful replantation include adequate preservation, contraction of the muscle in the amputated limb after stimulation, the level of injury, and no tobacco use. The best predictor of success is the serum potassium level in the amputated segment*. If the serum potassium level is higher than 6.5 mmol/L, replantation should be avoided*. Replantation is indicated in levels from the distal forearm to the fingers. The more proximal to the wrist, the greater the amount of ischemic muscle mass and the more complex the metabolic and surgical demands. *Approximately 85% of replanted parts remain viable. Sensory recovery with two-point discrimination occurs in 50% of adults.*

5. (a)

There are a number of traditional transradial socket options. *Three traditional styles use anatomic suction suspension so that a harness is not needed. This is known as a "selfsuspending" system*. *These three are each designed to be used with different residual limb lengths and are named the Muenster, the Northwestern, and the TRAC (Transradial Anatomically Contoured) designs. The Muenster-type socket was introduced in the 1960s for a short transradial level amputation that provided more intimate encapsulation of the residual limb*. *The elbow is set in a preflexed position (usually 35 degrees), and a channel is provided at the antecubital space for the biceps tendon. This allows for unobstructed flexion. The suspension is achieved through anterior-posterior compression around the olecranon*. *It is not an optimal design for bilateral amputees because it is donned with a pull sock*. This led to additional innovations that included the popular Northwestern socket design. *Unlike the Muenster socket, the Northwestern uses medial-lateral compression of the arm above the epicondyles and less restrictive anterior-posterior compression. It is used primarily in those with long residual limbs*. The reduced anterior-posterior compression creates a less snug suspension and can lead to problems with electrode contact and increased forces on the distal residual bone. *The socket is known for its ease of donning and is a popular choice for bilateral amputees*. The trim lines of the transradial socket are dependent on the length of the

residual limb; the shorter the limb, the higher the trim line. For a longer limb, the trim line is lower and there is more allowance for pronation-supination. *The patient's ROM will be limited by a transradial prosthesis to approximately 70% of the motion possible without a prosthesis*. It might be necessary for the prosthetist to add flexion to the socket so that the end range allows for easy contact with the person's mouth and face. *The TRAC socket incorporates design elements from both the Muenster and Northwestern sockets but with more aggressive contouring of the limb to maximize load-tolerant areas of the residual limb. Similar to the Muenster, the TRAC retains the encapsulation of the olecranon posteriorly and the generous relief of the biceps anteriorly. The TRAC uses both anterior-posterior and medial-lateral compression for enhanced stability and comfort*. The TRAC socket, through detailed anatomic contouring, transfers the load from the distal end of the radius to the more load-tolerant proximal musculature.

An elbow disarticulation socket or a long transhumeral socket includes the residual limb and excludes the acromion, the deltopectoral groove, and the lateral border of the scapula. At this level of amputation, humeral rotation is captured by the intimate fitting at and above the epicondyles, which creates a well-suspended socket. *Elbow disarticulation prostheses require the use of outside locking joints located on either side of the humeral epicondyles and external to the socket. This level might add active rotary control but at the expense of additional bulk to the medial-lateral dimension of the socket. A medium length transhumeral socket has trim lines up to the acromion and includes the deltopectoral groove and the lateral border of the scapula. The extra "wings" on this socket are used to stabilize the socket and limit rotation. A short transhumeral socket has trim lines that include the acromion and acromioclavicular joint. The trim lines continue medial to the deltopectoral groove and medial to the lateral border of the scapula. These "extended wings" are used to help stabilize the socket and to control rotation*.

6. (d)

An advanced amputation surgical technique referred to as agonist-antagonist myoneural interface (AMI) or the Ewing amputation procedure has been trialed in individuals with transtibial level amputations. The AMI procedure preserves the dynamic muscle relationships within the native anatomy, *which facilitates proprioceptive signals from mechanoreceptors within both muscles to be communicated to the central nervous system.* When *these signals are communicated to a prosthetic ankle joint*, *subjects have* demonstrated *improved control over the prosthesis compared to subjects having traditional amputation.*

7. (c)

When a prosthesis is not worn, transtibial amputees should keep the knee in full extension. Similarly, individuals with transfemoral amputations should be counseled not to put a pillow under the residual limb or between their legs when in bed to prevent the formation of joint contractures. Careful joint ROM measurements with a goniometer are important; with knee extension measured with the goniometer, the arms are carefully aligned with the femur and tibia, and hip assessment is performed with the Thomas test. Contractures of the hip and knee on the amputated side can hinder the process of fitting a prosthesis or prevent it altogether. *A knee flexion contracture can increase the energy, strength, and endurance*

needed for prosthetic ambulation. A hip flexion contracture greater than 15 degrees makes prosthetic fit difficult, and appropriate alignment modifications to the prosthesis are required.

8. (b)

Functional Index Level	Description
K0	No ability or potential to ambulate or transfer with use of a prosthesis and prosthesis does not enhance the quality of life
K1	Ability or potential to transfer or ambulate with a prosthesis for household distances on level surfaces at a fixed cadence
K2	Ability or potential to ambulate limited community distances and traverse low-level environmental barriers; ambulation at a fixed cadence
K3	Ability or potential to ambulate unlimited community distances and traverse most environmental barriers; ambulation with variable cadence
K4	Ability or potential to exceed normal ambulation activities and use a prosthesis for activities exhibiting high impact, stress, or energy levels

Functional Index Level	Recommended Prosthetic Components
K0	None for function Potential for cosmetic prosthesis
K1	Feet: solid ankle cushion heel, single axis Knees: manual locking, weight-activated stance control
K2	Feet: multiaxial and flexible keel feet Knees: weight-activated stance control
K3	Feet: multiaxial, energy storing Knees: hydraulic, pneumatic, and microprocessor controlled
K4	Feet: energy storing or other specialty feet Knees: no specific limitations

9. (a)

