

# CASE REPORT: Treatment of a Traumatic Facial Tattoo

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## ABSTRACT

Not all tattoos are placed intentionally or for cosmetic purposes. Traumatic tattoos are areas of abnormal skin pigmentation caused by embedded foreign particles. Many different techniques have been proposed in the past for late traumatic tattoo removal, nowadays lasers have become golden standard for tattoo removal. A two-step procedure involving fractional resurfacing plus Q-switched laser appears to increase tattoo clearance, eliminate blistering, shorten recovery, and diminish treatment-induced hypopigmentation. We present a case of traumatic facial tattoo successfully treated with two step procedure, resulting in a great patient satisfaction and with a complete disappearance of the lesion without any side effects.

**Key words:** traumatic tattoo removal, Q-switched Nd:YAG, complete clearance.

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## I. INTRODUCTION

Tattoos have been around for thousands of years. The first evidence of tattoos and tattoo removal attempts were found in Egyptian mummies 6000 years old [1]. But not all tattoos are placed intentionally or for cosmetic purposes. Medical tattoos are placed to mark treatment boundaries (e.g. in radiation therapy) or as a part of reconstructive therapies (e.g. in areola reconstruction after mastectomy). Traumatic tattoos are areas of abnormal skin pigmentation caused by embedded foreign particles which accumulate under the skin due to explosive forces, abrasion, or accidental injuries. This particles are usually amalgam, pencil point, petroleum products, fireworks particles, dust, dirt, sand, metal, glass, wood, gunpowder, blacktop, suture material, soot, or surgical pen [2,3]. The colour of traumatic tattoos is dark blue, brown, grey or black depending on the material and its depth [4,5]. The best possible results can be obtained if the foreign particles are removed as soon as possible

(under 24h) [6–8] which is unfortunately not always possible. Many different techniques have been proposed in the past for late traumatic tattoo removal; salt abrasion, dermabrasion, cryosurgery, surgical excision and others [9,10]. These methods are effective but have a high risk of permanent side effects such as depigmentation and scarring [1]. With the advances in technology lasers have become more available and therefore used more. Ablative full beam or fractional lasers (Er:YAG and CO<sub>2</sub>) [11–13] and non-ablative Q-switched lasers (Nd:YAG, alexandrite, ruby) [1,2,14–17] have been successfully used as a single step procedure for safe and effective tattoo removal. Recently, a two-step procedure involving fractional (ablative or non-ablative) resurfacing plus Q-switched laser has been proposed and tried by different authors [18–21] with the aim to increase transdermal pigment elimination [22]. This combined technique for laser tattoo removal appears to increase tattoo clearance, eliminate blistering, shorten recovery, and diminish treatment-induced hypopigmentation [20,21]. In this report we present a case of traumatic facial tattoo successfully treated with combined fractional and full beam Q-switched Nd:YAG laser, resulting in a great patient satisfaction and with a complete disappearance of the lesion without any side effects.

## II. CASE

A 22-year-old man came to our hospital with a grey-blue partially scarred tattoo on about 95% of his face, including the periocular area and both upper and lower eyelids. The traumatic tattoo was a result of a home gas explosion 6 months previously and probably consisted of carbon particles. He suffered extensive injuries to his face (traumatic neuropathy of both eyes, partial lagophthalmos) and was treated by other specialists for those problems. The traumatic tattoo was not treated before he presented to us. We decided to only treat one third of the face in one session because of the patient's extensive injuries. The treatment was performed with StarWalker MaQX (Fotona, Slovenia).

First 3 sessions, done with 10 week interval were tolerated without any problems, so in the 4<sup>th</sup> session 4 months later whole face was treated.



Fig. 1: Before the treatment.



Figure 2: During the treatment

**Table 1: Parameters used in the first 3 sessions. Each session 1 pass was performed over one third of the face.**

	1 <sup>st</sup> session (lower third of the face)		2 <sup>nd</sup> session (middle third of the face)		3 <sup>rd</sup> session (upper third of the face)	
	1 <sup>st</sup> step	2 <sup>nd</sup> step	1 <sup>st</sup> step	2 <sup>nd</sup> step	1 <sup>st</sup> step	2 <sup>nd</sup> step
Laser System	StarWalker MaQX					
Wavelength	Qs 1064 nm					
Handpiece	FS20A	R28	FS20A	R28	FS20A	R28
Mode	MaQX-1		MaQX-1		MaQX-5	MaQX-1
Fluence/Energy	7.6 mJ/px	1.7 J/cm <sup>2</sup>	7.6 mJ/px	1.4 J/cm <sup>2</sup>	10.7 mJ/px	4 J/cm <sup>2</sup>
Spot size	9x9 px	4.9 mm	9x9 px	5 mm	9x9 px	5 mm
Frequency	2 Hz	3 Hz	2 Hz	1.5 Hz	1 Hz	1 Hz

