Disclaimer

This movie is an educational resource only and should not be used to manage your health. All decisions about the management of Keloids must be made in conjunction with your Physician or a licensed healthcare provider.
<table>
<thead>
<tr>
<th>SECTION</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Normal Anatomy</strong></td>
<td>a. Introduction</td>
</tr>
<tr>
<td></td>
<td>b. Normal Skin Anatomy</td>
</tr>
<tr>
<td></td>
<td>c. Scarring</td>
</tr>
<tr>
<td><strong>2. Overview of Keloids</strong></td>
<td>a. What are Keloids?</td>
</tr>
<tr>
<td></td>
<td>b. Symptoms</td>
</tr>
<tr>
<td></td>
<td>c. Risk Factors</td>
</tr>
<tr>
<td></td>
<td>d. Prevention</td>
</tr>
<tr>
<td><strong>3. Treatment Options</strong></td>
<td>a. Conservative Treatment</td>
</tr>
<tr>
<td></td>
<td>b. Surgical Treatment</td>
</tr>
<tr>
<td></td>
<td>c. Post Operative Precautions</td>
</tr>
<tr>
<td></td>
<td>d. Risks and Complications</td>
</tr>
</tbody>
</table>
INTRODUCTION

When an injury occurs to the body, scar tissue forms to hold the wound tissues together. As the scar matures, the normal repair process takes place where new skin develops and scar tissue is broken down. It is during this maturation phase of healing that problem scars such as Keloids can develop.

Keloids are an extreme overgrowth of scar tissue that present as raised, reddish, shiny, smooth skin growths. In order to learn more about Keloids, it is important to understand the normal anatomy of the skin and the normal scarring process.
Normal Skin Anatomy

The skin is the body’s largest organ. It protects against heat, sunlight, injury, and infection. Skin also helps control body temperature and stores water, fat, and vitamin D. The skin has three layers. The two main layers are the epidermis (upper or outer layer) and the dermis (lower or inner layer), and the third layer is the subcutaneous fat layer.

- Epidermis
- Dermis
- Subcutaneous Fat.

(Refer fig. 1 & 2)

The Epidermis is the thin outer layer of the skin and is made up of 3 kinds of cells:

Squamous cells

Thin, flat cells that form the top layer of the epidermis.

(Refer fig. 3)

Basal cells

Round cells under the squamous cells.

(Refer fig. 4)
Melanocytes

Found in the lower part of the epidermis, these cells make melanin, the pigment that gives skin its natural color. When skin is exposed to the sun, melanocytes make more pigment, causing the skin to darken.

(Refer fig. 5)

The dermis is the middle layer of the skin that contains pain and touch receptors. It is made up of three types of tissue: collagen, elastic tissue, and reticular fibers.

The dermis contains the following:

- Blood Vessels
- Lymph Vessels
- Hair Follicles
- Sweat Glands
- Collagen Bundles
- Fibroblasts
- Nerves

Blood Vessels

(Refer fig. 6)

Lymph Vessels

(Refer fig. 7)
Unit 1: Normal Anatomy

Hair Follicles
(Refer fig. 8)

Sweat Glands
(Refer fig. 9)

Collagen Bundles
(Refer fig. 10)

Fibroblasts
(Refer fig. 11)
Nerves
(Refer fig. 12)

The Subcutaneous Fat Layer is the deepest skin layer consisting of collagen and fat cells. It functions to conserve body heat and protect the body from injury.

(Refer fig. 13)

Scarring

A scar is the replacement of tissue with connective tissue that occurs during the healing process of a wound or injury. Connective tissue is made up of collagen, a protein commonly found in bones and cartilage. Collagen mends the injured tissue and matures into a scar. Scar tissue is weaker than the original tissue it replaced. Scars often appear red or purple in the early stages and eventually become white in the later stages.

(Refer fig. 14)

The quality and appearance of scars vary widely based on the individual’s healing process, the location of the scar on the body, the severity of the injury and degree of tension placed on the scar by sutures.
Scarring

The types of scars a patient acquires are influenced by personal, familial and racial factors. Scars will nearly always mature and flatten, but the time interval for this to occur varies, extending from several months to several years. However, sometimes scars enlarge with time to form firm, smooth, hard growths called Keloid.

(Refer fig. 15)
What are Keloids?

Keloids, also referred to as Keloidal scars, are an extreme random overgrowth of collagen formation at the site of a healed skin injury. Keloids are harmless, benign (non-cancerous) skin lesions resulting from an overgrowth of granulation tissue during the healing process.

They sometimes cause itching and pain and can limit skin movement in some people. Keloids are a serious form of scarring as they can continue to grow indefinitely into large growths beyond the borders of the original wound. Keloidosis is a term used when multiple or repeated instances of keloids are formed on the skin.

