Case Report

Cutaneous Lymphangioma in Adolescents: A Therapeutic Challenge

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Abstract

A 17-year-old girl, presenting as a blackish-red lump on her knee, present since birth. The lump occasionally caused itching, pain, and sometimes discharged blood or yellowish fluid. Dermatological examination revealed multiple clusters of vesiculopapules and hyperpigmented patches. Dermoscopy and histopathological analysis confirmed the diagnosis as cutaneous lymphangioma. The patient had previously undergone laser treatment without complete resolution. Various treatment modalities, including cryotherapy, CO_2 laser, and vascular laser therapies (pulsed dye laser and long-pulsed Nd-Yag1064 laser), were explored. Among these, the long-pulsed Nd-Yag laser proved most effective, leading to lesion reduction and less recurrence.

Keyword: Cutaneous lymphangioma, lymphatic malformation, vascular laser.

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Introduction

Congenital abnormalities of the lymphatic system include lymphphangiomas[1], constituting around 25% of benign vascular growths in children and 4% of all vascular malignancies. The most common kind is now called superficial lymphatic malformation (SLM), originally known as cutaneous lymphangioma circumscriptum. Effective management of lymphatic malformations remains challenging, largely due to the absence of consistently satisfactory treatment options.[2] This case is noteworthy because the patient's long-standing and recurrent cutaneous lymphangioma responded well to long-pulsed Nd:YAG 1064 nm laser therapy. Owing to its deeper penetration and selective vascular targeting, this laser achieved better lesion control compared to CO_2 laser or cryotherapy, suggesting a valuable alternative for treating deeper or recurrent lymphatic malformations.

Case Report

A girl, 17 years old presented to the dermatology clinic at Dr. Soetomo Hospital with a primary complaint of a blackish-red lump on her left knee. The lump had been present since birth and occasionally caused itching and pain. When scratched, it sometimes released blood or a yellowish fluid. Over the past month, the lump had enlarged and increased in number, although the patient was unsure of the cause of this growth. She denies any history of trauma to the affected leg.

In her past medical history, she was diagnosed as hemangioma as a child at Dr. Sutomo Hospital and underwent laser treatments 3 to 4 times. However, the lump persisted and remained red after the procedures. There is no history of tum-

ors or autoimmune diseases. There is no family history of similar complaints or tumors.

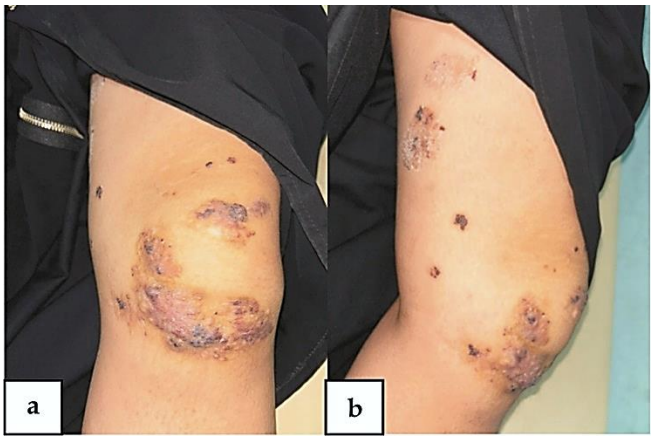

Figure 1A: Regio genu sinistra: multiple erythematous and hyperpigmented cluster of vesiculopapular lesion were found. **B:** Regio femoral sinistra: hyperpigmented patches with white scales on top were found.

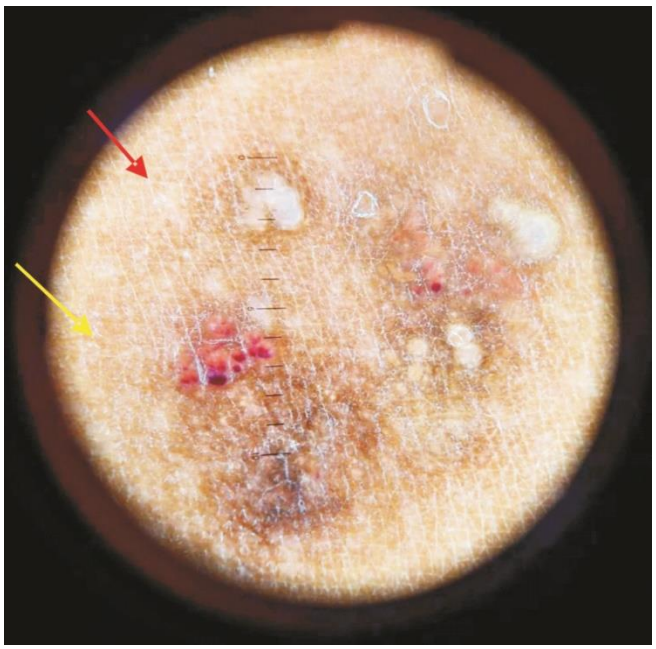

Figure 2: Dermoscopy revealed multiple translucent vesicular structures (red arrow), accompanied by dark-red or bluish lacunae (yellow arrow).

