Interesting image

The role of bone scanning in severe frostbite of the feet in a mountaineer

La gammagrafía ósea en un alpinista con congelaciones de los pies

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A 35-year-old man was admitted to our hospital 7 days after suffering a frostbite injury in feet while he was trying to reach the top of the Nanga Parbat mountain (height of 8,126 meters). Within the first 24 h after frostbite the patient received treatment based on warm baths, heparin, acetylsalicylic acid and non-steroidal anti-inflammatories in the base camp. A 740 MBq $^{99m}$Tc-MDP double phase bone scan in plantar view was performed 7 days after frostbite injury (Fig. 1) in aseptic conditions with a low energy/high resolution collimator. $^{57}$Co marks in distal ends of toes once removed dressings were also performed. The blood pool showed an absence of vascularisation in distal phalanx of both first toes. The delayed images also showed an absence of bone uptake in the same toes. The increases of uptake in other distal ends of toes in both phases were related to reparative changes.

Twenty-eight days later a second bone scan (Fig. 2) was performed in the same conditions as the first one. The delayed phase did not show any modification in bone uptake. Bilateral amputations at the mid-proximal phalanx level were performed 10 days later. The line of demarcation was identical to the scan studies.

Frostbite injuries affect frequently hands and feet. In mountain climbing the extreme conditions, such as high altitude, fatigue and below zero temperatures (Celsius scale), along with hypoxia, compensatory polycythaemia, chronic dehydration and delayed medical care are factors that aggravate these injuries.\(^1\) The medical treatment (acetylsalicylic acid, warm baths, peripheral vasodilators, heparin, tissue plasminogen activator (tPA) and non-steroidal anti-inflammatories) must be introduced within the first 24 h to prevent the amputation, especially tPA and heparin.\(^2\)

In clinical practice, it is difficult to establish an early prognosis, so we need four or five days to know if the injuries are superficial or deep and about 3–7 weeks to define the severity of the lesion and the amputation level. Bone scan can predict the amputation level earlier than clinical findings. On the other hand, superficial frostbite is not a reliable indicator of the absence of the affectation of deep tissues and it is not uncommon that a frostbite, initially considered serious, recovers successfully, while other frostbites with better aspect need amputation. A second bone scintigraphy is performed to follow the evolution of the cold areas and to help the surgeon define the demarcation line.\(^3\)

Bone scan is indicated in frostbite injuries, it can predict the extension of necrotic tissues earlier, can help to establish a prognosis and can determine the demarcation line.

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After 28 days those blisters dried and hard eschars developed throughout and circumferentially on the distal phalanges of both toes (A). 740 MBq $^{99m}$Tc-MDP double phase bone scan did not show any modification in bone uptake (B).

**References**