It generally has been established that in the adult population the energy costs of walking following lower limb amputation increases as the amputation level ascends proximally up the lower limb and that amputees adopt slower self-selected walking speeds. However, this principle does not appear to apply to all pediatric cases. As expected, among the most proximal amputation levels of transfemoral and hip disarticulation*, there is a 20% to 30% reduction in self-selected walking speed coupled with an increase in metabolic energy costs approximating 150% of normal*. Similarly, children with bilateral lower limb amputations walk at a slightly reduced self-selected walking speed with a slightly elevated heart rate. *However, children with ankle disarticulations, transtibial amputations, and knee disarticulations appear to walk at essentially the same self-selected walking speeds and oxygen costs as their nonaffected peers.*

10. (c)

Success as a unilateral amputee can be a helpful predictor of success in ambulation as a bilateral amputee. *The metabolic cost of ambulation increases during prosthetic ambulation with bilateral amputations. The more proximal the amputations the higher the associated energy cost*. *Energy requirements increase for unilateral amputees at a certain level and then increase further if there is another amputation on the contralateral limb at the same level. Because of these increased needs, there must be sufficient cardiac capacity and strength capacity to bear these extra burdens*. Flexion contractures of the hips or knees can restrict or inhibit prosthetic ambulation in amputees in general but pose even greater issues for the bilateral amputee. The early intervention of the rehabilitation team is therefore paramount in the prevention of contractures.

In general, training with bilateral prostheses requires more time and effort. Because there is loss of proprioceptive sensation from both lower extremities with bilateral amputation, use of bilateral prostheses can cause a greater sense of insecurity that may result in a wider stance, slower pace, and the use of an assistive device. *The bilateral amputee faces a greater challenge when negotiating ramps, curbs, stairs, uneven terrain, and other environmental barriers. Important skills would also include sitting and standing from a chair, as well as falling in a controlled manner and recovering from a fall*.

In bilateral amputation, preservation of residual limb length can have a dramatic impact on the success of prosthetic ambulation. This is especially true if the knee can be preserved.

Stubbies can provide a useful initial phase in the training of bilateral transfemoral amputees to ambulate. Stubbies consist of an ischial containment socket, a pylon, and specially designed feet to give more stability when leaning backward.

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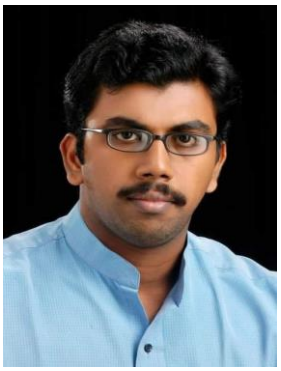

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Dr Sudheera, Consultant, Kozhikode District Cooperative Hospital

On a New Stage

Starting my role as an the only Physiatrist ,with 5 physiotherapists, a Speech therapist, Dietician and a visiting Orthotic person (Started coming after I joined) in a reputed private Medical College. I resigned for personal reasons. I could relive with immense satisfaction that PM &R had become one of the most popular departments in that institution for academics and Patient management. In Kozhikode District cooperative Hospital where I was posted 3 days after relieving, things were the same. It is a one man show. Here where all departments are functioning with full fledged OP, there is only a Physiotherapy unit to represent PM& R. So As my past experience taught me I met all the Consultants in person, made myself known to them. Awareness regarding what all things we do in PM&R is very important just as their support and cooperation. In fact now it's only 5 days I started OP. I'm getting consultation, references of my own. PM&R is a specialty that sadly many of the patients, staff and even few consultants do not know what we do here. So not only awareness, but making it practical from my activities as a Rehabilitation Physician is very important. A big task lies before me to improve all areas of Rehabilitation especially neuro-rehabilitation. With the full support I have to begin from the beginning. We as rehabilitation physicians only, can make our specialty come to the forefront. It is not by

competing, grumbling, or frustration, but by determination to make others accept our speciality and consider it one of the most important, essential part of Patient management.

Dr Santhosh Babu, Consultant, Trissur

I presented a paper on environmental modifications to be executed in schools in order to make them disabled friendly during our National conference in AFMC, Pune. It was well appreciated then. All the new construction in public places should be done as per the CPWD norms which are absolutely disabled friendly.

Dr Ann Noble Zacharia, Consultant, Aster Medicity, Kochi

The first offline meet of ‘PMR Doctors of Kochi’ was a much awaited event, which was delayed for over two years owing to the Covid-19 pandemic.

The event had finally taken place on March 5, 2022 and held at Holiday Inn, Kochi. The forum was established two years ago to encourage academic and clinical discussion as well as build a mutually-supportive network of PMR specialists in Kochi. The meeting was inaugurated with a cake cutting by Dr Surendran K, one of the most senior physiatrists in Kochi.

This event was conducted by Dr Ann Noble Zachariah, Specialist Physiatist in Aster Medcity. It was sponsored by Sun Pharma Industries Ltd. Dr Zachariah, Consultant physiatrist at Aster Medcity, presented the welcome address.

Dr Sashikumar, Senior Consultant, spoke to the audience about his illustrious career, which spans over 30 years. This was followed by a clinical discussion by Dr Nitin Menon, Lead consultant and HOD of PMR, Rajagiri Hospital.

The meeting concluded with self-introduction of all the attendees and a grand dinner.

Dr Lakshmi Nair, Consultant Physiatrist, Kauvery hospital, Chennai

Dr Shadiya Begum, Assistant Professor, Government Medical College Ernakulam, Kochi

The topic included mainly pulmonary rehab during and post COVID. I talked about positioning, breathing exercises, chest physio, expectoration techniques. I also included general exercises such as warm up, strengthening and cool down exercises in post COVID patients

Dr. T.K Vasudevan, Professor & HOD, Department of P.M.R, Sree Narayana Institute of Medical Sciences

The following papers were published:

- *Assessment of Sexual Function in Spinal Cord Injured Persons* .**Dr. T.K Vasudevan**, Dr. P. Selvan , Dr. Tojo P. Joy. Global Journal of Research Analysis, Volume- 11, Issue- 01, January 2022. The study suggests that there is strong need for the treatment of medical complications of spinal cord injury, sexual counseling, literature, information, & peer support for successfully rehabilitating sexual dysfunction in this population.
- *Study of Effectiveness of Massage Therapy as a Therapeutic Adjuvant in the Management of Pressure Ulcer.* **Dr. T.K Vasudevan**, Dr. Selvan P., Dr. Sreejith R. Global Journal of Research Analysis, Volume- 11, Issue- 02, February 2022. The study showed that massage therapy is effective as a therapeutic adjuvant in the comprehensive management of stage 2 & 3 pressure ulcers. The patient benefits include faster healing times, early return to active mainstream rehabilitation, & better quality of life.

