

Documenting Deep Tissue Pressure Injuries Using Mobile Multispectral Near-Infrared Imaging: A Case Series

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Introduction

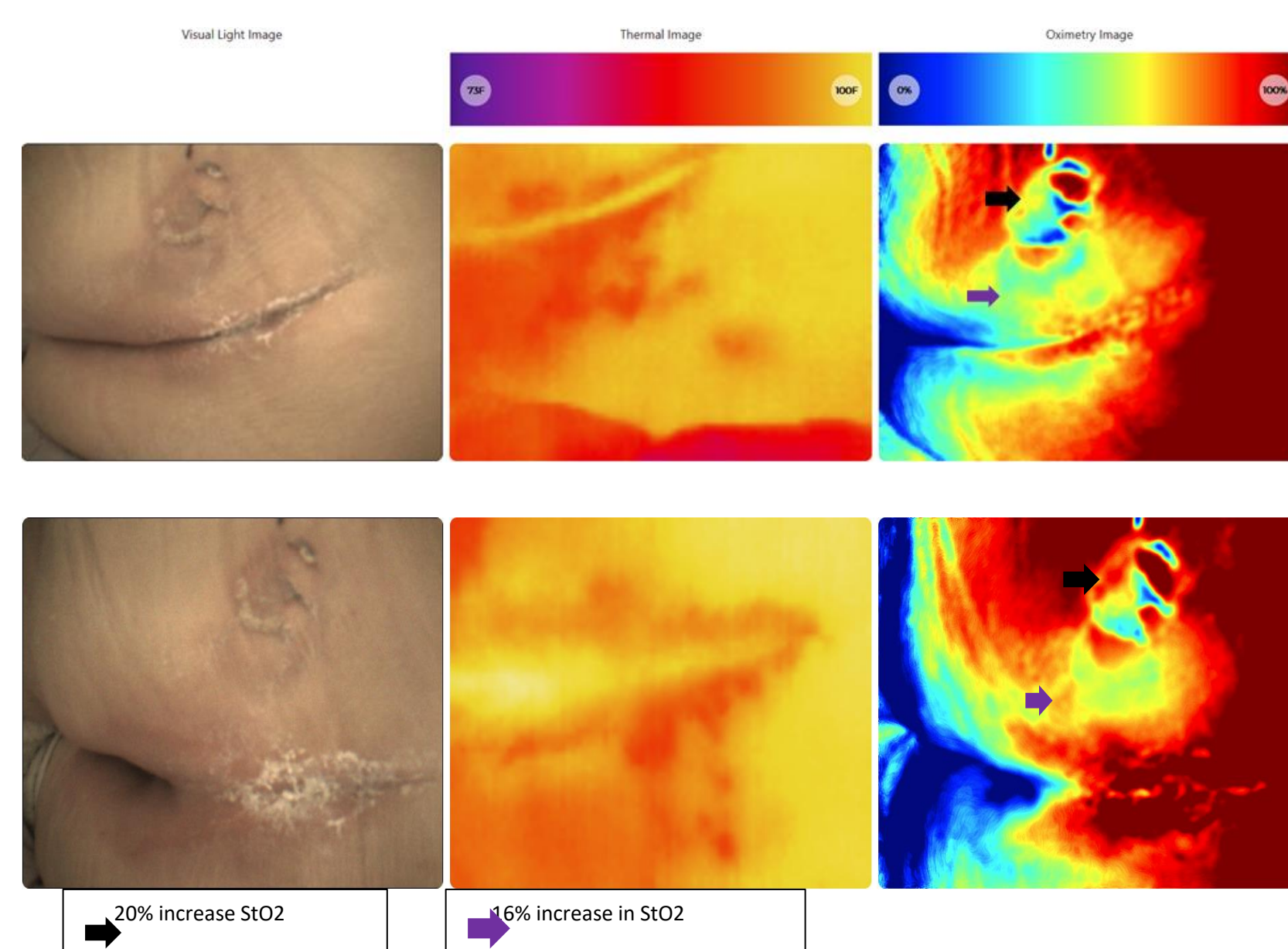
Pressure injuries (PI) impose a significant burden on patients, health care and legal systems. Patients hospitalized with PIs experience substantial increase in lengths of stay and hospital costs. Repetitive ischemia-reperfusion is a significant contributor to the genesis of PIs. Routine skin assessment is a critical component of PI prevention. However, several barriers tend to hinder such programs, including subjectivity and documentation challenges. Deep tissue pressure injuries (DTPIs) are the most common type of pressure injury which occurs in the muscle rather than the skin. It often presents as skin discoloration, but the associated tissue damage can also be detected earlier through change in temperature and tissue oximetry. In this study, we aim to assess the ability of mobile multispectral near infrared imaging to support the documentation of DTPIs.