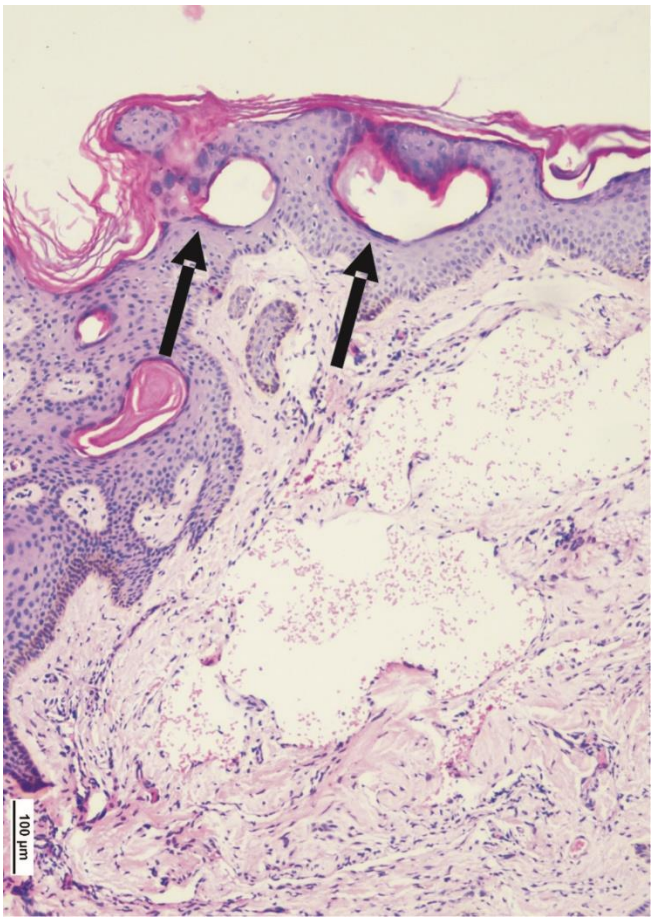

Figure 3: Haematoxylin and eosin staining – 100x revealed proliferation and dilation of lymphatic vessels containing lymph fluid and erythrocytes.

On dermatological examination, the sinister genu region revealed multiple clusters of erythematous and hyperpigmented vesiculopapules with a verrucous surface, some of which were topped with blackish papules (Figure 1a). The lesions were soft on palpation. Additionally, on the sinister femoral region, hyperpigmented patches with white scaling were observed (Figure 1b). Dermoscopy examination revealed multiple translucent vesicular structures, accompanied by dark-red or bluish lacunae. Additionally, a hyperpigmented patch was observed (Figure 2).

A punch biopsy of the left knee revealed epidermal acanthosis with elongated rete ridges and dermal dilation of lymphatic vessels containing lymph and erythrocytes, without signs of malignancy (Figure 3). These findings confirmed cuta-

neous lymphangioma.

Clinical, dermoscopic, and histopathological findings confirmed a diagnosis of cutaneous lymphangioma. The first modality that was chosen based on patient's preference was ablative CO_2 laser on the lesion in the femoral. After treatment, the hyperpigmentation patch in the thigh region disappeared and only left granulation tissue, but after a 1 month follow up, confluent hyperpigmented papules reappeared (Figure 4).

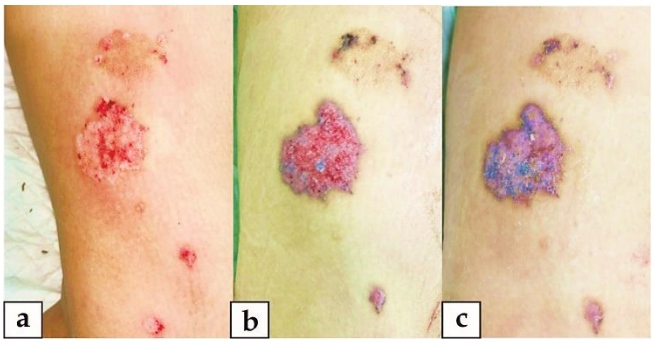

Figure 4: Follow up of the lesion after CO_2 laser. **A:** The day post-procedure **B:** Nine days post procedure. **C:** One month post procedure.

