CASE REPORT/OLGU SUNUMU

Spontaneous Closure of Macular Hole Induced by Accidental Nd:YAG Laser Injury

Kaza ile Nd:YAG Lazer Sonrası Gelişen Maküler Deliğin Spontan Kapanması

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ABSTRACT

The natural history of Neodymium:yttrium aluminum garnet (Nd:YAG) laser-induced macular holes remains uncertain because this type of injury is uncommon. A 47 years old male physicist with the diagnosis of macular hole induced by accidental Nd:YAG laser injury was followed-up. The size of the macular hole decreased and vitreous hemorrhage resolved spontaneously. Accidental exposure to high-energy Nd:YAG laser may lead to concussive retinal damage and create a macular hole. Laser-induced macular holes can resolve spontaneously. The presence of an epiretinal membrane and the size of the macular hole are the common ocular signs that seem to affect the natural course of laser-induced macular holes.

Key Words: Nd:YAG laser, retinal injury, macular hole.

ÖZ

Neodymium:yttrium aluminum garnet (Nd:YAG) lazerin yol açtığı maküler deliklerin seyri, bu tip kazaların ender olmasından dolayı bilinmemektedir. Kaza ile Nd:YAG lazer hasarına bağlı maküler delik tanısı alan 47 yaşında erkek fizik uzmanı takibe alındı. Maküler deliğin boyutu azaldı ve vitre hemorajisi çekildi. Kaza ile yüksek enerjili Nd:YAG lazere maruz kalınması, retinada ciddi hasarlara neden olabilir. Ancak, lazere bağlı gelişen bu maküler delikler spontan kapanabilir. Lazere bağlı maküla hasarında, doğal seyri etkileyen en sık bulgular epiretinal membranın varlığı ve maküler deliğin boyutudur.

Anahtar Kelimeler: Nd:YAG lazer, retina hasarı, maküla deliği.

INTRODUCTION

The natural history of Nd:YAG laser-induced macular holes remains uncertain because this type of injury is uncommon. Surgical closure may be delayed because some cases demonstrate spontaneous closure.[1-3] However, there is no common ocular sign that can predict the natural course of laser-induced macular holes. Thus, it is unclear whether these holes will close spontaneously or not. This study reports the findings of a case in which a person was accidentally exposed to Nd:YAG laser and discusses the possible mechanism of spontaneous closure of the laser-induced macular hole.

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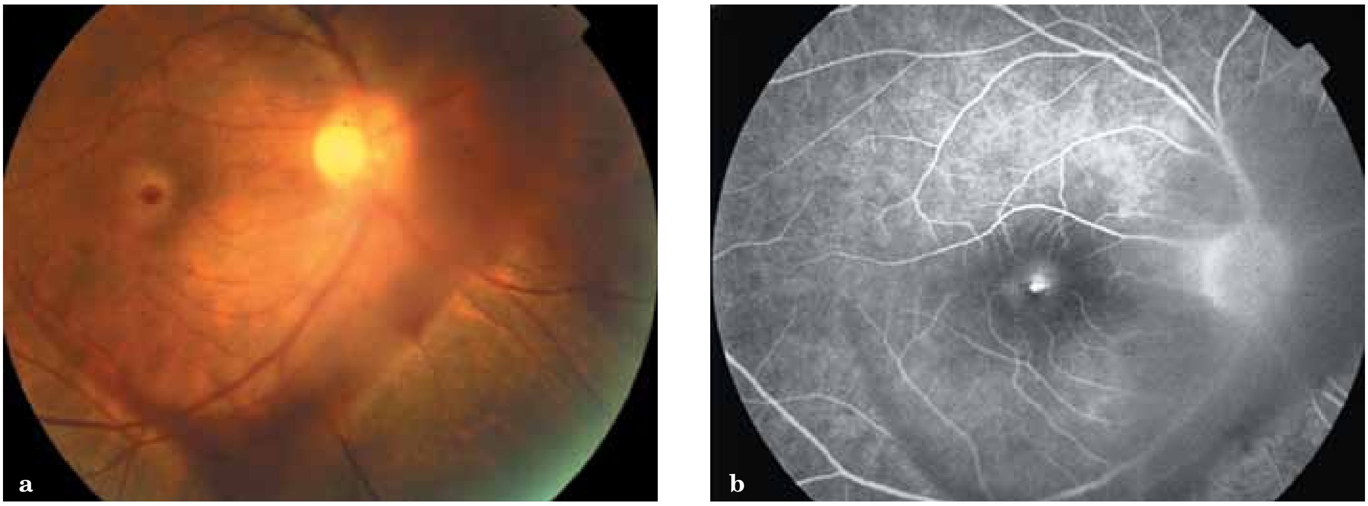

Figure 1a,b: *Fundus photograph on the day of injury revealed vitreus hemorrhage and laser induced foveal burn (a). Leakage of fluorescence pointing out window defects on late phase fluorescein angiography (b).*

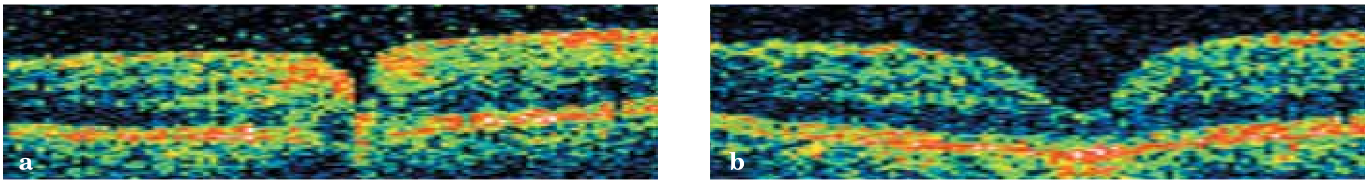

Figure 2a,b: *Optical coherence tomography showed lamellar macular hole of 290 µm diameter (a). The macular hole is closed six weeks later after injury (b).*

