TREATMENT OF FACIAL ANGIOFIBROMAS OF TUBEROUS SCLEROSIS WİTH RADIOFREQUENCY DESSICATION AND COAGULATION

https://doi.org/10.26574/rojced.2017.4.3.182

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Abstract

Tuberous sclerosis is an autosomal dominant neurocutaneous disorder with an incidence of approximately 7/100 000. Inheritance is autosomal dominant, but up to 70% of cases are new mutations. Tuberous sclerosis is mainly characterized by a triad of epilepsy, learning difficulties and skin lesions including angiofibromas, hypopigmented macules, connective tissue naevi and periungual fibromas. Angiofibromas are a common presentation of tuberous sclerosis. They cause considerable cosmetic and hygienic morbidity for patients. Treatments of angiofibromas have included curettage, cryosurgery, chemical peeling, dermabrasion, shave excision, lasers and 13-cis retinoic acid. Traditional methods of treating angiofibromas are not entirely successful as they frequently lead to scarring and pigmentary changes. We report the successful use of radiofrequency dessication and coagulation in treating multiple angiofibromas of four patients. The technique is easy to use and very cost effective.

https://doi.org/10.26574/rojced.2017.4.3.182

Keywords:

tuberous sclerosis, angiofibroma, ambulatory surgical procedures.

Cite this article:
Ulas Guvenc, Anil Gunsel Bahalı, Umit Tursen, Tamer Irfan Kaya, Guliz Ikizoglu, Erdinç Terzi. Treatment of facial angiofibromas of tuberous sclerosis with radiofrequency dessication and coagulation. *RoJCED* 2017;3(4):182-185

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Introduction

Tuberous sclerosis (TS) is a neurocutaneous disorder, characterized by a triad of epilepsy, learning difficulties and skin lesions that include angiofibromas, hypopigmented macules, connective tissue naevi and periungual fibromas. Incidence of TS is approximately 7/100 000 and inheritance is autosomal dominant, but up to 70% of cases are new mutations (1, 2). Genetic loci of TS are established on chromosomes 9 for TS1 and chromosomes 16 for TS2 (3).

Angiofibromas (AF) are 1-3 mm yellowish-red, translucent, discrete, waxy papules that are distributed symmetrically over the cheeks, chin, nose and forehead, and they represent a common presentation of tuberous sclerosis (4). They cause considerable cosmetic, hygienic, psychological problems, bleeding, and secondary infections. Treatments of AF have included curettage, cryosurgery, chemical peel, dermabrasion, shave excision, lasers and 13-cis retinoic acid (5-12). Traditional methods of treating angiofibromas are not entirely successful as they frequently lead to scarring and pigmentary changes.

In this study, we report the successful use of radiofrequency dessication and coagulation in treating multiple AF of four patients.

Materials and methods

The AF of four patients with TS, aged 11-33 years, was treated using radiofrequency dessication and coagulation. For this study, we divided AF into two different types, depending on their clinical appearance: vascular and fibrous.

Patient 1 is an 11 year old male with multiple vascular AF on the cheeks, nasolabial sulcus and chin.

He has learning difficulties, epilepsy, hypopigmented macules and no family history.

Patient 2 is an 18 year old male with multiple fibrous and vascular AF on the cheeks, nose, nasolabial sulcus and chin. He has learning difficulties, connective tissue naevus, hypopigmented macules, periungual fibromas and no family history. He had significant facial erythema.

Patient 3 is a 30 year old female with multiple fibrous AF on the cheeks, nose, nasolabial sulcus and chin. She has connective tissue naevi and hypopigmented macules without family history and learning difficulties.

Patient 4 is a 33 year old male with multiple fibrous AF on the cheeks, nose, nasolabial sulcus and chin. He has positive family history, connective tissue naevi, hypopigmented macules and no learning difficulties.

Patients with primarily fibrous lesions were treated with radiofrequency dessication (RD) and primarily vascular lesions were treated with radiofrequency coagulation (RC).

Soft tissue resistance to these waves causes the cellular water in soft tissue to heat, which produces steam and results in cellular molecular dissolution of individual tissue cells. Because of the low level of tissue destruction and controlled direction of the radio wave current, there is generally much less postoperative pain, swelling, and risk of infection than is generally experienced with other techniques (13). Radiosurgery can simply be termed as an electro surgery with radiofrequency. It is necessary to eliminate any possible misconception about radiosurgery by 'electrocautery' which is an older modality and quite different from radiosurgery. In electrocautery, the heat (rather than the radio wave) is transferred to the soft tissue by convection. A massive cell destruction results from the application of cautery and the destruction caused by this cauterisation is equivalent to that of a third degree burn (14).

Radiofrequency dessication and coagulation are superior techniques used for the treatment of a variety of benign skin lesions for which AF can be prototype. The lesion to be removed must have a point at which it can be detached from an underlying firm dermis. The site was prepared with 10% polyvinylpyrrolidone solution (Batticon® solution, ADEKA-ISTANBUL) and local anesthesia using 5% lidocaine with epinephrine (Jetokain® ampul, ADEKA-ISTANBUL). We did not use alcohol to prevent possible ignition. The lesion was then removed by smooth strokes of the curette with the head of the curette held at an angle to the skin. On the forehead and cheeks, the underlying dermis was very sebaceous and more care was taken to determine the appropriate depth of curettage. Our clinical endpoint with regard to the depth of tissue ablation was based on visual identification of the upper reticular dermis. When treating vascular AF with RC, we used the local anesthesia in same procedure as the fibrous AF, except for the very small lesions. We used needle electrodes in RD and ball electrodes in RC. Postoperative wound care consisted of topical fucidic acid (Fucidin® pomad, ABDI-IBRAHIM-ISTANBUL).

