

A CASE STUDY ON THERMOGRAPHICAL ASPECTS OF PLASTRON WOUND IN A SPUR-THIGHED TORTOISE (*TESTUDO GRAECA*)

UN STUDIU DE CAZ PRIVIND ASPECTELE TERMOGRAFICE ALE UNEI LEZIUNI A PLASTRONULUI LA O ȚESTOASĂ GRECEASCĂ (*TESTUDO GRAECA*)

Simona Mirela RUSU¹⁾, Sabine ÖFNER²⁾,
M. BAUR²⁾, I. PAPUC¹⁾

ABSTRACT | REZUMAT

The aim of this paper is to present the temperature evaluation, by thermographic method, of a tortoise presenting a wound at the border between the skin and the plastron with total loss of the intergular scale and partial loss of the gular, extragular and humeral scales. The patient was a found, injured spur-tighed tortoise (*Testudo graeca*) that was brought to the Reptile Rescue Center Munich.

The wound was treated topically with a honey based ointment. Before applying the bandage, thermographical images were taken. The images were taken during 6 days on day 1, 4, 5 and 6. The images obtained have been analyzed with the program provided by the manufacturer of the camera, measuring the temperature in the same two spots every time, including the lesion area and a healthy spot on the body.

Keywords: temperature, thermography, wound healing, tortoise

Scopul acestei lucrări, este prezentarea evoluției temperaturii prin metoda termografică, la o țestoasă diagnosticată clinic cu o leziune la limita dintre piele și plastron cu pierderea totală a solzului intergular și pierderea parțială a solzilor gulari, extragulari și humerali. Pacientul a fost reprezentat de o țestoasă grecească (*Testudo graeca*) găsită și adusă la centrul de salvare al reptilelor din München.

Rana a fost tratată topic cu unguent pe bază de miere. Imaginile termografice au fost realizate pe o durată de 6 zile în zilele 1, 4, 5 și 6 și au fost analizate cu programul furnizat de către producătorul termografului, măsurându-se temperatura din aceleași două puncte, incluzând zona de leziune precum și o zonă cu tegument sănătos.

Cuvinte cheie: temperature, termografie, vindecare răni, țestoasă

Vertebrates are divided in endotherms and ectotherms depending on how they realize thermoregulation. Reptiles are ectotherms and therefore are dependent on the environment temperature in order to increase or decrease their body temperature (1).

Reptiles have a similar inflammatory reaction as birds (4), but cannot increase their body temperature by internal processes, so they resort to the so called "behavioral fever" (1).

A study from 1995 (2) made in two years, that involved the daily variation in movement of spur-tighed tortoises, showed that the interval of the temperature in which the animals were active ranged between a minimum of 6.5°C to 15°C and a maximum of 19°C to 30°C with some individuals very active in colder respective hotter days (a maximum of 41.8°C) also.

Studies regarding the use of honey in wound ma-

nagement lead to the conclusion that it has an important antibacterial effect as well as anti-inflammatory and osmotic effect (3).

MATERIALS AND METHODS

The patient, a spur-tighed tortoise (*Testudo graeca*), was found and brought at the Reptile Rescue Center Munich, because it presented a wound at the border between the skin and the plastron in the cranial part of the body with total loss of the intergular scale and partial loss of the extra gular and humeral scales.

As the wound was older, it was cleaned extensively and disinfected with iodine solution and a honey based ointment (Mielosan®, CP-Pharma) as well as a bandage was applied. The bandage was changed every two days, the wound was cleaned and the honey ointment applied. Generally, the patient received infusion (10% of the body weight with saline or Ringer solution), pain management was performed with flunixin-meglumine (Findadyne®, MSD, 2mg/kg), antibiotic therapy - enrofloxacin (Baytril®, Bayer, 10mg/kg s.c.

1) University of Agricultural Sciences and Veterinary Medicine
Faculty of Veterinary Medicine of Cluj-Napoca

2) Reptile Rescue Center Munich, Germany
e-mail: simona_rusu_vet@yahoo.ro

as initial dose, then 5mg/kg s.c. for 7 days) and homeopathic remedies as *Tarantula cubensis* D6 0.1ml/kg s.c. and Traumeel D6 1ml/kg s.c. injection solutions were used in alternate days.

The animal was housed in the quarantine room in an individual hospitalization tank with a light tube that provided the light and a hiding spot both for shelter and temperature gradient.

Thermographic images were performed when the bandage was changed using the thermographic camera FLIR E6 (Flir Systems, Sweden). The images were analyzed with the program Flir Tools provided by the manufacturer, taking the temperature every time from the same two spots (one in the wound area and one in an area with healthy skin). The images were taken during 6 days on day 1, 4, 5 and 6. Then, the animal was claimed by the owners and the wound treatment was continued by the animal's current veterinarian.

RESULTS AND DISCUSSION

The accuracy of the camera is 2%, so for a better data accuracy, we calculated the average of the values obtained from 3 different images at the moment of each measurement. The value of the temperature in the wound area remained quite constant during these 6 days with values ranging between 30.45°C and 30.75°C. The temperature in the healthy spot had, on the other hand, a broader interval that ranged between 34.85°C in the first day and 32.05°C in the sixth day. The difference of temperature between the healthy spot and the wounded area dropped from 4.2°C in the first day to 1.3°C in the sixth day.

