
Comparative study of the temperatures reached at the surface, 10mm and 20mm depths when performing the non invasive Venus Freeze® on the lower abdomen.

Joseph Ajaka, MD, Beth Mahoney, RN

INTRODUCTION

Invasive Energy Assisted Procedures for skin tightening and fat reduction are commonly used by many physicians. At our practice we had two types of energy assisted procedures that we have used to achieve optimal temperatures for skin tightening and fat reduction.

1. Laser Assisted
2. Radiofrequency Assisted

The common aim is to reach external temperatures of 41-43 °C and/or a sub dermal temperature of 45-47 °C for skin tightening. When performing invasive skin tightening or fat reduction with energy assisted procedures, internal and external temperature devices do not always give accurate endpoints. When using temperature monitoring devices and aiming for a temperature endpoint alone when performing energy assisted procedures overtreatment can occur with the formation of hard raised nodules and internal scarring. Overtreatment can also occur if any brief interruption results in a reduction in temperature which then increases the amounts of joules required reaching the optimal temperature, so at our practice we prefer to use temperature as a guide along with energy density delivered.

In order to successfully treat a patient less invasively by using an alternative method to that of energy assisted procedures we first need to know what is the correct energy density/temperature elevation needed to achieve results? To answer this question lets go back to some basic physics. Firstly, the specific heat of fat is 2.47 J/cm³/C and the specific heat of water (the main component of collagen) is 4.186 J/cm³/C. This means that it takes 2.47 joules per cubic centimeter of fat to raise the temperature by 1 degree Celsius

and that it takes 4.186 joules per cubic centimeter of water to raise the temperature by 1 degree Celsius. Secondly, the sub dermal temperature at which collagen remodelling occurs is approximately 45-47°C, therefore an 8- 10°C rise in body temperature is needed in the dermis to cause optimum skin tightening.

Energy assisted procedures, as the name suggests, are dependent on the amount of energy delivered to an area to achieve optimal skin tightening and fat lysis. In the experiment outlined the results show how temperatures previously only reached using internal invasive energy assisted procedures can now also be achieved when using the non invasive Pulsed magnetic fields of the Venus Freeze®. It also shows that the optimal clinical endpoint of the increase and maintenance of the ideal temperature can be achieved, thus delivering the major factor determining the optimal clinical outcome.

We have shown that with the Venus Freeze® we have reached the ideal external temperature of 41-43°C, and a sub dermal temperature of 45-47°C required for optimal temperature for skin tightening, and that it is possible that the non invasive Venus Freeze® can externally achieve the same temperatures as its predeceasing and more invasive energy assisted counterparts. However, this study focuses on skin tightening alone therefore temperatures required for fat reduction were not considered. Some circumferential reduction was noted at the temperatures achieved during this study but the reduction was temporary, thus concluding that performing one treatment at the temperatures achieved during the study only results in a temporary reduction effect on fat cells. However, as Dr Schlomit Halachmi has suggested when reaching temperatures in the region of 50°C 'significant reduction in the

ability for the fat cell to survive which would predict a reduction in fat volume over time.'

METHOD

Standard treatment procedure was followed. The comparative study was performed on 3 patients that were treated with the Venus Freeze device on the lower abdomen. Age and gender being irrelevant, internal and external temperature were monitored throughout and recorded at set intervals, being before treatment, during treatment, 5 minutes post treatment, 10 minutes post treatment and 15mins post treatment. The depth of internal monitoring of 20mm was determined by the rule of thumb as suggested by Dr. Schlomit Halachmi in her discussion on (MP)² Academic and Clinical Experience. Stating that the depth of RF penetration is half the distance between electrodes, so when on using the OctiPolar applicator where the distance between the two furthest electrodes is 5.5cm this indicates that 3D penetration can be reached at a depth of up to 27mm.

