SHORT COMMUNICATION

Comparison of Chemical Matricectomy with Trichloroacetic Acid, Phenol, or Sodium Hydroxide for Ingrown Toenails: A Systematic Review and Network Meta-Analysis

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Ingrown toenail is a common nail disorder in people of all ages, and the associated pain, oozing, and abscess formation have significantly negative effects on quality of life. Partial nail avulsion with chemical matricectomy is a frequently performed method with a low recurrence rate. Phenol is the most commonly used agent for chemical matricectomy, but other agents, such as sodium hydroxide (NaOH) and trichloroacetic acid (TCA), have shown high success rates for the cauteryization of the lateral matrix horn (1). However, only a few head-to-head studies have compared the efficacy of these chemicals. We evaluated the current evidence to determine the most suitable agents for chemical matricectomy using a network meta-analysis (NMA).

METHODS

A systematic search was conducted in PubMed, Embase, Web of Science, and the Cochrane Library for comparative studies published before 30 May 2019 to evaluate different agents for chemical matricectomy to treat ingrown toenails. Keywords for search included “trichloroacetic acid,” “phenol,” or “sodium hydroxide” combined with “ingrown nails.” The primary outcome was the recurrence rate after partial nail avulsion with chemical matricectomy. For NMA, odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. A random-effects model with an informative prior was used to analyse the direct and indirect comparisons of the NMA. p-values < 0.05 were regarded as statistically significant. Analyses were conducted using NetMetaXL and WinBUGS version 1.4.3 (MRC Biostatistics Unit, Cambridge, UK).

RESULTS

Initially, 425 studies were identified, and after serial exclusion, 10 (3 randomized controlled trials (RCTs), 4 non-RCTs, and 3 retrospective observational studies) studies were included for qualitative synthesis (Fig. 1) (2–11). Table I presents the basic characteristics of all included studies. A final total of 9 studies with adequately evaluable data were calculated in the NMA (2–10). In the pairwise meta-analysis (Table II), both TCA (OR 0.03; 95% CI 0.00–0.26) and phenol (OR 0.18; 95% CI 0.05–0.49) resulted in significantly lower recurrence rates than placebo treatments, but no significant differences in recurrence were detected between NaOH and placebo (OR 0.22; 95% CI 0.04–1.18). TCA showed a trend of lower recurrence rate than phenol, but no significant differences existed between them (OR 0.17; 95% CI 0.02–1.00) (Table II).

DISCUSSION

Partial nail avulsion combined with phenolization was confirmed to prevent the recurrence of ingrown toenails more effectively than surgery alone (9). However, local and systemic toxicities may occur after phenolization, and phenol is contraindicated for patients or clinical practitioners who are pregnant. Conversely, TCA causes no systemic toxicity, since it neutralizes itself after reacting locally with the skin (12, 13). Our results indicate that TCA is comparable to phenol for chemical matricectomy for reducing recurrence of ingrown toenail.

In addition to the recurrence rate, an ideal agent for chemical matricectomy should enable a lower degree
Table I. Basic characteristics of included studies in network meta-analysis

| Study            | Study design | Chemicals | Exposure time (min) | Patients n | Total nail sides n | Recurrence n | Maximal follow-up months |
|------------------|--------------|-----------|---------------------|------------|--------------------|--------------|--------------------------|
| Bostanci et al., 2007 (3) | Non-RCT      | NaOH (10%) Phenol (88%) | 1           | 20         | 82                 | 4            | 13                       |
| Tatlican et al., 2010 (4) | Retrospective observational study | NaOH (10%) Phenol (88%) | 3           | 41         | 24                | 1            | 24                       |
| Grover et al., 2015 (8) | RCT (single-blind) | NaOH (10%) Phenol (88%) | 1           | 23         | NA                 | 1            | 6                        |
| Légaré et al., 1999 (2) | Retrospective observational study | Phenol (80%) Placebo | 1           | 26         | 0                 |              |                          |
| Isik et al., 2013 (6) | Retrospective observational study | Phenol (80%) Placebo | 1           | 42         | NA                 | 2            | NA                       |
| Talwar & Puri, 2012 (5) | Non-RCT      | Phenol (88%) Placebo | 3           | 15         | NA                 | 1            | 18                       |
| Khan et al., 2014 (7) | RCT          | Phenol (80%) Placebo | 1           | 50         | NA                 | 1            | 6                        |
| André et al., 2018 (9) | RCT (double-blind) | TCA (100%) Phenol (88%) | 1           | 39         | 42                 | 0            | 4                        |
| Terzi et al., 2018 (10) | Non-RCT      | TCA (90%) Phenol (88%) | 4           | 36         | 51                 | 6            | 72                       |
| Moustaidé et al., 2019 (11) | Non-RCT   | TCA (100%) Phenol (88%) | 2           | 60         | NA                 | NA           | 12                       |

NA: not available; RCT: randomized controlled trial.

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