Scar evaluation and management: recommendations

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Introduction

Scars are commonly characterised by definitions concerning the depth of elevated tissue, the colour, softness, shape and orientation. Evolution of the proliferative process and histopathological differences are also used to differentiate a hypertrophic scar, a process generally limited in time, from a keloid, which involves a permanently evolving production of cells, covering the initial edges and extending beyond the original scar boundary into the surrounding skin.

Clinically, some tools can be used in order to help physicians to characterise and monitor the pathologic scar. The Vancouver scale has been validated for burn scars, but it remains difficult to transpose this assesment scale to other types of scars. Some predisposing factors such as the type of skin injury (traumatic, surgical, burns); the anatomical location (face, neck, arms); genetic susceptibility and environmental or nutritional influences are well known.

Clinical evaluation needs to be standardised in order to provide the maximum amount of useful information. This point is important when trying to determine a progression profile and in order to anticipate therapeutic consequences.

In a recent review of the literature[1], an independent international panel provided evidence-based recommendations concerning scar management, based on a qualitative overview of over 300 published references using standard methods of appraisal. The recommendations focus on the management of hypertrophic scars and keloids, and are internationally applicable in a range of clinical situations.

Types of scars

Scars can be defined by their contour, colour, shape, measurements, width, orientation following natural lines of strength of the skin, texture and extensibility. Some parameters previously used to evaluate burns scars are decribed here using the same classification[2].

1) Contour

Elevated scar tissue can be observed in situations where the scar edge is formed by tissues presenting differences in depth or different lymphatic modes of drainage: a linear scar can present a step-wise aspect; a postoperative suture following excision of a large piece of skin can present irregularities at the extremities. Flaps, mainly circular, will present a centripetal retraction, due to an apparent excess of tissue. Differences in the structure and depth of two areas of skin where one originates from a different anatomical region will lead to a scar having a tendency not to follow the usual lines of tension of the grafted area. The aesthetic aspect following any type of flap placement must often be analysed dynamically because most of these flaps become bulky or create retractions when moving inside the recipient area.

Hypertrophic scars can be defined as areas containing an excessive number of collagen fibres remaining inside the scar limits, the scars presenting an abnormal depth. Progression with time characterises this type of pathologic scar. The hypertrophic process generally starts four to six weeks after the injury, increases during three to seven months, with the scar stabilising after this time and regressing in colour and volume after one year.

Clinically, hypertrophic scars are red, covered by a thin epithelium, pain is variable, hardness is palpable and surrounding tissues present moderate inflammation. These scars are more prone to develop in certain areas like the thorax, neck, arms and legs, and are less prone to develop on the ear concha or the plantar aspect of the foot. The presence of bone immediately below the affected skin can be considered as a preventive factor.

Hypertrophic scars do not develop on sites where pressure ulcers appear. Scars crossing natural skin lines of tension are more frequently affected by hypertrophy. Joints and other mobile areas are more involved and the mechanical factor seems to be predominant.

Keloid scars are defined as a progressive accumulation of scar tissue, extending over the original scar edges, a pseudo-tumoral proliferation. The causes are not clear. A genetic factor has been hypothesised, as well as the body skin colour. Individuals with dark skin present higher risks,

but fair-skinned individuals are also considered as presenting some risk of keloid development. A specific hormonal environment has been frequently reported, elderly people presenting a lower risk of keloid formation than teen-agers or adults. The aspect of a keloid can be similar initially to that of a hypertrophic scar, but its evolution is constantly progressing during the first six months, resulting in a pseudotumor appended to the scar by a narrow base.

Depressed scars, atrophic scars and spread scars are characterised by the absence of underlying structure below the epidermis. These situations are more often observed either after loss of dermal-epidermal substance and skin grafting over an aponeurosis, or when some tension exists on the edges of the scar, as after naevus resection on the back.

2) Degree of congestion, colour, vascularity

A parameter comprising these aspects has been defined in the Vancouver scale[3] and three different abnormal stages have been proposed:

0: normal colour that closely resembles the colour over the rest of the body.

1: pink. This colour, usually observed during a transient period of time in most of the normal maturation processes, becomes a warning signal of pathological scar when it remains present after the second month of evolution.

2: red. A red aspect is linked to a scar hypervascularisation. This colour becomes obvious 4-8 weeks after complete healing and is a good sign of pathologic evolution. Usually, a red scar is combined with a progressive elevation, defining a scar hypertrophy.

3: purple. A purple scar is observed in highly vascularised scars, like burn scars or at the initial stage of a keloid process.

One of the main interests of these categories is in the use of vasopression as a tool to evaluate the scar vascularity. The time of recoloration after a provoked digital pressure on the scar can be measured and this time has been considered as a reflection of the scar evolution. This characteristic has also also been used to assess the effects of localised treatments (silicone gel sheets, corticosteroid injections, compressive garments).

3) Pigmentation

This charactetristic is more applicable to burn scars that extend over a large surface and have been subjected to different degrees of injury. Problems of pigmentation following dermabrasion (traumatic or therapeutic) have also been reported.

0: normal skin

1: hypopigmentation

2: hyperpigmentation

4) Shape

Various shapes of scar can be encountered. A good analysis of the scar shape is useful in determining which therapeutic mode should be proposed. Some shapes can be conservatively treated, trying to obtain an attenuation of the aesthetic aspect without complete removal of the area, others can just be excised (subsequent coverage can be made using several techniques). Scar shape can be linear or curved, trap-door, semi-circular, web or broken line, stellate, ice-pick or pitted, overhanging or avulsed.

5) Anatomical location

Scars crossing mobile areas like joints are more prone to retract and to provoke contractures. Direction is important and scars crossing Langer lines are prone to retract. The anterior and posterior thoracic areas are more prone to develop hypertrophy. This may be due to the major mechanical forces applied by the great mobility of the skin or by the weight of the breasts in females.

However, in the neck area, the relative absence of underlying mechanical resistance also leads to the development of hypertrophic scars. It is important to determine local biomechanical factors, either before or after creating a surgical scar, in order to propose a corrective solution.

6) Width

Scars subjected to mechanical forces will enlarge to some degree, depending on their anatomical location (shoulder, thorax, back). This enlargement can be associated with atrophy (frequently observed after the excision of naevi), or with hypertrophy (thermal burns).

7) Height

The Vancouver scale promoters proposed a classification of height changes in burn scars, which can be extended to other types of scars, including negative values for atrophic scars. Evaluation can be made using different tools, such as clinical evaluation or photospectroscopy. An increase in height is a useful sign of a pathologic scar and is related to an excessive amount of collagen synthesis.

0: normal

1: height (h)<2mm

2: 2mm<h<5mm

3: h>5mm

8) Texture, consistency, extensibility, pliability

Multiple situations can be observed with regard to the scar texture and its pathogenicity. Usually, stages 3 and 4 require local treatment, but for stage 5 surgery needs to be considered.

0: normal

1: supple: flexible with minimal resistance

2: yielding: giving way to pressure

3: firm: inflexible, not easily moved, resistant to manual pressure

4: banding: producing striations that blanche on stretching but with no limit to the range of motion