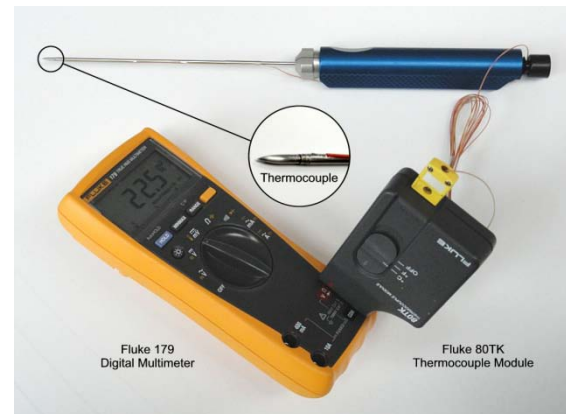
Treatment program for Skin Tightening was selected, and the appropriate treatment head was used for this area (OctiPolar applicator). The treatment area was cleansed and glycerine was applied. The Octipolar applicator was applied to the skin and treatment commenced using the recommended "figure 8", "swirls", "snakes" and "wave" shaped movements without stopping. All patients underwent 25 minutes of active treatment, treatment started at an energy level of 80% for 3 minutes or until an optimal external temperature of at least 42°C was achieved, then the remainder of the treatment or 22 minutes at an energy level of 70% to maintain the optimal external temperature of between 42-45°C. All patients tolerated these settings and adjustments where not required we use when performing energy assisted procedures, Fluke 62 mini IR thermometer, which has proved to give accurate readings. Internal temperatures were measured using the Fluke Digital multimeter with Thermocouple module which

at our practice has been proven to again give accurate readings.

An Infrared thermometer was used to measure the epidermal temperature. We used the same external temperature device as

