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Clinical Review

Conventional Types of Trans Tibial Amputation is Absent in Develop Countries, but some New Thing is also Being Undeveloped When We Think About the Prosthetic Rehabilitation

Nayeem Hasan*

Prosthetist and Orthotist, Bangladesh

***Corresponding Author:** Nayeem Hasan, Prosthetist and Orthotist, Bangladesh.

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Live saving amputation was a traditional way in war zone but in 2022 its looks more develop also in a war condition. Some new technique can help an amputee later on when they fit a Prosthesis.

Problem we faced as a Prosthetist when we fit a problematic stump. So Bridge types of Trans-Tibial amputation (attachment bone) preferable and helpful for patient at the term of Proper Rehabilitation Achievement.

Sometimes distal fibula pinch the internal vessels and tissue that causing pain so there is nothing to do for solution as a PO. This pain is mainly coming from the weight of the patient when patient on the device due to the weight Prosthesis also providing counter pressure to prevent drop down and thus creating internal pain which is coming from the beginning. Longer fibula can create this problem.

When we see the extra small Trans Tibial stump like 5cm or 6cm, there is a big problem with patient knowledge.

Small stump carry more load Cause there is less space for weight bearing areas which we know.

Joint and thigh corset looks bulky and difficult to wear Sometimes heavy too its depend on the materials availability. Due to the use of Joints Patients have to pay more and require more professional skills too. Other thing is purposefully align more flexion to provide more weight on MPT which is comfortable or not that we have to measure when we are going to prescribing a Trans Tibial Prosthesis.

Those all Problems can be minimize before the surgery. Patient education and further treatment should be discuss with the service user than the next phase will be easier by the consent of Patient or family member.

Patient main problem is they don't want to cut more body part from their injured area. So we have to overcome this problem by some simple steps like communication or advice.

Short stump as a TT, if we think of comfortable gait maybe KD most preferable other hand If we think of joint discrepancy than TF can help. But in TF the Height of the body from the ground goes higher so the stability will be reduce, More energy require for ambulation. So in that case also patient can help what will be the better when we talk to them about the advantages cost or even disadvantages too.

So what will be the most suitable Surgery?

Only Surgery isn't the last stage of treatment when we are going to plan a proper rehabilitation for that Particular Patient. If we want to make them valuable for the society like previous than we have to treat more to utilize their Ability which we maximized by the help of Prosthesis, Wheelchair, Crutch, Vocational training etc.

Socio-economic status can be regain by the Rehabilitation which improve their Physiological health.

Example: She is an amputee and she is using a wheelchair. So she is able to move one space to another without any help which indicating she can able to earn by herself if we treat her properly without any Prosthesis.

Now, imagine she is using a Prosthesis instead of using a wheelchair so it can be measurable that she will be more productive, that's what we have to clear first what we are going to do with a patient.Picture shown 1st page.

Most preferable stump shape for prosthetic users is Conical.

Cylindrical shape also provide much advantages without the donning and doffing issue. Bulbous shape is most horrible when we try to minimize the cosmetic circumference and easy donning and doffing.

When we get the fibula more shorter than usual than we have to think about the weight distribution cause bony surfaces also bear the body weight.

cylindrical shape of trans tibial also suitable when we see the length of fibula not longer than tibia and bevale or smooth well so the lateral shaft of fibular weight distribution will be provide. Circumferencial pressure is require if we want to achieve the rotational control. Triangular shape of device is most important as well as lateral fibular shaft pressure.

Any kinds of shape of trans tibial amputee have access to get their Prosthetic service But there is an issue that is always ask by the patient why the cost of this device too high and the answer is we have to work more as a professional we know other shape like conical or cylindrical require less time.

On the other hand when we finish the cosmetic part its looks bulky and it's natural because we use more material so the price of Prosthesis became higher but it can be minimize if we think of MDT.

Longer fibula as well as without smoothing the distal part of bone can create friction inside the stump thus cause internal hemorrhage.

So proper beveling and ensuring the ideal length can help us to improve the service with minimal efforts and problems.

