RETROSPECTIVE REVIEW

Treatment of Xanthelasma Palpebrarum Using Trichloroacetic Acid 80%

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OBJECTIVE: We sought to analyze the effectiveness, recurrence, safety, and patient satisfaction rates following xanthelasma palpebrarum (XP) treatment with trichloroacetic acid (TCA) 80%. **METHODS:** This was a retrospective review of patients treated with TCA 80% for XP between January 2012 and August 2022. A prospective telephone questionnaire was administered to the same patient population to evaluate recurrence, patient satisfaction, and side effects. **RESULTS:** In total, 77 patients were included in this retrospective review. Most patients received one treatment (n=38; 49.4%) and had XP located bilaterally (n=59; 76.6%) on either the lower eyelids only (n=18; 23.4%) or both the upper and lower eyelids (n=18; 23.4%). Following treatment, 94.2 percent (n=49) of patients expressed satisfaction and 97.2 percent (n=70) displayed a clinician-reported improvement in XP. In the prospective patient questionnaire, the reoccurrence of XP was self-reported in 24.7 percent (n=19) of all patients. The adverse events, reported by the clinician during the retrospective review and the patient during the prospective questionnaire, included erythema (n=2; 2.6%), hyperpigmentation (n=4; 5.2%), hypopigmentation (n=3; 3.9%), and scarring (n=2; 2.6%). **LIMITATIONS:** Limitations may exist due to the retrospective nature of the chart review, missing data, and lack of a comparator cohort. Thus, further studies are required to validate this study's preliminary results. **CONCLUSION:** XP has a strong likelihood of recurrence. However, TCA 80% for XP management should be considered as a treatment option due to high patient satisfaction, mild side effects, low cost, and long-term cosmetic results.
KEYWORDS: Xanthelasma, xanthelasma palpebrarum, trichloroacetic acid, eyelids, xanthoma

Xanthomas are cholesterol-rich deposits that can appear anywhere on the body, such as the neck, trunk, shoulders, and axillae.[1,2] Xanthelasma palpebrarum (XP) is the most common presentation.[2] XP is a type of xanthoma characterized by soft, symmetrical, yellowish plaques, commonly located near the inner canthus of the eyelid, and more often on the upper, rather than lower, eyelid.[1,2] The prevalence is approximately 4.0 percent, with higher incidence rate in women (1.1%) than men (0.3%).[2] The age of onset ranges from 15 to 73 years; however, the majority of patients experience XP in their fourth or fifth decade of life.[2] XP development is potentially triggered by hyperlipidemia, thyroid dysfunction, and diabetes mellitus.[1]

Although XP is typically asymptomatic, XP produces cosmetic and psychological issues for patients due to their highly visible location on the face.[1] Various treatment options exist; however, there are no specific guidelines toward a gold standard of treatment due to the lack of satisfactory outcomes.[1] Different methodologies include surgical excision, radiofrequency, systemic therapies such as probucol and alirocumab, liquid nitrogen, cryotherapy, pingyangmycin, laser ablation therapies, such as CO_2 laser and pulsed dye laser, and chemical cauterization with trichloroacetic acid (TCA).[1,2]

TCA is a form of chemical destructive therapy, primarily used in topical concentrations of 50% to 100%.[2] This treatment modality is an affordable, short, and simple procedure.[1,2] The TCA procedural technique involves careful topical application in a circular fashion, with the greatest amount of TCA applied at the margin of the lesion. Following TCA treatment, sodium bicarbonate is typically applied for neutralization.[1,2]

Although TCA is a commonly used treatment option, the studies investigating TCA application had small sample sizes, used varying concentrations, or had short follow-up times. A 2018 review study for XP treatment options highlighted five studies with sample sizes of 21 to 51.[2] A 2015 study compared the efficacy of different concentrations of TCA (35%, 50%, and 70%) and CO_2 laser in 30 patients with approximately 6 to 9 patients per treatment group.[3] The study found that TCA 70% and CO_2 laser are highly effective and well tolerated for XP treatment, with 100 percent of patients in their groups achieving the best results, defined as very good or excellent results.[3] Another study observed that TCA 70% was the most effective concentration with the least amount of treatments with a total sample size of 51 subjects.[4] An average of 2.67 applications of TCA 70% were required to achieve the best results.[4] Recurrence rate ranges between 25 percent to 39 percent, with one study reporting a 34.5-percent recurrence rate at six-month follow-up.[4–7] Another 2010 study evaluated the efficacy of TCA 95% for XP clearance in 44 patients, with a mean follow-up time of 31.8 months; the study observed a 61-percent success rate.[5]

