Comparison of Treatment of Cherry Angioma With Pulsed-Dye Laser, Potassium Titanyl Phosphate Laser, and Electrodesiccation

A Randomized Controlled Trial

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Objective: To assess the comparative efficacy of energy treatments in resolving cherry angioma.

Design: Rater-blinded randomized controlled trial.

Setting: Outpatient dermatology clinic in an urban referral academic medical center.

Participants: Fifteen healthy adults aged 21 to 65 years were enrolled. Two eligible individuals who were approached declined to participate, and no one enrolled was withdrawn for adverse effects.

Interventions: For each participant, 3 areas on the torso were demarcated such that each area contained 4 cherry angioma. Each area was then randomly assigned to receive 1 of the 3 treatments: pulsed-dye laser (PDL) (595 nm), potassium titanyl phosphate (KTP) laser (532 nm), or electrodesiccation. Two treatments spaced 2 weeks apart were delivered to each area.

Main Outcome Measures: Standardized photographs from before treatment and 3 months after the last treatment were evaluated for color and texture on visual analog scales.

Results: Mean change in color was a significant improvement of 7.77 ($P < .001$), but there was no significant difference across treatment arms ($P = .19$). Mean change in texture was a significant improvement of 6.23 ($P < .001$), and the degree of textural change also differed across treatments ($P < .001$). In pairwise comparisons, cherry angiomas treated with electrodesiccation were significantly less improved than were those receiving KTP laser ($P = .003$) and those treated with PDL ($P = .001$). The effects of KTP laser and PDL on texture were not different ($P = .50$).

Conclusions: Cherry angiomas can be effectively treated with electrodesiccation and with laser. Laser, especially PDL, may minimize the likelihood of treatment-associated textural change.

Trial Registration: clinicaltrials.gov Identifier: NCT00509977

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Cherry angioma, the most common acquired cutaneous vascular proliferations, often begin to appear in the third decade of life and continue to increase in number across time. These lesions typically present as bright red, round papules or macules that vary in size and are usually localized to the trunk and proximal extremities. Because many patients find cherry angiomas unsightly, treatment may be undertaken. Options for ablation include electrodesiccation, shave excision, and laser treatment. Few studies compare the efficacy of alternative treatments for cherry angioma. The objective of this study was to determine the relative effectiveness of 3 such treatments: (1) pulsed-dye laser (PDL) (595 nm) (Vbeam; Candela Corp, Wayland, Massachusetts), (2) potassium titanyl phosphate (KTP) laser (532 nm) (Aura; Laserscope, San Jose, California), and (3) electrodesiccation (Hyfrecator 2000 Electrosurgical Unit; ConMed Corp, El Paso, Texas).

METHODS

PARTICIPANT SELECTION

Fifteen adults were enrolled in the Department of Dermatology at Northwestern University. The principal inclusion criterion was the...
presence of at least 12 documented cherry angioma on the torso. The exclusion criteria consisted of cutaneous laser treatment in the past 6 months and implanted pacemakers or defibrillators that may be inadvertently actuated by electro surgical devices.

EQUIPMENT AND SETTINGS

Treatments were performed in windowless laser-ready rooms. The laser parameters used in this study were selected after a review of parameters used in previous studies, parameters recommended by the manufacturers (and laser experts retained by the manufacturers) for the specific laser devices used, and our own clinical experience. The parameters for the PDL varied between the first and second treatments because (1) bruising (short pulse duration) and nonbruising (longer pulse duration) parameters are routinely used clinically and we wanted to include both and (2) nonbruising parameters were used for the first treatment because this might be less anxiety producing for novice patients. For the electrodesiccation arm, we performed pilot testing of the energy level, and we selected the lowest energy level consistent with any visible immediate tissue effect on cherry angiomas of the trunk and extremity.