Ideal length is between 12.5 cm to 17.5cm according to the height of the person or tibia length.

Two different device for a same leg But they has different advantages and disadvantages.

Internal Pain can be the results for bad surgery like at this picture we can see.

Wrong padding produce a large impact in prosthetic fitting. It may change the length of stump in different posture (Standing and Sitting) create problem during donning and doffing. Sometimes increases the chance of Anterior distal discomfort too.

Top of this image we can see some stump where re amputation required in some condition like cost of prosthesis, risk especially for diabetic cases, comfort, available of knowledge as well as materials, components etc. Sometimes to minimize or overcome to input comfort we decide to add inner liner for safety that is costly.

Knee disarticulation is one of the best results of amputation level without the discrepancy between artificial and anatomical knee joints height

The main aim of a KD Prosthesis distal end of the inner socket will be flat according to the body alignment (Flexion, Extension and rotation) and the suspension. Femoral epicondyle describe the amount of anatomical suspension if there is any lack due to the types of amputation than external suspension can be install.

Amputation types can help from the beginning to reduce the fabrication cost and time. For the developing bone maybe Growth plate can be preserve to increase the length of body.

Ankle disarticulation is the same to Intact growth plate which will reduce the weight of the prosthesis later on.

Syme type of amputation provide flat surface at the lower distal, keep space to attach the component to reduce the height discrepancy. Patient can walk without prosthesis less compare to the pirogoff type of amputation.

Pirogoff there intact calcaneus so patient can walk without prosthesis with some functional loss like Push off, Base of support, Stability etc.

Ankle disarticulation is very common for landmine, RTA etc.

There is a discrepancy between the length due to different technique and aim.As a PO we faced problem when we can't provide the low profile foot to maintain the proper height.

Ideal stump features are well known So Problem free stump will be get better results compare to the other stump.As a Prosthetist and Orthotist you have the access to send them to a Doctor by the proper counselling.

A medium stump Trans Tibial Prosthesis which is more acceptable to the patient in terms of Function and design.

Re amputation can be helpful in some cases.

Medium stump always get better results in terms of component attachment. On the other hand long stump has better results too (Muscle attachment, Weight distribution areas, lever arm) but cosmetically looks bad some cases.

Early Prosthetic fitting is always helpful for the patients who are recently amputated and we know the importance of this trail basis fitting which will help us to indicate the patient ability how much we preserved after amputation as well as the alignment and reshape the stump by compression (Socket).

Mainly Prosthesis is necessary for all the amputee Patient but sometimes we wait for proper healing of the stump for two reasons. One is to avoid pain and another to reduce to cost of treatment. Because prosthesis is quite expensive and there is an issue of financial problem as well as lack of awareness.

Improve Proprioceptive Feedback.

- Reduce the Phantom pain
- Fear of prosthesis.
- Improve the Muscle strength.
- Healing will be faster for weight bearing.

Orthotic and prosthetic treatment goal

Every work has a aim without aim no treatment can't fulfill it's demand. Here goals will be describe how that particular patient going back his/her normal life with the time duration so that we can plan our work like gait, ADL, Donning and Doffing etc.

We divided the Goal with two terms

- Short term: What we want to see immediately or within the short period of time.
- Long term: What we want to achieve at the long run.

Example

With an Orthosis (AFO) we Prevent TA tightness for further progression and later on it will help to correct, Control or Prevention.

With a Prosthesis Patient will stand up and walk with in a short period of time and later on S/he will be able to go back their normal life with full of Respect and socio-economic status.

How a Patient Get PO Services

Patients are the key of this Health Profession So we should Respect them as well as we should guide them too for better Treatment.

Even Directly to a Prosthetist and Orthotist.

Patient to patient that can be a media for referral

How to set a Prescription Goal for PO service

N: B : We should ensure the service and develop this area, who is referring the patient it doesn't matter for us

Assessment (Objective and Subjective)

- Functional Losses
- Joint Range of Motion
- Muscle Strength
- Body Alignment
- Patient Expectation Too
- Geographical Structure
- Components Availability
- Professionals Knowledge

N: B: What I believe if we discuss our treatment plan with the duration to a patient before starting the treatment than there will be no Problem, its like a consent.

