This information sheet explains about the toe to hand transfer operation which can be used to create a new digit on the hand for children who have conditions such as loss of a digit due to illness, injury, symbrachydactyly or amniotic band syndrome/ring constriction syndrome. It also outlines what you can expect when your child comes to Great Ormond Street Hospital (GOSH) for assessment and treatment.

What is toe to hand transfer?
Toe to hand transfer is one of several treatment options for conditions where the hand has short or missing fingers. It is a complex operation used to reconstruct the hand when fingers are missing. The transferred toe can either act as a thumb or allow the thumb to have something to pinch against. It has a nail, and joints which can bend and straighten, although not as much as finger joints.

The toe next to the big toe is usually the most suitable and contains the joints, tendons, tissues and nail to make a good finger. The toe is removed from the foot, taking with it all the associated blood vessels, nerves, bones and tendons, and then is transplanted to the hand. A toe from the other foot can also be transplanted in the same way, either in one longer operation or separately. It is important to remember that, even after the transfer, the new finger will only have the range of movement of a toe.
The toe may be used either to replace the thumb or to replace a finger. This allows the thumb and finger to form a pinch grip. If there are no digits on the hand at all, the operation is usually more successful if the child can 'cup' the palm of his or her hand.

Toe to hand transfer is more effective if one of your child’s feet has formed normally. If there is any abnormality, the operation may not be possible, may be more difficult than usual or may not achieve such a good result. Although the toe next to the big toe is the most suitable, occasionally the big toe is used but this usually affects the general appearance of the foot. Removing one toe leaves a foot reduced in width, with four toes present. The gap where the toe was removed is closed. Removal of the second toe does not have any functional impact on walking, running or jumping.
Will it improve the look and function of my child’s hand?

Often one of the expectations of undergoing surgery is that it will improve the way the hand looks as well as upgrade hand function by improving grasp and grip. Surgery may improve the hand’s appearance, but it will not achieve a normal looking hand, and will make some change to the appearance of the feet.

As children grow older they will become more aware of the how different the affected hand looks. This can sometimes lead to self-consciousness and a worry about being stared at or teased at school.

It may be helpful to discuss these issues with the clinical psychologist attached to the team, who will be able to help with strategies to deal with teasing and self-consciousness and help with decision-making. Our booklet *Bringing up a child whose face looks different* was written for families with children who have birthmarks but contains some useful strategies for dealing with unwanted attention to any sort of visible difference. It is available on our website or ask for a copy at the Patient Advice and Liaison Service (Pals) office.

Feet after toe to hand transfer
What is hand function like pre-surgery?

Hand function varies depending on how many digits are missing or partially missing and if one or both hands are affected. Surgery aims to upgrade performance in the affected hand. In many cases, children can still grip with the affected hand although fine motor skills might be a problem. Also, children are very good at adapting to their condition, and can usually achieve most tasks. There are some things that can be more difficult, particularly with a more severely affected hand. These include some activities that need both hands, for example, hooking up a zip, managing brakes on a bike, using a knife and a fork together, holding paper when cutting with scissors, and playing some musical instruments. Some of these tasks can be managed with special equipment. You can get advice about this from your occupational therapist and through the organisation REACH (contact details at the end of the information sheet).

Preparation clinic

We will invite you and your child to attend a preparation clinic appointment before you make any decisions about surgery. The purpose of this appointment is to meet the clinical nurse specialist, clinical psychologist and occupational therapist. They will give you some practical information about the process of toe to hand transfer and any daily care that will be needed. You will see pictures of children before, during and after the procedure, and discuss how the hand will look and function. The clinical psychologist can discuss expectations of and preparation for surgery, offer help with decision making and cover any aspect of the procedure that you and/or your child find worrying. Parents often ask to be put in touch with another family who have been through the procedure already and we can help you with this if required.
Pre-admission clinic

This is an outpatient appointment where you will be able to discuss your child’s planned operation with the team before coming in to hospital for your admission. The surgeon will see you to explain the toe to hand transfer surgery in more detail, discuss any worries you may have and ask you to give permission for the surgery by signing a consent form. If your child has any medical problems, such as allergies, please tell the surgeon. Your child will also have various tests and investigations carried out during this appointment.

We will also ask for photographs to be taken of your child’s hands and feet to record them before treatment, so that the changes afterwards can be measured.

What does the operation involve?

Toe to hand transfer is carried out while your child is under a general anaesthetic. During the first part of the operation, the surgeon examines your child’s affected hand closely to make sure that there are appropriate blood vessels, nerves and tendons within the hand and arm, to which the toe can be attached. The surgeon may find that there are not the appropriate blood vessels, nerves and tendons, but this happens only occasionally. If this is the case, the surgery will not proceed any further and the toe will not be removed.

