

Non-Invasive LLLT Treatment of Delayed Union in Foot Metatarsal Shaft Fracture

Ip David

Wellness Clinic Hong Kong MBBS FRCS(Edin)Orth FHKCOS FHKCOS(Rehabilitation) FHKAM (Orth Surg).

***Corresponding Author:** Ip David, Wellness Clinic Hong Kong MBBS FRCS(Edin)Orth FHKCOS FHKCOS(Rehabilitation) FHKAM (Orth Surg).

Received date: October 13, 2026; **Accepted date:** October 19, 2026; **Published date:** October 26, 2026

Citation: Ip David, (2026), Non-Invasive LLLT Treatment of Delayed Union in Foot Metatarsal Shaft Fracture, *J. Clinical Case Reports and Studies*, 7(10); DOI:10.31579/2690-8808/343

Copyright: ©, 2026, Ip David. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Summary

Delayed Union is usually defined as lack of or inadequate new bone formation across the fracture 3-6 months after fracture. Many surgeons would recommend operative intervention with fixation by metallic implants and bone grafting. This involves 2 wounds one at the site of fracture, one at pelvis to harvest bone. New Physical therapy modality Low-Level Laser Therapy [LLLT] can quicken the healing of delayed fracture union and sometimes obviate the need for major surgeries.

We were being taught throughout the years that delayed union of fracture of the bones in the extremity that are slow to heal would always need open reduction and internal fixation and frequently bone grafting

With the advent of newer physiotherapy techniques known as Low-level Laser Therapy (LLLT) that has Both bone healing and Bone Re-modelling potential, the concept above might need to be taken with a grain of salt [1].

The same holds for fresh metatarsal shaft fracture as illustrated in Figure 1 that refuse to unite after 3 months of observation. Figure 2 shows the healing of the displaced metatarsal shaft fracture after LLLT administration for 4 months without surgery or bone grafting. This patient had refused operation.



Figure 1: Delayed Union of Metatarsal shaft fracture treated initially by casting



Figure 2: Healing and remodeling of the fracture after LLLT

Low-Level Laser Therapy (LLLT) unlike ordinary physiotherapy machines has the potential to Both Heal and Remodel the fracture ends to obviate the need for surgery as most patients are afraid of operation LLLT is a totally noninvasive treatment modality. It has bio modulation action and acts on the cellular molecular level by increasing the energy level of the injured body cells [2], increased blood supply by the nitric oxide pathway [3], also causes gene activation to produce more BMP or bone morphogenetic protein [4]; it further remodel the bone ends by its action of Both the osteoblasts and osteoclasts cells. LLLT is free of side effects and well tolerated by patients and adds to our technology in managing delayed fracture union in particular patients who strongly refuse the operative option.

Reference

1. Ip D (2016). Use of Low level laser therapy in Orthopedics Lap Lambert Publications Germany.
2. Ferraresi C et al. (2014). LLLT increases mitochondrial membrane potential and ATP synthesis in C2C12 myotubes with a peak response at 3-6 hours Photochem Photobiol 91(2): 411-416.
3. Moriyama Y et al. (2009). In vivo effects of LLLT on inducible nitric oxide synthase Lasers Surg Med Mar 41(3):227-231.
4. Pyo Se-Jeong et al. (2013). LLLT induces expression of BMP-2 Osteocalcin, TGF in hypoxic cultured human osteoblasts Lasers Med Sci Feb: 28(2): 543-550.



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: [Submit Manuscript](#)

DOI: [10.31579/2690-8808/343](https://doi.org/10.31579/2690-8808/343)

Ready to submit your research? Choose Auctores and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

At Auctores, research is always in progress.

Learn more <https://auctoresonline.org/journals/journal-of-clinical-case-reports-and-studies>