**Table 2: Parameters used in the 4<sup>th</sup> session. One pass was performed over each of the mentioned areas.**

4 <sup>th</sup> session	Eyelids	Lips and ears	All other facial areas	
Laser System	StarWalker MaQX			
Wavelength	Qs 1064 nm			
Handpiece	FS20A	R28	FS20A	R28
Mode	MaQX-1		MaQX-5	MaQX-1
Fluene/Energy	7.6 mJ/px	1.5 J/cm <sup>2</sup>	30 mJ/px	5.5 J/cm <sup>2</sup>
Spot size	9x9 px	5 mm	9x9 px	5 mm
Frequency	2 Hz	1 Hz	1 Hz	1.5 Hz

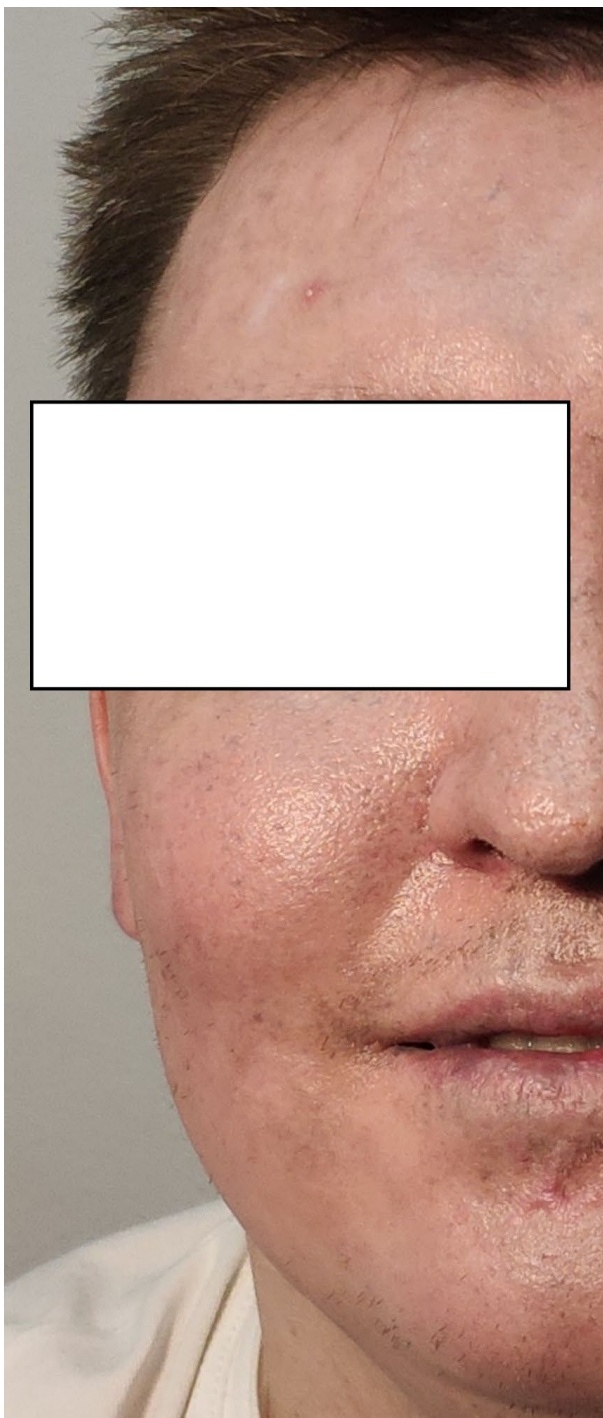


Fig 3: After 4 sessions

No anaesthesia was needed; any discomfort was reduced with air cooling. All personnel within the room wore protective goggles with the proper optical density. The patient was provided with protective eyewear (goggles or intraocular metal shields when we treated the eyelids). After each session the patient received 30 mg of prednisolone intramuscularly, topical solution of chlorhexidine and Bepanthen (Bayer, Germany) was prescribed. After the area healed fully in about 2-5 days, a use of SPF50 topical was encouraged. The exogenous particles were almost completely gone with 2 sessions.

### III. DISCUSSION

Tattoo removal has been sought for thousands of years but most of the older non-laser techniques carry high risk of permanent side effects such as depigmentation and scarring [1]. Lasers offer an effective way or removing any kind of tattoos with minimal chances for side effects [18–22], this is especially true for two step procedures like presented in this case report. Fast, safe and complete removal is important especially given the location of the traumatic tattoo in our case. Had the patient not been treated, the noticeable discoloration of the facial region would have had a significantly negative psychologic impact and cause great distress to the patient. We have been overly cautious because of the extensive injuries of our patient and it took 4 sessions for an almost complete clearance. However in retrospect we now know that first 3 treatment sessions could be performed all together in one sitting. Therefore only 2 sessions would be needed in order to get good results. We can conclude that StarWalker MaQX laser is a useful technique for traumatic tattoo removal with no side effects or complications, short recovery time (2-5 days) and minimal discomfort for the patient..