Currently, there is a lack of investigations focused on exploring the use of TCA 80% for XP treatment. Clinicians are therefore limited to providing patients with treatment options that are associated with low efficacy and high recurrence rates. The primary objective of this study is to evaluate the effectiveness of TCA 80% to make recommendations for using this modality for XP management over a longer follow-up period. The secondary objectives include assessing safety and patient satisfaction.

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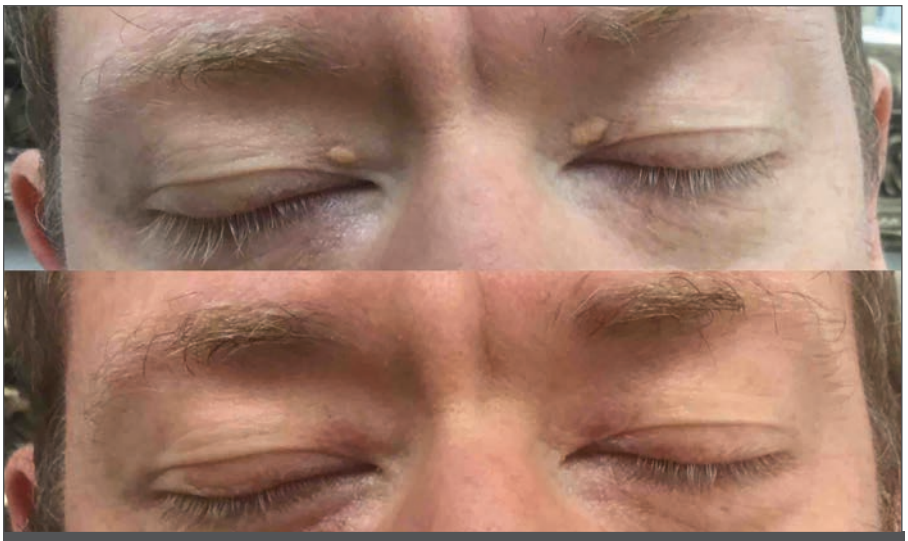

FIGURE 1. Bilateral xanthelasma palpebrarum resolution 58 days after one treatment of TCA 80%

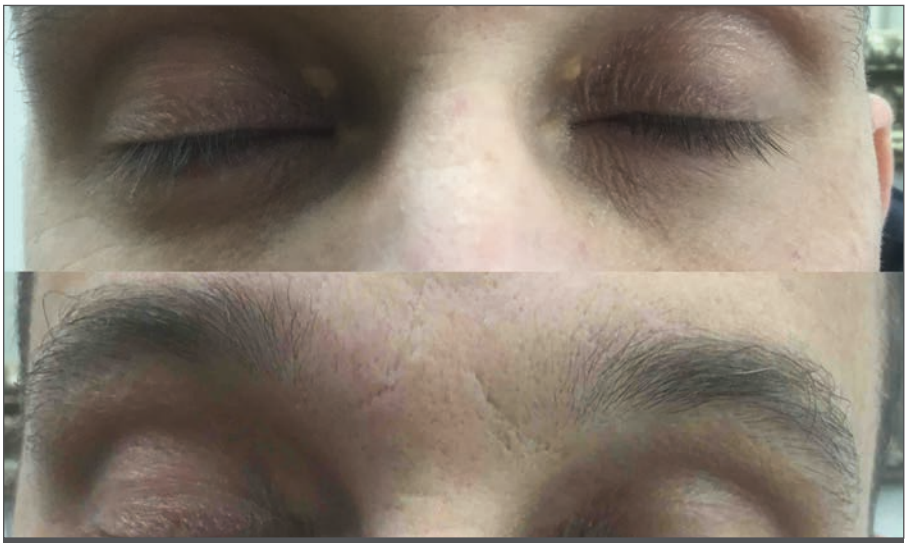

FIGURE 2. Bilateral upper and lower eyelid xanthelasma palpebrarum resolution 772 days after two treatments of TCA 80%