Methods

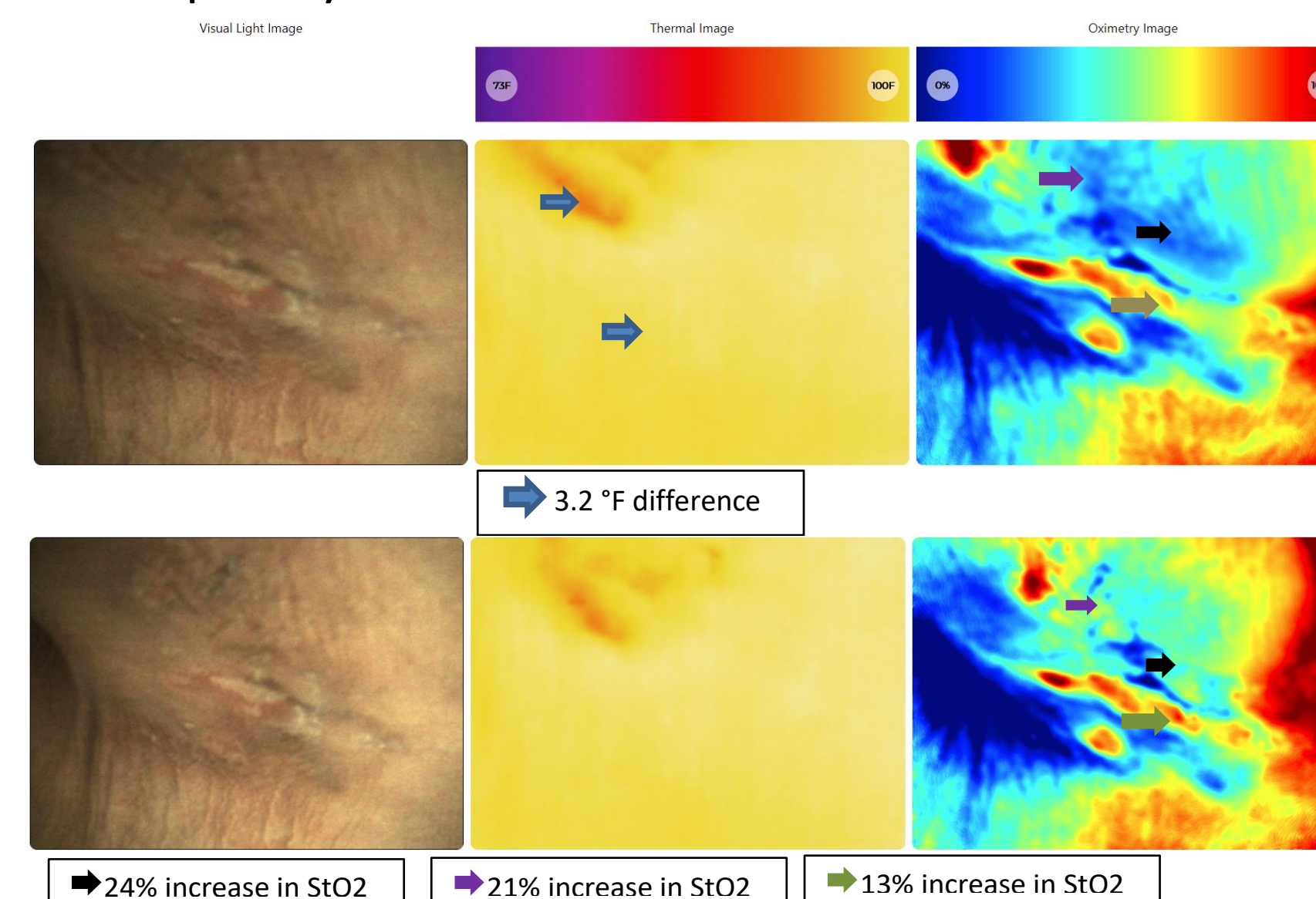
This case series observed individuals in an inpatient setting. During routine skin assessments performed by wound specialists, multiple multispectral near infrared images were collected from individuals who had an active PI. A hand-held multispectral near infrared imaging device* was used to measure temperature and tissue oximetry of PIs. Differences in tissue oximetry and temperature measurements were observed to measure physiological characteristics of DTPIs. We included three cases to depict our experience in documenting DTPIs.