Dr. Bineesh Balakrishnan, Assistant Professor of P.M.R, Sree Narayana Institute of Medical Sciences

I attended a Cerebral Palsy treatment camp at Vimi Memorial Cerebral Palsy Centre, Thrissur, on 27th February, 2022. I assessed & treated nearly 43 children in this camp.

Dr.Soumya T, Senior Resident Department of P.M.R, Sree Narayana Institute of Medical Sciences presented a talk on *'Palliative Medicine Vs. Rehabilitation Medicine'* in the Clinical Club Meeting at Sree Narayana Institute of Medical Sciences. This session was chaired by DR. Bineesh Balakrishnan, Assistant Professor of P.M.R. The speaker dilated on the similarities between these two fields of Modern Medicine & also the differences between them. She threw light on the use of medications, exercises, orthoses, assistive devices, environmental modifications in the rehabilitation of patients with terminal illnesses.

Dr Roshin Mary Varkey, Associate Professor/HOD,Believers Church Medical College and Hospital, Thiruvalla

Participated in a live health program organized by BCMCH on ''What is Physical Medicine and Rehabilitation and its importance''

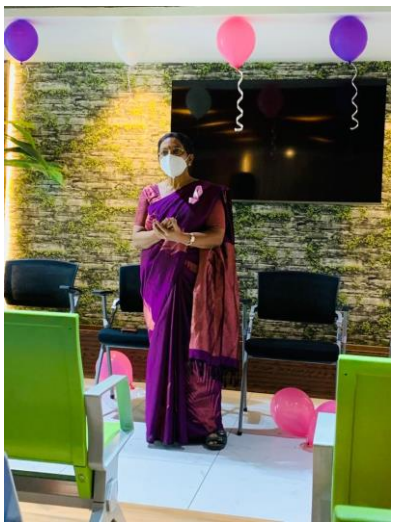
Organized and hosted an in- house training program(CME) on Clinical overview and Rehabilitation in Parkinson's Disease in BCMCH

Organized and Topic Presentation on Rehabilitation in Traumatic Brain Injury as an in- house training program as part of TBI awareness month March 2022 in BCMCH

Dr Sreekala, Consultant, Professor Department of PMR, Sree Gokulam Medical College, TrivandrumSP Wellfort , Sasthamangalam, Thiruvananthapuram

Inaugurating Women's Day celebrations

Addressing the staff of the institution



Dr Nitha Jayaram, Consultant, KIMS Trivandrum

KIMS HEALTH limb center had conducted a camp in KIMS AL SHIFA... We could provide 130 artificial limbs.

Meet the Masters: An interview with a member of the Senior Advisory Panel of Kerala Journal PMR- featuring Dr George Joseph

Authors:

Dr Muralidharan PC, President Kerala Chapter of IAPMR, Associate Professor, Department of P.M&R, Government Medical College, Kottayam.

Dr Jayaram, Consultant Physiatrist

Dr Surendran K, Emeritus Professor, Department of P.M&R, Amrita Institute of Medical Sciences, Kochi.

Dr.Santhosh.K.Raghavan, Professor and HOD, Department of P.M&R, Government Medical College, Alappuzha.

Dr Shehadad, Add.l Professor, Department of P.M&R, Government Medical College, Calicut.

Dr Sreejith K, Professor and HOD, Department of P.M&R, Government Medical College, Kottayam.

Dr Sheela KP, Consultant Physiatrist

Dr Sreedevi Menon, Professor and HoD, Department of P.M&R, Government Medical College, Calicut.

Dr Ravi Sankaran, Professor, Department of PMR, Amrita Institute of Medical Sciences, Kochi.

Life is fleeting, but some of the people we meet leave their mark on us. One can know a person by what they say about themselves and what others say about them. This piece would not exist if I hadn't met Dr George Joseph, and would not be as rich without all the other contributors. This article first provides relevant biographic data from its subject, followed by words from his contemporaries, and students. – Ravi Sankaran

Dr George Joseph speaks a bit about himself :

Coming from a middle class family, I studied under kerosene lamp till my BSc. I joined for MBBS in Govt. Medical College, Kottayam in 1974, and completed internship in 1980. I then worked in a private hospital in central Kerala for one year which was a tremendous experience, independently managing a variety of patients, including obstetrics.

I joined for DPMR in 1981 in half mind. I knew very little of PMR at that time. After joining the department and noting the glamour and teaching skills of the then HOD, Prof. PBM Menon and his juniors Dr. S. Hariharan and Dr. Ramaswamypillai, I understood that there is some substance in the specialty and it is a field where I can do something for the needy. Meanwhile, I got selection for diploma in ENT and Orthopaedics, the latter being one of my favourite subjects. I was in a dilemma whether to divorce PMR and marry Orthopaedics or stick on to PMR. I went to Dr. Menon for advice. He did not give me a direct answer, but his gestures and explanations influenced me to continue my studies in PMR. That day was actually my career defining moment, and I owe it to Dr. Menon, the father of Physiatry in Kerala and one of the legendary Physiatrists in India.

After DPMR, I worked for short periods as general practitioner in few centres, later joined as the first Physiatrist in the private sector in Kerala in SIMI Hospital (now AJ Hospital), Kazhakoottam. But after a short period, I shifted to Kerala Health Services as Physiatrist in Palakkad District Hospital. Had a tough time there to establish the specialty, always remembering the help and guidance of late Dr. Madhavan Nair, who was the deputy DHS of PMR during that period. I also functioned as RMO of the hospital for nearly 2 years.

Then came a major change in my career as a Physiatrist. I got appointment as lecturer in PMR in Kozhikode Medical College. It was a tough decision to accept the offer or to continue in Health Services, since by that time I had developed a reasonable professional existence there. Anyway, I joined the Medical Education Department in 1987 as lecturer under the then HOD, Dr. K.K. Menon. I got admission for MS General Surgery in 1988, which I completed in 1991. I am thankful to Dr. K. K. Menon for allowing me to do my MS while working as lecturer in PMR. Then I passed DNB in 1992.