METHODS

Study design. A retrospective medical chart review was conducted followed by a prospective telephone patient questionnaire. The retrospective review consisted of patients who had XP treated with TCA 80% between January 2012 and August 2022. All patients received treatment from one outpatient dermatology site in Oakville, Canada. The patients who met the study criteria were identified by the code used in the site's electronic medical database for XP and TCA treatment. Exclusion criteria included patients who received the study treatment for any indication other than XP and patients who did not return to the site after initial treatment. Retrospective chart review and data collection was followed by a prospective patient questionnaire in the same patient population. The patient questionnaire was administered via a telephone call where the patient had the option to provide or deny verbal consent for the optional telephone patient questionnaire. An attempt was made to contact all patients for a telephone interview to inquire about recurrence of the lesion, patient's satisfaction with the treatment results, and side effects experienced. Three attempts were made on three separate occasions to contact each patient for the telephone questionnaire.

The study protocol, patient questionnaire, and verbal informed consent form was approved by a centralized research ethics board. A waiver for consent was obtained for the retrospective nature of the study; the patients included in Figures 1 to 3 provided additional written consent for use of these photos for research purposes and the patients who participated in the prospective questionnaire portion of the study provided verbal consent. Patients were not incentivized to receive treatment as the TCA 80% treatment was paid for by the patients as cosmetic procedures.

Clinical evaluations for effectiveness (improvement), patient satisfaction, as well as safety and tolerability of TCA 80% were completed from the retrospective review of chart notes. The prospective patient satisfaction, recurrence rate, and safety were completed from the patient questionnaire.

Procedure. The procedure was performed with the patient in the supine position. The TCA 80% preparation was obtained from a local pharmacy (Mississauga, Ontario). A pointed wooden applicator stick with a small wisp of cotton was dipped into TCA 80% and then blotted on a piece of gauze to remove any excess acid. TCA 80% was carefully applied topically to the lesion using a dotting technique until the entire lesion has been covered. Special care was taken to prevent the acid from trickling down on the edge of the eyelid or non-lesional areas. The lesion became frosted white within a few seconds. Once the treated area has completely frosted, an applicator stick was used to remove the remaining TCA. All patients were then prescribed fusidic acid 2.0% ointment, which was used twice daily for five days for infection prophylaxis. When necessary, another application of TCA 80% was repeated during subsequent visits.

Statistical analysis. Data analysis was performed using the IBM SPSS Statistics software (Version 29.0.0; SPSS Inc, Chicago, Illinois). The following variables were assessed: age, sex, number of TCA treatments, size of XP, location, adverse events, patient satisfaction, response to treatment, concomitant medications/therapies, follow-up period length, and reoccurrence of XP. Age and follow-up period length were summarized by mean, standard deviation, minimum value, and maximum value. All other variables were summarized by frequency, percent, valid percent, and cumulative percent.

RESULTS

After accounting for the inclusion and exclusion criteria, a total of 77 patients were identified to have undergone TCA 80% treatment for XP. The mean age of patients during the time of treatment initiation was 48.41 years (SD±8.64), with a minimum age of 26 years and maximum age of 69 years. The age of one patient was unknown. The patient population consisted of 80.5 percent females (n=62) and 19.5 percent males (n=15). The number of TCA treatments administered to each patient ranged from 1 to 5, with a mean of 1.64. The majority of patients received one treatment (n=38; 49.4%), which was followed by two treatments (n=31; 40.3%), three treatments (n=6; 7.8%), and lastly, four treatments (n=1; 1.3%) or five treatments (n=1; 1.3%). Furthermore, the size of the initial XP was classified as small, medium, or large based on clinician assessment. Data on XP size was missing for 57.1 percent of patients (n=44) in the electronic patient chart notes. Of the 33 patients whose XP was classified by size, 20.8 percent (n=16) had small-sized lesions, 2.6 percent (n=2) had medium-sized lesions, and 19.5 percent (n=15) had large-sized lesions. The XPs were also assessed by location, specifically side (left, right, or bilateral) and area (upper eyelid, lower eyelid, or upper and lower eyelids). For side, 16.9 percent (n=13) of patients had XP on the left only, 6.5 percent (n=5) had XP on the right only, and 76.6 percent (n=59) had XP bilaterally. For affected eye area, 53.2 percent (n=41) of patients had XP on the upper eyelid only, 23.4 percent (n=18) of patients had XP on the lower eyelid only, and 23.4 percent (n=18) had XP on both the upper and lower eyelids. Table 1 shows the demographic information of the study patients.

