

## Skin scarring after septicaemia

The bacteria that cause meningitis can also cause septicaemia, or blood poisoning. Very bad cases of septicaemia can leave skin scars and deeper damage to muscle and bone. This factsheet explains how this happens and what can be done to help.

### How does septicaemia damage skin, muscle and bone?

When the bacteria that cause meningitis and septicaemia invade the bloodstream they produce toxins (poisons) that attack the lining of the blood vessels so they start to leak. This causes the rash of septicaemia, which can rapidly develop into larger purple areas of skin. This leakage of blood means that there is not enough blood to carry oxygen to all parts of the body. At the same time, the toxins cause blood clots to form in the tiny blood vessels in the skin, making it even harder for blood to reach all parts of the body. To maintain circulation to the vital organs (the brain, liver, kidneys, heart and lungs), the circulatory system reduces the blood supply to the extremities such as the hands, feet and the surface of the skin. When skin loses blood supply, it is starved of oxygen and vital nutrients, and patches of it die off and blacken. This most often happens to tissue on the fingers, hands, toes and feet because the blood has further to travel to reach these areas. In extreme cases this can lead to the loss of fingers and toes and sometimes limbs or parts of limbs may need to be amputated.

It can be very distressing to see your child's body damaged by septicaemia, but it is important to remember that the way your child looks in hospital during and immediately after their illness will not be the same as when their body has had time to heal.

### Can treatment prevent or reduce scarring?

The first priority in treating children severely ill with septicaemia is life-saving antibiotics and urgent resuscitation. The sickest children need to be transferred to a paediatric intensive care unit (PICU). There, specialist doctors and nurses work around the clock to combat septicaemia. Large volumes of resuscitation fluid are given through intravenous lines, which makes the child look very bloated. The overworked heart and lungs need support, so the child has to be sedated and put on a ventilator to help them breathe. More intravenous lines must be put in to deliver medicines to support the heart and other vital organs. At the same time, other drugs and therapies deal with clotting and restoring the normal chemical balance

of the body. As well as saving the child's life, these actions can reverse the processes that lead to damage of skin, muscle, bone and other organs.

It is important that any skin damaged by septicaemia can heal properly. Skin is the first line of defence against infection, and enables us to control body temperature and fluid balance. Any areas of skin that have blackened and died can be a source of infection for the tissue underneath so it is important to remove this. The process of removing dead skin (debridement) will usually be done under general anaesthetic in an operating theatre and will leave an open wound. Whilst in hospital any open wounds will be cleaned regularly and a dressing will be applied to encourage healing. These dressings are likely to be changed two or three times a week. Initially dressing changes may take place under general anaesthetic in the operating theatre, but if the wounds are less extensive or they have started to heal they can take place on the ward or as an outpatient using suitable pain relief.

Sometimes when a child is very sick or if the area is small, the skin is left to heal naturally. It may do this by forming a thick black scab called an eschar. The scab may come off naturally or may need to be removed in theatre some weeks later when the child is much better. In some cases a skin graft may be needed at this stage to help the wound under the scab to heal properly.

### How does damaged skin heal?

When a wound heals it leaves a scar. Scar tissue provides a sufficient barrier from the environment to protect the body against infection, but is not the same as normal skin. Although scar tissue is generally thicker than normal skin, it has a thin, fragile surface layer that breaks down and blisters more easily. The deeper layers of normal skin contain hair follicles and glands that secrete oil to keep the skin moist so it can stretch. In scar tissue these structures have been destroyed. This means that scar tissue is very dry, and therefore itchy and easy to tear. As scar tissue does not stretch much, it can feel tight and sometimes restrict movement. Scar tissue is also more prone to sun damage than normal skin.

The way in which a wound heals will affect the strength and appearance of the scar. Wounds will heal in different ways depending on the amount of tissue that is damaged during your child's illness.

If the area of damage is small and the edges of the healthy skin either side of the wound are close together, the skin can heal edge to edge. This type of healing should make a small and good quality scar in strength and appearance and heal within two to four weeks.