In 1993, I went to Saudi Arabia as PMR specialist. I had to face a lot of problems created by my HOD there in the initial few weeks. He insisted that I work ‘at par’ with the therapists which I refused. He made the local administration to insist that I will be demoted as resident, with the correspondingly less remuneration. The reason they found was that my PG degree is in Surgery and my DNB is only ‘diploma’. Poor guys did not know the difference between diploma and diplomate or so they pretended. I said if I am working there, I will work only as a specialist as per my contract or I will go back to my country where I have a ‘decent job’. They stopped me from working and sent my papers to the Ministry of Health and the superior authority of the hospital management who had recruited me. Nearly a month passed before the reply came from both authorities clearing my appointment as specialist. The local administration had to take me back with all pending salaries. One can imagine the amount of uncertainty and mental stress I had to face for those few weeks in a foreign country soon after reaching there. I am thankful to my few Malayalee friends who helped me to tide over the crisis. I am especially thankful to Dr. Joy Putharickal, one of the medical consultants, who gave me immense support, both psychologically and financially in those days. Later I understood that the actual reason behind all this was the jealousy of the HOD, an Egyptian with only a diploma in PMR, as I was getting a higher salary than him.

I continued there for nearly 2 years, the most boring period in my life and career. My only duty was to see inpatient consultations from

other departments, hardly 1 or 2 a day, and supervise the therapists in the wards, a work hardly requiring 1 or 2 hours in total. Spending the rest of the duty hours was the most difficult part. Anyway, thanks to the cards play, cinemas (only through CDs), cooking and such entertainments with my friends in the evenings and holidays, I could continue there.

I came back to Kozhikode in 1995, and continued with the routine work and PG teaching. I got promotion as Assistant Professor in 2001, 14 years after entering the Medical Education Department. I am really thankful to my senior colleagues Dr. N. Uthaman and Dr. K. Kesavaram and all my junior colleagues for providing a pleasant working atmosphere during the period. I became the HOD in 2003, got promotion as Associate Professor in 2006 and Professor in 2008 and retired in 2009.

I joined my present post as Professor of PMR in Amrita Institute of Medical Sciences in 2009 thanks to Dr. K. Surendran, who was Professor and HOD there.

I have trained a number of postgraduates during my career in both institutions and I am proud to state that most of those students were highly dedicated and sincere to the specialty. I loved all my PGs and they loved me too, the greatest joy any teacher can boast of.

During my period as HOD in Kozhikode Medical College, I could start the Electrodiagnostic and Musculoskeletal Ultrasound services there. I could also start the Sports Medicine Institute under the PMR department, which I consider as a significant achievement in my career in Kozhikode. I have prepared the proposal for the same and designed the infrastructure including the site, even the specifications of each room and other details.

The MD PMR was started in Kozhikode in 2003 while Dr. Chandini Devi was HOD. The PMR department had taken over the District Disability Rehabilitation Centre in Kozhikode in 2003 with me as the nodal officer and we had conducted more than 50 disability camps in various parts of the district through which we had issued more than 12000 disability certificates in addition to the supply of aids and appliances.

I could also contribute something in the association level. I conducted Midterm National Conference of IAPMR in Kozhikode in 2001. Organized Annual National Conference in 2004, the first annual national conference in Kozhikode, if what I remember is correct. Reorganized the defunct state chapter of IAPMR in 2007 I served as its secretary and later as president. I am thankful to all my seniors and colleagues who joined me in rejuvenating the state chapter. I also served as Academic Committee Chairman of IAPMR from 2008 to 2011 and became National President of the organization in 2011.

My advice to the postgraduates

1. Once you opt for PMR, lend your mind fully for the specialty.

2. Develop a culture of independently assessing each and every patient. Don't look into the diagnosis or clinical findings of other specialists until you examine the patient and make your own diagnosis. Many of our patients with musculoskeletal pain may not have a real physical problem, and a detailed history including any underlying psychological issues or fear of serious disease and a little explanation about their condition may alleviate their symptoms.

3. Start any treatment only after making a working diagnosis.

4. Don't merely shunt the patient for therapy, when there is no need for the same. Most of our patients do not need any institutional physiotherapy. A little counselling, few drugs, activity modification and simple home exercises can solve many problems.

5. Money is important, but humanity is much more important. Don't turn your practice into a mere money making service only. I know doctors charging Rs. 5000 or more for a simple local steroid injection for a trigger point or tendonitis. I hope my PGs will not follow this model.

What others say about him

Dr Muralidharan PC- I have been associated with him since 2001, when I joined PMR dept as Senior Lecturer. Actually he was instrumental in my continuing in the speciality. Though I completed MD in 1996 and was working as a Physiatrist, the various avenues and opportunities related to the speciality were unknown to me. Since then, my impression about the speciality has been highly influenced by George sir to the extent that I declined to join D.Ortho in service quota and DNB Ortho which was started in Calicut Medical College. I wholeheartedly thank George sir for having played a role in shaping my career. I deem it a privilege to honor George sir on personal behalf and on behalf of the association.

Dr Jayaram- He was the leader when we fought successfully in High and Supreme Courts and won a government order preventing PTs and OTs prefixing Dr. before their names, and preventing them from treating patients as first contact person. His most important contribution is getting the sports medicine academy of Kozhikode MC under PMR, surmounting many obstacles. He leads by example. He rarely sends patients to therapists, often teaching them exercises to be done at their homes on their own. Thereby the patient saves time and money.

Dr Surendran K- I invited him to join AIMS PMR in 2010. Several times he expressed willingness to retire, but continued on to support the department though challenging times. Despite difficulties to come from Kozhikode, he continued on as HoD so the PG course would not collapse.