Following TCA 80% treatment, 36.4 percent (n=28) of patients experienced an adverse event, as assessed by the clinician. This included edema (n=8; 10.4%), erythema (n=5; 6.5%), hyperpigmentation (n=6; 7.8%), hypopigmentation (n=2; 2.6%), induration (n=3; 3.9%), crusting (n=1; 1.3%), and scarring (n=3; 3.9%). All patients were prescribed fusidic acid 2.0% topical ointment for infection prophylaxis. Some patients also utilized one of the following concomitant medications or therapies: dexamethasone 0.1% topical ointment (n=2; 2.6%), doxycycline 100mg (n=1; 1.3%), hydrocortisone valerate

FIGURE 3. Left upper eyelid xanthelasma palpebrarum resolution 56 days after one treatment of TCA 80%

TABLE 1. Demographic data for 77 patients with xanthelasma palpebrarum treated with trichloroacetic acid

CHARACTERISTIC		VALUES
Age		Mean (± SD)
Years		48.41 (± 8.6)
Sex		Frequency (%)
Female		62 (80.5)
Male		15 (19.5)
Size of Xanthelasma		Frequency (%)
Small		16 (20.8)
Medium		2 (2.6)
Large		15 (19.5)
Missing data		44 (57.1)
Location of Xanthelasma		Frequency (%)
Side	Left	13 (16.9)
	Right	5 (6.5)
	Bilateral	59 (76.6)
Area	Upper eyelid	41 (53.2)
	Lower eyelid	18 (23.4)
	Upper and lower eyelids	18 (23.4)
Number of treatments		Frequency (%)
1		38 (49.4)
2		31 (40.3)
3		6 (7.8)
4		1 (1.3)
5		1 (1.3)

TABLE 2. Duration of follow-up period from the retrospective chart review and prospective telephone questionnaire

FOLLOW-UP DURATION	MEAN (± SD)
Retrospective chart review	
Days	244.47 (± 269.39)
Prospective telephone questionnaire	
Days	910.75 (± 629.21)*

*Data is missing for 45 patients

TABLE 3. Patient satisfaction from the retrospective chart review and prospective telephone questionnaire

PATIENT SATISFACTION	FREQUENCY (%)
Retrospective chart review	
Dissatisfied	3 (3.9)
Satisfied	49 (63.6)
Missing Data	25 (32.5)
Prospective telephone questionnaire	
Extremely dissatisfied	3 (3.9)
Dissatisfied	7 (9.1)
Neutral	4 (5.2)
Satisfied	8 (10.4)
Extremely satisfied	10 (13.0)
Missing data	45 (58.4)

TABLE 4. Patient responses to treatment from the retrospective chart review and prospective telephone questionnaire

TREATMENT RESPONSE	FREQUENCY (%)
Retrospective chart review	
Improvement	70 (90.9)
Reoccurence/no improvement	2 (2.6)
Missing data	5 (6.5)
Prospective telephone questionnaire	
Sustained improvement	13 (16.9)
Reoccurrence	19 (24.7)
Missing data	45 (58.4)

TABLE 5. Adverse events experienced following treatment from the retrospective chart review and prospective telephone questionnaire

ADVERSE EVENTS	FREQUENCY (%)
Retrospective Chart Review	
Crusting	1 (1.3)
Edema	8 (10.4)
Erythema	5 (6.5)
Hyperpigmentation	6 (7.8)
Hypopigmentation	2 (2.6)
Induration	3 (3.9)
Scarring	3 (3.9)
None	49 (63.6)
Missing Data	0 (0.0)
Prospective Telephone Questionnaire	
Crusting	0 (0.0)
Edema	0 (0.0)
Erythema	2 (2.6)
Hyperpigmentation	4 (5.2)
Hypopigmentation	3 (3.9)
Induration	0 (0.0)
Scarring	2 (2.6)
None	21 (27.3)
Missing Data	45 (58.4)

0.2% or hydrocortisone 0.5% topical ointment (n=2; 2.6%), pimecrolimus 1.0% topical ointment (n=1; 1.3%), polysiloxane and silicon dioxide-based gel (n=6; 7.8%), or triamcinolone acetonide 10 mg (n=1; 1.3%). Only one patient required three concomitant interventions, including fusidic acid 2.0% topical ointment, 0.5% hydrocortisone topical ointment, and triamcinolone acetonide 10mg.

