High-Resolution Infrared Thermography for Bedside Wound Monitoring and Diagnosis

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Introduction: Infrared thermography has significant clinical potential in wound care. It is non-invasive, free from adverse effects, requires no sedation or mobilization—especially valuable in critically ill patients—and does not emit ionizing radiation. It allows bedside evaluation of physiological processes such as perfusion, inflammation, and metabolism.

Methodology: Descriptive narrative study of three clinical cases managed through interdisciplinary protocols in Montevideo, Uruguay. IR sensors Flir E75 640 x 480 pixels; UltraMax, 0.04°C sensitivity) were used after a 10-minute stabilization period. The Thermo Wound protocol was applied. Analyses included ΔT in regions of interest (ROI), thermal histograms, and thermal profiles using Vision Fy 2.1.1 software.

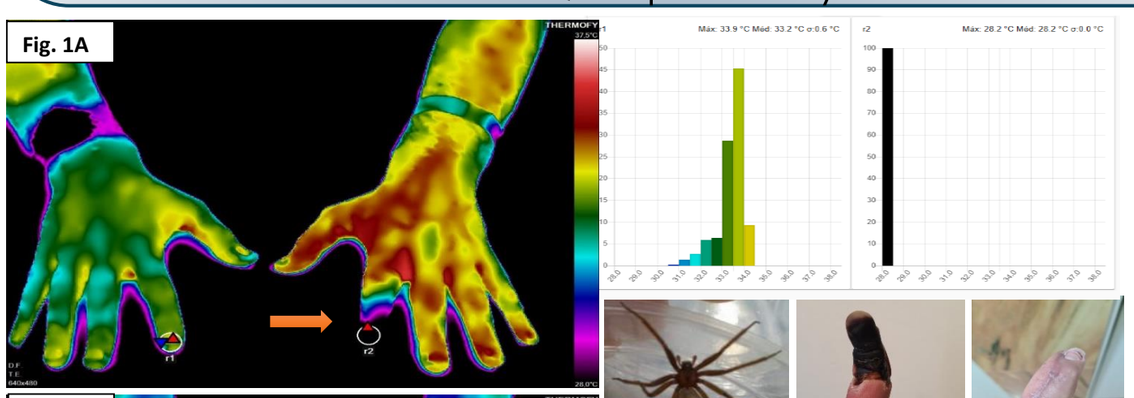
Discussion: Thermal profiles, including the "M" pattern and HTO (Brioschi et al., 2020), reflect healing phases. ΔT > 1°C is associated with inflammation and active perfusion. IR enabled detection of critical findings not visible in photographs. ΔT > 2°C indicates infection risk. Ko et al. (2018) and Machado et al. (2023) suggest ΔT cutoffs of 2.2°C and 2.3°C, respectively.

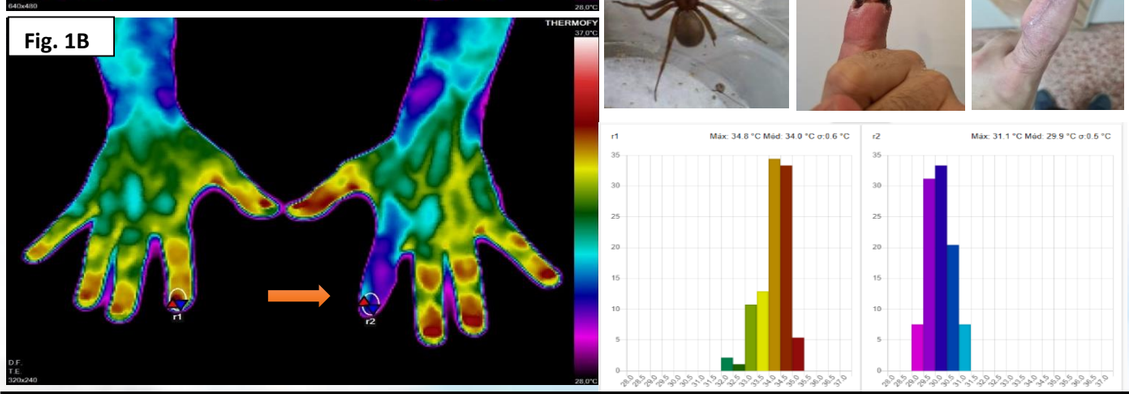
Objective: To evaluate the contribution of infrared imaging (IR) in the clinical monitoring of complex wounds at the bedside by analyzing three clinical cases. This study compares thermal images to conventional photographs, highlighting IR's potential to identify risk areas early, support therapeutic decisions, and optimize clinical outcomes.