Dr Sreedevi- Once long back the mother of a close friend was terminally ill. She had a stroke and was dying. This friend was financially strained, the house was in such disrepair the roof was leaking, and there was no way she could handle all of this. Patients like this don't have potential to improve, so normally they don't gain admission in rehabilitation ward. I asked George sir if we could we admit her in the ward anyway. George sir knowing she only few weeks left, and no rehabilitation scope agreed. The result was peaceful death and problems like lack of dignity and caregiver burnout were averted.

Dr Santosh Raghavan- We PGs affectionately call him "GJ"; he was the senior most Lecturer in the department in Government Medical College Calicut during 1998-2000 period. From the beginning of my PG days I used to sit with him in the first outpatient cubicle. I still remember in the first day itself he has made me to draw the schematic diagram of brachial plexus in order to discuss the case of a patient came to the OPD with brachial plexus injury. He was very keen regarding one thing, a definitive clinical diagnosis before starting medical rehabilitation. He used to tell us that whoever has previously seen the patient we have to see the patient as a fresh case and have our own independent assessment and a definitive diagnosis. He is an astute clinician with good observational abilities.

I can quote one incident to substantiate regarding his clinical acumen. We got a triplegic patient in the ward due to tuberculous arachnoditis. He had florid paralysis of all the limbs except one upper limb. George sir used to instruct us to take limb girth measurements of such invalid patients on a routine basis. One day that exercise helped us to diagnose deep vein thrombosis of leg veins in that patient. When his calf girth and thigh girth suddenly increased on one side, we could prove a DVT by Doppler study.

Another important lesson he has taught us take limb length measurements of all patients since limb length discrepancy due to pseudo-arthrosis of hips as a result of improperly managed Tom smith's arthritis which was fairly rampant in a generation of people in that locality.

In addition to PMR having a degree in General Surgery he did soft tissue releases for those with cerebral palsy. I was his assistant. The Indian Railways made an initiative called "hospital on wheels". Through this I could assist him during couple of soft tissue releases performed in the operation theatres in a train which became a hospital. We worked along with the plastic surgery team.

He was the master brain behind the formation of "Physiatrist's society". I am also one of the founder members of the society. It was formed as the IAPMR Kerala chapter was not active at that time. We could attend several CMEs and get-togethers under its banner. During the train journey to New Delhi to attend IAPMR National conference in 2000 the preliminary discussions to revamp the defunct Kerala chapter got kicked off and he was the master brain behind that. Later he could successfully conduct the IAPMR National conference in Calicut in a grand way and later he became the National President of IAPMR. As a leader he was very instrumental to increase the infrastructure facilities of PMR department. He stills an active member in all association related activities including the latest paramedical bill discussions.

During our final year in 2000 a CME was held under his aegis on "foot pain" and the most distinctive feature is that all speakers are post graduate students; right from the beginning to end. That was a special experience for all of us and which was definitely a shot in the arm for our presentation skills.

He was very adamant regarding one thing; never allow other specialties to belittle our specialty. He fought tooth and nail with anyone who tried to. This has given us enough self confidence to feel proud of our specialty and take appropriate measures to protect its dignity. I could present here one incident happened to me while appearing in MACT court, Alappuzha to testify as an expert witness in connection with a disability certificate issued by me. During those court proceedings I was wrongly addressed as Physiotherapist by the defense counsel. It is only his teachings gave me the courage to correct the counsel while standing before a court of law. I politely told the Judge my credentials and he promptly corrected the defense counsel.

Dr Shehadad- He has a way to solve the problem of the patient with minimum use of resources. His vast theoretical knowledge and clinical experience gives him the ability to do so. As a student, I have benefitted so much from his approach. That approach gives us the ability to solve the issue that's troubling the patient. That is the secret why most of his students are good practitioners.

Precise, up to the point and affordable to the patient...That's his success formula.

We got a chance to witness his enthusiasm in the past during his PG days, when, on one day he brought a copy of Kendall-fully handwritten with all those beautiful drawings made by him! It showed us what it takes to be a master in muscle examination and localization like him.

He was always keen to imbibe any new development in the field of PMR. The musculoskeletal ultrasound and State institute of Sports Medicine at Kozhikode are the two best examples of the learner and visionary in him who put into practice what he learnt and encouraged his juniors to excel in many of the newer fields.

His communication with patients and with students has a unique style, up to the point and practical. There was the evident sincerity in his words which any patient will understand. So their compliance to his treatment is always good because they found a trustworthy well wisher in him.

With the students, again he has his unique style. He was strict, tough, jovial and soft at the same time. During the rounds, you may get scolded for any lacunae in patient care. But after the rounds, he will wait for you in the corridor to take you personally with him for a coffee and he will make you understand the reason why you were scolded. It was such a sweet behavior modification technique. Looking back, I always feel, with regret that as a teacher I am unable to replicate that beautiful way with my students.

I have seen him only as a team leader. He always led from the front ever-ready to delegate duties to his subordinates. He gave them responsibility and power. He was there always to support you. You can be confident that he will not point fingers at you or abandon you at times of crisis. He will be there by your side. That unique quality helped lot of his students to come with innovative ideas and implement them.

He was the national leader of IAPMR for years. He was the person behind revamping the state chapter of IAPMR. His leadership qualities are evident from the fact that he was allowed to hold responsible posts of IAPMR national body for a long period of time.

He took care of even personal problems of his PGs. When one had financial constraints for attending a conference, he found a way to support him. Many of his PGs will remember such instances. He also helped his PGs to fight legal battles to get their degree recognized. His PGs will have so many sweet memories like these to cherish.

As a professional and a physiatrist, he is a successful role model. From a skilled clinician to an efficient organizer, he is such a noble human being. We have with us today a lot of active physiatrists, whom I will call the GJ brand. This is a brand name which you can be proud of.

Dr Sreejith K- I knew nothing about Physiatry during my MBBS days. I was not even aware of the building or Department. After MBBS I was working as RMO in various private hospitals. My friend Dr Manoj who was doing DPMR in Calicut told me about this specialty. What interested me was the chance to use various interventions including injections to treat patients with musculoskeletal conditions. Since I was not good at academics and it was tough to get most wanted specialties like medicine and pediatrics, I thought this was a good option. I was good at general practice and thought PMR would help me.