(Refer fig. 16 & 17)

Keloid Scars can result from any of the following skin injuries:

- Chickenpox
- Acne
- Minor scratches
- Surgical incisions
- Traumatic wounds
- Vaccination sites
- Burns

Symptoms

Symptoms of Keloids include the following:

- Raised mound of scar tissue at the site of an healed skin injury
- Pigmentation of the skin
- Itchiness
- Pain
- Sensitivity
- Redness
Risk Factors

Keloid scars have two main predisposing risk factors:

- Location of the scar and
- Genetic background of the patient

Location Keloids are more common in the upper part of the body and are rare in the eyelids, soles of the feet, palms of the hand and genitals. Keloids are most likely to develop:

- In the earlobe after ear piercing
- Along the border of the jaw
- The shoulder
- The skin over the breast bone

(Refer fig.18 to 24)
Risk Factors

Genetic Background:
- Keloids are uncommon in people with fair skin. These patients are more likely to develop hypertrophic or thick scars which eventually fade. The difference between these two types of scar is often hard to determine.
- Keloids are more common in patients with dark skin.
- Women are more likely to develop Keloidal scars.
- Young people under the age of thirty are at highest risk.

Other Risk Factors:
- Keloids are more likely to form when the wound is closed under tension or where there is an infection or hematoma (bleeding) after surgery.
- If a foreign body is present in the wound, as may occur after an accident, keloids also seem to be more likely to develop.
- In cosmetic surgery some scars are more likely to become thicker, these include the scars associated with: otoplasty (ear pinning), breast reduction and abdominoplasty (tummy tuck).

Prevention

Scar tissue may be minimized to a degree by proper attention to the injury and proper care during the healing process. Preventing complications such as infection and treating medical conditions that affect healing such as diabetes can help minimize scarring. Minimizing swelling and increasing the blood supply to the injured area also help in the healing process and minimize scarring.

Other measures to minimize scarring may include the following:

(Refer fig. 25)
Occlusive Dressings

Occlusive dressings include silicone gel sheets and dressings, non-silicone occlusive sheets, Cordran tape, and Scarguard. These measures have been used with varied success. Anti-keloidal effects appear to result from a combination of occlusion and hydration, rather than from an effect of the silicone.

(Refer fig. 25)

Compression Therapy

Compression therapy involves pressure, which has long been known to have thinning effects on skin. Reduction in the cohesiveness of collagen fibres in pressure-treated hypertrophic scars has been demonstrated by electron microscopy.

Compression treatments include button compression, pressure earrings, ACE bandages, elastic adhesive bandages, compression wraps, Lycra bandages, and support bandages. Other pressure devices include pressure-gradient garments made of lightweight porous Dacron, spandex (also known as elastane), or bobbinet fabric (usually worn 12-24 hours/day for up to 4-6 months) and zinc oxide adhesive plaster.

(Refer fig. 26)
Conservative Treatment

No single therapeutic modality is best for all keloids. The type of therapy used is determined by:

- The location, size, and depth of the lesion;
- The age of the patient;
- The past response to treatment.

Prevention is key, but therapeutic treatment of keloids includes the following:

- Intralesional corticosteroid injections
- Cryotherapy
- Interferon therapy

Talk to your physician about other possible treatments that could be used in your particular situation. Research in the treatment of Keloidal scars is ongoing and new innovations may be indicated for your situation.

**Intralesional corticosteroid injections:**

Corticosteroids, specifically intralesional corticosteroid injections, have been the mainstay of treatment. Corticosteroids reduce excessive scarring by reducing collagen synthesis, altering glucosaminoglycan synthesis, and reducing production of inflammatory mediators and fibroblast proliferation during wound healing.

Steroids are injected directly into the scar tissue to help decrease the itching, redness, and burning sensations that these scars may produce. Sometimes, the injections help to actually decrease the size of the scar.

*(Refer fig. 27)*

**Cryotherapy:**

This involves the scar being "frozen" off by a medication applied to the Keloid. Cryosurgical media (e.g., liquid nitrogen) affects the microvasculature and causes cell damage via intracellular crystals, leading to tissue anoxia. Generally, 1, 2, or 3 freeze-thaw cycles lasting 10-30 seconds each are used for the desired effect. Treatment may need to be repeated every 20-30 days.

*(Refer fig. 28)*
Cryotherapy:
The physician will take care to administer liquid nitrogen in short application periods because of the possibility of reversible hypopigmentation. Cryotherapy can cause pain and depigmentation in certain patients.