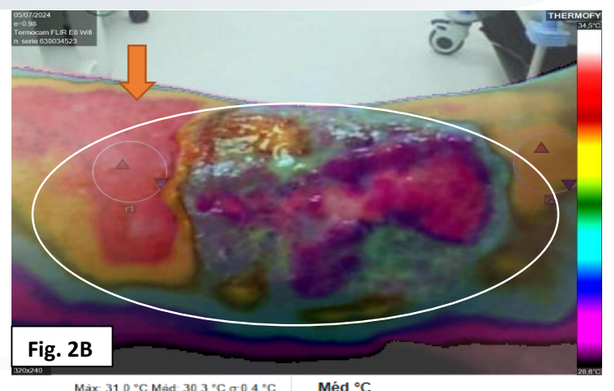
Case 1: A 33-year-old male healthcare worker with necrotic lesion on the dorsum of the left index finger after a Loxosceles spp. bite. IR detected ΔT > 1°C on the second phalanx, indicating viable tissue. Based on this, amputation was avoided, and vasodilator treatment followed by grafting led to good recovery. **Fig 1A-B**

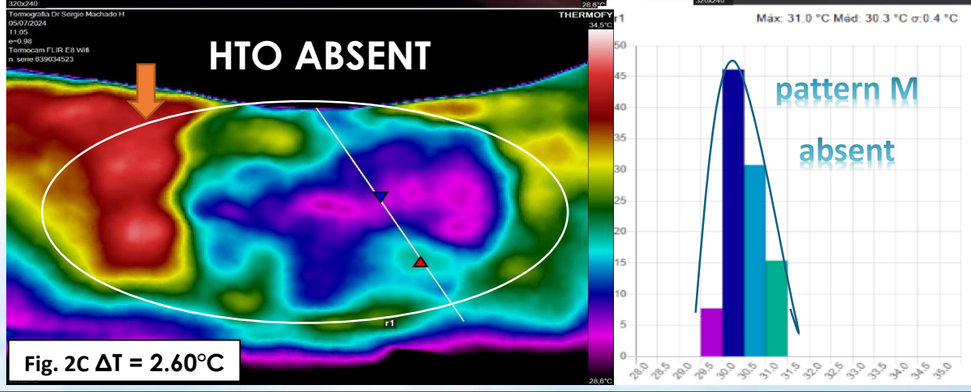
Case 2: A 48-year-old male with a chronic, painful wound (VAS 6) with two months of slow evolution. IR showed absence of the "M" pattern and a hot spot (ΔT = 2.6°C), suggesting possible infection. Laboratory tests confirmed leukocytosis. **Fig 2 A,B,C**

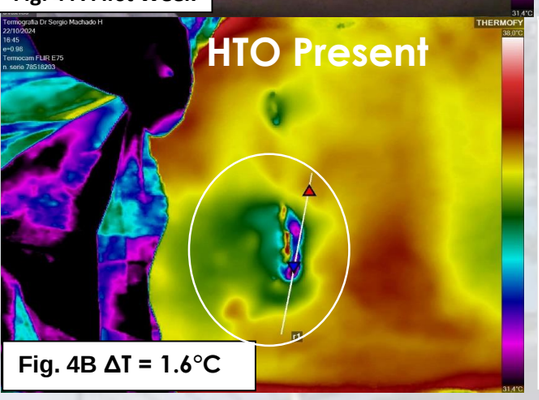
Case 3: A 7-year-old boy, post-nephrectomy (45 days), with a clean surgical wound. IR revealed presence of "M" pattern, hidden thermal hyperemia (HTO), and ΔT =1.6°C 1.2°C, compatible with a normal healing process. **Fig 4,A-D**