CASE REPORT

A fourty seven years old physicist who did not wear protective eye equipment during a workshop was accidentally exposed to a Q-switched Neodymium:yttrium aluminum garnet (Nd:YAG) laser at a wavelength of 1064 nm. The laser had pulse energy of 100 mJ and pulse duration of 10 nanoseconds and it was firing at a frequency of 20 Hz. Immediately after the injury, the patient noticed a sudden loss of vision in his right eye. On initial examination three hours after the exposure, best-corrected visual acuity (BCVA) was 20/400 O D and 20/20 OS.

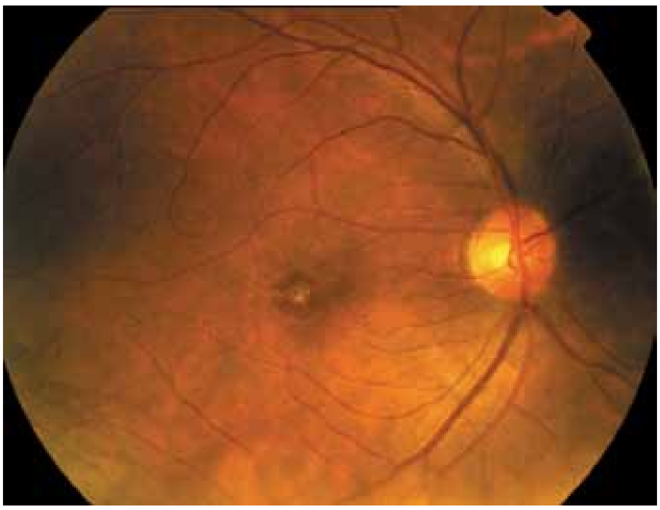

Figure 3: *Fundus photography of the same eye six weeks after injury revealed central pigmentation of the laser burn site.*

Intraocular pressure measurement and anterior segment biomicroscopy in both eyes were normal. The amsler grid revealed metamorphopsia and a central scotoma. Fundus examination showed discrete vitreous hemorrhage and a lamellar macular hole in the right eye (Figure 1a).

Fundus fluoresce in angiography (FA) revealed a leakage of fluoresce at the site of the lesion, and optic coherence tomography (OCT) demonstrated a hole size of 290 µm in diameter (Figure 1b,2a). Posterior subtenon triamcinolone acetonide with a dosage of 40 mg/ml was administered.

During the next month, the size of the hole decreased and vitreous hemorrhage resolved (Figure 2b). The patient's BCVA increased to 20/40, and fundus examination revealed a scar formation with atrophy of the retinal pigment epithelium (Figure 3). At the final examination after 2 years, the patient's visual acuity and the macular status remained unchanged.

DISCUSSION

Accidental exposure to high-energy Nd:YAG laser may lead to concussive retinal and choroid damage. When the destructive energy of the laser reaches the macula, it destroys tissues and may create a hole. The natural history of these laser-induced macular holes remains uncertain because this type of injury is uncommon.

Unlike idiopathic macular holes, there is no consensus on the operative treatment for laser-induced macular holes, because some cases demonstrate spontaneous closure.[1-4] However, no evidence or report clearly describes a mechanism for spontaneous closure of this kind of traumatic macular hole. The macular hole in this case closed within six weeks of injury. In a recent study of accidental Nd:YAG laser macular injury, only one of five patients had spontaneous hole closure.[1] There is no certain ocular finding that can help to determine the natural course in cases with laser-induced macular holes. Sou et al.,[2] reported that macular holes, which do not have surrounding fluid and swelling of the retina, might close spontaneously.

Hagemann et al.,[3] studied a patient whose macular hole closed spontaneously in association with development of an epiretinal membrane, which may have caused closure of the macular hole by contracting the hole's edge after Nd:YAG laser trauma. It has also been suggested that the occurrence of spontaneous closure could be influenced by hole size as non-resolving macular holes are generally larger (>250 µm).[1] The possible mechanism of spontaneous closure of laser-induced macular holes is based on fibroglial proliferation.[3,4]

Disruption of retinal tissue and associated hemorrhage results in intraocular cellular proliferation. These cells include fibroblasts, myofibroblasts, and retina pigment epithelium. Myofibroblasts, the contractile cells found in healing wounds, are considered responsible for wound contraction.[4]

Therefore, glial cell proliferation activity, which is high in young patients, could be the determining factor in the wound-healing process associated with retinal injury and spontaneous closure of macular holes.

The depth of tissue destruction in these cases may also affect the prognosis. Lamellar macular holes have more aptitude to close spontaneously compared to full-length ones.[5] The lamellar nature of macular hole in our case may have been a contributing factor for tissue healing without surgery.

In conclusion, laser-induced macular holes can resolve spontaneously. The presence of an epiretinal membrane and the size of the macular hole are the common ocular signs that seem to affect the natural course of laser-induced macular holes. Further research is required to define the mechanism that closes the macular hole, and to identify the ocular findings that may help to predict the clinical course of these cases.

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