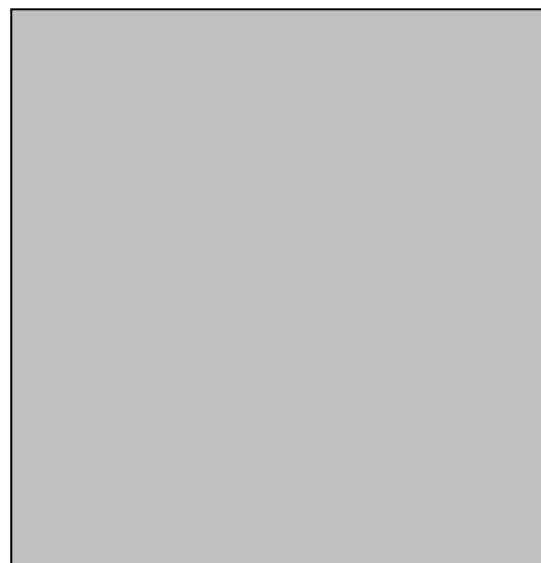


External



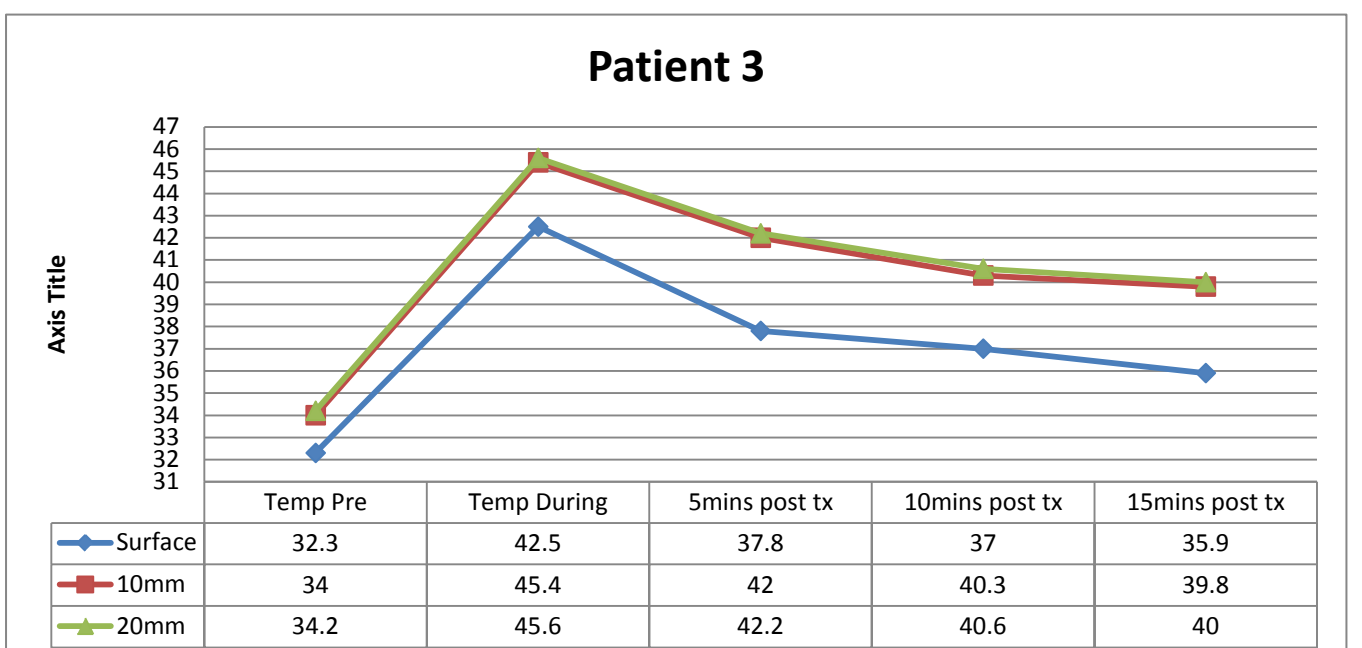
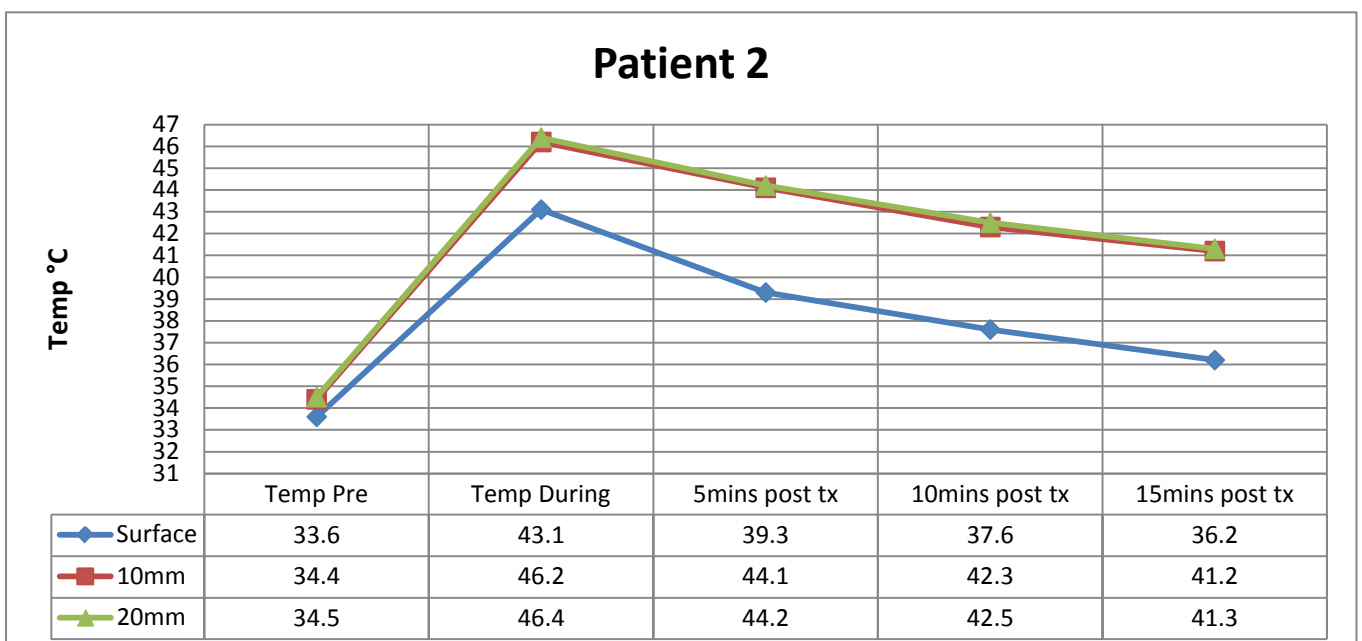
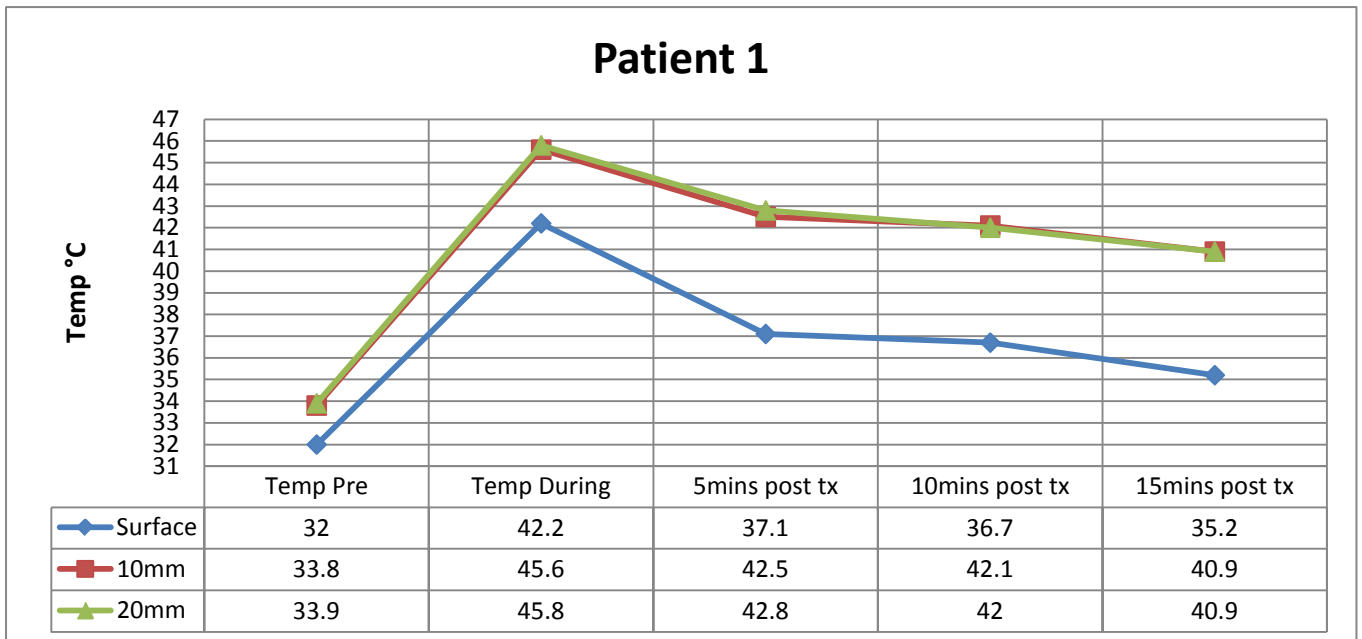
Internal