We used Ellmann EL-EMC Surgitrion (Ellmann International Inc. Helwett, NY, USA) radio surgery unit.

Results

We applied the treatment once a month in 2-5 sessions on the patients and our results were considered excellent in the majority of the lesions. Removing vascular AF was completed faster than fibrous AF. The patients were suggested to avoid sun exposure especially the first two weeks after the treatment sessions; and they were also told to use sun protection products for 2-3 months following the treatment. Thus, the possibility of postinflammatory hyperpigmentation development was minimized.

Clearance with treatment without any adverse events occurred in more than 80% of lesions on treated areas (Figures 1 and 2). The second patient's periungual fibromas were also treated with RD. No problem was observed in wound healing after the treatment. The lesion, which was completely cleared in a short time, recurred after eight months, though it was rather small compared to the previous one. We thınk the reason is the ınsufficient depth of the curettage.

Wound healing was completed in two weeks. As a side effect, hypertrophic scarring was noted in patient 2 during the treatment on the chin region, which was attributed to lack of compliance with postoperative wound care. Hypertrophic scarring was successfully treated with intralesional corticosteroids (Triamcinolone 40 mg/mL). Side effects were not observed on the other regions.

Figure 1. Before treatment (Patient 2)

Figure 2. After third session of treatment (Patient 2)

Patient satisfaction paralleled resolution of lesions and side-effects. The patients stated that they regained their self-confidence after treatment of AF.

Discussion

The therapeutic challenge of treating patients with AF is the need to destroy hundreds of angiofibromas while minimizing the risk of scarring. Thus, the literature reports numerous surgical treatments for the condition, including chemical peels, dermabrasion, cryotherapy, shave excision and lasers each with varying success. Traditional methods of treating AF are not entirely successful as they frequently lead to scarring and pigmentary change. The facial AF is often an annoying cosmetic issue for these patients, treatment alternatives should to offer better cosmetic results.

Radiofrequency surgery involves the passage of radio waves at the frequency of 1.5 to 4.5 MHz. In case of skin lesions, the most commonly used frequency is 3.8 MHz (15). A radio-surgical unit consists of an electrode, a ground plate (antenna) and a transformer. An antenna is used to focus the 'radio wave' which unlike traditional electro surgical units, does not have to be skin contact with the patient, rather it needs to be in the close proximity of the operating field. The unit is activated by a foot pedal. Electrodes are interchangeable, having four basic types: needle electrodes (for making incisions), loop electrodes (for excision and shaping tissues), ball electrodes (for coagulation), rod electrodes (for fulguration and dessication). The radiofrequency unit is used for four standard settings like cutting, cutting and coagulation, pure coagulation and fulguration (16). The radio waves generated, travel from the electrode tip to the lesion and return to the unit through the antenna (17).

Radiofrequency dessication-radiofrequency coagulation is a superior treatment since it is easy and inexpensive to apply, and the contraindication profile is minimal. Being applicable in policlinic conditions, and the minority of the adverse effects during and after operation are other important characteristics of RD-RC (13, 18, 19). Furthermore, it is advantageous for both patients and doctors that the patients are not required any important preparation before the operation, and they have the opportunity to assume their social lives after the operation; and the doctors apply the treatment in a short time and they do not need general anesthesia.

Although radiofrequency instrumentation has a lengthy documented history of use in oral, ophtalmic, plastic and anorectal surgery (20-25), there have been few published reports of its use in dermatological surgery (15-17). In practice, physicians use RF for many indications (15-17, 26-27) (Table 1).

1.	Removal of skin tags, warts, seborrhoic keratoses, syringoma, trichoepithelioma
2.	Removal of melanocytic naevi, telangectasias, early skin tumors
3.	Skin biopsies and grafts
4.	Resurfacing of scars
5.	Primary resection of keloids
6.	Debulking of skin tumors
7.	Depilation
8.	Resurfacing in case of Rhinophyma, Darier's disease, etc
9	Blepharoplasty
10.	Hair restoration surgery: scalp reduction, scalp lifting, scalp flaps
11.	Excision of plantar fibromata, ingrowing toe nail
12.	Non-ablative face lift

Table 1. Some indications for radiofrequency surgery

Radiofrequency surgery allows cutting without pressure and there is a little tissue damage with minimal scarring (13, 18). The electrode tip is sterile, as is all tissue being exposed to it. Healing is produced by granulation with a soft supple scar and no excessive fibrous scar tissue (19, 28). Radiofrequency surgery can be performed with ease in depth and in difficult areas of the skin. With radiofrequency, the targeted tissue temperatures stay stable within a 60-90°C range, thus limiting heat dissipation and damage to adjacent tissue (18, 19). In contrast, electrosurgery or laser temperatures are significantly higher (750-900°C), which can be associated with some negative effects (29). There are minimal incidences of postoperative infection

with radiofrequency and faster wound healing with low level of tissue destruction (13, 28, 30).

During many procedures like electrocautery, the area of operation is blurred due to frequent bleeding and smoke production. This problem makes the procedure more difficult and time-consuming. In contrast, radiofrequency surgery technique keeps us away from these problems.

Radiofrequency dessication-radiofrequency coagulation is an important treatment option, which can be applied on patients having facial AF, either alone or with the combination with other treatment options.

As a final note, the spectrum of applicability is large, respectively at a frequency of 3,8 MHz, it can perform cutting, simultaneous cutting and coagulation, and pure coagulation, whereas at a frequency of 1.7 MHz, it can effectively fulgurate the tissues (16).

In conclusion, the use of the RD-RC provides effective, safe and significant cosmetic results in treating facial AF. We believe that this technique must be considered as a treatment choice for these patients.

Financial disclosure: none declared.
Patient consent obtained.
Conflicts of interest: none declared.

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