Results

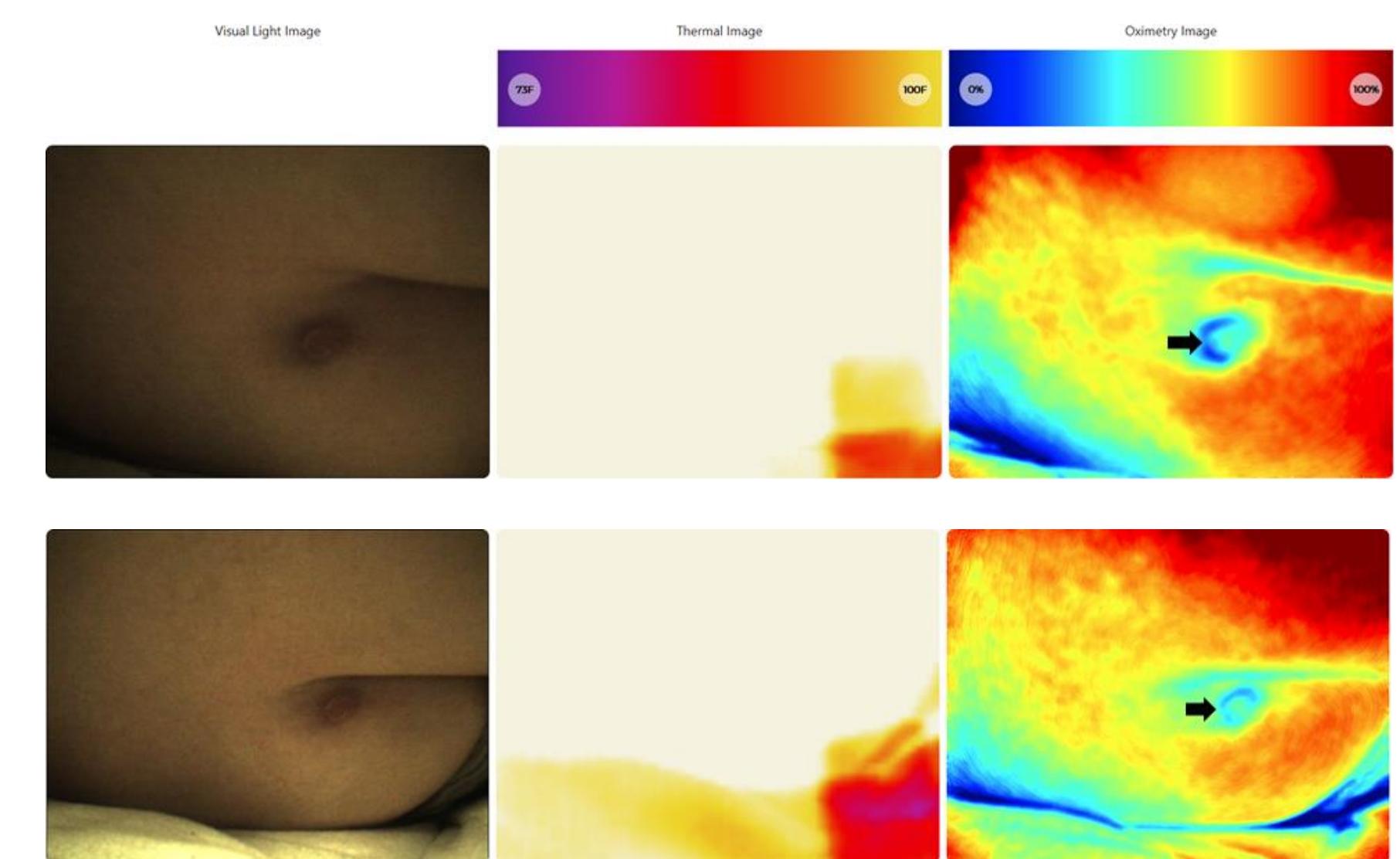
Case 1: A 95-year-old female with a history of dementia was identified with a DTI in its initial stage located on the left buttock. NIRS imaging showed signs of ischemia within the PI, and high levels of tissue oxygenation in the surrounding tissue. Another image was taken after 2 minutes which showed an increase of tissue oxygenation within the PI (20% StO₂) and surrounding areas (16% StO₂). This individual's PI went on to heal completely.



Case 2: An 83-year-old female identified with a history of lymphoma presented with an early-stage sacral DTI. NIRS imaging showed areas of ischemia and high oxygenation within the PI and low levels of tissue oxygenation in the surrounding tissue. Another image was taken after 2 minutes which showed increases of tissue oxygenation within the PI (13% increase) and surrounding areas (24% and 21% increase as per black and purple arrows, respectively). Thermal imaging detected lower skin temperature within the DTPI when compared to the surrounding areas (3.2 °F shown by blue arrows in thermal image). This individual's PI went on to heal completely.



Case 3: A 69-year-old male with a history of B cell lymphoma was found to have a documented DTPI. An image was captured immediately after the individual was rolled, which showed signs of ischemia within the PI, and high levels of tissue oxygenation in the surrounding tissue. Another image was taken 2 minutes later that showed an increase of 26% tissue oxygenation within the DTPI. No significant differences in temperature were observed. This individual's PI went on to heal completely.



Conclusion

The use of mobile multispectral near infrared imaging shows utility in documenting DTPIs when used during routine skin assessments. Such imaging can support healthcare professionals in the tracking and detecting of such injuries that may traditionally be overlooked or missed entirely. The role and assessment of ischemia-reperfusion in PIs may also help in predicting whether healing is possible for specific injuries. More research is required to explore the full utility of multispectral near infrared imaging in the prevention of PIs overall.

*MIMOSA Pro, MIMOSA Diagnostics Inc. Toronto, Canada.