Per clinician assessment, 90.9 percent (n=70) of patients exhibited an improvement in XP following TCA 80% treatment. No change was observed in 2.6 percent (n=2) of patients, and information regarding treatment response was missing for 6.5 percent (n=5) of patients. Therefore, from the available clinician notes, 97.2 percent (n=70) of patients experienced an improvement. Patient satisfaction was also self-reported during the time of follow-up in clinic, with no prompting from the clinician. Most patients (63.6%; n=49) reported being satisfied with the treatment outcome while 3.9 percent (n=3) of patients were dissatisfied due to treatment ineffectiveness. The satisfaction or dissatisfaction rates of 32.5 percent (n=25) of patients were not reported in their electronic medical health records. Therefore, of the patients who reported satisfaction during in-clinic visits, 94.2 percent (n=49) of patients reported satisfaction. Overall, all 77 patients were followed for a mean duration of 244.47 days (SD ± 269.39) in the clinic. The minimum follow-up period was 15 days post-treatment, and the maximum follow-up period was 1,297 days post-treatment. Table 2 reflects the means and standard deviations for the minimum and maximum follow-up times.

The same patient population was invited to participate in a prospective telephone questionnaire to evaluate XP reoccurrence, satisfaction, and adverse events. Of the 77 patients involved in the retrospective arm of this study, 41.6 percent (n=32) were successfully contacted and provided verbal informed consent. From the time of treatment initiation to questionnaire completion, the involved patients were followed for a mean period of 910.75 days (SD ± 629.21). The minimum follow-up length was 1,117 days while the maximum follow-up length was 2,117 days. From the patients who participated in the prospective telephone questionnaire (n=32), 24.7 percent (n=19) reported reoccurrence of XP and 16.9 percent (n=13) reported long-term treatment success with no reoccurrence to-date. Patient satisfaction was also assessed through a five-point Likert scale in which patients were asked to select one of the following options: extremely dissatisfied, dissatisfied, neutral, satisfied, and extremely satisfied. Most patients reported being extremely satisfied (n=10; 13.0%) or satisfied (n=8; 10.4%) with TCA 80% treatment for XP. A total of 5.2% (n=4) of patients assessed their satisfaction to be neutral while 9.1 percent (n=7) selected dissatisfied and 3.9 percent (n=3) selected extremely dissatisfied. Retrospective and prospective patient satisfaction and improvement are reported in Tables 3 and 4, respectively. When asked about adverse events experiencing during or post-treatment, 2.6 percent (n=2) of patients reported erythema, 5.2 percent (n=4) hyperpigmentation, 3.9 percent (n=3) hypopigmentation, and 2.6 percent (n=2) scarring. No adverse events were reported by 27.3 percent (n=21) of patients who participated in the prospective telephone questionnaire. Table 5 summarizes the adverse events experienced retrospectively and prospectively.

DISCUSSION

TCA is a common treatment method for XP due to being an cost-effective, simple, and short procedure.[2] TCA is traditionally used topically at concentrations of 50% to 100%.[2] Previous studies have evaluated the efficacy of TCA concentrations of 30%, 35%, 50%, 70%, 95%, and 100%.[3–5,8] Higher concentrations between 70% to 100% have been demonstrated to have higher efficacy in treating XP patients irrespective of the number, type, or size of lesion; Nassief[9] demonstrated a statistical significance in treatment with TCA 70% in comparison to 30%. Mourad et al[3] compared the efficacy and tolerability of TCA concentrations of 35%, 50%, and 70%, with TCA 70% being the most effective concentration. To our knowledge, this is the first report evaluating TCA concentration of 80% in XP management and treatment. Haque and Ramesh[4] treated 16 of 51 patients with TCA 70% with a mean of 2.67 treatments, another 2009 study had a mean of 1.50 treatments with TCA 70%, and a 2010 study using TCA 95% had a mean of 1.68 treatments.[4,5] The present study had majority of patients receive only one treatment (49.4%; n=38) with a mean of 1.64 treatments of TCA 80%. This study, in addition to previous studies, showed that 1 to 2 treatments were sufficient in initially achieving the desired cosmetic outcome, suggesting that this treatment can be effective in XP clearance.

