

# Laser Therapy of Cutis Marmorata Telangiectatica Congenita Vascular Malformation

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A – koncepcja i projekt badań, B – gromadzenie danych, C – analiza i interpretacja danych, D – pisanie artykułu, E – krytyczna korekta artykułu, F – ostateczne zatwierdzenie artykułu

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## SUMMARY

*Laser Therapy of Cutis Marmorata Telangiectatica Congenita Vascular Malformation*

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The purpose of this study is to determine a long-term effectiveness of a 532 nm and 1064 nm large spot laser with contact cooling in the treatment of CMTC. Cutis marmorata telangiectatica congenita (CMTC) is a rare, congenital, vascular disorder characterized by dilated capillaries and veins, in all layers of the dermis and subcutaneous tissue. It manifests itself as erythematous-to-violaceous, reticulated, net-like, or marbled-appearing patches on the skin. Two types of CMTC have been observed: isolated and classic. The aetiology of CMTC is not well understood. CMTC is most commonly found on the lower limbs, as in the case of the patient in this study.

A 45-year-old woman visited Klinika Ambroziak due to vascular malformations on her right thigh, shank, and foot, which included numerous deep lying and serpiginous capillaries with a marbled pattern and visible telangiectasia. Discrete ivory white scarring was visible along dilated vessels and was evident in dermoscopic evaluation. A classic type of cutis marmorata telangiectatica congenita was diagnosed. It was treated with a large spot 532 nm and 1064 nm millisecond laser with contact cooling, as well as a picosecond 1064 nm laser with the diffraction lens. The latter was added to treat associated discrete scarring. Although an immediate response after vascular laser was achieved both clinically and dermoscopically, videodermoscopy performed after five months showed that large capillary loops persisted and clinical improvement was not satisfactory. After the initial treatment, the effectiveness of the laser therapy was noticeable. However, over time the results were disappointing. Effective treatment can be difficult due to regeneration of abnormal vessels and natural tendency to scarring.

**Key words:** CMTC, capillary malformation, laser therapy, 532nm laser

## STRESZCZENIE

*Laseroterapia malformacji naczyniowej cutis marmorata telangiectatica congenita*

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Celem tego badania jest określenie długoterminowej skuteczności lasera wielkopunktowego 532 nm i 1064 nm z chłodzeniem kontaktowym w leczeniu CMTC. Cutis marmorata telangiectatica congenita (CMTC) to rzadka wrodzona choroba naczyniowa charakteryzująca się rozszerzonymi naczyniami włosowatymi i żyłami we wszystkich warstwach skóry właściwej i tkanki podskórnej. Objawia się jako rumieniowe lub fioletowe, siateczkowate lub marmurkowate plamy na skórze. Zaobserwowano dwa typy CMTC: izolowany i klasyczny. Etiologia CMTC nie jest dobrze poznana. CMTC występuje najczęściej na kończynach dolnych, podobnie jak w przypadku pacjenta w tym badaniu. 45-letnia kobieta zgłosiła się do Kliniki Ambroziak z powodu malformacji naczyniowych na prawym udzie, podudziu i stopie, o marmurkowatym układzie z widocznymi wenangiektazjami. Wzdłuż rozszerzonych naczyń widoczne były dyskretne blizny w kolorze kości słoniowej, które były widoczne w ocenie dermoskopowej. Rozpoznano klasyczny typ cutis marmorata telangiectatica congenita. Pacjentka była leczona laserem o dużej plamce 532 nm i 1064 nm z chłodzeniem kontaktowym, a także laserem pikosekundowym 1064 nm z soczewką dyfrakcyjną. Ten ostatni został dodany w celu leczenia towarzyszących blizn. W trakcie zabiegów uzyskano natychmiastową adekwatną odpowiedź polegającą na ściemnieniu zmian w ocenie klinicznej, jak i dermoskopowej wskazujących na zamknięcie przepływu. Jednak dermoskopia wykonana po 5 miesiącach wykazała duże pętle naczyń z utrzymanym przepływem i brak pełnej poprawy klinicznej. Już po wstępnym leczeniu skuteczność laseroterapii była zauważalna. Jednak z czasem wyniki były rozczarowujące. Skuteczne leczenie może być utrudnione ze względu na regenerację nieprawidłowych naczyń i naturalną skłonność do powstawania blizn.

**Słowa kluczowe:** CMTC, malformacja naczyniowa, laseroterapia, laser 532 nm

Cutis marmorata telangiectatica congenita (CMTC) is a rare congenital vascular disorder that results in dilated capillaries and veins throughout the dermis and subcutaneous tissue. Venous lakes may also be present, leading to erythematous-to-violaceous, net-like or marbled patches on the skin [1,2,3,4,5].

CMTC can be classified as either isolated or classic, with the latter being a more severe form that can result in recurrent ulcerations, cutaneous atrophy and other vascular malformations [1,2,3,4,5,6].