I got admission for DPMR in Trivandrum medical college. During my first day my first acquaintance was with Hariharan sir. He was conducting a clinical case discussion and asked me to join them. Dr Raji now professor in PMR CMC Vellore was presenting the case on SCI. I still remember that class on SCI and community based rehabilitation. I was really impressed and decided was for me. My hometown being Calicut, I requested the then HOD PMR Ahmed Pilla sir to transfer me to Calicut which he agreed.

Joining Calicut medical college was turning point in my life. There I met two persons Dr Biju Gopinath and Dr George Joseph sir. Dr Biju had joined Calicut medical college after working in Annamalai University. He is an expert in Electrodiagnostic medicine. Since his native place is in Trivandrum he used to stay in a nearby lodge in Calicut and we spent a lot of time together. We used to do and discuss a lot about electrophysiology.

George Sir had a strong influence on me. I used to reach the dept at 8:15am, which is very unusual of me. My wife used to make fun of me saying that in this world I am afraid of only a single person. His clinical skills impressed me. The way he teaches the basics of musculoskeletal and neurological examination helped me to sharpen my clinical skills. Though he was very strict and tough outside we residents loved and admired him. After one year Dr Biju left Calicut and I was in charge of the electrophysiology lab. George sir used to send patients for EDX examination and used to discuss the case. He will point out the disparities in the EDX study and clinical diagnosis. That helped me to understand what went wrong and to correct it. He was always receptive to suggestions and very open to discussions.

I lost my father in early life and it was my mother who looked after us. My brother was also studying for a professional course and we had lot of financial hardships so that I could not concentrate on my studies. I lacked confidence and the drive to study and presented only very few cases during my undergraduate days. George sir made us to present cases regularly and was very particular that we all should present in national conferences. I presented a paper on pressure ulcer management in a national conference at Calicut. It was a total disaster. The comments made by chairperson still echo in my mind.

During my MD course I was looking for a thesis topic. Dr Biju and George sir suggested BERA. At that time there were only very few papers on BERA in neurological conditions and no one in Calicut was doing it. For a thesis it was a risky venture because Dr Biju was leaving Calicut and George sir was not well versed with it. Usually guides avoid such difficult topics. But he told me that if nobody is doing it you should do it. Then you can become an expert in that area. He provided the needed guidance and infrastructure. All that remained was to learn it, which I did. Learning this gave me the extra edge that is necessary to practice neuromuscular diseases. We started to get lot of references from pediatrics, neurosurgery and orthopedics. Subsequently Dr Krishnaprasad, Dr Shehadad, Dr Mohanraj took over and are doing excellent work.

I presented a paper on BERA at a national conference and got the prestigious Dadichi award for the best paper. That incident really improved my confidence and I started reading and presenting in conferences. I presented in almost every conferences of PMR which was unthinkable for me 20 yrs back.

George sir was planning to start a sports medicine centre in Calicut and was in the process of procuring instruments. At that time musculoskeletal ultrasound was just beginning to be used by physiatrists in United States. He procured a high end USG machine to our Sports Medicine Department and sent us to training in the Radiology department. After some time Annamalai university started an online course on Ultrasonography. I asked Nandakumar sir about that course and he said it is a good option. Learning ultrasound was pretty easy for me because I was pretty strong in anatomy which I owe to George sir's teachings. He always used to say that he has a hand written copy of Kendal with him. He painstakingly used to teach muscle testing to us regularly and I am sure all his students are good at clinical examination. Now Calicut PMR Dept is well ahead of other centers in Electrodiagnostic medicine and Musculoskeletal ultrasound.

I strongly feel if a student fails, it is the teacher who fails. Hope we have more teachers like Hariharan sir, George sir and Nandakumar sir who not only teach you the specialty but mold your character.

Dr Sheela KP- George Sir, if not for his humane and compassionate nature, I would not have had the chance to be a physiatrist at all! When there was hardly 5 months, for me to complete my course, my mother was struck down by stage 3 ovarian cancer and had to be treated at AIMS Kochi. Me being the only daughter, with siblings residing outside Kerala, my presence was mandated. I still remember how I burst into tears, in George Sir's room, saying I wanted to discontinue the course. It took him some time to console me. What happened in the next five months, I still cannot imagine today. With chemo every 3 weeks, cytoreductive surgery, and I shuttling with her from Thalassery to Cochin as her care giver in the midst of the course. Sir was so considerate, and assured me that I could manage both the roles. Sir would ensure that I don't miss important cases and classes. He took personal care, to see that I don't miss out anything. He would make me sit in his OPD and make me present all varieties of cases, and instill confidence in me. He permitted me that extra leave, when I needed it most. I can surely say that I owe the label of physiatrist that I don today to our dear and most respected George Sir.

Dr Ravi Sankaran- You can learn more about a person by going against them rather than with them. Most of our contributors met Sir in their youth. They experienced many of their first times with him. Being a foreigner and trained in Internal Medicine and PMR abroad, my perspective is different. Being rigid and a non-conformist, I'm generally not easy to work with. On compiling the work of others to make this article, I now see the subtle hand of George Sir in shaping me.

I'd like to start with his jocularity. At the state conference in Calicut once sir looked at my plate and anxiously exclaimed 'Is that chicken?'. Being vegetarian and consciously avoiding such, I promptly replied 'No'. His rebuttal was 'I swear I saw the cook add some just before you took it'. Not realizing it was a joke I was flustered. When he saw me turn to the trash, he let me know he was joking. At a national conference banquet in Delhi he asked me 'So what are you drinking?' The only thing open was the bar, and he knew I don't consume alcohol. Surendran Sir was there and he immediately expressed irritation. I took the opportunity to bury myself deeper into the book I was reading. Many teachers don't know how to share their personable side with their students. Doing so endears them to the student though.