Following cryotherapy, lesion regrowth was noted. Vascular laser therapy was then initiated: pulsed dye laser (PDL) was applied to the distal knee and long-pulsed Nd:YAG 1064 nm laser to the proximal knee. Settings for Nd:YAG included 160 J, 25 ms, 1 Hz, with 3–4 passes; PDL was set at 10 J, 1.5 ms, with 2 passes. Post-treatment compression with 0.9% NaCl was performed. One week later, the proximal knee showed greater lesion resolution with blackish crusting, prompting continued treatment with the long-pulsed Nd: YAG laser. Subsequent sessions resulted in drying, crusting, and gradual reduction of lesion size without recurrence (Figure 5). Dermoscopy post-treatment revealed purplish discoloration of previously reddish lacunae, indicating therapeutic response (Figure 5).

Discussion

Lymphatic Malformations (LM) represent localized developmental anomalies of the lymphatic vessels. These malformations are characterized by the presence of either small vesicles or larger

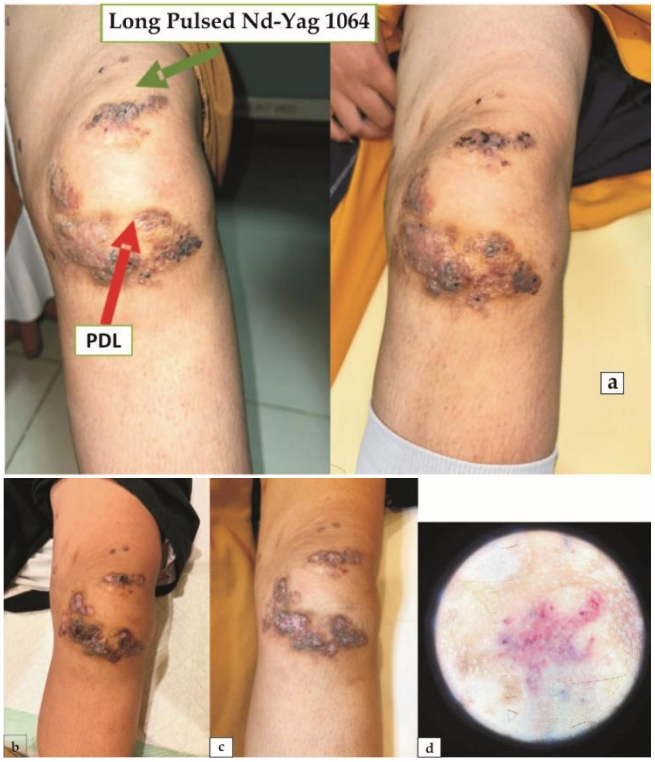

Figure 5a: Follow up of patient 1 week after PDL and long pulsed Nd-Yag 1064 laser.
B: Follow up 1 month after long pulsed Nd-Yag 1064 laser.
C: Follow up 2 months after long pulsed Nd-Yag 1064 laser. **D:** dermoscopy after laser: purpura (purple discoloration) can serve as a therapeutic endpoint

cysts that are filled with lymphatic fluid. While macrocystic LMs can be identified as early as the first trimester of pregnancy, the majority are typically diagnosed during infancy, often before the child reaches two years of age. However, in certain cases, LMs may not present until adolescence or adulthood.[1] In the United States, lymphangiomas are uncommon. They account for about 25% of benign pediatric vascular tumors and 4% of all vascular tumors. There is no preference based on gender or race. Congenital lymphangiomas develop during fetal life from abnormal lymphatic cisterns that fail to connect properly with the normal lymphatic system. These cisterns may link to ectopic vessels and can expand over time, eventually protruding through the skin due to smooth muscle contraction.[3]

