

TechnoTalk

The TASC Newsletter



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Editorial

Well another busy year is drawing to a close for the TASC team and we prepare to enjoy a well earned break and partake in festive season activities.

This is our final edition of TechnoTalk for 2007 and to embrace the Christmas spirit our speech pathologists have included creative ideas on programming DynaVox series devices with Christmas messages.

Our seating consultants have completed their comprehensive series on seating principles with an overview of positioning the foot and ankle. This includes a look at the anatomy as well as strategies and ideas.

Finally the TASC team would like to wish all of our readers a safe and relaxing summer break.

Seasons Greeting!!
Jo Ford

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“All the best for the Festive Season”, from the TASC Team



We welcome any feedback, good or bad, that you have on our service. Please feel free to contact us by phone on 02 9972 8183, email tasc@tscnsw.org.au or by writing to The Spastic Centre PO Box 184 Brookvale NSW 2100

TechnoTalk Newsletter is free and available from www.thespasticcentre.com.au/news/index.htm

Main Story: Positioning of the Leg, Ankle and Foot

by Natalie Carden and Sarah Nottage

In this article, the TASC Seating team conclude the series on seating principles and supports by discussing those used to position the leg, ankle and foot.

The legs, along with the pelvis should provide a stable base of support from which the body can move for function. Postural supports for the foot must be considered in conjunction with supports for the pelvis, trunk, hips and legs. Please refer to TechnoTalk March and July 2007 for information regarding pelvis and trunk positioning.

Once the pelvis, thighs and lower legs are in optimal alignment, the aim is to maintain the ankle and foot in its best position for loading, as close to neutral as possible, with as much surface area of the sole of the foot supported by the footplate as possible. Some clients will require supports that allow slight movement at the lower legs, ankles and feet, others will require more secure stabilisation due to excess movement.

The tibia and fibula are the bones of the leg. Anatomically, the term “leg” refers only to the region between the knee and foot. The tibia supports most of the weight, and articulates with the condyles of the femur superiorly and the talus inferiorly. The fibula is the main attachment for muscles, but it also provides stability to the ankle joint.

Anatomy

The foot is concerned with support of the lower limbs in a seated position. The bony anatomy of the foot can be seen in the diagram. The key bony landmarks are the medial and lateral malleoli. (bony protuberances at the distal end of the tibia and fibula) and the calcaneus (the heel bone) (see Figure1).

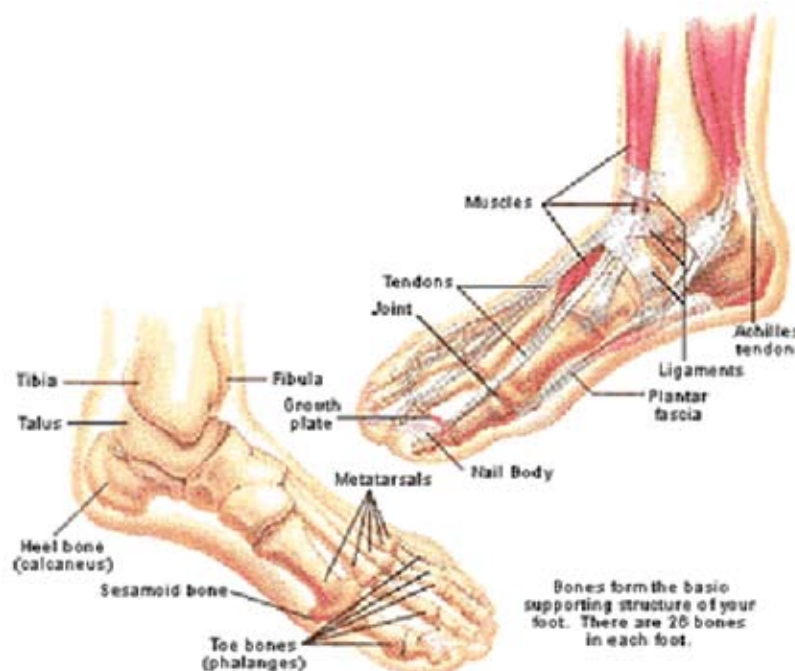


Figure 1.

<http://images.google.com.au/images?q=anatomy+of+the+foot&hl=en&um=1&ie=UTF-8&sa=X&oi=images&ct=title>

The distal attachments of the leg muscles are in the foot. The skin on the dorsal surface of the foot is thin. The skin on the plantar surface or sole of the foot is thin on the toes and instep, but it is thick over the heel and ball of the foot. Being a weight bearing structure, the foot is particularly susceptible to development of pressure areas, particularly for individuals with reduced voluntary movement or uneven weight bearing secondary to bony deformities (Moore, 1992). Pressure areas related to ‘sheering’ may also be of particular concern, due to excessive movement and/or incorrect foot support.

