Management of heatstroke in Malaysian pilgrims in Saudi Arabia

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Summary

Heat stroke is hardly seen in Malaysia. However, it occurs commonly in Saudi Arabia during the Haj season. Many Malaysian pilgrims are affected every year and some die. Having faced this environmental hazard for eight years, the Malaysian Medical Mission, sent each year to look after our pilgrims, modified its treatment strategy in 1988 and successfully decreased the overall morbidity and mortality of affected patients without the use of sophisticated equipment. A brief account of the management of 17 cases seen in 1988 is given. Only one died following treatment. The rest recovered fully without any residual neurological deficit or other complications.

Key words: Heatstroke, Malaysian pilgrims, Saudi Arabia, management.

Introduction

About 30,000 Malaysian pilgrims throng the Holy Land every year to perform the Haj. The last six to seven years have been particularly hot in the holy cities of Mekah and Madinah with temperatures ranging from 41 to 43°C. Malaysian pilgrims were not accustomed to such extreme temperatures and many of them came down with heat exhaustion or heat stroke. Experience in the treatment of such cases in the Holy Land is shared for the benefit of Muslim doctors who are selected to serve the Mission in future. It is also hoped that other Malaysian doctors not familiar with the management of heat stroke will benefit as heat-related illnesses could occur in Malaysia also (Table 1).

Table 1

Heatstroke: Incidence and death amongst Malaysian pilgrims from 1984 till 1988

	1984	1985	1986	1987	1988
Number of cases	59	28	33	32	17
Number who died	42	20	2	1	1
Percentage of **total** deaths	0.25	0.11	0.13	0.13	0.06

COMMENTS:

1. Decreasing number of heatstroke cases over the last five years reflect greater awareness by pilgrims as a result of intensive health education talks locally and abroad.
2. Marked decrease in mortality from heatstroke over the last five years.

Of the various illnesses resulting from exposure to high temperatures, heat stroke presents the greatest threat to life. It is a medical emergency which requires early diagnosis and prompt treatment. There is no agreed definition of heat stroke. It may be referred to as a heat syndrome characterised by hyperpyrexia (core temperature of 41–43°C), severe neurological disturbances, vomiting, diarrhoea, hypotension, and hot skin, with or without other organ damage.[2]

Our ability to function in a hot environment depends on the body's adaptation to the environmental situation, a process called acclimatisation. An integral part of acclimatisation is the increased ability to produce sweat. Heat stroke occurs when the sweating mechanism fails and the body is no longer able to cool itself. The body temperature will then rise rapidly resulting in damage to the brain and other vital organs. The extent of damage will depend on how rapidly the patient receives appropriate treatment. Susceptible patients include the elderly, the obese, those with pre-existing heart disease, diabetic and unacclimatised individuals, especially females.[4,5]

Subjects and methods

Patients: Seventeen patients, 15 of whom were obese females, were seen at Mina, Saudi Arabia. They were diagnosed immediately as suffering from heat stroke, using set clinical criteria described below. Fifteen of them were more than 55 years old. The rest were between 45 and 55 years of age. The clinical criteria used were:

1. Rectal temperature of 41–43°C.
2. Hot and dry skin.
3. Impaired consciousness, confusion and or convulsions.

All 17 of them had the above criteria.

Investigations: It was neither possible nor necessary to carry out full scale investigations on heat stroke patients in the Holy Land. Basic investigations like Hb, haematocrit, urine examination, blood urea, serum electrolytes, blood sugar (dextostix method) and peripheral blood film for malarial parasites were done if the patient did not recover within an hour to exclude associated complications and other causes of hyperpyrexia. In our series no such investigations were carried out.

Management: Once the diagnosis was made or even suspected, the following measures were immediately taken:

The management team was divided into three groups, A, B and C. (Table 2)

1. Group A was responsible for cardio-pulmonary resuscitation (if required) and monitoring of vital signs. It was imperative to ensure a clear airway even before initiating cooling measures. In 1987, there were cases of asphyxiation by loose-fitting dentures initially missed in the haste to cool the patients. In 1988, we removed any loose-fitting denture/s at the start of treatment.

   Vital signs included were rectal temperature, blood pressure, pulse rate and pupil size every 10–15 minutes after moving the patient to an air-conditioned room, or a room with a cooler and placing the patient on a canvas bed drenched with ice-cold water.

2. Group B was responsible for cooling as follows:

   (a) All clothing was removed and the patient splashed liberally with ice-cold water.

Table 2

Treatment of Malaysian pilgrims with heatstrokes

Group	Function
A	1. Ensure clear airway (remove loose dentures)
	2. Initiate cardiopulmonary resuscitation if no pulse and patient not breathing
	3. Move patient to room with air-condition or cooler
	4. Monitor vital signs every 10–15 mins. (rectal temp., blood pressure, pulse rate and pupil size)
B	1. Remove all clothing
	2. Drench patient with ice-cold water
	3. Apply brisk and vigorous body massage
	4. Place sheet or cloth soaked with ice-water on neck, forehead, armpits and groins.
	5. Spray ice-cold water and turn on fan towards patient
	6. Stop cooling when temperature is 39°C.
C	1. Hydrate patient with IV Normal Saline using wide-bore catheter
	2. Stop IV infusion when Systolic BP is 100 mmHg
	3. Observe for signs of fluid overload (sudden breathlessness, increased JVP and crepitations in lung bases)
	4. Monitor urine output (at least 50cc per hour)
	5. Watch for complications of heatstroke (seizures and systemic bleeding).

