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TOPICAL NITROGLYCERIN IN THE MANAGEMENT OF CHONDRODERMATITIS NODULARIS HELICIS: A COMPREHENSIVE REVIEW

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ABSTRACT

Introduction. Chondrodermatitis nodularis helicis (CNH) is a benign but painful inflammatory nodule of the helix or antihelix that mainly affects older adults and often disturbs sleep. It is widely regarded as the result of chronic pressure and ischemia of the relatively avascular ear cartilage, which is the rationale for treatments that improve local perfusion. Topical nitroglycerin (glyceryl trinitrate), a vasodilator, has been proposed as a non-invasive, low-cost option.

Aim of the study. To analyze the evidence on the efficacy and tolerability of topical nitroglycerin for CNH, including the influence of concentration and formulation and its place among other treatments.

Material and method. This comprehensive narrative review searched PubMed (supplemented by reference-list screening) using the terms “chondrodermatitis nodularis helicis,” “nitroglycerin,” and “glyceryl trinitrate.” English-language clinical reports of topical nitroglycerin for CNH and relevant background literature were reviewed and summarized descriptively.

Results. Across case reports and small prospective and retrospective series, topical nitroglycerin (0.2–2%, as ointment, gel, or patch) produced clinical improvement in about 90% of treated lesions with mainly transient headache that was readily managed by dose reduction or dilution. Although surgery retains the highest strict cure rate among modalities with substantial evidence, nitroglycerin offers substantial symptomatic and lesional benefit without the cost or morbidity of an operation and is a reasonable first choice among conservative measures. Larger controlled trials are warranted to confirm these findings.

KEYWORDS

Chondrodermatitis Nodularis Helicis, Topical Nitroglycerin, Glyceryl Trinitrate, Vasodilation, Conservative Treatment

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Introduction

Chondrodermatitis nodularis helicis (CNH), also called chondrodermatitis nodularis chronica helicis and historically the painful ear nodule, is a benign but markedly painful inflammatory condition of the external ear, first described by Winkler in 1915 (Kechichian et al., 2016). It is most common on the helix (73.5% of cases in a pooled analysis) and less common on the antihelix (26.5%), and is seen predominantly in fair-skinned, middle-aged and older adults, with most series reporting a mean age in the mid-sixties and a male predominance of up to 10:1 (Flynn et al., 2011; Garrido Colmenero et al., 2014; Kechichian et al., 2016).

A wide range of treatments has been reported, broadly divided into surgical approaches (wedge or punch excision, curettage and electrocauterization, and excision of the underlying cartilage with or without skin removal) and conservative measures (pressure-relieving devices, topical and intralesional corticosteroids, cryotherapy, carbon-dioxide laser, photodynamic therapy, and others) (Juul Nielsen et al., 2016; Kechichian et al., 2016; Park et al., 2025; Shah & Fiala, 2017). Reported efficacy varies widely and recurrence is common; no randomized controlled trial has compared these modalities, and much of the evidence rests on single cases or small series (Kechichian et al., 2016). Effective non-invasive options are therefore particularly desirable,

especially for older patients in whom surgery is undesirable. Against this background, topical nitroglycerin (glyceryl trinitrate)—a vasodilator best known for the treatment of angina and ischemic heart disease—has been proposed as a treatment that, by increasing local blood flow, targets the ischemic mechanism of CNH directly (Flynn et al., 2011; Garrido Colmenero et al., 2014). This review synthesizes the available evidence on the efficacy and tolerability of topical nitroglycerin for CNH and situates it among competing treatment options. Whereas earlier reviews of CNH have surveyed the full range of surgical and conservative treatments (Juul Nielsen et al., 2016; Kechichian et al., 2016; Park et al., 2025; Salah et al., 2018; Shah & Fiala, 2017), the present review focuses specifically on topical nitroglycerin, consolidating the drug-specific evidence on its efficacy, formulations, concentrations, dosing, and tolerability that those broader surveys address only in passing.