Glossary of Terms

Eversion:	Moving the sole of the foot away from the median plane, eg., when the lateral surface of the foot is raised.
Inversion:	Moving the sole of the foot toward the median plane, eg., when you examine the sole of your foot to remove a splinter.
Plantarflexion:	Extending the foot downwards, toes towards the floor.
Dorsiflexion:	Flexing the foot towards the leg.
Hanger angle:	Angle between legrest hanger and vertical front edge of the wheelchair, eg., standard wheelchair hangers are 70°, directly in front of seat is 90° (where user's knees will be closest to 90°).
Footplate angle:	The horizontal angle of the footplate. Correlates most closely to the motion of the ankle through dorsi to plantarflexion.

The Importance of well positioned ankles and feet

When footplates are set too high, pressure can increase, which may result in a pressure sore. Footplates set too low, or a foot not positioned on the footplate can lead to the client sliding forward in the seating system, reduced blood flow to the feet and knees positioned at an angle greater or less than 90°. Lack of foot supports, where needed, could result in injury to the legs or feet or in reduced function, as these can be the support the individual uses to complete certain tasks. Foot supports also play an important role in positioning to minimise ankle/foot becoming fixed in positions assumed due to the influence of other forces.

Ankle and Foot Positioning Strategies

Flexible ankle foot position

- Choose a hanger angle that suits the user, position the ankles and feet in a comfortable, neutral position.
- Adjust the footplate angle to suit this position, allow flexibility for function where required.

Fixed ankle foot position

- Adjust the angle of the footplate to support the position of the ankles/feet if they are fixed. This can be achieved with an angle adjustable footplate or a foam wedge or fully customised contoured / padded footplates. Custom foot guides (foam padded metal or timber) can be fitted to the footplates in any position to block / position the foot.
- If the client is fixed in plantarflexion, it may be appropriate to provide support proximally at the calf using calf pads. These are commercially available. Length and width is dependent upon the amount of support required. Custom shaped channels may improve contact and support.

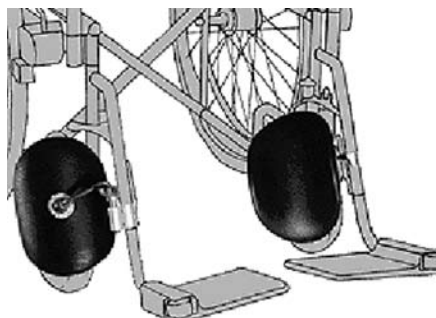


Figure 2.

Tight Hamstrings

- If the client's knee extension is restricted (hamstring tightness), consider extending a footboard (custom-made extension for the footplate) back towards the wheelchair. Caster clearance may be an issue.
- If the client's lower limbs are falling behind the footplates, a calf strap or pad may be used to stop them. However, if the reason for the lower limbs falling behind the footplate is hamstring tightness, the strap must be flexible or the resistance will cause the pelvis to move forward in the seat.

Knee Extension

- If the client's knee flexion is reduced, such that their feet fall in front of the footplate, consider extending a footboard forwards. Consider overall length of the wheelchair and clearance over uneven ground.
- Consider also whether this position is fixed or a result of increased tone in the knee extensor muscles, which may be more functional if positioned in flexion using a shin strap and / or foot positioners.

Strong Extension (extensor thrust)

- Two footplates could be made into a single plate (footboard) to provide greater strength, correct size and correct angle to position and maintain the lower limbs in flexion. Additional straps may be required, eg., toe loops see exaggerated muscle activity below.

- A further option to prevent the feet moving forward is the front foot guard. A custom-made option, it is a vertical metal or timber 'edge' around the front of the footplate which can be padded to further protect the toes. Edges can be placed at the rear, front or sides of a footplate.

Control/prevent unwanted movement due to exaggerated muscle activity

Possible options:

- 1) **Ankle straps** – Attach straps with Velcro or buckles, close to the lateral border of the foot at a 45° angle.
- 2) **Toe straps** – to control unwanted inversion or eversion, use toe straps with ankle straps.
- 3) **Ankle Huggers** – allows some movement but prevents excessive inversion, eversion or extension. Provides sensory input to the ankle and foot. They can be fastened with a side release buckle or Velcro and can have fixed or flexible mounting (supplier – Able Rehab, GTK Rehab).
To measure for ankle huggers, measure the circumference above the ankle.