(b) Vigorous and brisk body massage was done to facilitate elimination of excess heat.[2,5]

(c) Sheets or cloth soaked in ice-cold water and ice-packs were placed on the sides of the neck, forehead, armpits and groins.

(d) Ice-cold water was constantly sprayed on to the patient.

(e) A fan, if available, was turned fully-on towards the patient to assist in the elimination of heat.

(f) Cooling was immediately stopped once the rectal temperature dropped to 39°C as the body usually cooled itself by then.[5]

3. Group C was responsible for hydration with IV fluids, using large bore catheters to replace water and sodium lost. Normal saline was used at the outset and the first one to two pints were given rapidly (within 30 minutes). Subsequent infusions of saline would depend on the blood pressure. Before treatment the blood pressure would usually be very low because of systemic vasodilatation. With effective cooling techniques, it would normalise as the systemic vessels began to constrict. Further rapid infusion of IV fluids when the blood pressure was back to normal levels as observed by previous management teams would cause acute pulmonary oedema as a result of overloading of the central circulation.

Precautions observed:

1. Cooling was stopped when the rectal temperature dropped to 39°C to prevent overcooling.

2. Complications arising from overzealous cooling such as shivering and arrhythmias were looked for.
3. Signs of fluid overload (sudden dyspnoea, raised JVP, basal coarse crepitations in the lungs) with rapid IV infusion of fluids were also watched for by Group C.
4. Patients were catheterized to monitor urine output. If after rapid infusion, the output was less then 50 cc per hour, the infusion rate was decreased and renal function carefully assessed.
5. Extra caution was taken with elderly patients and those with pre-existing cardiac or renal impairment and ischaemic heart disease (ascertained from their medical records).
6. Complications of heat stroke like bleeding (due to either a prolonged prothrombin time, thrombocytopenia or disseminated intravascular coagulation or DIVC), electrolyte disturbances or arrhythmias were constantly looked for and treated appropriately. Intravenous diazepam was given for seizures and cases of bleeding were referred to the Arab hospital.

Results

Seventeen cases of heat stroke were seen at Mina, 15 of whom were obese women. Rectal temperatures ranged from 41.4 to 43.1°C (Table 3). The main clinical features seen were hypotension, hot and dry skin, delirium and coma, including four patients with seizures (Table 4). One was transferred to the Arab Hospital because she did not recover within an hour and DIVC was suspected since she developed spontaneous bleeding from the venopuncture sites. We were told that she died at that hospital within 48 hours of admission. The others had full recovery within an hour without any residual neurological or other deficits.

Factors predisposing them to heat stroke included obesity and their habit of frequenting mosques for noon and mid-afternoon prayers in the scorching heat and frequent performance of the Umrah (little pilgrimage). These activities generated heat and as heat dissipation by radiation or convection and sweat evaporation was prevented by the high ambient temperatures there was excessive heat storage and this resulted in heat strokes.

Table 3

Initial rectal temperature of 17 Malaysian pilgrims with heatstroke

Initial rectal Temp. °C	Patient		
	Male	Female	Total
41.0 – 41.4	0	1	1
41.5 – 41.9	0	4	4
42.0 – 42.4	1	7	8
42.5 – 42.9	1	2	3
>43.0	0	1	1
Total	2	15	17

Table 4

Clinical signs of 17 heatstroke patients

Clinical signs	Male	Female
Systolic BP (mmHg)		
79 or less	2	5
80 – 99	0	9
100 – 110	0	1
Delirium	2	8
Coma without seizures	0	3
Coma with seizures	0	4
Hot, dry skin	2	15
Systemic bleeding	0	1

Discussion

In the treatment of heat stroke, prompt intervention is of paramount importance as mortality parallels the degree and duration of hyperthermia.

We had chosen to divide the management team into three groups primarily to co-ordinate treatment efforts and prevent unnecessary duplication and disarray which were apparent in previous efforts, due to the constant influx of such ill cases within a short period during the peak periods. By identifying their responsibilities, each group knew exactly what to do in a systematic manner with full conviction and commitment. Management, threfore became expeditious and well-coordinated. Failure to realise this approach in previous efforts had resulted in utter confusion and chaos because patients with heat strokes usually presented with delirium and aggressive behaviour, not one, but four to five at any one time with all requiring urgent treatment.

In 1988, out of the 17 cases, only one was referred to the Arab Hospital. Most of the Arab hospitals utilised sophisticated body cooling units (BCU) bought at great cost, following the recommendations by M. Khogali who with Weiner[1] reported on 13 cases in 1980 using this technique. The BCU provides rapid evaporative cooling using finely atomised water under pressure at 15°C, sprayed over the whole body surface from above and below, in combination with warm air at 45–48°C.[1]

Our technique follows the above principle of rapid cooling assisted with warm air from ordinary fans. I am of the opinion that what really matters in decreasing mortality rate is the speed and efficiency of correcting hyperthermia as shown in this study.

Conclusion

This article outlines the management of heat stroke by the Malaysian Medical Mission in Saudi

Arabia during the Haj season. The management entails the division of the management team into three groups to co-ordinate and expendite efforts of cooling, monitoring and evaluation and infusion of IV fluids, without the need to resort to sophisticated body cooling units found at most Arab Hospitals. Seventeen cases were treated and only one died of suspected DIVC at an Arab Hospital. The rest remained in our care and fully recovered within an hour.

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