

PEGGY & FRIENDS

LOWER LIMB PROSTHETICS FOR CHILDREN & YOUNG PEOPLE

NOTE: This advice sheet is based on our experience of our daughter Laura's limb loss since 1998 and the experience of other families who have contacted the charity since 2000, together with our knowledge of the U.K. Limb Service. Therefore this advice sheet may not relate to your child's condition or your experience and is intended as a guide only. If you require specific advice about your child's condition, you should speak to your consultant at your limb centre.

INTRODUCTION

In this advice sheet we discuss why children might require a prosthesis and what surgical and prosthetic factors should be considered in their treatment plans.

CAUSES OF LIMB LOSS

Limb loss in children falls into three broad categories: emergency amputation, congenital limb deficiencies and elective amputation.

2.1 Emergency Amputations

Injuries leading to emergency amputations account for approximately 70% of all paediatric limb loss and affect children of all ages and have a wide variety of causes, including motor vehicle accidents, lawn mower or power tool accidents, electrical or chemical burns to name a few. Furthermore, amputation may arise as a result of a disease such as Meningococcal Septicaemia.

2.2 Congenital Deficiencies

Children with congenital deficiencies fall within three broad groups:

- Children who require a standard prosthesis because of a missing limb or missing part of a limb.
- Children who require a standard prosthesis as a result of an elected amputation because of a deficiency.
- Children who require a non-standard prosthesis because of an abnormality.

Some congenital deficiencies can be clearly identified, for example, as a result of constriction of a limb by the umbilical cord (often referred to as amniotic bands). However, the cause of most congenital limb deficiencies will be unknown.

1. SURGICAL CONSIDERATIONS

Amputation surgery in children differs from that in adults in two significant ways:

- Surgeons will usually attempt to preserve the growth plates to allow continued longitudinal growth. For this reason, a surgeon would, for example, usually select a through knee amputation as opposed to an above knee amputation.
- Surgeons should also attempt to preserve as much length as possible because children heal better than adults. This in general allows for better control and increased power when using a prosthesis.

However, children are more prone to surgical revisions because of overgrowth of the transected (amputated) bone, often referred to as spikes which is very common in children under 10 years old with below knee amputations involving the fibula.

2. PROSTHETIC CONSIDERATIONS

4.1 Staging

Children unlike adults are constantly growing and changing and therefore prosthetic designs should be staged based upon the child's developmental readiness.

4.2 Age at fitting

Children are usually considered for prosthetic fitting when they begin pulling to stand up which usually occurs between 9 and 12 months (although the prosthesis will not have a knee joint). However, younger above knee children with very short residual limbs may require a passive prosthesis, before this time, to help them to sit up.

This design may well be reviewed once the child begins to 'walk' which usually occurs between the ages of 15 and 22 months. Because children of this age walk with a wide-based gait with knees and hips flexed and without the normal heel-to-toe gait, the next prosthesis will be simple in design, for example, an above knee user would generally be fitted with a locked knee.

A more normal gait will usually occur between the age of 3 or 4 years at which stage the prosthetic design may become more complex, for example, an above knee user would generally be fitted with a simple articulating knee.

Normal heel-to-toe gait does not usually occur until the age of 5 years at which stage the child may, depending on their physical strength, be considered for a fully functioning prosthesis.

4.3 Growth

Because children go through periods of rapid growth, both up and out, they should have frequent reviews. During these review periods they should be seen by their prosthetist every 3 months.

Tip: Regularly measure the height of your child, for example, on a door, so that you can identify periods of rapid growth.

4.4 Activity Level

Children are generally far more active than adults and therefore their prosthetic prescription should:

- Maximise prosthetic performance: Long term use of a lower limb prosthesis will subject your child to a higher degree of physical stress than able-bodied children of the same age which may result in physical deterioration at an early age in adulthood. Although the choice of componentry for children under the age of 10 is often limited, wherever possible your prosthetist should try to use components that will maximise performance, such as energy-storing feet.

Recommendation: When children put on muscle bulk and they get an adult gait we strongly recommend that they be fitted with an energy storing foot. In girls this usually occurs at about the age of 8 years and in boys between the ages of 9 and 10 years.

- Minimise weight: This is the trade-off between providing the componentry to maximise performance and the added weight this brings, particularly in young children who lack adequate physical strength to make best use of their prosthesis. However, the use of state-of-the-art materials such as graphite, acrylics, thermoplastics and titanium do make this more achievable today.
- Reinforce the prosthesis: Older children and adolescents with below knee or symes amputations are often involved in sports such as football and hockey which subjects their prosthesis to high levels of stress. To cope with this your prosthetist should be using the modern materials referred to in the section above.

4.5 Appearance

When our daughter, Laura, was first fitted with a prosthesis at the age of eight years old we asked for one with a lifelike appearance, only to be told by her clinician that 'it wasn't necessary because children don't care what their limbs look like'.

In fact what he was saying was, that in his opinion as a middle-aged, successful and confident man he did not think that it was necessary.

This ignored three things:

- Firstly, that western society is obsessed by what we look like (how many of us have dieted or worked-out at one time or another?).
- Secondly, children between the ages of eight and eleven are now targeted by advertisers and are therefore very body aware.
- Thirdly, that a lifelike prosthesis might be necessary for parents to come to terms with their child's limb loss (it was for us).

In the U.K. there are a wide variety of products available that can enhance the appearance of your child's prosthesis, ranging from low-cost low-definition silicone cosmesis to high-cost high-definition silicone cosmesis. However, you should be aware that silicone products are not usually available for children in the U.K. Therefore, if this is an issue for your child or for you, then you will need to do some research to find out what might be available from your health providers before you ask.

If your limb centre is still unable to provide any sort of lifelike cover, don't despair because there are still things that your prosthetist can do, to improve the look of the prosthesis:

- Make sure that your child's prosthesis is not manufactured with excessive length 'to allow for growth'.
- Make sure that the dimensions of your child's prosthesis match their sound side, if any, in terms of calf dimensions and ankle shape.

If this still does not meet your child's or your needs, then you will need to think about why it is important to you and be able to express this in order to gain the support of the limb centre to help you make an application to your Primary Care Trust for additional funding.

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