Once the appropriate blood vessels, nerves and tendons have been identified in the hand, the surgeon removes the toe along with its own blood vessels, nerves and tendons. The gap between the big toe and the third toe is then closed with stitches and a dressing is applied. The toe bones are joined to the hand bones and fixed together with a wire (K-wire) and left to heal for
approximately six to eight weeks. The wire extends outside the digits so that it can be removed when the bone and the tendons that move the new digit are healed.

The longest part of the operation is joining together the tiny blood vessels and nerves. The surgeon uses an operating microscope to do this as the vessels are so small. The surgeon may not stitch up all the skin on the hands as the healing blood vessels are very sensitive to pressure. A small skin graft may be needed or the surgeon may leave the skin to heal without stitches.

At the end of the procedure, the surgeon will put a bulky dressing or plaster cast on your child’s hand to protect it while it heals. There will also be a dressing on the foot. The whole surgical procedure will take several hours.
Are there any risks?
Like any other operation this one also carries risks. There is a chance of bleeding when the toe is removed but this risk is reduced by the use of tourniquet (tight band) around the leg to reduce blood flow. The tourniquet is also used on the arm to reduce any blood loss when the toe is being transferred to the hand. Sometimes when the toe is transferred to the hand, there is a chance that the blood may not flow well through the repaired vessels. This may need a second surgical procedure. If it is not possible to restore good blood flow, there is a small chance that the digit may not survive. The bone may heal slowly or fail to heal properly and this may require further surgery. As with all surgery there is a risk of infection, but antibiotics will be given during and after the operation to reduce the chance of this occurring.

What happens after the operation?
Your child will be transferred to the post-operative ward once he or she is starting to wake up from the anaesthetic. For the first few days, your child will be monitored closely, with the nurses regularly checking the blood supply to the new digit. Your child will need to be kept warm so that the blood flow around the body is adequate and he or she will be given extra fluid through an intravenous (into a vein) drip. Your child may be given a blood thinning medicine to stop any clots forming and blocking the blood vessels. He or she will also be given regular pain relief, intravenously at first, but then in the form of medicine or tablets once your child is eating and drinking again. About five to seven days after the operation, when the surgeon is happy that the blood supply to the new digit is satisfactory, your child will be able to return home.
When you get home

- Your child will need to take things easy for the first few weeks.

- You will need to keep your child’s hand warm so avoid going out if the temperature is low. If you do need to go out, you can cover the hand bandage with a large woollen sock to keep it warm.

- It is important that the hand bandage and foot dressing remain clean and dry. For more information about caring for your child’s hand and foot at home, please see our information sheet available from the nurses or on our website.

- Your child will be able to put weight on the affected foot but should avoid running and jumping until the operation site is fully healed. Younger children should use a pushchair whenever outside. Older children will need a wheelchair for some of the time.

- Your child will be able to go back to school after the first dressing change but should stay indoors during breaks and not take part in PE or sport lessons. We will advise when it is safe to start taking part in PE and sport. It is also advisable to avoid messy activities, such as painting, sand or water play while the bandage is in place.
Follow up and longer term care

Your child will need to come back to GOSH for a dressing change and removal of the K-wire about six weeks after the operation. Your child will see the occupational therapist at this point to have a splint made to protect the hand. While nerve sensation is returning, which could take between three and six months, it is important to protect your child’s hand from heat and cold and sharp objects. This splint will remain in place until your child’s nerve sensation has returned. The splint will need to be removed several times every day so that your child can move the new finger. A set of regular exercises will be given. He or she will need to attend several outpatient appointments over the few months to check nerve sensation recovery and general movement of the new finger.
What is the outlook for children who have had this operation?

Your child’s new finger will always be more sensitive to cold than the rest of the hand, so it is important to wear gloves in cold weather and to avoid holding ice-cold drinks with that hand if possible. Further treatment may be necessary, for instance, to reduce the size of the tip of the new finger if it is out of proportion to the rest of the finger or hand. Sometimes, the tendon that moves the new finger becomes 'stuck' to the soft tissues around it so it does not move well. This may need an operation to free up the tendon, causing the finger to bend.

There will always be some scarring around the operation site but we may be able to improve this in future if it is concerning your child.

The outlook is generally good with improvement in function expected and nerve sensation gradually returning.

The new finger will always look different to the other fingers but this is generally outweighed by the improvement in function.

Further information about toe to hand transfer

If you would like to know more about the toe to hand transfer operation and think it would benefit your child, you will need a referral to the Congenital Hand Anomaly team. We can accept referrals from your local paediatrician or another consultant. The Congenital Hand Anomaly team consists of the hand surgeon, clinical nurse specialists, occupational therapist and clinical psychologist.

You can also find out more about toe to hand transfer by contacting REACH (The Association for Children with Hand or Arm Deficiency).

REACH, PO Box 54, Helston, Cornwall TR13 8WD.
Tel: 0845 130 6225
Website: www.reach.org.uk