



Radiofrequency Ablation, Tattoo Inks, and Risk of Thermal Burn: First Case Report

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INTRODUCTION

Radiofrequency ablation (RFA) is a pain management modality that consists of the use of **electric currents near nociceptive pathways** with the goal of interrupting pain impulses.

The thermal energy generated by ohmic heating leads to tissue **destruction and modulation at the nerves**

RFA has been associated with **skin burns**, especially at the grounding pad site. Radiofrequency energy delivery in the proximity **of metallic components**, such as metallic particles in tattoo inks, may also lead to a heating effect.

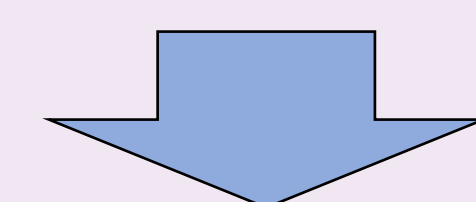
We present the first documented case where the **particles of tattoo ink are associated with thermal skin burn**.

MATERIALS AND METHODS

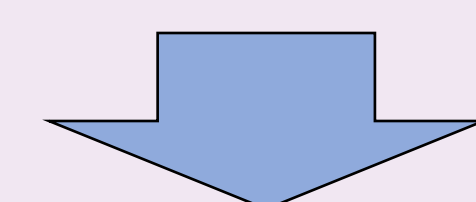
As this case report is **devoid of patient identifiable information**, it is exempt from IRB review requirements as per Cook County Health, Stroger Hospital's policy. Patient **informed consent was obtained** for submission of this case report.

CASE PRESENTATION

- 60-year-old female with no significant PMH. She has a 10x5 cm **tattoo located in the left scapular area**.
- Tattoo was made in Mexico using red and black color ink
- Due to cervical facet arthropathy, **right RFA was done (C4-C6)**



- RFA was performed under fluoroscopy guidance. **The needles were inserted about 30 cm from the tattoo**.
- The **grounding pad was located about 2 cm from the tattoo**.
- Sensory stimulation at 50Hz and 1V. Motor stimulation at 2 Hx and 3V were negative.
- Lesion was performed for **90 seconds at 80 degrees**.



- No evidence of complications in the recovery area**.
- On a follow-up visit, she stated that **four hours after the procedure she noticed erythema worse in the inside peripheral margin of the tattoo**.
- She used acetaminophen and aloe vera. Mild scarring was noticed in a 2 months follow-up.
- Complete resolution by 6 months**.

DISCUSSION

Our results	Other authors
Burning in the internal area of the tattoo, particularly in the edges. One ablation cycle	Huffman et al > Grounding pads Huffman et al > Three ablation cycles
Metallic particles?	Jin et al. > Metallic particles in liver (no statistical difference) Nguyen et al. > Effects are potentiated Nguyen et al. > Applicable in cardiology
Origin of the tattoo?	Karadagli et al. > Metallic components?
Resolution of symptoms and recommendations	Similar as burnings related with padding

REFERENCES

- Huffman SD, Huffman NP, Lewandowski RJ, Brown DB. Radiofrequency ablation complicated by skin burn. *Semin Intervent Radiol*. 2011;28(2):179-182. doi:10.1055/s-0031-1280660
- Goldberg SN, Solbiati L, Halpern EF, Gazelle GS. Variables affecting proper system grounding for radiofrequency ablation in an animal model. *J Vasc Interv Radiol*. 2000;11(8):1069-1075. doi:10.1016/s1051-0443(07)61341-4
- Lin ZW, Chu H, He F, Wang LP, Kong J. An in-vitro animal experiment on metal implants' thermal effect on radiofrequency ablation. *World J Surg Oncol*. 2013;11:147. Published 2013 Jun 22. doi:10.1186/1477-7819-11-147
- Nguyen DT, Barham W, Zheng L, Dinegar S, Tzou WS, Sauer WH. Effect of radiofrequency energy delivery in proximity to metallic medical device components. *Heart Rhythm*. 2015;12(10):2162-2169. doi:10.1016/j.hrthm.2015.05.011
- Nguyen DT, Tzou WS, Zheng L, et al. Enhanced Radiofrequency Ablation With Magnetically Directed Metallic Nanoparticles. *Circ Arrhythm Electrophysiol*. 2016;9(5):e003820. doi:10.1161/CIRCEP.115.003820
- Karadagli SS, Cansever I, Armagan G, Sogut O. Are Some Metals in Tattoo Inks Harmful to Health? An Analytical Approach. *Chem Res Toxicol*. 2023;36(1):104-111. doi:10.1021/acs.chemrestox.2c00323