

Advanced Assessment of the Colorectal Incision with Long Wave Infrared Thermography (LWIT)

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Background:

The risk of infection after colorectal surgery is threefold compared to other sites.¹ Surgical-site infection (SSI) after enterostomal closure has been reported at 2%–41%.² Delayed detection of SSI results in prolonged recovery and higher costs.³

Purpose:

Indicators of delayed incisional healing may not be visible in the initial stages; temperature, an indicator of delayed healing and infection, can be subjective and challenging to assess.

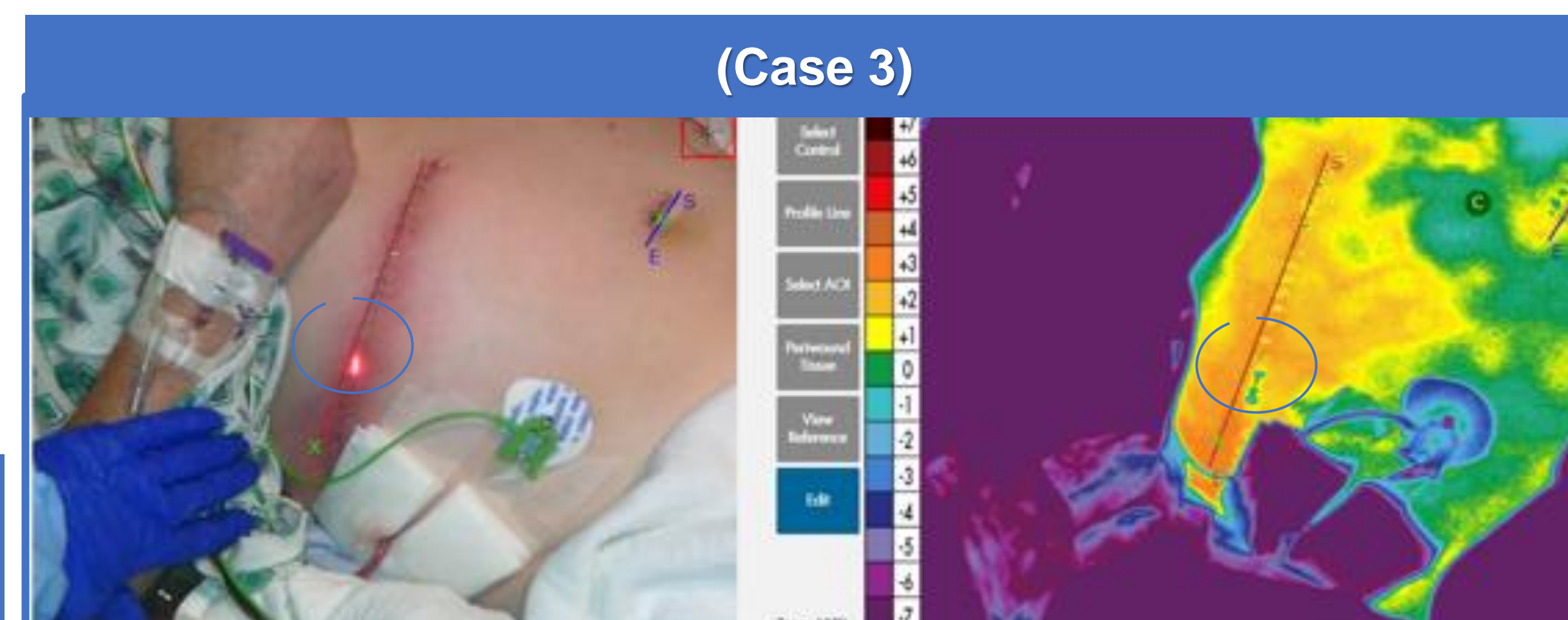
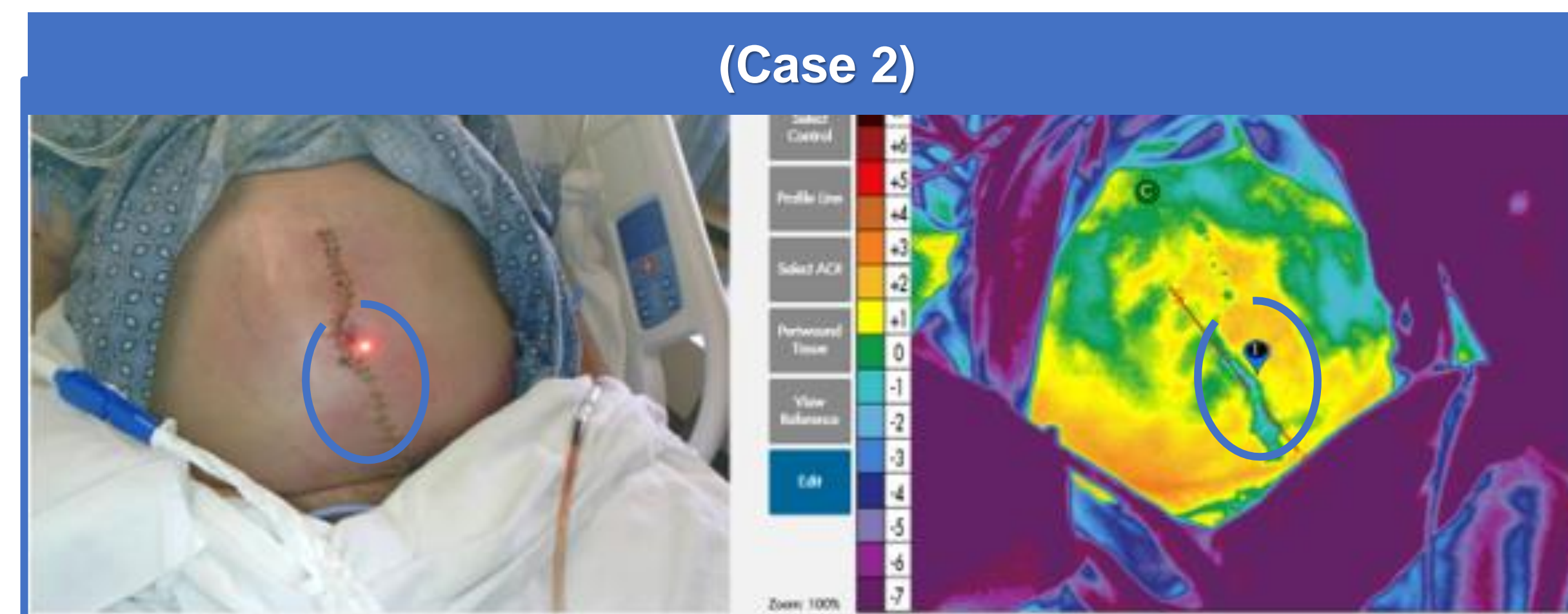
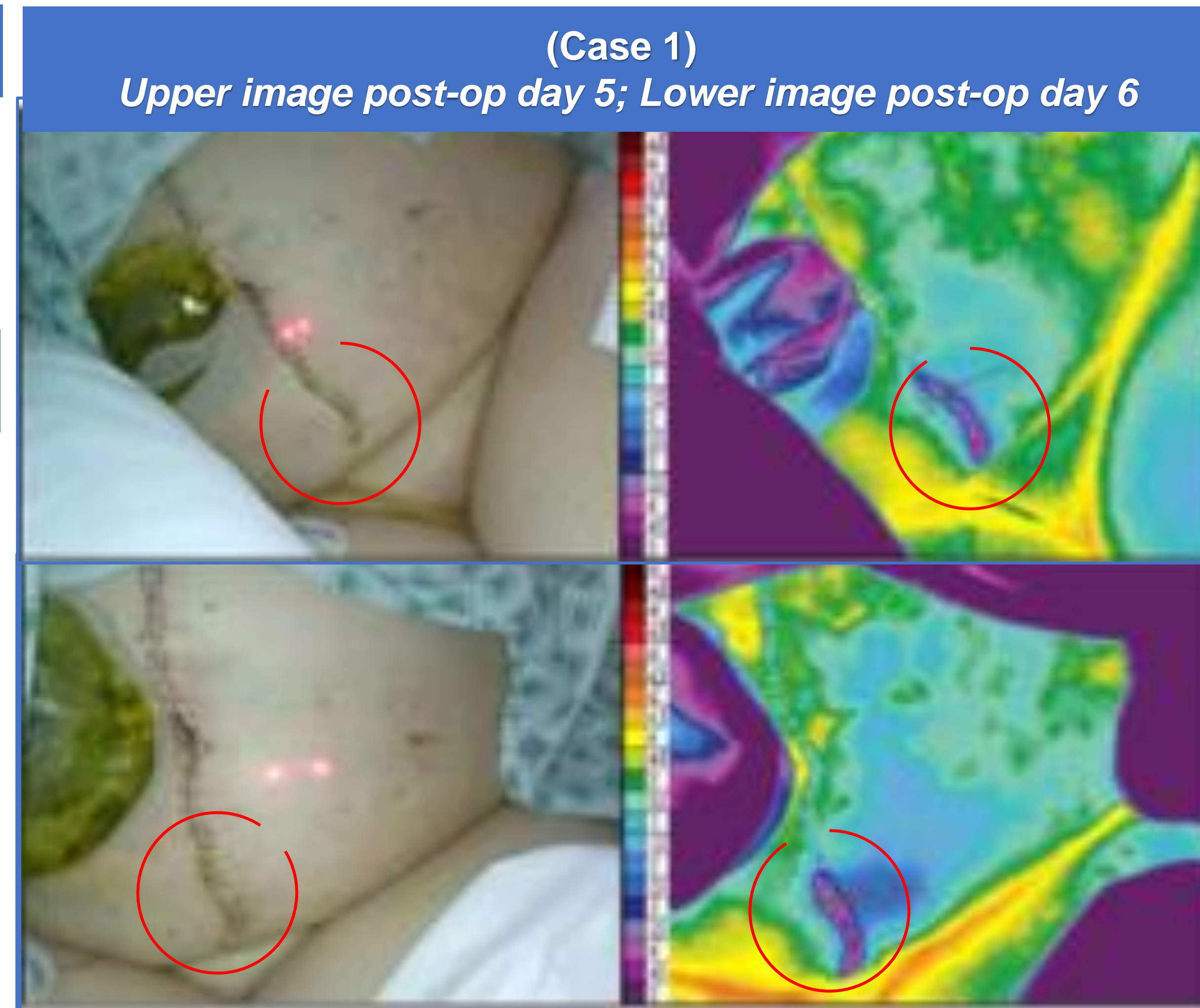
The purpose of this work is to use Long Wave Infrared Thermography (LWIT) to assess the colorectal incision via infrared feedback and provide pathophysiologic findings. Previous research determined delayed healing can be detected using LWIT within the first four days after surgery of Colorectal patients.³

