

Treating Birthmarks with Laser

Dr Salinda Johnson details the different types of birthmark and how to effectively treat them using laser

As an aesthetic practitioner, I treat adults who bear the constant reminder of symptoms first seen within one month of them being born. Today's younger patients with birthmarks enjoy the benefits of a science that has nearly come of age; however, many adult patients still suffer the trauma of looking different from their peers, and are often reluctant to return to the hospital environment, that sometimes dismisses their concerns as being only cosmetic. This article therefore focuses on the treatment of birthmarks in adults. Specifically it will cover the classification, treatment and expected results of a number of common types of birthmark.

The progression of treatment options

Vascular laser treatments originated with the treatment of port wine stain (PWS), using an Argon laser in the mid 1960s.¹ It was successful in reducing the colour of the PWS, but the pulse length (a repeated pulse of 0.2s) and small spot size (1mm), tended to result in a more general 'bulk' heating with resultant burning followed by scarring.² The use of laser in medicine changed when a major breakthrough occurred in 1983, following publication of the paper 'Selective photothermolysis: precise microsurgery by selective absorption of pulsed radiation' by Anderson and Parrish.³ This paper set out the principle that has been used in the subsequent 30 years of treating of birthmarks – if you can select a wavelength that is absorbed predominantly by haemoglobin or melanin, and use that in a pulse that is sufficiently powerful and timed to match the size of the target, you are able to selectively damage that target while having little or no negative impact on the surrounding tissue.³ In practice, lasers target a specific chromophore – haemoglobin in vascular lesions or melanin in pigmented ones. The chromophore heats up in the presence of light of certain wavelengths while the surrounding tissue does not. Heat radiates from the target into surrounding tissue at a given rate (thermal relaxation time).^{4,5} But because different wavelengths are required, and the depth to which the laser can penetrate the skin depends on the wavelength, multiple lasers are required. In the 1990s Intense Pulsed Light (IPL), which is produced by a halogen flash lamp, was introduced.⁶ Rather than use



Male patient in his 50s before treatment and one month after treatment for PWS, using 3 TX with Ellipse PR 530 applicator (PWS setting)

one specific wavelength, the raw broadband light of IPL covers a wavelength of 400-1200nm, which non-selectively targets haemoglobin, melanin and water. Early lasers and IPL had standard pulse lengths imposed by the limitations of the light sources concerned, but advances in electronics

mean that today's models are not so restricted. For example, the first Pulsed Dye Laser (PDL) had a pulse of only 0.45ms – too short for adult vessels. Now, the ability to create a range of pulse lengths gives the capability of treating adults. This is important, as the thermal relaxation time of the target is proportional to its size. For deeper vessels (the venous component of some lesions) a longer wavelength is required, and Nd:YAG laser meets these requirements. Many lasers can treat pigmented lesions, but Q-Switched lasers have been suggested to be more successful in treating dermal-pigmented lesions,⁷ as the energy used is delivered in a pulse measured in nanoseconds, effectively pulverising rather than heating the pigment. With the exception of many epidermal naevi, where lack of chromophore restricts treatment, all of the birthmarks mentioned below (or their residual effects) are treated using light-based technology.

Vascular Conditions

Diagnosis in adults is a question of looking at the colour and size of the lesion to determine vessel diameter and depth – larger vessels that are a dark colour (purple/blue) could suggest a deeper cause.⁸ Use a dermascope to gain more detail where required.

Infantile hemangiomas

These benign vascular neoplasms often involute naturally; 70% of cases do so by the age of seven.⁹ The drug propranolol is the current treatment of choice for children, and given as either systemic medication or topically,¹⁰ with the possible adjunct of PDL or IPL. However, more than 30% of adult patients who as children had natural involution by age six, and 80% of patients where this occurred after the age of six, have residue, scarring or develop telangiectasias.¹¹ I tend to treat resultant redness with IPL, using a short (5ms) pulse.

Naevus simplex (Stork Bites)

These are present in almost half of newborns as bright patches of skin.¹² Most resolve naturally with no residue within the first year of life, but 50% of those on the nape of the neck persist into adulthood.¹³ Again, the vessels are very small, and a 2 x 2.5ms pulse or single 5ms pulse can reduce the redness.

Naevus flammeus (Port Wine Stains)

This form of birthmark is found in 0.3% of babies.⁹ They persist and develop through the life of the patient. Initially bright pink or red in appearance, as patients age, the vessels dilate and the lesions darken through purple to a blue colour. In later life it may become nodular, and bleed spontaneously.¹⁴ A longer pulse (8ms) is more beneficial in adults. Success of treatment is in part determined by the location of the PWS itself; the forehead responds well, followed by the remainder of the face and neck, but results are not quite so good on the trunk and extremities, due in part to the depth and flow-rate of the vessels, and in part to the greater likelihood of hypertrophy.¹⁵

Pigment Conditions

Epidermal naevi are present in 0.1% of children who are under one year old.¹⁶ There are many subtypes depending on the cell type contained;¹⁶ keratinocytic or nonorganoid epidermal naevi typically contain only keratinocytes, whereas organoid epidermal naevi may involve additional types of epidermal cells, such as the cells that make up the hair follicles or yellow and pebbly sebaceous naevi; the wart-like verrucous epidermal naevus. While historically these were removed surgically as some feared the development of basal cell



carcinoma,¹⁷ most today are removed for aesthetic reasons via a short surgical procedure performed under local anaesthetic.

Café au lait macules (CALM)

14% of adults have one or more café au lait macules, which can occur anywhere on the body.¹⁸ While IPL can work in some cases, Q-Switched Nd:YAG is treatment of choice, as the much faster pulse can shatter the pigment, rather than heating it.

Dermal melanocytoses

These are a group of deeper dermal pigmented lesions including Mongolian spot (affecting the lumbrosacral area and often not persisting into adult life), Nevus of Ota (affecting the face) and Nevus of Ito (back and shoulders). All tend to present as a blue-brown lesion requiring Q-Switched Nd:YAG.

Conclusion

Before treating the patient, it is vital to ensure that they have a realistic expectation of the treatment result and are aware that treating an adult for a birthmark is likely to involve several sessions and result in skin that looks better, but is not totally perfect. A patch test to determine the suitability of the patient for treatment is essential, as is a full medical history. The rewards of such treatments are not just skin-deep; it is possible not only to change the appearance of the patient, but also to change their entire outlook on life, and the way in which they are viewed by society.



Dr Salinda Johnson is an aesthetic practitioner and has lectured and trained in the specialty for many years. Dr Johnson completed a specialist fellowship programme in cosmetic dermatology in 2000 and has continued to hone her techniques and expertise in the field ever since, incorporating up-to-date procedures and best practice as they develop.

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