The exact aetiology of CMTC is unknown, but genetic testing has revealed mosaic heterozygous pathogenic variants in the GNA11 oncogene [1,3,4,7]. While in germline, this mutation is lethal. The exact mechanism and down-stream pathway leading to vascular malformation is unknown. Partially inactivating guanosine triphosphatase (GTPase) activity, the GNA11 mutation leads to constant activation of the mitogen-activated protein (MAP) kinase pathway. As a result, the function of vascular endothelial growth factor-2 (VEGF-2) is affected, which plays a critical role in angiogenesis. Such mutations are likely to impact the pathophysiology of various vascular lesions. The identification of GNA11 gain-of-function mutations in some patients with capillary malformation suggests that drugs inhibiting constitutive GNA11 signalling may provide therapeutic benefits (8). Chronic hypoxia often manifests itself in numerous diseases through the appearance of scarring and vessel formation.

CMTC is most commonly found on the lower limbs. Although various vascular lasers have been proposed for its treatment, including pulsed dye, alexandrite, NdYAG 1064 and IPL, reported results have been unsatisfactory or only partial. Improperly progressing regeneration processes could be responsible for these poor results.

Recent studies have shown that a 532 nm large spot laser is effective in treating port-wine stain capillary malformations.

Fractional lasers are used for treatment scarring, preventing scars related to trauma and normalization of the tissue [9,10,11,12].

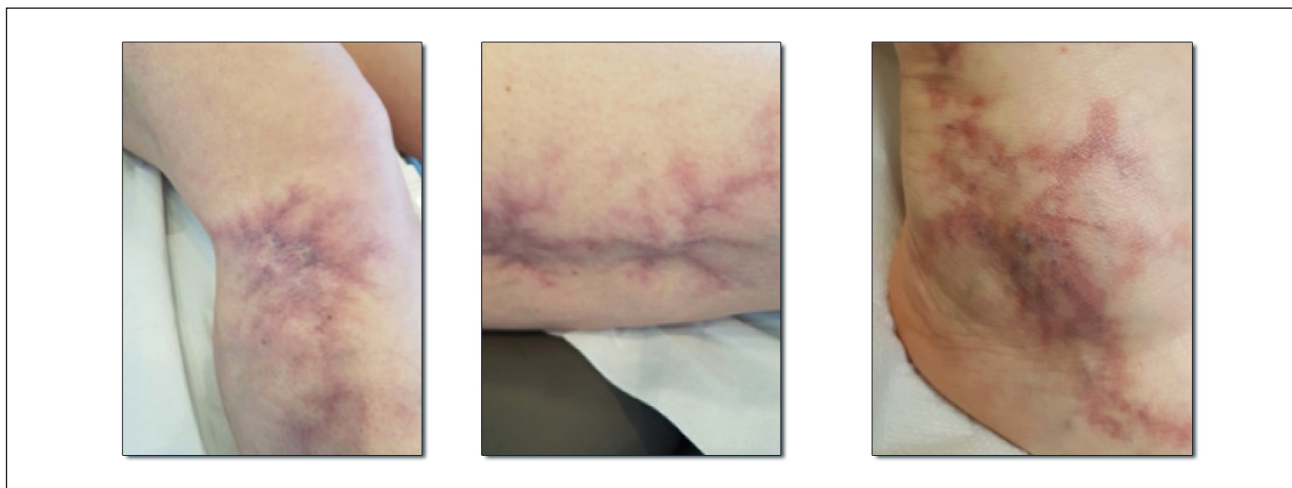
## AIM OF THE STUDY

The objective of this study is to assess the prolonged efficacy of utilizing a large spot laser with contact cooling at 532 nm and 1064 nm wavelengths for the treatment of CMTC.

## CASE STUDY

A 45-year-old woman presented to Klinika Ambroziak with vascular malformations on her right thigh, shank, and foot (fig.1), featuring numerous deep lying and serpiginous capillaries displaying a marbled pattern, as well as visible venectasias. Dermoscopic evaluation revealed discrete ivory white scarring along dilated vessels, leading to a diagnosis of the classic type of cutis marmorata telangiectatica congenita.

The patient gave a history of endovascular treatment for varicose veins in her lower limbs. We started the treatment with a large spot laser at 532 nm with contact cooling (Cutera Excel V, USA), laser setting: 532 nm 8-9 mJ, 6 ms, 10 mm, 5 deg C, with gel and post-treatment cooling with cold packs for 10 minutes. The laser was administered with pulse times ranging from 4 to 10 milliseconds (ms), with the most common duration being 6 ms. It was observed that the best outcome, vessel darkening, was achieved following the 6 ms pulse. Additionally, a picosecond laser 1064 nm with



**Fig. 1.** A 45-years-old woman visited Klinika Ambroziak due to vascular malformations on her right thigh, shank, and foot. The diagnosis confirmed the presence of the classic variant of CMTC. It manifests itself as erythematous-to-violaceous, reticulated, net-like, or marbled-appearing patches on the skin.