The following device settings were used: (1) Vbeam PDL: first treatment visit: fluence, 7.5 J/cm²; pulse duration, 10 milliseconds; spot size, 10 mm; dynamic cooling device setting, a 30-millisecond burst with a 20-millisecond delay; and 1 pulse per lesion if the lesion diameter was less than 3 mm and 2 pulses if 3 mm or greater; second treatment visit: fluence, 8.0 J/cm²; pulse duration, 15 milliseconds; spot size, 7 mm; dynamic cooling device setting, 30 milliseconds with a 20-millisecond delay; and 1 pulse per lesion if the lesion diameter was less than 3 mm and 2 pulses if 3 mm or greater; Aura KTP laser: fluence, 10 J/cm²; pulse duration, 10 milliseconds; spot size, 7 mm; dynamic cooling device setting, 1.5 milliseconds; spot size, 7 mm; dynamic cooling device setting, 30 milliseconds with a 20-millisecond delay; and 1 pulse per lesion if the lesion diameter was less than 3 mm and 2 pulses if 3 mm or greater; second treatment visit: fluence, 8.0 J/cm²; pulse duration, 10 milliseconds; spot size, 7 mm; dynamic cooling device setting, 30 milliseconds with a 20-millisecond delay; and 1 pulse per lesion if the lesion diameter was less than 3 mm and 2 pulses if 3 mm or greater; Hyfrecator electrosurgical unit: monoterminal, high-voltage setting, at energy of 3 W, using a sharp epilating needle.

STUDY DESIGN AND RANDOMIZATION

Approval for this randomized, controlled, rater-blinded clinical trial was obtained from the Northwestern University institutional review board, and all the participants provided written informed consent before study initiation.

For each participant, 3 treatment areas were demarcated on the torso. In each area, 4 cherry angioma were identified. Then, for each participant, using preselected random number sequences in sealed opaque envelopes, each treatment area was randomly assigned to receive 1 of the 3 treatment types described in the “Equipment and Settings” subsection. The allocation sequence was generated by a different investigator (S.L.B.) than the investigator who enrolled participants and assigned them to their groups (J.C.). Because the 3 devices used appeared different and because when applied they felt different to the participants, the participants and those administering the interventions were not blinded to group assignment; however, the 2 raters (L.E.W. and S.S.) assessing the outcomes were blinded to group assignment. The preoperative sizes of the angioma were statistically the same in all the treatment groups. Before treatment, differences in the mean size of angioma across treatment groups were not significant \( (P=.19) \).

EXPERIMENTAL PROTOCOL

Each participant received treatment with PDL, KTP laser, and electrodesiccation to separate randomly selected areas on the torso, with each area bearing 4 cherry angioma. Two weeks later, participants were again treated with the 3 study devices as before.

PRIMARY OUTCOME MEASURES

Serial standardized photographs evaluated by 2 blinded dermatologist raters (L.E.W. and S.S.) were the primary outcome measure. Photographs of the treatment area were obtained immediately before treatment, immediately after the first treatment, 2 weeks after the first treatment (immediately before the second treatment), 2 weeks after the second treatment, and 3 months after the second treatment. Color and texture were scored by the raters at each time point on a visual analog scale from 0 to 10 (color: 0=skin colored, 5=red, and 10=purple; texture: 0=flat, 5=mildly elevated, and 10=elevated).

SECONDARY OUTCOME MEASURES

The diameter of each targeted lesion was measured at each visit. At the third and final visit, participants completed a survey in which they were asked to rate, for each of the 3 treatments arms, the percentage improvement (if any) in texture (“bumpiness”) and color (“visual appearance”). Percentage improvement was then translated onto an ordinal scale (0%=0; 1%-25%=1; 26%-50%=2; 51%-75%=3; 76%-99%=4; and 100%=5). For each treatment type, participants were also asked to rate pain on a visual analog scale from 1 (no pain) to 10 (severe pain). Finally, participants were asked which treatment type they believed worked the best and which they would prefer to treat their remaining cherry angioma (ordinal scales from 1 [best or most preferred] to 3 [worst or least preferred]).

STATISTICAL ANALYSIS

For the primary and secondary outcome measures, means were obtained for values on ordinal scales, and treatment types were compared using repeated-measures analysis of variance with post hoc t tests. With 15 patients, there was 80% power to detect a difference of 1 SD using a 2-tailed test and a type I error rate of 5%. The standard deviation was the variability across participants for cherry angioma being treated by the same energy device.

The first participant was recruited on October 2, 2006, and the last participant follow-up was on January 29, 2007. Two eligible individuals declined enrollment, and 15 individuals were enrolled and randomized. Their mean age was 48 years, and 10 were men. All the treatments were completed per schedule, and all the participants returned for 3-month follow-up after their final treatment. The analysis was intention-to-treat.