I first met Sir during our re-inspection for PG course in 2010 by Dr U Singh. After that he became the president. Being new to the system I was unsure what it all meant. Operating as a super-specialty department labeled as a primary care discipline in a corporate hospital, made getting access to fresh patients a challenge. From the day I joined there was steady pressure to develop the department from many parties. Each insisted if their demands were met it would somehow remedy our plight. The same wouldn't lift a finger to help though. Rather they would direct their irritation at me when the demands weren't met, or when unrelated problems came up. This drove me to act, which created a lot of discomfort for those around me. George Sir had to counsel me to be less aggressive and less abrasive when promoting the department. So that I wouldn't offend the powers that be, for a while I began creating small medical devices. I always found support for my inventions in Sir. The best part was when he would defend my work against those who wanted to criticize it. While most of these projects have since fallen to the wayside, it opened up my thought process to possibilities. This lead to me finding opportunities no one in PMR at the time had considered. His support of my zany creativity remains my strongest impression of him.

Many patients I presented to him came referred with a wrong diagnosis, and inadequate prescriptions, while chanting physiotherapy. He was able to correct their perspective, explain their issue, and heal only by talking and listening. A mundane orthopedic exam compartmentalizes and isolates disease processes. Early on he blew my mind by finding an underlying C6 radiculopathy in a Gastroenterologist with tennis elbow from doing twelve daily ERCPs for a year. It was then that I realized the neuro-musculoskeletal system was connected to itself. In order to instill confidence in me during my first botox case as faculty, he walked out once the needle went in. Not knowing this I panicked when he didn't respond to my queries, only to laugh inside at his technique once everything was over.

He appreciates inquisitiveness. If the question is particularly intelligent he'll praise the enquirer. A long pause often precludes a great response. He never tells a student to be quiet when they are asking irrational questions. Despite so may gray areas in healthcare either he answers to the best of his knowledge or admits he doesn't know. This is an important skill more teachers need to demonstrate. Some elevate themselves by pushing others down. Their students blindly copy them. From there he researches and gets an answer. A discussion with the enquirer ensues. The result is the student learns his thought process. We have a reverse walker in the department for kids with CP. In a state conference quiz at Trivandrum, when asked our PGs had no idea what it was. So subsequently, during his class I deposited it his room and resumed work. Our PGs went on to report his child-like curiosity at how this works. A teacher with that much experience obviously knows much more, but the attitude made the PGs interested in learning.

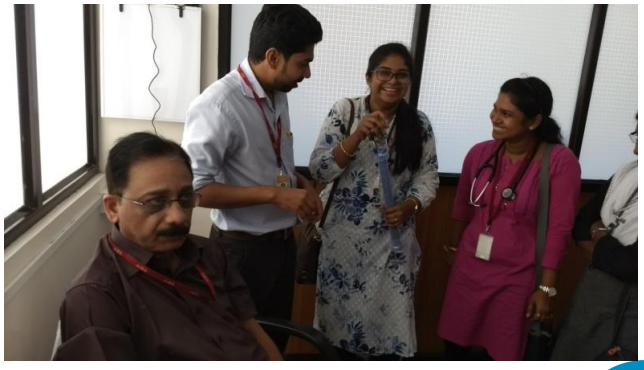
Though I continuously seek his guidance I don't always agree with him, especially in the handling of PGs. George Sir says be tolerant when PGs behave or perform poorly. His talking with them often gets them back on track. Some though are incorrigible. Sir mentions how he was also of similar nature in his youth. Perhaps this is why he condones this. When they begin cultivating habits that will harm them later on, my first reaction is to nip it at the bud. Why? Others suffer (patients, bystanders, work

colleagues, and eventually the perpetrator PG) because of these issues. In retrospect I can see why he insists we be patient. It takes a degree of maturity to understand consequence, and this comes with time. As our students are in their peak of youth, this is often lacking. Their perception is usually limited to what they want, and what is in front of them at the time. When they realize how the world works and their deficiencies, they can look back favorably at their PG days and recall how nice their teachers were despite these. I aim to be a teacher on par with the lofty standards he so easily sets. For that the grudges carried from past mishaps is something to let go of. This is an important lesson he's never voiced to me directly. Rather I'm learning it as I repeatedly encounter this, seek his advice, and disagree with his suggestions. History repeats itself, until we learn from it.

I've saved the most important lesson for last. If you have a problem, own it. It takes two hands to clap. If you see a problem, identify your role in it and start fixing it from there. Struggle and find a way to overcome the problem. If you put the blame on someone else, you no longer can solve the problem. This becomes more problematic when the accused, doesn't know your feelings. If you don't talk to them, they can't offer solutions. This is how problems get bigger and bigger. Instead of blaming others, step up find out why things are as they are, then try to work with the aggrieved to find a solution. Often there isn't one, but they fact you tried is what counts. That grit is useful when real opportunity comes. Sometimes the solution is possible but far off. It's ok play the long game. Such perseverance can carry you through any problem. This is the single most important lesson any disgruntled Physiatrist needs to learn.

Dr George Joseph- I am really surprised how my ex PGs think about me. I don't think I deserve all those good words. One thing I can tell you is that I loved all my students and am proud to see all of them in good standing now. I used to scold many of them but never kept any grudge to anyone. There are many instances which are quoted, which I really don't remember. Perhaps this is because I took them only as minor things from my point of view. Here is one thing to remember; as teachers, we have many advantages, but our students lack many of them. When we do a minor favor to one of them or show empathy to any problem, so trivial that we may not remember it the next day, the student keeps it in his mind and will be grateful to us forever. The greatest joy of a teacher is the love and affection from his ex-students. I have an ex-student who regularly sends me wishes on every birthday and every marriage anniversary. It is a moment of proud and happiness. I am very happy to note that you wrote about some of the disagreements too. When one says only good things, it may not reflect the actual situation. Every human has many flaws in their attitude and behavior as well as good qualities.

Conclusion: I hope you enjoyed this bouquet of roses. George Sir had a hand in the final copy. PMR in Kerala today is what it is because of the struggles of Physiatrists like himself. Our generation has different issues to face. We can't overcome them by lying down and crying.



Dr. T.K VijayaRaghavan was born & brought up in a middle class family in Kanimangalam village near Thrissur town. He took his DPMR from Government Medical College, Trivandrum. As a doctor he practiced in Ammadam village & his practice was not constrained by consulting fees or hours. During his tenure as DMO he served people in all ways possible, & worked to promote PMR as a speciality. He also did a short stint at Metropolitan hospital, Thrissur. This gifted doctor also worked in Iran for around 5 years, & in Oman for a short time. Besides being a great doctor, he was a spirited activist, who wrote & directed several satirical plays & was also a talented drama actor. He served as President of Cochin Dewaswom Board & played a pivotal role in recovering lost properties of temples. For his numerous achievements he was honored on 1st July 2019, as part of the Doctor's day celebrations of IMA.