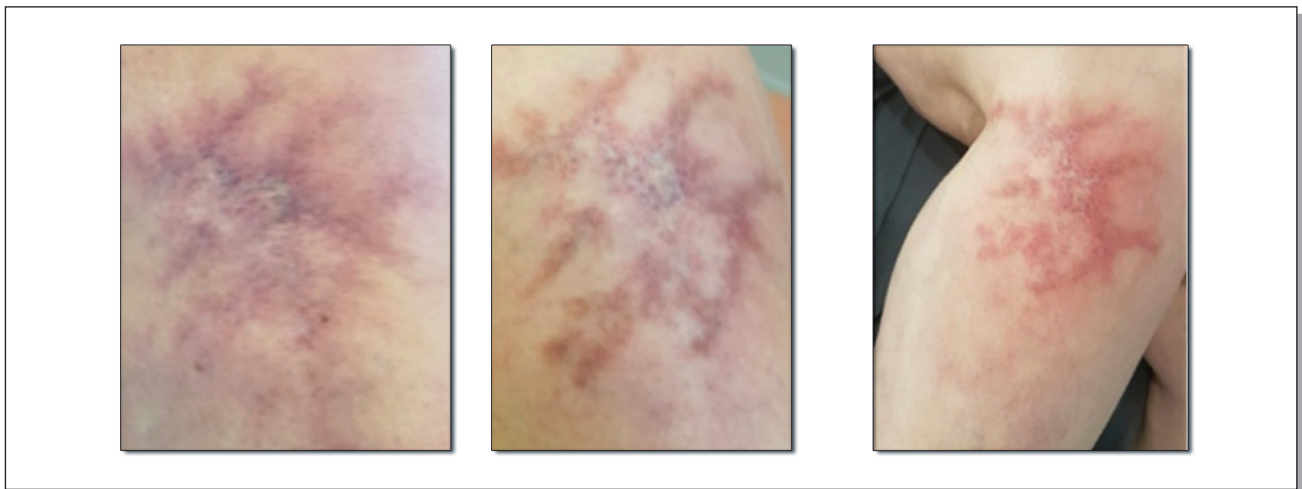
the diffraction lens (Cutera Enlighten, USA) was used to address associated discrete scarring. The 1064 nm laser was applied pointwise to larger vessels, but with no visible effect. The patient underwent five treatment sessions with a 532 nm laser with 4 to 10 weeks interval. Following the last session, a topical application of timolol was administered (the dosage of timolol at a concentration of 5 mg/ml – 5 times daily externally for 14 days after the procedure). Timolol was added to the treatment plan in an attempt to reduce neoangiogenesis of abnormal vessels (fig. 2). Additionally, during the third laser session, a picosecond laser was administered to address scarring and atrophy associated with vascular lesions. Immediately after that, a 532 nm laser treatment was used.

In this study, we used videodermoscopy to evaluate the lesions and monitor treatment efficacy.

Additionally, the application of timolol has proven unsatisfactory as it has failed to completely halt neoangiogenesis, while the utilization of a picosecond fractional laser has shown minimal reduction in scarring.

Timolol and rapamycin are both among others that have been explored for the treatment of port-wine stains capillary malformation. While these medications have shown some potential in reducing neoangiogenesis associated with port-wine stains, their effectiveness can vary and they may not provide complete satisfaction in all cases [13,14].

Following the initial laser therapy, the efficacy of the treatment was evident. Nonetheless, the outcomes eventually proved disappointing, as successful treatment can be challenging due to the regeneration of abnormal vessels and scarring occurring in the course



**Fig. 2.** Distant improvement involved the resolution of the peripheral parts of the lesions, and the colour of the central parts changed from violet to more brownish. However, visible scarring features of atrophie blanche in the central part of the lesions did not improve. Further treatments were performed using a 532 nm laser and a picosecond 1064 nm laser. Additionally, timolol was added to the treatment plan in an attempt to reduce neoangiogenesis of abnormal vessels.

## RESULTS

Despite obtaining immediate clinical and dermoscopic improvements after vascular laser treatment, videodermoscopy conducted five months later revealed persistent large capillary loops, and the patient's clinical improvement was deemed unsatisfactory.

## CONCLUSION

For several years, 532 nm lasers with a large spot have served as the primary approach for treating capillary malformations alongside PDL lasers, whereas 1064 nm lasers are commonly used in the laser therapy for venous lesions. However, studies indicate that laser therapy alone does not yield comprehensive efficacy in the treatment of capillary malformations.

of treatment. It is crucial to conduct further research, as this assessment is based on a single case and necessitates a more comprehensive investigation.

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All authors declare no conflict of interest.

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