The primary objective of this study was to assess the effectiveness of TCA 80% in the treatment of XP as denoted by prospective recurrence rate and retrospective clinician-reported improvement. Recurrence is a common problem with XP, regardless of the method of treatment. Recurrence of XP is expected due to the re-depositing of cholesterol. One

study evaluating TCA 95% in XP management reported 66.7 percent (n=34) of patients experienced recurrence, lesion persistence, or underwent post-TCA surgical excision at a mean follow-up of 31.8 months.[5] This study also conducted a phone interview, which found their treatment success with TCA 95% dropped from 70 percent at a mean follow-up of 14.3 months to 33 percent at a mean follow-up of 31.8 months.[5] Another study assessing TCA 70% reported a lower recurrence rate of 25 percent (n=6) at the six-month follow-up; however, this study had a smaller sample size and shorter follow-up time in comparison.[6] The present study has significantly lower recurrence rate of 2.6 percent (n=2) retrospectively. Although the prospective recurrence rate increased to 24.7 percent (n=19) during a mean follow-up duration of 30.4 months (910.75 days), this rate was still lower with a larger sample size and equivalent or larger follow-up duration than other studies. The difference could potentially be explained by the relatively high amount of missing data (58.4%; n=45) from the prospective questionnaire as 41.6 percent (n=32) of patients consented to the prospective patient questionnaire. The remaining patients (n=45), who did not consent to the questionnaire or could not be contacted, did not report reoccurrence with the treatment. From the clinician notes, 97.2 percent (n=70) had noted improvement after treatment; this reported outcome is consistent with another study evaluating TCA 70%, in which 91.2 percent (n=31) patients reported improvement. However, the present study included more than double the number of patients in the study evaluating TCA 70% and had a higher percentage of patients experiencing improvement. There was a decline in patients that reported sustained improvement (16.9%; n=13) during the prospective questionnaire; this is expected with the recurrence history of XP. The drastic change between the retrospective and prospective improvement frequency may also be due to the amount of missing data (58.4%; n=45) from the prospective questionnaire. If the missing data is removed, 68.4 percent (n=13) reported sustained improvement at a mean follow-up at 30.4 months (910.75 days). There were no associations found between the number of eyelids involved or number of TCA treatments and the rate of recurrence of XP; this is consistent with another study evaluating TCA 95%.[5]

The secondary objectives included evaluating treatment safety and patient satisfaction. TCA has been popularly used in various concentrations ranging from 35% to 100% as tissue cauterants.[3–5,8,10] The mechanism of action involves precipitating and coagulating proteins as well as dissolving lipids.[11] The main complications associated with TCA treatment include hypopigmentation, hyperpigmentation, scarring, ectropion, as well as inflammation and scarring of conjunctiva or cornea.[5] No serious side effects were seen, and the rate of side effects is not greater than other studies evaluating any concentration of TCA. More serious complications associated with chemical peeling such as ectropion, ulcerations, or burns were not experienced.[9] The most common side effects experienced in this study included edema, erythema, hyperpigmentation, hypopigmentation, induration, crusting, and scarring, which are consistent with other studies evaluating TCA usage. One study examining TCA 70% had adverse events of edema (45%; n=9) and erythema (50%; n=10) while another TCA 70% study only experienced hypopigmentation (33.3%; n=8).[6] Haque and Ramesh[4] compared TCA concentrations of 50 percent, 70 percent, and 100 percent in 51 patients; side effects reported included hypopigmentation (21.6%; n=11), hyperpigmentation (9.8%; n=5), and mild scarring (2.0%; n=1). The rate of side effects reported in the present study were consistent compared to other studies with a total of 36.4 percent (n=27) of patients experiencing side effects. One study demonstrated that 2.0 percent (n=1) of patients experienced scarring while another study indicated 3.0 percent (n=15), which is on par with the scarring (3.9%; n=3) reported in the present study.[4,12] As per Rubin[13], scarring complication could be due to a very deep skin wound. Induration was experienced by 3.0 percent (n=3) of patients in the present study, and this could be due to the development of a scar. Only one patient in the present study reported crusting. Crusting is an expected process after TCA application and during the healing phase. All patients are informed by the clinician prior to starting treatment that crusting is a very common side effect of the treatment process, thus, only exceptional crusting was reported and recorded in the patient's chart. Therefore, the one reported incidence of crusting could be classified as significant even though all patients in the study likely experienced crusting associated with TCA treatment. In addition, a similar incident was reported in a case report with five applications of TCA 33%.[14] In this case report, the reported crusting could have been due to inadvertent dripping of TCA. The present study did not have any reported inadvertent application of TCA. Prospectively, only 14.3 percent (n=11) of patients reported side effects, which is a much lower rate of incidence than in the retrospective chart review. This may be due to sizeable amount of missing data (58.4%; n=45) or patients' inadvertently forgetting adverse events experienced during the treatment period due to the long follow-up times.

