

Novel Needle-type Electrocoagulation and Combination Pharmacotherapy: Basic and Clinical Studies on Efficacy and Safety in Treating Keloids

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Background and aim:

Keloids cannot be effectively treated using monotherapy regimens. This study aimed to evaluate the efficacy and safety of ablation (a novel needle-assisted electrocoagulation technique) combined with pharmacotherapy (corticosteroid and 5-fluorouracil [5-FU] injections) in removing keloids and to investigate the underlying biological mechanisms.

Methods:

The effects of energy consumption and duration of needle-assisted electrocoagulation on the ablation zone were tested in porcine liver tissue, which simulates human skin. The regulatory effects of ablation combined with pharmacotherapy on collagen deposition, cell proliferation, and angiogenesis were analyzed in a keloid-bearing nude mouse model in vivo. In a clinical trial involving six patients with keloids, the Vancouver Scar Scale (VSS) and Patient and Observer Scar Assessment Scale (POSAS) scores were graded before treatment and 1 month after one cycle of ablation combined with corticosteroid and 5-FU therapy.

Results:

Higher energy consumption and longer duration of electrocoagulation resulted in a larger ablation zone and higher surface temperature. Ablation combined with pharmacotherapy significantly reduced keloid volume in nude mice, upregulated MMP-1 and MMP-3, downregulated COL I and COL III, and inhibited angiogenesis and proliferation. This combination also significantly reduced the VSS and POSAS scores in patients with keloids after treatment without any obvious adverse events.

Conclusion:

Our findings show that electroablation combined with pharmacotherapy effectively reduces keloid volume by inhibiting collagen deposition, angiogenesis, and cell proliferation. Thus, this novel combination may serve as a safe therapeutic approach for keloid removal.

Keywords:

collagen; electrolysis; keloid; laser ablation.