### REFERENCES

1. Adatto MA, Halachmi S, Lapidoth M. Tattoo removal. *Curr Probl Dermatol.* 2011;42:97-110. doi:10.1159/000328269
2. Kent KM, Graber EM. Laser tattoo removal: A review. *Dermatologic Surg.* 2012;38(1):1-13. doi:10.1111/j.1524-4725.2011.02187.x

3. Moreno-Arias GA, Casals-Andreu M, Camps-Fresneda A. Use of Q-switched alexandrite laser (755 nm, 100 nsec) for removal of traumatic tattoo of different origins. *Lasers Surg Med.* 1999;25(5):445-450. doi:10.1002/(SICI)1096-9101(1999)25:5<445::AID-LSM12>3.0.CO;2-Q
4. Apfelberg DB, Manchester GH. Decorative and traumatic tattoo biophysics and removal. *Clin Plast Surg.* 1987;14(2):243-251.
5. Suzuki H. Treatment of traumatic tattoos with the Q-switched neodymium:YAG laser. *Arch Dermatol.* 1996;132(10):1226-1229.
6. Bohler K, Muller E, Huber-spitz V. Dermatologic surgery Treatment of traumatic tattoos with various sterile brushes. 1992;749-753. doi:10.1016/0190-9622(92)70105-O
7. Vrints I, Den Hondt M, Van Brussel M, Nanhekhan L. Immediate debridement of road rash injuries with versajet® hydrosurgery: Traumatic tattoo prevention? *Aesthetic Plast Surg.* 2014;38(2):467-470. doi:10.1007/s00266-014-0290-x
8. Park JS, Min JH. Effective prevention of posttraumatic tattoo using hydrosurgical debridement in the ED. *Am J Emerg Med.* 2016;34(4):759.e3-759.e4. doi:10.1016/j.ajem.2015.08.033
9. Goldstein N, Penoff J, Price N, et al. VIII. Techniques of Removal of Tattoos. *J Dermatol Surg Oncol.* 1979;5(11):901-910. doi:10.1111/j.1524-4725.1979.tb00774.x
10. Peris Z. Removal of traumatic and decorative tattoos by dermabrasion. *Acta Dermatovenerol Croat.* 2002;10(1):15-19.
11. Cambier B, Rogge F. Traumatic tattoo: Use of the variable pulsed Erbium:YAG laser. *Photomed Laser Surg.* 2006;24(5):605-609. doi:10.1089/pho.2006.24.605
12. Seitz AT, Grunewald S, Wagner JA, Simon JC, Paasch U. Fractional CO2 laser is as effective as Q-switched ruby laser for the initial treatment of a traumatic tattoo. *J Cosmet Laser Ther.* 2014;16(6):303-305. doi:10.3109/14764172.2014.956669
13. Ibrahim OA, Syed Z, Sakamoto FH, Jd MMA, Anderson RR. Treatment of tattoo allergy with ablative fractional resurfacing: A novel paradigm for tattoo removal. :1111-1114. doi:10.1016/j.jaad.2010.11.005
14. Luebberding S. New Tattoo Approches in Dermatology. 2014;32:91-96. doi:10.1016/j.det.2013.09.002
15. Kuperman-Beadle M, Levine VJ, Ashinoff R. Laser removal of tattoos. *Am J Clin Dermatol.* 2001;2(1):21-25. doi:10.2165/00128071-200102010-00004
16. Bonan P, Bassi A, Bruscinio N, et al. Combined pulsed dye laser and Q-switched Nd:YAG laser intraumatic facial tattoo removal: A case series. *Dermatol Ther.* 2019;32(5):3-5. doi:10.1111/dth.13069
17. Jeon H, Geronemus RG. Successful treatment of a traumatic tattoo in a pediatric patient using a 755-nm picosecond laser. *Pediatr Dermatol.* 2018;35(6):e430-e431. doi:10.1111/pde.13668
18. Nordahl T. FracTat™ Tattoo Removal. *J Laser Heal Acad.* 2019;1(1):CB02.
19. Nachman-lee Y. Tattoo removal with Er : YAG predrilling. *J Laser Heal Acad.* 2018;1(1):CB09.
20. Weiss ET. Combining Fractional Resurfacing and Q-Switched Ruby Laser for Tattoo Removal. 2011;37:97-99. doi:10.1111/j.1524-4725.2010.01821.x
21. Marini L. Tattoo removal using multilayer Q-switched laser. *Prime.* 2016;(July/August):14-23.
22. Anderson RR. Regarding Tattoos. *Arch Dermatology.* 2001;137:210-212.

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