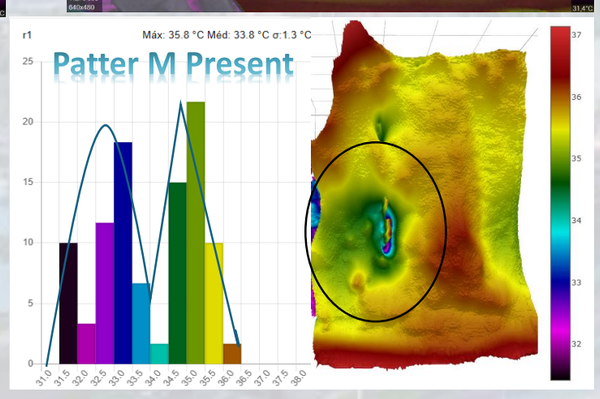


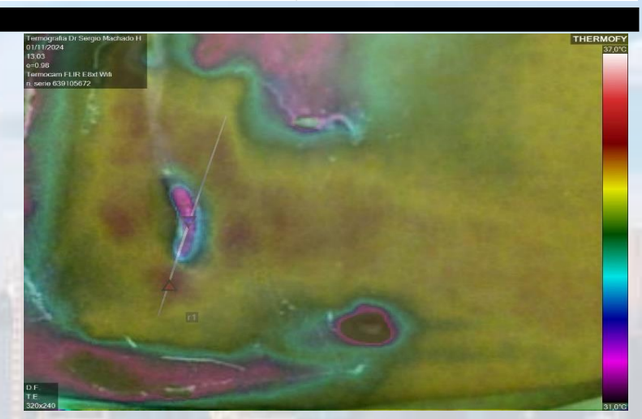


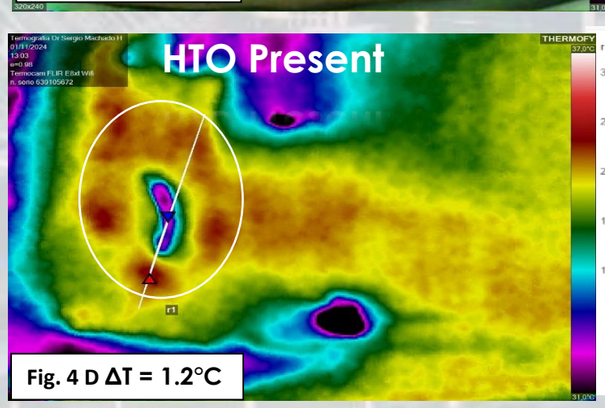


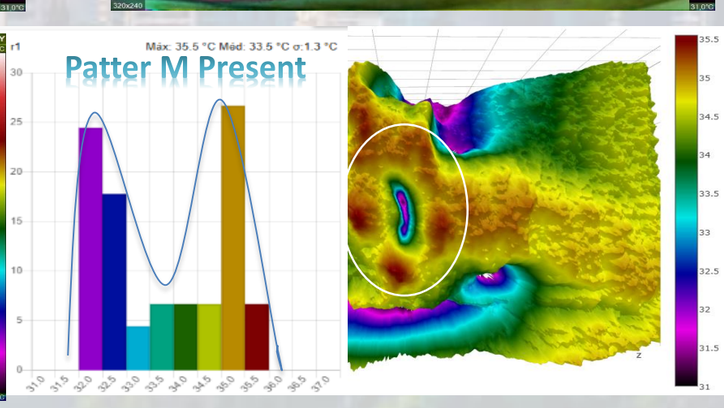












Conclusion:

High-resolution Infrared thermography adds value to wound assessment by revealing dynamic physiological data. It complements photographs and supports more accurate, timely clinical decisions in complex wound care.

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We have no conflict of interest