Case Descriptors:

Case 1. Visible Image on post-op day 5 showing intact incision without signs of inflammation; however, the thermal image is showing a worrisome area of cool temperatures at the distal incision. Image on post-op day 6 reveals signs of worsening in size and scope spreading laterally. Indicative of thermal presentation prior to dehiscence – while no visible indicators are yet present.

Case 2. Patient complaining of abdominal pain. Thermal scan showed concern of inflammation with hypoperfusion to distal incision. WOC team and medical team had differing opinion of concern due to visible presentation without symptoms. Incision dehiscd the following day with positive MRSA cultures.

Case 3. Visible image shows only incisional inflammation while the thermal image shows a vast area of inflammation spreading beyond the incisional line – note also the cool area at distal incision.



Observational study results of thermal temperature of surgical wounds detecting delayed healing within 4 days after surgery³

	Non-infected Incisions	Infected incisions
OR Day	Cool/ (interstitial fluid)	Cool/ (interstitial fluid)
Day 1	Warming (angiogenic capillaries)	Lower/ cooler than non-infected
Day 2	Periwound warmer/ with no cool spots	Incision cooler than non-infected
Day 3	No difference from day 2	Remained cooler
Day 4	Remained warmer/ no cool spots	Cold spots (poor blood supply)

Objective:

LWIT images of the incision were taken at the bedside as part of the nursing assessment to assess healing delays. The LWIT software measured the temperature differential of the incision and surrounding skin. Adequate blood supply within the wound bed is required to deliver oxygen and to sustain normal healing. Cold spots along the surgical wound indicate poor blood supply, leading to delayed healing⁴

Outcomes and Conclusion:

These three cases show a thermally cool area along the distal incision prior to visible infection or dehiscence. **Case one** showed a progressing cool spot with serial imaging. **Case two** also showed incisional coolness and dehiscd with positive MRSA cultures the following day. **Case three** visually showed minimal inflammation and thermally showed inflammation spreading beyond the incision line and a cooler area at the distal incision.

Along with the clinical history, LWIT imaging can be an adjunct to support the assessment of incisional site healing delays, which could be identified (by lower temperatures) prior to dehiscence.

References:

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Disclosure/Acknowledgement:

LWIT imager utilized the SCOUT from WoundVision. Author is employed by WoundVision as Dir. Clinical Solutions Specialist