Methodology

This article is a comprehensive narrative review of the published literature on topical nitroglycerin for chondrodermatitis nodularis helicis. PubMed was searched, supplemented by manual screening of the reference lists of retrieved articles, using combinations of the terms “chondrodermatitis nodularis helicis,” “chondrodermatitis nodularis chronica helicis,” “nitroglycerin,” “nitroglycerine,” and “glyceryl trinitrate.” The search covered literature published from 2011, the year of the first report of topical nitroglycerin for CNH (Flynn et al., 2011), to 2026. Clinical reports of topical nitroglycerin for CNH—comprising case reports, case series, and prospective and retrospective observational studies—were reviewed, together with comparative and background literature on the condition and its other treatments. The findings were synthesized descriptively. As a narrative review, this work did not follow a formal systematic-review protocol, predefined screening counts, or risk-of-bias assessment; given that the primary literature comprises only small uncontrolled studies, no quantitative pooling was attempted. The review nonetheless comprehensively covers the limited available evidence on topical nitroglycerin for CNH.

Clinical features and diagnosis

CNH usually presents as a solitary, firm, round-to-oval nodule, typically 3 to 20 mm in diameter, on the helix or antihelix. It reaches its maximum size within a few months and, untreated, tends to persist indefinitely, often developing a central crater filled with keratotic crust (Kechichian et al., 2016; Salah et al., 2018). Its defining feature is disproportionate tenderness: the lesion is exquisitely painful to the slightest pressure and characteristically wakes patients who lie on the affected side, so the pain frequently disturbs sleep and impairs quality of life (Flynn et al., 2011; Kechichian et al., 2016). Lesions are usually unilateral and on the preferred sleeping side; right-sided and helical lesions predominate in men, whereas in women the antihelix is more often affected, perhaps because hair covering the helix leaves it relatively protected (Salah et al., 2018). CNH is chiefly a disease of older adults but can occur at any age, including in children and adolescents; lesions are bilateral in a minority of cases, and presentation at a younger age should prompt consideration of an underlying autoimmune or connective-tissue disorder (Salah et al., 2018).

The diagnosis is clinical, and the marked tenderness is itself a useful discriminator, helping to separate CNH from its principal mimics—actinic keratosis, basal cell carcinoma, squamous cell carcinoma, keratoacanthoma, and the perforating dermatoses (Kechichian et al., 2016; Yélamos et al., 2013). Because nonmelanoma skin cancers of the sun-exposed helix can look similar and carry real consequences, biopsy is warranted whenever the presentation is atypical or malignancy is suspected, and surgery has the advantage of yielding tissue for histological confirmation (Flynn et al., 2011; Kechichian et al., 2016). Histologically, CNH shows epidermal acanthosis and hyperkeratosis with a central focus of ulceration or transepidermal elimination, degenerative dermal collagen with increased vascularity and a perivascular inflammatory infiltrate, and—when the specimen includes cartilage—degenerative change of the cartilage and perichondrium (Flynn et al., 2011; Salah et al., 2018; Yélamos et al., 2013).

Pathophysiology and rationale for topical nitroglycerin

Although CNH is idiopathic, the unifying theme of its proposed mechanisms is impaired perfusion of the auricular cartilage. The pinna is anatomically vulnerable: its skin is tightly applied over cartilage with little intervening subcutaneous tissue and a sparse blood supply, so sustained external pressure readily compromises the perichondrial circulation (Salah et al., 2018). The great majority of patients habitually sleep on the side of the lesion, supporting a pressure–ischemia mechanism (Kechichian et al., 2016; Salah et al., 2018). A long-standing perichondrial-vasculitis hypothesis, based on the observation of arteriolar narrowing in the part of the pinna most remote from its arterial supply, holds that this ischemia leads to degeneration and necrosis of the cartilage (Flynn et al., 2011; Salah et al., 2018). The degenerative dermal and cartilaginous material is then extruded through the epidermis, so that CNH is regarded by some authors as a disorder of transepidermal elimination akin to the perforating dermatoses (Salah et al., 2018; Yélamos et al., 2013). Age-related thinning and reduced elasticity of skin and cartilage, repetitive minor trauma, chronic actinic damage, and pressure from headgear, hearing aids, telephone headsets, mobile phones, and face masks have all been implicated, and occasional associations with autoimmune or connective-tissue disease and with cardiovascular risk factors have been reported (Cascino et al., 2024; Di Berardino & Zanetti, 2018; Garrido Colmenero et al., 2014; Salah et al., 2018).