In most cases of skin damage caused by septicaemia, the edges of the healthy skin are too far apart to heal together directly. In these cases the wound is often covered by an eschar and the body heals by shrinking the wounded area underneath the scab as much as possible and filling the gap from the bottom up with blood vessels and collagen (protein). At the same time, new skin cells formed at the edges of the wound migrate over the top of the filled area to form the scar surface. This type of healing can result in lumpy red raised scars known as hypertrophic scars (figure 1).



**Figure 1: Hypertrophic scars that have taken a long time to heal and appear lumpy and red in the early stages of healing**

The scars which form will differ from person to person. Dark skin is more prone to forming lumpy hypertrophic scars than white skin. Some parts of the body tend to form more noticeable, fragile scars than others - for example, the chest and upper arms.

Some areas may be so badly damaged that skin grafting is necessary to help with healing. A split skin graft involves moving a thin layer of healthy skin from an undamaged area of the body and grafting it to the wounded area. The healthy skin acts as a source of new skin cells and so helps the wound heal more quickly. The area of the body where the healthy skin

is removed should heal within seven to ten days, leaving a red mark, which usually settles and does not leave a noticeable scar (figures 2 and 3).



Figure 2: Area of skin that has recently been used as a source for a skin graft



Figure 3: Area of healed skin that has been used as a source for a skin graft

### How can we improve the appearance, elasticity and texture of scars?

If scars are cared for correctly then their strength and appearance can often be significantly improved. Scars fade naturally over time and over the course of 18 months to two years the scar should begin to look better. Although very severe scars will remain visible, the colour of the scar will improve and the protein in the scar tissue which initially exists in circular whirls will streamline itself and flatten down to make the scar feel softer and less lumpy.

There are nonsurgical treatments that can speed up this process. These mainly involve maintaining the scar tissue as well as possible. Some of the basic rules on caring for scars are outlined below:

- Wash the scarred area regularly, as for the rest of the body, and keep it fresh
- Massage the scars at least once every day to help flatten out the lumpy collagen and make them soft.
- Use an aqueous cream or lotion that you know your child is not allergic to when massaging the area. It is the action of the massage that breaks the fibres down, not the product being used.
- Protect the scars from the sun by using a 50+ sun block. The scar can darken permanently if left in the sun during the first two years.

If your child has extensive scarring it is likely that you will attend a scar management clinic.

Nurses at the clinic may recommend the following treatments:

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- Silicon - can reduce the redness and raised appearance of scar tissue, and is particularly useful in the first two years of scar treatment. It comes in many forms such as a spray, adhesive sheet, tape or gel. If silicon is recommended, the nurse will suggest a particular type based on where your child's scarring is and what their lifestyle is like.
- Pressure garments - can reduce the height of thick scars by about 1mm. They are recommended for use during the first year after the scar has formed and the garment is made to measure for the child. The team looking after your child will talk to you about whether pressure garments are suitable for your child.

### Scars can result in problems with movement

When large wounds heal, they shrink and fill in with relatively rigid scar tissue. When this happens over or close to a joint, nearby tissue is pulled inwards which can limit movement at the joint. If nothing is done to prevent the scar becoming tight over the joint, then muscles and other tissues may also become tight. This can lead to permanent movement restriction, called a contracture.

If your child has scarring over their joints, they may see a physiotherapist or occupational therapist while still in hospital. The initial stage of healing is an important time to start preventing contractures as the scar tissue is more easily shaped. This is because in the early stages of scar formation the scar tissue is a bit like cement; initially it can be moulded or moved, but once the scar tissue has set, it is very difficult to shape or move.