LMs are made up of macrocysts (>1 cm in diameter, formerly known as cystic hygroma) or

microcysts (formerly known as lymphangioma circumscriptum) that enlarge in proportion to the kid.[1] Multiple, clustered or dispersed, transparent or hemorrhagic vesicular papules that resemble frog spawn are the clinical manifestation of lymphangioma circumscriptum. Purple patches can be visible sporadically among the vesicle-like papules because the lesions are made up of both blood and lymph components. Pruritus, discomfort, burning, lymphatic discharge, infection, and cosmetic issues are possible concomitant symptoms.[4] The mouth cavity, axilla, trunk, and proximal extremities are the most common localizations.[5] Dermoscopy helps distinguish superficial lymphangioma from other skin lesions. Two main patterns include yellow lacunae with clear septa (without blood) and mixed yellow-pink that alternate with dark-red or bluish lacunae (with blood). A "hypopyon-like" feature, which is a color shift from dark to light in certain lacunae, is a dermoscopy finding that has been reported more recently. Histopathology of superficial lymphangioma shows large lymphatic cisterns in the deep dermis, connected by dilated endothelial-lined channels. The overlying epidermis is often acanthotic with elongated rete ridges. No atypia or mitotic activity is typically seen, though mild to moderate inflammation may be present.[4] Clinical symptoms, dermoscopy and biopsy in this case are consistent with cutaneous lymphangioma.

Treatment for both superficial and deep lymphangiomas can be challenging. However, surgical excision is still the preferred treatment for any kind of lymphangioma when it is practical. Since recurrence is frequent, extensive local excision of the impacted lymphatic pathways is required. There have been reports of symptom improvement following destructive procedures using electrosurgery, long-pulsed Nd-Yag lasers, and carbon dioxide (CO2) lasers. Less often used techniques include sclerotherapy with 23.4% hypertonic saline, superficial radiation, and cryotherapy.[4]

The CO_2 laser, operating at 10,600 nm, is highly absorbed by water—the primary chromophore in tissue—causing rapid heating and vaporization of water-rich cells.[6] It is effective for superficial lymphangioma circumscriptum, where vesicles are limited to the epidermis and upper dermis. For deeper lesions, it may need to be combined with other modalities. Cryotherapy, using liquid nitrogen at –196 °C, induces tissue destruction through freezing, results in irreversible cell damage.[7] It is similarly effective with CO_2 laser for superficial lesions.[8] Both are typically used for small, localized lesions rather than extensive or deep-seated lymphatic malformations.

Oxyhemoglobin strongly absorbs light at 418 nm, 542 nm, and 577 nm, making these wavelengths ideal for vascular targeting.[9] The Pulsed Dye Laser (PDL) operates at 585 nm or 595 nm, near the absorption peak of oxyhemoglobin at 577 nm, making it effective for targeting blood vessels mainly for superficial to mid-depth lesions. In contrast, the Nd-Yag laser at 1064 nm is minimally absorbed by skin chromophores.[1] This low absorption is beneficial because it allows the laser energy to penetrate deeper into the skin. When used at longer pulse durations, there is conversion of laser energy into heat that can cause non-specific thermal coagulation of larger blood vessels. Hence, in this case, the long-pulsed Nd:Yag showed superior results compared to CO_2 laser, PDL, or cryotherapy.

Previous reports have demonstrated the successful use of CO_2 and long-pulsed Nd:YAG lasers for lymphatic malformations, particularly in the vulvar and head–neck regions. Sasaki et al, (2014) described a 16-year-old patient with vulvar lymphangioma circumscriptum who achieved marked improvement after combined CO_2 and long-pulsed Nd:YAG laser sessions, emphasizing the latter's superior effect on deep lymphatic channels and lower recurrence risk.[10] Similarly, Chang and Hsiao (2019) reported long-term success in 190 cases of head and neck lymphatic malformations treated with intralesional Nd:YAG laser photocoagulation, achieving an average 85% lesion reduction with minimal complications and low recurrence.[11] Consistent with these findings, our case demonstrates that long-pulsed Nd:YAG laser offers effective and durable results for refractory cutaneous lymphangioma by providing deeper penetration and selective coagulation of

vascular–lymphatic structures, surpassing the outcomes of CO_2 laser and cryotherapy.

Conclusion

Lymphangiomas are benign lesions that can be difficult to diagnose and manage. While surgical excision is the treatment of choice, it is not always feasible. In this case, long-pulsed Nd:YAG laser therapy proved more effective than ablative CO_2 laser, pulsed dye laser, or cryotherapy.

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Author's Contribution

KKH: Conceived, designed, edited the manuscript, given final approval of the version to be published, critical revisions.

LA: Manuscript writing, final approval of the version to be published, agree to be accountable for all aspect of the work.

IC: Manuscript writing, final approval of the version to be published, agree to be accountable for all aspect of the work.

MS: Manuscript writing, final approval of the version to be published.

BHK: Conceived, designed, edited the manuscript, given final approval of the version to be published, critical revisions.

MYL: Manuscript writing, final approval of the version to be published, agree to be accountable for all aspect of the work.

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