

Treatment of exposure

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In recent years the old "common sense" approach to exposure has had to be radically changed and a sensible re-thinking by people like Pugh and Keatinge has shown the true picture. Few doctors have ever seen exposure and what knowledge they do possess has necessarily to be entirely theoretical. Most would probably admit almost complete ignorance regarding treatment, not surprisingly.

Two years ago two army cadets died of exposure on Dartmoor and in the subsequent enquiry it was disclosed that none of the staff officers and certainly none of the participants had any knowledge of the signs and symptoms of exposure.

Definition

Exposure is correctly called hypothermia and this includes immersion hypothermia. It is a state in which there is a fall in body temperature, which results when the heat produced internally by the body no longer balances the heat loss. This can occur anywhere in this country; Pugh (1966) reported on 25 deaths occurring in Wales, the Lake District and Scotland.

Typically, cases occur in bad weather, perhaps with insufficient clothing or becoming wet through, or both. All too frequently their own stamina or the distance or the height has been incorrectly assessed and so the wetness and coldness is added to exhaustion. Other factors such as thinness and inexperience will also contribute. If there is oxygen lack, i.e. at a high altitude, the symptoms will occur even more quickly.

But you do not have to go to the wide open spaces, Cohen (1968) reported six cases of severe cold injury occurring in London.

Keatinge (1965) showed that in the Lakonia disaster 113 of the 124 deaths were due to immersion hypothermia. These casualties were in water at about 15 deg. C. but some survived after seven hours. Hervey (1955) stated that a lightly-clothed man will not live more than 15 minutes at 0 deg. C. (I and three companions tried immersion at -2 deg. C. for not more than two minutes; it entailed wading slowly in, pushing ice floes aside, until up to one's chest, ducking one's head and wading rather more quickly out, followed by a very rapid run on the snow. It was physically and psychologically very exhilarating, but we were very acclimatized to cold.)

Signs and symptoms

I lecture on exposure to the naval cadets at Dartmouth before they do practical leadership exercises on Dartmoor. To try and get it across to them I liken it to an internal combustion engine running in a colder and colder environment until the oil gets thick and the machine slows up. It's not exactly similar but they seem to get the idea.

The onset is insidious, probably commencing with abnormal behaviour e.g. irritability, aggressiveness, silence or apathy; a slowing of the pace, stumbling and weakness; a 'not-interested' attitude; cessation of shivering. All this can progress to confusion, irrational responses and an inability to continue the task. There is probably an hour

or two from the onset of symptoms to collapse. The collapsed patient, if untreated, becomes stuporose and death ensues in 2 to 6 hours.

I can best illustrate some of these symptoms by a personal experience caused by very rapid cooling. Fairly newly arrived in the Antarctic I had had a fatiguing day controlling my nine huskies and my sledge with its half ton load over rough country, while on skis myself, and had sweated profusely from the heavy physical work. When we stopped to camp for the night the leading man had killed a seal to feed the dogs. There was little wind but the air temperature was about -35°C . As the routine of setting up camp proceeded I became progressively colder; we fed the dogs who fought a lot as they usually did with fresh meat. I became even colder. I was asked to stitch up Darkie who had been badly cut in a fight and irritably I replied "B—— Darkie". By then shivering had ceased and I knew, through a consciousness numbed and clouded that I was carrying out accustomed tasks slowly and clumsily. I felt very tired and thought how nice it would be to lie down for a while. Happily, I also realized, at last, what was happening and stumbled into our tent, much to the surprise of my travelling companion. After removing my windproofs, (which as effectively keep heat out), and warming up by a roaring primus and a pint of hot, sweet tea, I regained normality and returned outside to stitch up Darkie and finish the other tasks. My mistake had been to wear *too much*, hence my profuse sweating which immediately froze all over me when we stopped to camp.

Treatment

We must reverse the process and warm the patient up. Ideally, a warm bath at $42-44^{\circ}\text{C}$., which must be kept at that temperature by adding hot water until the patient has recovered his normal temperature, i.e. when he feels warm and looks a normal colour.

Baths being uncommon on mountains and moors it is necessary to endeavour to approximate to the above treatment.

Halt and erect or find shelter.

Remove windproofs and all wet clothing.

Put him into a sleeping bag, perhaps with wrapped-up heated stones;—perhaps with another man.

His hands can be plunged into water heated to 44°C ., (bearable to the elbow); remember the large surface area of the hand.

Cover his face even, if this is causing heat loss.

No rubbing; his skin is already partially traumatized.

No alcohol as it adds to heat loss by vasodilatation. (One wonders how many people were killed by the St. Bernard dogs!)

After all this one can consider moving him.

It is worth adding here that undoubtedly several patients with exposure have died from cerebral anaemia from being carried on a stretcher down a mountain feet first.

Prevention

For ordinary exposure this is achieved by:
 windproof and water-proof outer garments,
 adequate replacements of dry inner garments, (easy with cellophane bags),
 budgeting for the worst weather conditions,
 setting a pace to suit the slowest member,
 instructing all at risk in the early signs and symptoms of exposure,
 instructing them also in treatment.

For immersion exposure, prevention is not so easy. The best one can do is instruc-

tion on heat conservation by wearing plenty and reducing movement. Unless a boat or the shore is within *very* easy reach, then it is better to keep still and stop trying to warm the water all around you. (Keatinge 1965, Pugh 1968). On removal from the water treatment as for ordinary exposure is commenced.

Summary of treatment

Remove wetness.
Re-warm quickly.
No alcohol.
No rubbing.

REFERENCES

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