What we want to achieve

After proper assessment we have to use our critical reasoning what we want to do with that particular patient for Rehabilitation. Based on that Proper MDT plan can help.

Purpose of Orthotic Treatment

- Accommodate Deformities (No option for correction)
- Correction Deformities (Apply correction Forces Can be 3 or 4)
- Control Deformities (To minimize the deformities)
- Therapeutic Purpose (Involve Body weight, GRF, Muscle Power)
- Prevent from further Deformities (Maintain the current position)
- Fixing Deformities (Just maintain for good posture or Ambulation)

Orthotics is an application for results of device implementation with the input of practical and theatrical knowledge which will define your Service.

History says many think Shoes were a valuable element at that period so without that and accelerate faster treatment patient walk with a Prosthesis. Now we are prescribing and using shoes at our betterment.

It's a conservative treatment to reduce the cost and risk of Patient.

- Right: Due to the Hamstring Tendon stiffness patient can't be able to Extend her knee. As well as Agonist muscles also became stronger.
- Left: Using external Force to increase the length of tighten tendons. Maintaining Position as well. Preventing from further Progression.

Fatema affected by Rheumatoid Arthritis thus causing joint pain as well as Inflammation which restricting her to do her normal joint motion. Later on due to the restriction Agonist muscles became stronger (Tendon Stiffness).

Orthotic goal is to improve the tendon flexibility by over stretching.

Why this device act as a Therapeutic purpose?

Physiotherapy can help her by doing exercise for stretching the muscles and Mobilization at the joint. If we think of this Orthosis function what does it doing?

I think same… except Mobilization its doing Immobilization.

Patient Expectation is a key to improve the quality of service. At that time during assessment you can decide what you are going to do and what you will give to your patient. If you have an demo or Object the work will be more better but never forget to input your Objective assessment.

Patient expectation is a big challenge for our Profession to overcome this problem (due to the lack of appropriate technology or other element including tools, mechinaries, materials, knowledges etc) We can just modify our design of custom made orthosis just keep the function.

Materials cost and the patient affordability sometimes hamper the proper service so we have to choose the alternative.

Knee valgus which can be corrected by KO (Knee Orthosis) which can be jointed or without joints. Joints will allow movement at the human body and without joints will restrict the body motion.

So prescription will be depends on both Subjective and Objective assessments.

We have to consider wrong prescription and it's happening only for the money, Couse still this PO service under development and Awareness.

How external elements can help us to correct, control and prevent any deformities?

Planter flexion and dorsi flexion all are allowed at Ankle Joint but when we Attach an Orthosis depends on the Biomechanical principals and concept of meterials functions than This plastic can do more than other plastics.

When we do dorsi flexion and keep the position.

By maintainig your dorsi flexion position now put it on the ground than you can observe your joints alignments.Foot remainning flat on the ground and knee flexion but what you did only Dorsiflexion.

This movement will allow by the implementation of Mechanical

joints.By continuing this motion during ambulation it will streatching your TA.

Planter flexion stop dorsi flexion allow

- It's Allow Dorsi Flexion of Ankle motion.
- It's Resist planter Flexion of Ankle motion.
- Planter flexion Motion of Orthosis help to control Knee collapse With the help of Closed Kinematic Chain and GRF.

Dorsi flexion Motion of Orthosis help to control Knee Hyper-Extension With the help of Closed Kinematic Chain and GRF.

Articulated AFO Control the Frontal Deformities of Ankle, Subtalar and foot Problem as well as it Enhance the motion of knee joint. Articulated AFO improve the ambulation if we think of Foot Rocker.(Figure 1,2).

Dorsi flexion allow Articulated AFO can help, to reduce the TA

Figure 1

Figure 2

tightness During the forward propulsion. (2nd rocker)due to the Body weight and GRF its pull the COG towards the ground and thus create a Streatching exercise behind the back of Ankle. So how long patient will wear that device the exercise and proper gait will maintain.