17 Maximizing Safety with Nonablative Lasers

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Abstract

Nonablative lasers are commonly used to treat a variety of conditions such as dyschromia, fine rhytids, acne scars, tattoos, burn scars, hair removal, and striae. Through selective photothermolysis, lasers are able to target specific tissue chromophores based on their absorption wavelength (i.e., hemoglobin, water, melanin) while being minimally absorbed by adjacent nontarget tissue. The goal of nonablative laser resurfacing, and its primary difference compared to ablative lasers, is to restore damaged collagen without injuring or removing the overlaying epidermis. Nonablative lasers typically lead to less downtime compared to ablative laser treatments but are also associated with less dramatic results.

Keywords: laser, selective photothermolysis, laser resurfacing, nonablative laser, mid-infrared lasers, Nd, YAG laser, Q-Switched Nd, YAG laser, Diode laser, Fraxel, tattoo removal, hair reduction

Key Points

- The most common nonablative lasers used in facial aesthetics include: Nd:YAG, Q-switched Nd:YAG, Diode, Erbium glass fractional, visible light, and intense pulsed light devices.[1,2,3,4]
- Nonablative lasers are variably and moderately effective at reducing fine rhytids. Deeper rhytids are difficult to improve, and may require ablative lasers, chemical peel, and/or soft-tissue fillers.[3,5,6]

17.1 Safety Considerations

- Wavelength-specific safety equipment (i.e., eye protection) is required. When performed in the operating room, a laser-safe endotracheal tube must be used, and the lowest possible FiO2 should be given. Wet towels are applied around the treatment area to absorb heat energy and reduce risk of fire.[4,7]
- A test area can be used to identify the optimal fluence for the patient's skin.
- There are usually no visual endpoints for nonablative lasers used for the treatment of rhytids.[8,9,10]
- For hypervascular lesions, the treatment endpoint is mild purpura, persistent bluing of the vessels, or stenosis of the vessels.[1,7]
- For tattoo removal, the treatment endpoint is skin whitening.[11]
- Hypopigmentation (10–20%) is thought to be caused by melanocyte destruction secondary to heat injury. This is often transient and self-limited. Rarely delayed hypopigmentation can present 6–12 months after treatment.[1]
- Scarring is rare with nonablative lasers. Blistering may occur and is typically treated with antibiotic ointment until healed.[3,4,7,10]

17.2 Clinical Correlations

- Scars: combination treatments of different nonablative lasers may be most effective. For example, fractional lasers improve scar pliability, while pulsed dye laser (PDL) or intense pulse light (IPL) serve to improve erythema, hypervascularity, and dyschromia.
- Dyschromia: lentigines are treated with lasers that target melanin as chromophore.Such lasers include Q-switched lasers such as the 532 nm laser, the ruby laser, and the 755 nm alexandrite laser. Longer pulsed technologies include a wide range of visible light devices, from the long-pulse 532 nm KTP laser to the pulse dye laser and finally IPL.
- Hypervascularity: PDL, 532 nm KTP laser, and IPL are all effective. PDL can be used with purpuric and nonpurpuric settings.
- Tattoo removal: Nonablative lasers break up large particles into smaller particles to be phagocytosed by macrophages. The ideal laser depends on tattoo color, but Q-switched lasers are ideal for tattoo removal. Patients must be aware that multiple treatments may be required (as many as 10–15 in some cases).
- Hair reduction: lasers target melanin in the dermal papilla to destroy the hair follicle. Typically, lasers used include 810 diode, 755 alexandrite, and 1064 Nd:YAG. IPL is also effective for many patients. Laser hair reduction is most effective in patients with light skin and dark hair.

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