This ischemic model provides a direct rationale for a topical vasodilator. Nitroglycerin is a nitric oxide donor that relaxes vascular smooth muscle; applied to the lesion, it is thought to restore perichondrial and dermal perfusion and so reverse the ischemic changes that drive the disease (Flynn et al., 2011; Garrido Colmenero et al., 2014; Kechichian et al., 2016). The same action has prompted its use in other conditions of impaired peripheral perfusion, such as Raynaud phenomenon, although controlled evidence of benefit there is limited and headache is a recognized adverse effect (Su et al., 2021). Analogical evidence for topical nitroglycerin's vasodilatory effect at the skin surface comes from laser Doppler imaging in patients with systemic sclerosis (Pintea Bentea et al., 2020); no equivalent data exist in CNH itself. An underlying auricular vasculopathy, whether the cause or the consequence of the local connective-tissue degeneration, is thus the most plausible explanation for the response of CNH to a potent topical vasodilator (Sanz-Motilva et al., 2015).

Efficacy of topical nitroglycerin in chondrodermatitis nodularis helices

The therapeutic potential of topical nitroglycerin for CNH was first demonstrated by Flynn and colleagues in a retrospective chart review of 12 patients (13 lesions) treated with 2% topical nitroglycerin applied twice daily (Flynn et al., 2011). Over follow-up periods ranging from 2 to 13 months, 12 of 13 lesions (92%) improved: 8 (61.5%) achieved complete clearance of both the lesion and its symptoms and required no further treatment, while 4 (30.8%) showed symptomatic improvement only. A single patient (8.3%) did not benefit, but that individual had also failed several other modalities, including two prior excisions and an intralesional corticosteroid injection. The authors concluded that this non-invasive, inexpensive approach achieved results on par with other reported treatments (Flynn et al., 2011).

This experience was supported by a case report from Yélamos and colleagues, who treated an 83-year-old woman with a 2-year history of a painful, ulcerated helical nodule that had not responded to topical corticosteroids (Yélamos et al., 2013). After 3 months of 2% nitroglycerin gel applied every 12 hours, the appearance of the lesion improved and pain on a visual analogue scale fell from 8 to 1, with no adverse effects (Yélamos et al., 2013).

Two further series extended these observations to alternative formulations and concentrations. Garrido Colmenero and colleagues conducted a prospective study of 11 patients treated with a 5-mg transdermal nitroglycerin patch applied to the lesion for 12 hours daily over 2 months (Garrido Colmenero et al., 2014). Seven of 11 patients (63.6%) achieved a complete response; one patient with an incomplete response proceeded to surgery, and one further patient discontinued because of non-adherence. Two of 11 patients (18.1%) withdrew because of moderate headache, a higher rate than reported with ointments or gels; patients predisposed to hypotension or headache had been excluded at the outset (Garrido Colmenero et al., 2014). The authors emphasized that the patch is inexpensive and well tolerated and that a single patch can be divided for repeated use (Garrido Colmenero et al., 2014).

Seeking to preserve efficacy while improving tolerability, Sanz-Motilva and colleagues evaluated a lower, 0.2% concentration in a retrospective observational study of 29 patients treated at two Spanish hospitals (Sanz-Motilva et al., 2015). A compounded 0.2% ointment was applied once daily for the first 10 days and then every 12 hours until resolution, alongside general pressure-relief measures. Clinical improvement

occurred in 27 of 29 patients (93%), with complete response in 63% and partial response in 37% of these; the mean treatment duration among responders was 1.8 months and the mean post-treatment follow-up was 5.9 months. Only one patient recurred (at 18 months, coinciding with reintroduction of chemotherapy for breast cancer). A history of prior surgical intervention was associated with a poorer response to topical nitroglycerin, being present in only a minority of complete responders but in most partial responders (Sanz-Motilva et al., 2015). A subsequent case report and accompanying single-center clinical experience of 16 patients from a Polish dermatology unit reported similar results with 2% nitroglycerin: in the index 82-year-old patient, pain resolved within 2 weeks and the lesion within 4 weeks, with no recurrence at 10 months (Sławińska et al., 2017).