Most interestingly, there was a high degree of patient satisfaction reported in the retrospective as well as prospective components. Patient and cosmetic satisfaction from the treatment are important considerations as these tend to be the primary reason that patients initially seek treatment. From the patients who recorded satisfaction in the chart notes, 94.2 percent (n=49) reported being satisfied with the treatment results at a mean follow-up of 244.47 days (8.1 months). Another 2009 study evaluating TCA 70% found 100 percent of patients (n=24) reported cosmetic satisfaction with the treatment at the three-month follow-up visit.[6] Overall, the present study had over double the sample size and longer follow-up time in comparison. However, of the patients that consented to the prospective patient questionnaire, there was a decline to 56.3 percent (n=18) patients that reported high degree of satisfaction (extremely satisfied or satisfied), 31.3 percent (n=10) reported dissatisfaction (dissatisfied, extremely dissatisfied), and 12.5 percent (n=4) of patients reported being neutral. A 2010 study evaluating TCA 95% with similar retrospective review and prospective telephone interview design found that 38.6 percent (n=17) were concerned or dissatisfied with the cosmetic appearance of their XP and requested further discussion about their treatment options at a mean follow-up of 31.8 months.[5] This same study reported 27.5 percent (n=14) of patients felt that the TCA treatment had limited success, but was not concerned about the appearance; therefore, patients had a neutral response.[5] If responses

are grouped into satisfied versus non-satisfied responses (dissatisfied and neutral), then, the 2010 study reported 60.8 percent (n=31) non-satisfied responses while the present study reported 43.8 percent (n=14) of non-satisfied responses. Due to the high propensity of XP recurrence, the increase in patient dissatisfaction is expected and warranted. The present study had a similar follow-up time to the study evaluating TCA 95%; however, the present study had a lower rate of dissatisfaction. Our study results suggest that this concentration could still be considered beneficial due to long term satisfaction.

There are certain limitations that arise from the retrospective design of the study. Reported effectiveness was based on subjective chart notes and a prospective patient questionnaire, which could have introduced bias due to any missing data within the charts as well as participation bias and recall bias for the questionnaire. A few patients used other topical products to assist with healing and scar management, such as a silicone gel, which could have contributed to XP resolution, recurrence rate, cosmetic outcomes, and correspondingly, patient satisfaction. A fully prospective study with a comparator group, larger cohorts at multiple treatment sites, and removal of any other scar healing agents that could contribute to aesthetic outcome should be considered. This study shows that this treatment modality has promising results but requires further investigation.

CONCLUSION

XP is a difficult condition to manage with a strong propensity for recurrence. TCA 80% shows promising results as a treatment modality for this difficult condition. This treatment has benefits of being a relatively fast, affordable, and easy procedure to complete for the clinician. Most importantly, the treatment exhibited a high degree of patient satisfaction that was sustained long-term compared to other TCA concentrations. The patients perceived nominal side effects, minimal invasiveness, and reduced risk of further cosmetic disfiguration. Furthermore, the results and clearance of XP can be maintained long-term with repeated treatments. Overall, TCA 80% offers a safe, cosmetically beneficial, and highly satisfying outcome for patients and clinicians.

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