He passed away on 17th of January 2022. He is survived by his son who is settled in the US, & a daughter who is an ENT Surgeon in the Health Services. The Kerala Chapter of IAPMR pays homage to this great doctor & wonderful human being.

How we managed to Set up Our Limb Centre in Punalur.

Dr Vipin P Vijayan MD
Junior Consultant,THQH Punalur,Kollam

It's the dream of every Physiatrist to have an artificial limb centre with Prosthetic workshop in the department. Custom made orthosis and prosthesis are way better in performance than readymade ones.We are fortunate enough to have one in Our PMR Department at Punalur Taluk Headquarters Hospital. It is the first Artificial Limb Centre in a Government Taluk Hospital in our state. There are many remote areas without adequate transport facilities in Punalur. Our Department renders great opportunity for them to get Rehabilitation services and services from our Limb centre. We are getting many patients, who stopped using their appliances after they became faulty. We repair their faulty appliances and even provide new appliances if their need demands. Equipments were purchased with financial support from Hospital Development Committee, National Health Mission, and by the Government of Kerala directly via Local Self Government, Punalur Municipality.

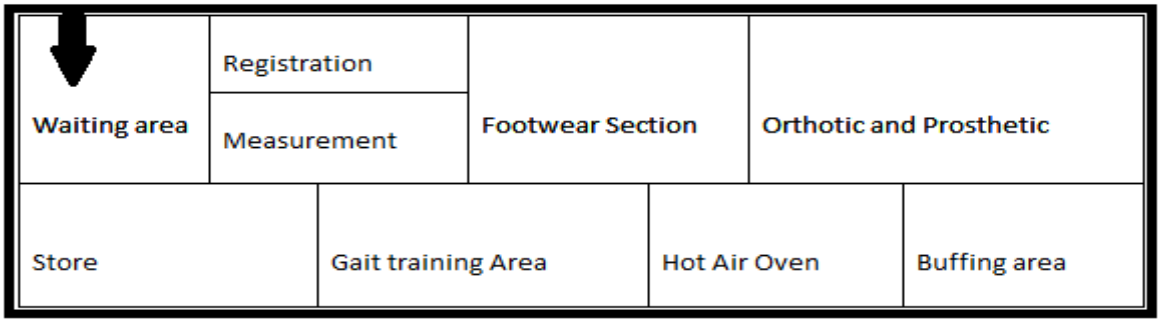
Our department has one Orthotic-Prosthetic technician and one assistant technician, appointed by the Hospital Development Committee.We are providing appliances for a very reasonable price, which in turn contributes towards their salary also ensures uninterrupted supply of raw materials. Children below the age of 18yrs are covered under Arogyakiranam programme by NHM and provided with free orthosis and prosthesis. Our services are not just limited to Punalur Municipality area but we also cater to cases referred from nearby districts.

The Hurdles Crossed...

Finding a suitable place for the Limb centre in the hospital was the primary concern. The area had to be wide enough to place various machines maintaining a safe distance between them. Some machines make a lot of noise and give out dust which also needs to be taken care of. Since our hospital has a dedicated system with exhaust line, this was not a big issue for us.

The designated area for workshop should be accessible to all kind of individuals especially for the differently abled and aged. Our workshop is situated in the Basement floor,

Floor Plan for Workshop



which is accessible via elevator & it also has direct access to outside road. It is situated next to our PMR OPD and Physiotherapy services, which will ensure direct supervision by Physiatrist. We have prepared separate order form to be filled by the Physiatrist while ordering an appliance. Each appliance is distributed only after clearance from Physiatrist.

There had to be adequate space for waiting area, measurement area and registration counter in addition to the manufacturing area.Accessibility to a water source was another important concern, since we are not working with computer assisted manufacturing unit. We had to make sure the doors were wide enough to allow wheel chair access. Initially we were working in a big hall without separate rooms, which later got separated into different designated areas for the smooth functioning of the department.

Fixing the price for the manufactured products was the next issue. After consulting with various Government hospitals with Limb centres, we fixed the prices and later the same was accepted by our Hospital Development Committee. Special reduction was given to the financially weaker patients. Cost of the appliance is collected by the common billing counter in the hospital reception. Special sanction from Medical Superintendent is needed for availing the appliance for free of cost for those who need some extra financial assistance. We are making various Orthosis including spinal braces and Lower Limb Prosthesis for our patients.

We insist our amputee patients to attend a few physiotherapy sessions before giving appliances, to make them familiar with the exercises programs. This will allow patient to strengthen the target muscle groups and acquire good body balance. We find it very useful as most of the patients coming from other hospitals are getting rehabilitated after a long period after their surgery.

During the first appointment, we will get the measurements done. During subsequent visits, we train them with the prosthesis. Once they become confident with their New Limb, we will send them home with the prosthesis. They are asked to come for regular visits for a few months. Special mention about warning signs, care of residual limb and prosthetic limb are very important. Instructions like, watch for ulcers, callosities and allergic reactions in the residual limb also should be mentioned in detail.

We used to get references for orthosis and prosthesis from other departments within our hospitals and from outside institutions. Amputee patients from other departments are referred to PMR and we give then the suitable prosthesis and proper training. Spinal braces for vertebral fractures help our palliative patients in transfers and walking. Diabetic foot ulcers are provided with offloading orthsosis and MCR footwear for those with diabetic neuropathy. Spasticity and Nerve injuries are provided with suitable Orthosis which accelerate their recovery.

Our institution won the Kayakalp Award for Taluk hospital in this year and Our Superintendent assured that our Limb Centre will get adequate financial support in coming years also. We are getting good support from the administrative authorities and from public for the betterment of our PMR Department. I am inviting you all with great pleasure to visit our department and give your valuable ideas.

Hot Air Oven

Bench Drill

Vaccum System

Alignment System