Taken together, these reports consistently show clinical improvement in approximately 90% of treated lesions across ointment, gel, and transdermal-patch formulations at concentrations from 0.2% to 2% (Table 1) (Flynn et al., 2011; Garrido Colmenero et al., 2014; Sanz-Motilva et al., 2015; Sławińska et al., 2017; Yélamos et al., 2013).

Table 1. Published clinical reports of topical nitroglycerin for chondrodermatitis nodularis helicis.

Study	Design	Patient s (lesions)	Formulation / concentratio n	Regime n	Response	Adverse effects	Follow- up
Flynn et al., 2011	Retrospectiv e chart review	12 (13)	2% ointment	Twice daily	92% improved; 61.5% complete clearance; 30.8% symptomatic improvement	Headache/dizzines s in 2 (17%); resolved on dilution to 1%	2–13 mo
Yélamos et al., 2013	Case report	1	2% gel	Every 12 h, 3 mo	Pain (VAS) 8→1; lesion improved	None	~1 mo after treatment
Garrido Colmener o et al., 2014	Prospective series	11	5-mg transdermal patch	12 h/day, 2 mo	63.6% complete response	Headache causing discontinuation in 2 (18.1%)	Reviewe d at 3 mo
Sanz- Motilva et al., 2015	Retrospectiv e observa tional	29	0.2% compounded ointment	Once daily ×10 d, then every 12 h until healing	93% improved (63% complete, 37% partial)	1 mild application- related headache; 97% good tolerance	Mean 5.9 mo (3– 18)
Sławińska et al., 2017	Case report + single- center series	1 (+16)	2% ointment	Twice daily	Pain resolved at 2 wk, lesion at 4 wk; no recurrence	Dizziness in 1 of 16	10 mo

VAS, visual analogue scale.

Adverse effects and tolerability

Topical nitroglycerin is generally well tolerated in CNH, and its adverse effects are predictable from its vasodilatory action. The most significant is transient headache, which in other indications such as chronic anal fissure and post-hemorrhoidectomy pain has been reported in a high proportion of patients; in CNH, however, headache has been far less frequent, affecting roughly 17% of treated patients in the earliest series, probably because of the small surface area of application on the ear and the limited vascularity of the site, which together restrict systemic absorption (Flynn et al., 2011; Yélamos et al., 2013). Dizziness and mild local irritation are also described (Flynn et al., 2011). These adverse effects can be managed without sacrificing efficacy: diluting 2% nitroglycerin to 1% with petrolatum eliminated headache and dizziness while preserving the therapeutic response (Flynn et al., 2011), and the lower 0.2% concentration was well tolerated in 97% of patients, with only a single case of mild application-related headache that resolved on reducing the amount applied (Sanz-Motilva et al., 2015). The transdermal patch was associated with the highest discontinuation rate for headache (18.1%), suggesting that delivery format influences tolerability (Garrido Colmenero et al., 2014). Given the potential for systemic vasodilatory effects, hypotension and headache are reasonable cautions; both were in fact used as exclusion criteria in the transdermal-patch study, and the drug should be used thoughtfully in patients already taking nitrates (Garrido Colmenero et al., 2014).

Practical use and dosing

Topical nitroglycerin is applied directly to the lesion, typically extending to a small margin of adjacent healthy skin, and is frequently combined with general pressure-relief measures such as postural changes or specially shaped pillows (Flynn et al., 2011; Sanz-Motilva et al., 2015). Beyond these broad principles, however, the published reports use markedly heterogeneous regimens, and no consensus exists on the optimal concentration, the number of daily applications, or the duration of treatment. Reported regimens have used 0.2% to 2% ointments or gels and a 5-mg transdermal patch; the frequency of application has varied from once to twice daily (or a patch worn for 12 hours per day); and treatment duration has ranged from a few weeks to about 2 months, generally continued until clinical resolution (Flynn et al., 2011; Garrido Colmenero et al., 2014; Kechichian et al., 2016; Sanz-Motilva et al., 2015). To improve tolerability, some authors begin with a lower concentration or a once-daily schedule before escalating to twice-daily application; because a stable 2% preparation can be difficult to compound, lower concentrations in a petrolatum base are commonly prepared (Sanz-Motilva et al., 2015). These uncertainties about dosing reflect the absence of any dose-finding or comparative trial and represent an important target for future research (Kechichian et al., 2016). Because malignant lesions of the helix can mimic CNH, treatment should be started only when the clinical picture is typical and malignancy is considered unlikely; otherwise biopsy or excision is preferable (Flynn et al., 2011; Kechichian et al., 2016).