The physiotherapist or occupational therapist will give you advice about minimising the risk of developing a contracture. This is likely to involve one or more of the following:

- instruction on exercises and stretches that can be performed daily
- splinting (applying a splint to hold the area in a stretched position)
- scar massage (once the area has healed)

As scars can take up to 2 years to fully mature it may be necessary for your child to do their exercises regularly over a long period of time. These can be uncomfortable and even painful, but try to keep at it as much as possible. Speak to your child's therapist or doctor about what sort of pain relief or other therapy you can use to help your child continue the exercises that they have been asked to do. Managing these scars well during the healing period may avoid the need for further surgery in the future.

## Surgical management of scars

Sometimes, no matter how well scars are cared for, further surgery may be needed because problems can develop as children grow.

Children who have significant scarring over their joints\* may develop contractures later on if the scar tissue cannot stretch when the rest of the body grows. If the scar has become tight over a joint, surgery may be necessary to remove the tight scar tissue and in some cases replace it with a skin graft to gain movement.

### \*DAMAGE AFFECTING GROWTH OF LEG AND ARM BONES

Children with scarring over their joints are at higher risk of having had damage to their bones during the acute illness. If the end parts of the bones which control growth are damaged then future growth of the bone can be stunted or distorted[1]. This is called growth plate damage. It might not be detectable until four or more years after recovery.

It is a good idea for children with scarring over their joints to have their growth and limb length monitored on a regular basis by a paediatrician or GP. It is also a good idea to look out for loss of wrist and forearm movement if there is scarring in this area[2].

More information about skin scarring is available online in a separate factsheet called 'Bone growth problems after septicaemia'.

## What can be done about very noticeable scars?

Although most scars look better over time, especially if they are cared for correctly, some scars will always be more noticeable, such as pitted scars (where the wound fails to fill up with blood vessels and a noticeable pit remains where the wound was). If your child's scars are causing them distress, talk to your doctor because surgery could be an option.

Surgery to improve the appearance or function of scars can involve one or more of the following:

- Cutting out the scar
- Injecting fat underneath the scar
- Skin grafting
- Using artificial skin

The surgical team will discuss with you which option is most suitable for your child.

Prosthetic fillers are a nonsurgical alternative for disguising some scars. They can be custom made and used with adhesive to disguise indented areas of skin.

When carrying out surgery for cosmetic reasons the doctors looking after your child will need to make sure that you and your child are happy with the procedure and that you appreciate what can realistically be achieved with surgery. It is likely that you and your child will work closely with physiotherapists and/or psychologists to make sure that you are aware of what is involved and what the end result is likely to be.

### Adjusting to a changed appearance

It can be difficult for older children with extensive scarring to come to terms with the fact that their appearance has changed. If your child is very young it may well be the case that you will find other people's reactions to your child's scarring or injuries more distressing than your child will. It is a challenge to handle other people's reactions effectively, but if you learn to do this then you can help your child to manage if they encounter any staring or questions about their appearance as they grow up and become more self-aware.

The charity Changing Faces can help children and parents come to terms with an altered appearance <https://www.changingfaces.org.uk/Your-Child/How-we-can-help>.

### Further sources of information and support

#### Changing Faces

Changing Faces is a UK charity for people and families who are living with conditions, marks or scars that affect their appearance. They give practical and emotional support to adults, children and their families.

**Website:** [www.changingfaces.org.uk](http://www.changingfaces.org.uk)

**Email:** [support@changingfaces.org.uk](mailto:support@changingfaces.org.uk)

**Freephone Helpline:** 0300 012 0275

#### Acknowledgements

Sian Falder, Consultant burns and plastic surgeon, Alder Hey Children's Hospital

Ann Edwards, Burns and plastic surgery nurse, Alder Hey Children's Hospital

Ann Maguire, Burns and plastic surgery nurse, Alder Hey Children's Hospital

Wendy Eastwood, Changing Faces Practitioner - Children and Young People

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## References

1. Bache, C.E. and I.P. Torode, *Orthopaedic sequelae of meningococcal septicemia*. J Pediatr Orthop, 2005. **26**(1): p. 135-9.
2. Mr Fergal Monsell, *Consultant Paediatric Orthopaedic Surgeon, Bristol Royal Hospital for Children, Personal communication*. 2012.