Image of internal temperature monitoring pending



When using temperature as an endpoint it is extremely important to continually monitor and use equipment with proven accuracy to avoid complications and burns.

Results can be seen in the graphs below.



RESULTS

The results showed that the temperature was significantly higher (up to 5°C) 20mm down than on the surface, inferring that the bulk of the heat delivered by the Venus freeze to depths of 10mm to 25mm, means that the elevation of temperature on the surface is caused by the heat that is radiating up and out from within. The results also show that there is not much difference in temperature at 10mm and at 20mm deep, thus indicating a Homogenous distribution of the heat at these depths

SUMMARY

When performing Laser Assisted or Radiofrequency Assisted procedure temperature monitoring alone is not recommended as a sole endpoint but in combination with energy density delivered to the risks of overtreatment and unwanted complication.

The Venus Freeze has proven to be able to externally reach the optimal temperatures required for successful skin tightening. So, with the non invasive (MP)² Technology now available with Venus Freeze we are able to safely reach the same ideal surface temperatures of 41-43°C and internal temperatures of 45-47°C needed to achieve visible skin tightening as is achieved during invasive Laser Assisted or Radiofrequency Assisted procedures.

Even tho the non invasive (MP)² Technology of the Venus Freeze can achieve optimal temperatures, I would not go as far to say that they can replace the more invasive internal procedures such as Laser Assisted or Radiofrequency Assisted. These procedures still are able to easily reach and surpass the optimal internal temperatures of 45-47°C required and can still be the first point of call for the patient, thus allowing for a more significant change to collagen remodelling and permanent fat reduction. I believe that both invasive and non invasive procedures can be used in conjunction with one another to give the patient the instant result that they want

to see and then follow up with a gentler procedure to enhance for optimal results.

The non invasive Venus Freeze is still an ideal option for patient not wanting to take the time and recovery of the more invasive procedures, but they have to be prepared to achieve a satisfactory, progressive result.

This external non invasive treatment now allows the practitioner to safely treat and visibly monitor the point of contact whilst successfully reaching dermal temperatures at which collagen remodelling and skin tightening occurs.