(Refer fig. 28)

Interferon Therapy
Interferon therapy, including interferon alfa, interferon beta, and interferon gamma, has been demonstrated in vitro studies to reduce keloidal fibroblast production of collagen. Interferon injected into the suture line of keloid excision sites may be prophylactic for reducing recurrences.

(Refer fig. 29)

Surgical Overview
If the Keloid scar is not responsive to non-surgical management options, surgery may be suggested. Scar revision surgery may improve the appearance of the scar but will not remove it entirely. It is important to understand that some types of Keloid scarring can actually be made worse by surgery. Your surgeon will discuss your options with you based on the size, depth, color and thickness of your scar.

One type of surgery directly removes the scar formation with an incision, and stitches are placed to help close the wound. Sometimes, skin grafts are used to help close the wound. This involves replacing or attaching skin to an area that is missing skin. Skin grafts are performed by taking a piece of healthy skin from another area of the body (called the donor site) and attaching it to the needed area.

Another option is laser surgery. Scars may be treated with a variety of different lasers, depending on the underlying cause of the scar. Lasers may be used to smooth a scar, remove the abnormal color of a scar, or flatten a scar. Most laser therapy for scars is done in conjunction with other treatments, including injections of steroids, use of special dressings, and the use of bandages. Multiple treatments may be required, regardless of the initial type of therapy.
Surgical Treatment

Surgical Keloid excision is performed as day surgery either in the hospital or outpatient surgery center under general, regional, or occasionally local anesthesia depending on the type of procedure performed and the surgeon’s preference.

(Refer fig. 30)

Your surgeon makes an incision at the site of the Keloid. The Keloid is shaved down with special instruments and scar tissue is cut out.

(Refer fig. 31)

Your surgeon may use a skin graft if there is not enough skin to cover the incision that was made to remove the scar tissue. The skin graft is obtained by removing a thin layer of skin from another part of the body (referred to as the donor site) and placing it over the incision site.

(Refer fig. 32)

The surgeon then carefully sutures the incision closed and covers the area with a sterile dressing. Scar revision surgery removes the Keloid and improved suturing technique minimizes the possibility of a new Keloid developing. For severe Keloids, excisional surgery may be combined with radiation to prevent their return.

(Refer fig. 33)
Post Operative Precautions

After surgery your surgeon will give you guidelines to follow depending on the type of surgery performed and the surgeon's preference. Common guidelines include:

- You will need someone to drive you home after you are released as the anesthesia may make you feel groggy and tired.
- You should rest for the first couple days after surgery.
- Avoid any lifting or pulling that puts tension or pressure on the new incision.
- Avoid exposing the incision to sunlight especially during the first year of healing.
- If sutures were used, these will be removed at your doctor's appointment.
- Follow your surgeon's guidelines on bathing and showering.
- If a skin graft was used, monitor the donor site as well as the incision for symptoms of infection such as redness, swelling, pain, and drainage. Report any such symptoms to your doctor right away.

Risks and Complications

As with any surgery there are potential risks involved. The decision to proceed with the surgery is made because the advantages of surgery outweigh the potential disadvantages. It is important that you are informed of these risks before the surgery takes place.

Complications can be medical (general) or specific to scar revision surgery. Medical complications include those of the anesthetic and your general well being. Almost any medical condition can occur so this list is not complete. Complications include:

- Allergic reactions to medications
- Blood loss requiring transfusion with its low risk of disease transmission
- Heart attacks, strokes, kidney failure, pneumonia, bladder infections
- Complications from nerve blocks such as infection or nerve damage
- Serious medical problems can lead to ongoing health concerns, prolonged hospitalization, or rarely death.

Complications are rare after scar revision surgery, but unexpected events can follow any operation. Your surgeon feels that you should be aware of complications that may take place so that your decision to proceed with this operation is taken with all relevant information available to you. After excision of Keloids, there is a risk of recurrence.

After excision, the use of steroids and/or radiation therapy may help to prevent the return of the Keloid. The main risks specific to scar revision surgery are that the scar may grow, change color, or appear worse than before surgery.
Disclaimer

Although every effort is made to educate you on Keloids and take control, there will be specific information that will not be discussed. Talk to your doctor or health care provider about any concerns you have about Keloids.
YOUR SURGERY DATE

READ YOUR BOOK AND MATERIAL

VIEW YOUR VIDEO / CD / DVD / WEBSITE

PRE - HABILITATION

ARRANGE FOR BLOOD

MEDICAL CHECK UP

ADVANCE MEDICAL DIRECTIVE

PRE - ADMISSION TESTING

FAMILY SUPPORT REVIEW

Physician's Name: ____________

Physician's Signature: ____________

Date: ____________

Patient’s Name: ____________

Patient’s Signature: ____________

Date: ____________