Changes in visual parameters were assessed across time (Figures 1, 2, and 3). Regarding color, the mean change detected by the 2 blinded raters from pretreatment to 3 months after treatment was an improvement of 7.77 (from 9.42 to 1.65) on a 10-point scale. Although the change across time was significant \( (P<.001) \), there was no significant difference across treatment arms \( (P=.19) \). Mean change in texture during the study was an improvement of 6.23 (from 6.66 to 0.43), a significant change across time \( (P<.001) \). Moreover, textural change was different across treatments \( (P<.001) \) (Table 1). In pairwise
comparisons, cherry angioma treated with electrodesiccation (mean at 3 months, 4.24) were significantly less improved than were those receiving KTP laser (mean at 3 months, 3.42) \( (P = .003) \), and those treated with electrodesiccation were also less improved than were those treated with PDL (mean at 3 months, 3.24) \( (P = .001) \). However, KTP laser and PDL were not different in their effect on texture \( (P = .50) \). Interrater reliability assessment of texture measurements indicated that the 2 raters were convergent in their mean ratings (rater 1: mean, 3.51; rater 2: mean, 3.76; \( P = .25 \)). The size of the treated lesions decreased significantly across time, with a net reduction of 4.32 on the visual analog scale \( (P < .001) \), but there was no difference across treatment types \( (P = .88) \).

Participants’ self-assessment ratings at 3-month follow-up indicated no significant difference in mean improvement in bumpiness \( (P = .51) \) or color \( (P = .22) \) (Table 2). Pain varied across treatments \( (P < .001) \), with electrodesiccation and KTP laser not different from each other \( (P = .07) \) but each individually more painful than PDL \( (P < .001 \text{ for both}) \) (Table 2). Overall improvement was best with PDL, intermediate with KTP laser, and worst with electrodesiccation, but this nominal difference was not significant \( (P = .16) \). On the other hand, when asked to identify their most preferred treatment modality, patients noted a difference among the 3 arms \( (P = .001) \), with PDL and KTP laser not significantly different from each other \( (P = .19) \) but with electrodesiccation less preferred than KTP laser \( (P = .01) \) and PDL \( (P = .001) \).

**COMMENT**

Vascular lasers and electrodesiccation seemed to be highly effective treatments for the reduction of cherry angioma. After 2 treatments with electrodesiccation, KTP laser, or PDL, most targeted lesions showed marked improvement.

There were some differences across treatments. Treatment with PDL was noticeably less painful than with the other 2 modalities. In addition, textural improvements were superior with PDL and KTP laser compared with electrodesiccation. Changes in color, size, and texture were statistically similar for the 3 study treatments, but modest nominal differences favored PDL the most, then KTP laser, and least of all, electrodesiccation. This order was also reflected in the overall subjective ratings of preference, where PDL was the most preferred treatment and electrodesiccation was the least preferred.

Strengths of this study include the randomized controlled design, which also allowed participants to serve...
Table 1. Mean Changes in Color, Texture, and Size of Cherry Angioma From Baseline to 3 Months After the Second Treatment by Treatment Type as Assessed by Blinded Raters

<table>
<thead>
<tr>
<th>Feature</th>
<th>ED</th>
<th>KTP Laser</th>
<th>PDL</th>
<th>P Value by ANOVA; Pairwise Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color a</td>
<td>5.27</td>
<td>4.99</td>
<td>5.19</td>
<td>&lt;.001; ED more improved than KTP laser, ED more improved than PDL</td>
</tr>
<tr>
<td>Texture a</td>
<td>4.24</td>
<td>3.42</td>
<td>3.24</td>
<td></td>
</tr>
<tr>
<td>Size, mm</td>
<td>3.40</td>
<td>3.44</td>
<td>3.31</td>
<td>.88</td>
</tr>
</tbody>
</table>

Abbreviations: ANOVA, analysis of variance; ED, electrodesiccation; KTP, potassium titanyl phosphate; PDL, pulsed-dye laser.

a Data are given on ordinal visual analog scales scored from 0 to 10 (color: 0 = skin colored, 5 = red, and 10 = purple; texture: 0 = flat, 5 = mildly elevated, and 10 = elevated).

Table 2. Mean Changes in Color, Texture, and Pain of Cherry Angioma From Baseline to 3 Months After the Second Treatment by Treatment Type as Self-Assessed by the Participants

<table>
<thead>
<tr>
<th>Feature</th>
<th>ED</th>
<th>KTP Laser</th>
<th>PDL</th>
<th>P Value by ANOVA; Pairwise Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color a</td>
<td>4.33</td>
<td>3.67</td>
<td>3.17</td>
<td>&lt;.001; ED more improved than PDL, KTP laser more improved than PDL</td>
</tr>
<tr>
<td>Texture a</td>
<td>2.50</td>
<td>2.32</td>
<td>1.96</td>
<td></td>
</tr>
<tr>
<td>Pain a</td>
<td>5.17</td>
<td>4.00</td>
<td>1.17</td>
<td>.51</td>
</tr>
</tbody>
</table>