Topical nitroglycerin in the context of other treatment modalities

The relative standing of topical nitroglycerin is best judged against the other available treatments, whose comparative efficacy was quantified in a systematic review of 29 studies (1,079 lesions) by Kechichian and colleagues (Kechichian et al., 2016). With cure defined strictly as complete healing and/or absence of pain without recurrence during follow-up, the pooled cure rate across all treatments was 73%. Among the modalities used most often, surgery had the highest pooled cure rate (82%), significantly higher than both topical nitroglycerin (51%) and pressure-relief techniques (37%) ($p < 0.0001$ for each); cure rates for nitroglycerin and pressure relief did not differ significantly from each other ($p = 0.1$) (Kechichian et al., 2016). Because these are pooled proportions from uncontrolled studies rather than head-to-head data, the apparent superiority of surgery is confounded by treatment indication rather than established by randomized comparison (Kechichian et al., 2016). The strict cure rates for the individual nitroglycerin studies (64% for the patch, 54% for the 2% ointment, and 45% for the 0.2% ointment) are lower than the “improvement” rates those studies reported, because the pooled analysis required complete and durable healing without recurrence rather than symptomatic improvement alone; the two sets of figures thus describe different endpoints rather than conflicting results, and the lower cure rate should be weighed accordingly (Flynn et al., 2011; Kechichian et al., 2016; Sanz-Motilva et al., 2015) (Table 2). On this basis the authors proposed surgery as first-line treatment—because it offers the highest cure rate and permits histological exclusion of malignancy—with nitroglycerin and pressure relief, alone or in combination, as second-line options for patients who are unsuitable for or decline surgery, and newer or less-studied methods as third-line (Kechichian et al., 2016).

Table 2. Pooled cure rates for the principal treatment modalities of chondrodermatitis nodularis helices. Data adapted from Kechichian et al.'s systematic review of 29 studies (1,079 lesions) (Kechichian et al., 2016). Cure was defined as complete healing and/or absence of pain without recurrence during follow-up.

Treatment modality	Lesions (n)	Cure rate
Surgery	774	82%
Topical nitroglycerin	53	51%
Pressure relief	135	37%
Corticosteroid	49	35%
CO ₂ laser	12	92%
Photodynamic therapy	5	80%
All treatments combined	1,079	73%

Figures are crude pooled proportions across heterogeneous, largely uncontrolled studies (chi-square comparison; no adjustment, confidence intervals, or risk-of-bias weighting) and are not head-to-head comparisons. Surgery was superior to both nitroglycerin and pressure relief ($p < 0.0001$ for each); nitroglycerin and pressure relief did not differ significantly ($p = 0.1$). Cure rates for individual nitroglycerin studies were 64% (patch), 54% (2% ointment), and 45% (0.2% ointment). Listed modalities do not sum to 1,079 lesions because less common treatments are not shown; rates based on very small samples (e.g., CO₂ laser, photodynamic therapy) should be interpreted with caution.

Surgery has been the most extensively studied approach. Reported techniques range from wedge or punch excision to curettage with electrocauterization and excision of the underlying cartilage with or without removal of the overlying skin; cure rates were similar for skin-and-cartilage excision (82%) and for cartilage excision alone (85%), and recurrence after adequate excision is on the order of 10% (Kechichian et al., 2016; Salah et al., 2018). Its drawbacks are procedural adverse events such as hematoma and infection, occasional poor cosmesis, and higher cost (Bilgen et al., 2026; Kechichian et al., 2016).

