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A Microneedling Fractional Radiofrequency Device for the Treatment of Nevus Comedonicus

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Nevus comedonicus (NC) is a rare type of epidermal nevus, usually involving the face, neck, and chest. It presents with dilated, clustered follicular openings with keratinous plugs. Treatment is advisable for aesthetic reasons and/or recurrent infections. Several different therapeutic options (oral retinoids, comedone extraction, dermabrasion, and lasers) have been attempted with only limited success.¹ Complete surgical excision remains the best option for widespread lesions.

A 27-year-old woman was referred with a biopsy-proven NC (Figure 1). The lesion had been present from birth and remained asymptomatic. Clinical examination revealed comedone-like papules, plaques, and pits clustered on the right neck area. The patient was referred for improvement of the appearance and given informed consent to treatment with a microneedling fractional radiofrequency (MFR) device (Chongqing Peninsula Co. Ltd., Chongqing, China). The bipolar radiofrequency energy is delivered through 49 microneedle electrodes covering an area of 1 cm² and is deployed into the deep dermis. A needle depth of 2 to 2.5 mm was chosen according to the depth of the lesion as measured from the H&E stained biopsy. The power was set between 12 and 16 W and was used for 4 sessions at 4-week intervals.

The treatment was performed in 2 to 3 passes with slight overlapping of the areas. At follow-up, the follicular plugs/comedones had disappeared without scarring (the scar in Figure 1 is due to the biopsy), and the patient did not display any long-term side effects. She was delighted with the result. After 1 year of follow-up, there was no recurrence of the lesion noted.

We suggest that treatment with MFR could be an effective approach for NC. A few reports have reported the use of ultrapulsed carbon dioxide laser and erbium YAG laser with some success.^{2,3} However, because the NC pathology extends down into the dermis, a device with the appropriate depth of penetration that can reach down to the dermis is necessary. Furthermore, MFR can possibly provide deeper thermal energy to induce functional and structural damage to the pilosebaceous units than other fractionated ablative or nonablative lasers. Moreover, MFR has been suggested to decrease inflammatory markers (NF- κ B and IL-8) in a previous study.⁴ It should be noted that the transcription factor NF- κ B regulates the expression of IL-1 α , which induces abnormal keratinization in the follicular infundibulum. On the basis of these findings, we hypothesize that MFR may decrease IL-1 α through downregulation of the NF- κ B pathway and improve the comedone-like lesions in NC.

Microneedling fractional radiofrequency is also likely to contribute to dermal remodeling by virtue of the microneedle therapy itself, while the heat produced by the radiofrequency will result in dermal fibroblast activation and collagen formation,⁵ all leading to the improvement in the appearance of NC. Thus, it has the advantage of both thermal and mechanical injury to the dermis compared with microneedling itself. Besides, MFR produces only minimal epidermal damage, so the patient should be less concerned about the risk of hyperpigmentation. In our case, the pigmentation of the lesions improved after treatment. In particular, because the depth of NC is variable, it is necessary to choose the appropriate depth of microneedle according to the results of the skin biopsy.

As far as we know, this is the first reported case of NC being treated with MFR with long-term follow-up. Theoretically, the efficacy of MFR on NC is likely to be better than other laser devices or microneedling itself. However, prospective controlled studies should be conducted to confirm our findings.

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Figure 1.

A woman with nevus comedonicus on the right neck area. (A) Many comedone-like pits, papules, and plaques can be seen in the lesion. (B) One year after initial treatment with microneedling fractional radiofrequency. The lesion had improved significantly.