Abbreviations: See footnote to Table 1.

a Data are given on ordinal visual analog scales (color: 0 = skin colored, 5 = red, and 10 = purple; texture: 0 = flat, 5 = mildly elevated, and 10 = elevated; and pain: 1 = no pain and 10 = severe pain).

as their own controls. The 3-month follow-up seemed to be sufficient for complete wound healing, and this was confirmed by subjective and objective assessments, which detected few residual lesions. The most robust reported differences, variable treatment effects on texture, were not only highly statistically significant but also exhibited excellent interrater reliability.

The generalizability (external validity) of this study is likely to be high due to the enrollment of a representative population in terms of sex and age. In addition, energy parameters in common clinical use were used when treating cherry angioma with lasers and electrodesiccation. The results may have been different had different parameters been used. Electrodesiccation is an inherently operator-dependent technique, and variation in the degree of pressure applied could theoretically affect outcome.

Limitations of this study include the absence of a cost analysis. To the extent that treatment of cherry angioma is elective and may be an out-of-pocket expense for most patients, the relative cost of these treatment options may affect treatment selection. If laser procedures are more costly than electrodesiccation, patients may prefer the slightly suboptimal cosmetic result or greater discomfort associated with the latter treatment type. A cost-minimization or cost-effectiveness analysis may, thus, yield results divergent from those we obtained. A cost-minimization analysis is not included herein due to the pricing variation across cosmetic procedures. On the other hand, because optimal visual outcomes and minimal discomfort are hallmarks of successful cosmetic procedures, patients may be willing to pay a premium for laser treatment. Other limitations of this study include the fact that all the participants were white and that only one set of parameters (ie, for lasers, pulse duration and fluence; and for electrodesiccation, energy level) was used for treatment with each modality. Patients with skin of color are likely to be at higher risk for complications, especially textural or pigmentary abnormalities, after destructive, nonselective modalities such as electrodesiccation; we chose not to include such patients in this study to standardize the assessments of color and residual angioma, which may have been more subject to error if there were a wide range of underlying skin colors in this relatively small patient sample. It may be postulated, and further research may confirm, that patients with skin of color may obtain even greater relative benefit from laser treatment compared with electrodesiccation.

Although this study did not assess ease of use of different treatment devices, there were incidental differences noted among the treatment arms. Laser treatment was less operator dependent than was electrodesiccation because the duration of each laser pulse was standardized. Time required for treatment was comparable for the 3 arms. In conclusion, cherry angioma can be effectively treated with electrodesiccation and with laser. Laser, especially PDL, seems to be less painful and may be more likely to enhance resolution while minimizing the likelihood of textural change.

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Author Contributions: Drs Collier, Boone, White, Rade-maker, West, Yoo, and Alam and Mr Anderson had full
access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Collyer, White, West, and Alam. Acquisition of data: Collyer, Boone, and White. Analysis and interpretation of data: Rademaker, Anderson, Kim, Smith, Yoo, and Alam. Critical revision of the manuscript for important intellectual content: Boone, Rademaker, West, Anderson, Kim, Smith, Yoo, and Alam. Statistical analysis: Rademaker. Obtained funding: Alam. Administrative, technical, and material support: Collyer, Boone, White, Anderson, Kim, and Yoo. Study supervision: West and Alam.

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Additional Contributions: Jillian Havey, BS, and Natalie Kim, BA, provided timely and accurate management of this project.

REFERENCES


Archives Web Quiz Winner

Congratulations to the winner of our October quiz, Alexander J. Finn, MD, PhD, Department of Pathology and Laboratory Medicine, University of North Carolina Hospitals, Chapel Hill. The correct answer to our October challenge was sebaceoma. For a complete discussion of this case, see the Off-Center Fold section in the November Archives (Teo E-Y, Wang Y-S. Fleshy facial lesion in an 80-year-old Dayak woman. Arch Dermatol. 2009;145(11):1325-1330).

Be sure to visit the Archives of Dermatology Web site (http://www.archdermatol.com) to try your hand at the interactive quiz. We invite visitors to make a diagnosis based on selected information from a case report or other feature scheduled to be published in the following month’s print edition of the Archives. The first visitor to e-mail our Web editors with the correct answer will be recognized in the print journal and on our Web site and will also receive a free copy of The Art of JAMA II.