- Medium – 19-23cm
- Large – 22-29cm
- Extra large 28-33cm



Figure 3.

- 4) **Heel cup with ankle strap** – can also be used to control and limit knee flexion, inversion or eversion.
- 5) **Foot box** – a padded 'box' consisting of protection front, back, left and right to prevent the user from injuring feet and legs on exposed hangers and footplates, for example if a client has fragile skin or bones in addition to exaggerated muscle activity.

Pressure Management

- Pressure management is vital for clients with fixed ankle/foot position. Consider use of high pressure relieving foam, ROHO pads, or polymer.

(Note: some gel products may 'bottom out' over time, bean bags are considered an aspiration risk and not supported by The Spastic Centre).

Summary

It is important to complete a thorough mat evaluation and seat the body as a whole. It is vital not to put joints into positions of undue stress to achieve symmetry. It is sometimes necessary to compromise leg, ankle and foot position in order to achieve correct positioning of the pelvis and spine. The lower limbs often need to be allowed to assume their preferred position and supported where they fall.

References

Moore, L. 3rd Ed. 1992. *Clinically Oriented Anatomy. International Edition*
Zollars, Otto Bock Seating Manual – available in TASC

Tips...

Christmas Visual Scene Displays

Well, the year has flown by, and Christmas is upon us again! Christmas is a time of parties, family and friends, presents and carols. For people who use speech generating devices, visual scene displays are an illustrative and fun way of arranging vocabulary and ideas.



Visual scene displays can be set in the DynaVox series devices (DV4, MT4, V and Vmax). They can also be made up in software programs such as VS Communicator and Clicker 5.

Visual scene displays involve using a photo or scene as the background to your page. You then set up active areas or 'hot spots' which can speak a message or open a pop-up. Usually the hot spot is set up over an area of interest. For example, if you had the picture below, an active area can be set up over Santa's face so that when you press it he sings "Jingle Bells". Similarly, active areas over the teddy bear or Santa's toy sack can speak a message.

Other ideas for a visual scene display could be a family photo with Santa. You can program an active spot for each person in their photo so their name and Christmas wish could be spoken out.

To make a visual scene display in the DynaVox series devices you need to:

1. Find a photo or picture scene and save it to a USB stick (remember the picture needs to be smaller than 600 x 800 pixels)
2. Go to the drop-down menu bar and select Page Editing → Page Editor.
3. Once you are in the Page Editor, go to the drop down-menu, select File → New Page. You will then need to name your new page, eg., 'Christmas scene'.
4. Double tap on the blank page to bring up the 'Modify page' menu.
5. Choose 'Background Picture'.
6. Select the check box next to 'Show all directories'.
7. Select UMS_FOLDER then choose your picture from the right viewport.
8. Select OK.
9. The picture should then show up as the background to your page.

Making Active Areas on your picture

1. Go to your Tools Palette and select the arrow next to 4th symbol.
2. Select the sunburst symbol representing 'Active Area'. The words 'Active Area' should then appear in your top toolbar.
3. Find the area which you would like a message to be stored under, eg., Santa's face, and drag your finger over it to create the active area.
4. When you release the selection, the active area will be drawn on the page and the Behaviour Editor menu will open.
5. Select the behaviours drop-down menu. The menu will expand to display a list of the available behaviour categories. Similar to when you are programming buttons, choose the behaviour you want (eg., Speak Text) then select add.
6. When you have finished adding behaviours, select OK. You have now made your active area.
7. Repeat steps 1-6 to add more active areas. When you have finished, select the drop-down menu and select Exit Page Editor.
8. Test out your active areas!

Linking your new page to a button

1. Find a button to add your new page to.
2. Press the green modify symbol then press this button. This will open the Modify Button menu.
3. Choose a label and symbol for the button.
4. Go to Behaviours and select the behaviours drop-down menu.
5. Select 'Go to Page' and 'add'. This will open the Page menu.
6. Select your Christmas page and press OK.

Information sourced from www.dynavoxsys.com

Profile

Lanie Campbell, Speech Pathologist TASC

I'm back! I have just returned to The Spastic Centre after a couple of years. I worked for TASC for four years previously and have also worked for Technability. It is great to be back working with such a committed and enthusiastic team.

I completed my degree in Speech Pathology at Cumberland College, Sydney University in 1991. Since that time I have mainly worked in the areas of traumatic brain injury and assistive technology. I have also done a few stints working on the wards in hospitals and in community health both here and in the UK.

I am sure that you will be hearing from me in a future edition of Technotalk. Until then, have a great Christmas and New Year!



the spastic centre

For people with cerebral palsy...

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