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## **Missing Limbs and Abnormal Body Shape: No Barrier to Functional Aquatic Interventions**

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The human body is, under normal circumstances, symmetrical. This symmetry contributes greatly to an individual's ability to remain balance and to perform a great variety of motor skills. Change the configuration of the body to create asymmetry and balance and motor function are compromised. Therapeutic aquatics can play a meaningful role in helping an individual with an asymmetrical body improve balance, as well as performance of functional motor skills.

### **Causes of Asymmetry**

Asymmetry can be either congenital or acquired. An individual born with an absence of a limb or limbs is said to be a congenital amputee. Congenital amputation can result from a genetic abnormality, or damage to the fetus in utero. An individual who loses a limb or limbs after birth is said to be an acquired amputee. Acquired amputation can be purposeful, as in the surgical removal of a diseased (from cancer), damaged (lack of leg circulation associated with diabetes) or useless (a limb that is present from birth, but has no functionality) body part. Acquired amputation can also be traumatic as a result of accident (automobile or bicycle) or severs damage (bomb blast).

This variance in causes of asymmetry creates somewhat different problems for the individual. In the case of congenital amputation, the individual has never known a symmetrical body. From earliest life, the individual has had to adapt to the existing situation, often making those adaptations easily and naturally by solving the normal movement problems of a growing child. For example, a child with only one leg, will still attempt to pull him or herself to a stand. However that stand will be on only one leg. The individual with an acquired amputation will have known a symmetrical body, but will, upon the amputation, have to adjust to the loss of a functional body part, as well as adjust to having to re-learn balance and motor skills affected by the loss.

### **Terminology of Amputation**

Amputation can take place at any point along a limb, from the most proximal joint to the most distal tip. There are 4 general terms to further quality an amputation point –

- AE – Above the elbow
- BE – Below the elbow
- AK – Above the knee
- BK – Below the knee

When choices need to be made regarding the point of purposeful amputation, even amputation as a result of trauma, physicians make every attempt to save as much of the limb as possible. It is

usually desirable to “save” a working joint. It is also usually desirable to save as much of a long bone as possible. The saved joint can provide more natural movement. The long bone can provide an anchor point for a prosthesis, including a prosthesis used in aquatic activity.

## **Amputation and Aquatic Participation**

There are no barriers to aquatic participation for someone who is an amputee. However, there are contraindications and precautions, including –

- All surgical wounds must be healed prior to water submersion for aquatics. It is important the skin over the surgical wound be intact and well. Softening that skin before healing is complete can result in skin problems when wearing a prosthesis. The wound and/or stump is critical to use of a prosthesis. Keeping that skin free from blisters, hot spots, abrasions, and other sores is very important.
- If the individual needs dressing assistance and wears a prosthesis, be sure to find out how to put a prosthesis ON before taking it off. Sometimes a child may not know how to put on their artificial limb.
- Watch for and prevent any abrasions to the portions of the body to which the prosthesis is attached. Anything that will damage those body parts, thus preventing the individual from wearing the prosthesis is to be avoided.

If precautionary conditions are met, there are many different activities that can be beneficial for someone who has body asymmetry due to amputation. These include, but are not limited to –

- Stationary and mobile balance activities.
- Balance recovery activities.
- Fall prevention training.
- Aquatic mobility facilitation.
- Physical fitness exercises.
- Swim instruction.
- Skin and scuba diving.
- Small craft activities.
- Personal safety and self-rescue training.

Some activities will be possible without any modification. Other activities will require adaptation, based on a variety of factors, including –

- Specific area of asymmetry and/or limb of amputation.
- Degree of functional mobility remaining in the affected limb.
- Buoyancy of the individual.
- Specific skill needed to perform the necessary participation skills.
- Ability to use a prosthetic device in the aquatic environment.
- Prior aquatic experience, particularly if the individual has a traumatic amputation.
- Ability to maintain healthy skin condition on the body stump.

Participation may be facilitated by use of additional equipment. First, determine the functionality of the individual without any additional equipment. Do not assume that just because an individual has an asymmetrical body that special equipment is needed. Let the individual try an activity, making

natural modifications. If, after trial and practice, success does not result, then consider trying equipment modification.

Typical types of equipment modifications include –

- Attachment of a swim fin or flipper to a stump to provide additional propulsion. As swim fins come in a variety of sizes and shapes, trial and error will be needed, as will experimentation with attaching a fin to the stump.
- Attachment of weights to an overly buoyant body part, usually a stump. Provide only enough weighting to position the stump in a more natural alignment with the rest of the body.
- Modification in manner of gripping a piece of exercise equipment or manner of holding small craft equipment. This might be a built up grip area, or attachment of the equipment directly to the stump.

When making equipment modifications, let the modification suit the amputee's limb. While it might look like the trunk is affected by the amputation, the trunk is usually not involved, per se. Rather, the trunk is the central fulcrum, with the center of buoyancy located in the chest area, around which the rest of the body will rotate. Change the configuration and/or buoyancy of the trunk and body rotation becomes unnatural and unpredictable. Make only the modifications necessary for functioning. Let the individual adapted mobility to make any additional accommodations needed.

## **The Challenge of Participation by an Amputee**

Body symmetry isn't the greatest challenge faced by the individual with body asymmetry caused by amputation. The mechanics of facilitating participation can be overcome through application of the principles of hydrodynamics. However, an amputee must overcome the challenge of being seen in a bathing suit – where the human body, no matter what form that body is in – is readily seen by everyone present. To facilitate working through this challenge –

- Provide an initial private session or two, when the individual can go through the locker room process and pool entry and exit with only you and the lifeguard present.
- Have storage/locker space available to keep prosthetics safe.
- Provide a dressing area large enough to accommodate working with a prosthesis.
- Ask the individual how you might help, before making any hands-on contact for assistance (unless an emergency exists).
- Provide an alternative to lower limb prosthetic use for movement to and from the pool area (this might be crutches or a chair on wheels).
- Discuss water entry and exit with the individual before actually attempting the activity.

In general, the best advice is to be considerate, use common sense, and be sure to discuss concerns with the individual. An individual with an asymmetrical body type due to amputation can benefit greatly from participation in aquatics. Mobility in water will, most likely, be much greater than on land. This will not only provide for enjoyable participation, but also engage the individual in a physical fitness orientated activity to stand them in good stead for leading a healthy lifestyle.