Pressure relief is the most studied non-surgical option. A range of devices, including doughnut pillows, customized ear prostheses, self-adhering foam, U-shaped neck pillows, and even hemorrhoid cushions, aims to offload the lesion during sleep, but its pooled cure rate (37%) is limited by the need for continuous use and by poor long-term compliance, and the devices themselves can cause neck pain (Ali et al., 2016; Kechichian et al., 2016; Mohammed et al., 2020). Recurrence appears somewhat more frequent for antihelical than for helical lesions, although the difference is not statistically significant (Kechichian et al., 2016). Topical and intralesional corticosteroids have given variable results in small series, and several newer or less-studied modalities have been reported as effective in selected cases, including photodynamic therapy, carbon-dioxide laser, intralesional hyaluronic acid, platelet-rich plasma, and procaine or collagen injection, though all rest on weak, largely uncontrolled evidence (Carey, 2021; García-Malinis et al., 2017; Kechichian et al., 2016).

Within this spectrum, topical nitroglycerin occupies a useful niche as a simple treatment that can be offered before, or instead of, surgery in clinically typical disease and can be combined with pressure-relief measures (Flynn et al., 2011; Kechichian et al., 2016). Its low cost is a particular advantage, two tubes of the ointment costing a small fraction of a diagnostic biopsy procedure (Flynn et al., 2011).

Discussion

The accumulated evidence is drawn from three small clinical series (one prospective, two retrospective) and two case reports (one with an accompanying case series). It consistently indicates that topical nitroglycerin is effective and generally well tolerated as a conservative treatment for chondrodermatitis nodularis helices, relieving pain and clearing the majority of lesions across the formulations and concentrations studied, with transient headache the only common adverse effect and one that is readily managed (Flynn et al., 2011; Garrido Colmenero et al., 2014; Sanz-Motilva et al., 2015; Sławińska et al., 2017; Yélamos et al., 2013). These outcomes are biologically coherent: by donating nitric oxide and dilating perichondrial arterioles, the drug counters the local ischemia that is thought to drive the disease (Flynn et al., 2011; Pintea Bentea et al., 2020). The 0.2% formulation appears to retain efficacy while further improving tolerability, suggesting that the lowest effective concentration is a reasonable starting point, and the choice between ointment, gel, and patch can be individualized to balance convenience against the slightly higher rate of headache seen with the patch (Garrido Colmenero et al., 2014; Sanz-Motilva et al., 2015).

Several caveats temper these conclusions. When cure is defined strictly (complete and durable healing without recurrence), pooled data place nitroglycerin (51%) below surgery (82%) and on a par with pressure relief (37%), so surgery remains the most reliable route to cure (Kechichian et al., 2016). A prior history of surgery may predict a poorer response to topical therapy (Sanz-Motilva et al., 2015). The long-term durability of the response is also poorly characterized: recurrence data are limited to isolated observations (a single late recurrence in one series and no recurrence at 10 months in another), against a pooled mean time to recurrence of about 9.3 months across all CNH treatments, so the rate and timing of relapse after topical nitroglycerin remain uncertain (Kechichian et al., 2016; Sanz-Motilva et al., 2015; Sławińska et al., 2017). Most importantly, the entire evidence base consists of small, uncontrolled studies (no randomized controlled trial of topical nitroglycerin in CNH has been conducted), and heterogeneous, often subjective outcome definitions and short follow-up limit comparison across studies (Flynn et al., 2011; Kechichian et al., 2016; Sanz-Motilva et al., 2015).

Conclusions

Topical nitroglycerin is a practical, low-cost, and non-invasive treatment for chondrodermatitis nodularis helioides: in the available reports it produced clinical improvement in most lesions while avoiding the morbidity of an operation, making it a sensible initial option among non-surgical measures for clinically typical disease, even though surgery still offers the highest strict cure rate. Nevertheless, given the absence of controlled data, further investigation (ideally adequately powered randomized controlled trials comparing nitroglycerin with surgery, pressure relief, and placebo, and defining the optimal concentration, formulation, and treatment duration) is required to establish its place in the management of CNH.

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