



Non-Invasive Treatment of Delayed Union in Human Long Bones

Dr. David IP*

Wellness Clinic, Hong Kong

Abstract

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 long bone 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 proximal femoral fracture as illustrated in Figure 1 that refuse to unite on the tension side despite intra-medullary nailing after 6 months of observation. Figure 2 shows the healing of bones at the Tension side after LLLT administration for 4 months.

Low-Level Laser Therapy (LLLT) unlike ordinary physiotherapy machines has the potential

OPEN ACCESS

*Correspondence:

Dr. David IP, MBBS FRCS (Edin) Orth,
FHKCOS FHKCOS (Rehabilitation),
FHKAM (Orth Surg), Wellness Clinic,
Hong Kong,
E-mail: wellnesspaincentre@gmail.com;
ipdavid@hotmail.com.hk

Received Date: 10 Oct 2026

Accepted Date: 13 Oct 2026

Published Date: 15 Oct 2026

Citation:

David IP. Non-Invasive Treatment
of Delayed Union in Human Long
Bones. WebLog J Phys Ther
Rehabil. [wjptr.2026.j1506](https://doi.org/10.5281/zenodo.23368713). <https://doi.org/10.5281/zenodo.23368713>

ISSN 3071-401X

Copyright© 2026 Dr. David IP. 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.



WebLog Open Access Publications

Article ID : wjptr.2026.j1506
Author : Dr. David IP



Figure 1: Delayed Union of the Tension Side of Proximal Subtrochanteric Fracture despite intra-medullary nailing.



Figure 2: Healing of even the fracture on the Tension Side of the Proximal Femur after LLLT.

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 non-invasive 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.

References

1. Ip D. Use of Low level laser therapy in Orthopedics Lap. Lambert Publications. Germany. 2016.
2. Ferraresi C, et al. LLLT increases mitochondrial membrane potential and ATP synthesis in C2C12 myotubes with a peak response at 3-6 hours Photochem Photobiol 2014, Dec 30; 91(2): 411-416.
3. Moriyama Y, et al. *In vivo* effects of LLLT on inducible nitric oxide synthase Lasers Surg Med. 2009; 41(3): 227-231.
4. Pyo Se-Jeong, et al. LLLT induces expression of BMP-2 Osteocalcin, TGF in hypoxic cultured human osteoblasts Lasers Med Sci. 2013; 28(2): 543-550.