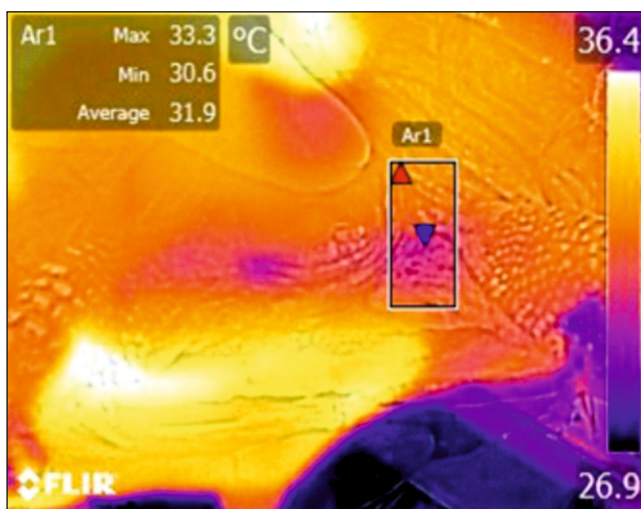


Fig. 1. Thermographic image of the tortoise in the day 4 (red arrow, maximum temperature in the selected area; blue arrow, minimum temperature)



Fig. 2. Image of the tortoise in the first day

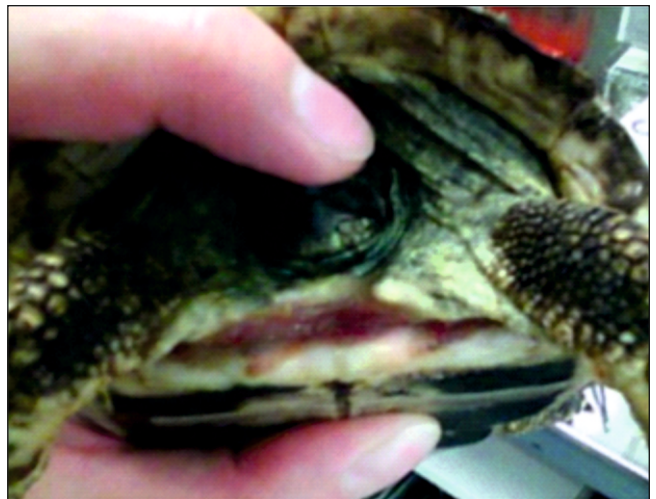


Fig. 3. Image of the tortoise in the day 4

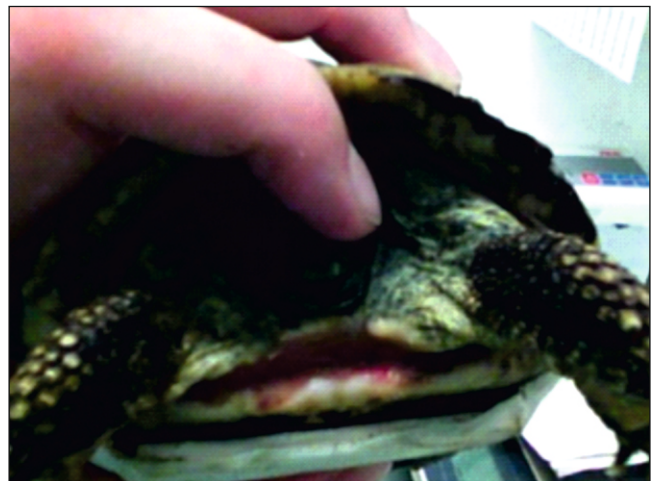


Fig. 4. Image of the tortoise in the day 6

These results may suggest that since the wounded area was colder both due to the denudated area and the high humidity of the wound due to body fluids that covered the wound, the animal expressed a behavioral fever that helped it to maintain that area in an

interval that is favorable for the healing process.

As the days passed and the wound became drier due to the healing process, this adaptive mechanism was less and less necessary so the overall body temperature of the animal decreased as well. The osmotic effect of the honey may contribute to the drying process of the wound which limit the evaporative effect for decrease of temperature in the wound area and the need of the animal to maintain a high overall body temperature.

CONCLUSIONS

When a wounded reptile is under treatment, the temperature is a very important factor in the success of the treatment: the efficient effect of medication and high enough temperature in wounded area favorable for the tissue reconstruction.

Keeping the wound dry helps by increasing of temperature in the wounded area and limiting of bacterial growth that are favorable to the healing process.

REFERENCES

1. *Deen C.M., Hutchinson V.H.*, (2001) – Effects of lipopolysaccharide and acclimation temperature on induced behavioral fever in juvenile Iguana iguana, *Journal of Thermal Biology*, 26, 55-63.
2. *Diaz-Paniagua C., Keller C., Andreu A.C.*, (1995) – Annual Variation of Activity and Daily Distances Moved in Adult Spur-Thighed Tortoises, *Testudo graeca*, in Southwestern Spain, *Herpetologica*, 51 (2), 225-233.
3. *Molan P.C.*, (2011) – The Evidence and the Rationale for the Use of Honey as a Wound Dressing, *Wound Practice and Research*, Vol. 19, No. 4, pp. 204-220.
4. *Montali R.J.*, (1988) - Comparative Pathology of Inflammation in the Higher Vertebrates (Reptiles, Birds and Mammals), *J. Comp. Path.*, Vol. 99.