THE MEDICAL EXPERIENCE OF THE MALTA MARATHON 1988

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Abstract

Marathon running is known to be associated with orthopaedic and medical injury. The aim of this study was to observe, report and analyse injuries occurring during the Malta Marathon, held on 21 February, 1988.

Observations showed that the commonest specific problems were muscle cramps and, upon completion of the event, hypotension. The significance of these, and other injuries in the context of long-distance runs is discussed.

Introduction

A broad spectrum of orthopaedic and medical injury is known to be associated with marathon and long distance running. In many events, musculoskeletal complaints such as cramps, tendonitis, sprains, blisters and fatigue fractures are very common (1, 2). Thermoregulatory disorders occasionally happen in such physically demanding events and the consequences of heat injury include disseminated intravascular clotting and acute tubular necrosis (3). Hypothermia may develop even on relatively warm days in the course of a long run (4). Rhabdomyolysis may also be another consequence of marathon running and may at times have a fatal outcome (5). Such complications have been observed not only in amateurs but also in trained professional athletes. Transient abnormalities which disappear after adequate rest are also known to occur and include haematuria and proteinuria (6).

This study is the first of its kind in Malta and focuses on the injuries occurring during the course of an international marathon held on 21 February 1988. It was organised in the light of a previous experience with thermoregulatory disorders exhibited by some of the participants during a locally organised long run (7).

The Marathon started at 9.00 a.m. and 310 participants were expected to complete the 42 km. course in approximately 3½ hours. Runners however had the option of participating in a half marathon run. 268 (86%) of runners were males and 42 (14%) were females. The maximum ambient shade temperature for that day was 17°C, and the relative humidity was 45%.

Abstract

In order to study the injuries occurring throughout the marathon, a team of observing medical officers was briefed beforehand about the wide range of problems that were likely to be encountered. A standard questionnaire was prepared, such that allowed a quick comprehensive assessment of casualties. Participants were to be identified by their competition number. The last station passed, time, type of injury and cause together with vital parameters and initial management, where relevant, were to be recorded.

Three medical officers supervised the race throughout in separate ambulances, while another six were stationed at the finish line. At this point, all participating runners were directed into a large enclosed area where medical facilities were available. Back-up facilities were available at the local general hospital, which was informed beforehand of the event.

Results

The number of contacts made by athletes with first-aid posts along the route and at the finish line was 54. The number of individuals seeking care was 52 out of a total of 310 participants (17%), two runners making contact twice with medical staff. The injuries observed were grouped into the following five main categories:

(a) Muscle cramps, (b) Non-specific complaints. This category included a diversity of problems that could not be grouped under the above headings such as nausea, vomiting, blisters, abrasions, chest tightness, dyspepsia, decreased hearing and tinnitus. (c) Hypotension occurring after the finish. (d) Orthopaedic injuries (e.g. sprained ligament, back pain, locking of knee). (e) Hypothermia.

Injuries occurred during the latter half of the race and were mainly of a musculoskeletal nature. Most of the injured athletes sought medical care at the finish line. It is possible that some runners ignored their symptoms when they first occurred and consulted the medical staff on finishing the race. A large number of runners experienced muscle cramps at the finish line and required muscle stretching for relief. Cramps mainly occurred in knee extensors, calf muscles and abdominal
muscles, the hamstring muscles being less commonly involved.

Hypotension secondary to hypovolaemia and vasodilatation a few minutes after the finish gave rise to about one fifth of casualties. None of the athletes required intravenous fluid replacement but responded well to rest, oral fluid therapy and elevation of the lower limbs.

**TABLE 1.**

<table>
<thead>
<tr>
<th>Distance from start</th>
<th>Muscle Cramps</th>
<th>Non-Specific</th>
<th>Hypotension</th>
<th>Orthopaedic</th>
<th>Hypothermia</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20km</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20km</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>25km</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30km</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40km</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Finish 42km</td>
<td>16</td>
<td>14</td>
<td>10</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Number of contacts made by runners with first-aid posts along route.

**TABLE 2.**

<table>
<thead>
<tr>
<th></th>
<th>Muscle Cramps</th>
<th>Non-Specific</th>
<th>Hypotension</th>
<th>Orthopaedic</th>
<th>Hypothermia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>19 (35%)</td>
<td>12 (22%)</td>
<td>10 (19%)</td>
<td>4 (7%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Females</td>
<td>4 (7%)</td>
<td>3 (6%)</td>
<td>0 (0%)</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Number of contacts made by runners with first-aid posts and frequencies N=54.

Eight of 54 contacts at first aid posts (15%) were made by female runners. 14% of participants commencing the race were female. Only one case was severe enough to warrant transfer to hospital. This was an athlete suffering from acute locking of the knee and he was eventually discharged that same day.

89% of participants (276) completed the event.

**Discussion**

Out of 310 runners, four presented with orthopaedic disorders, which involved the back and the lower limbs. Three of these runners managed to complete the marathon. One of the athletes presented with pain and numbness in the outer aspect of his right leg, which symptoms progressively got worse during the final 10 km of the marathon. He had a positive
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"Tinel" sign over the neck of the right fibula and admitted to a past history of a right common peroneal nerve compression. A female athlete twisted her ankle two days before the marathon and twisted it again during the run. She subsequently developed gross swelling and marked tenderness over the calcaneofibular ligament of her left ankle with pain on passive inversion of the foot in keeping with a ligamentous sprain. The two other orthopaedic problems were back-pain and a locked knee. The participant with back-pain managed to finish the marathon but the individual who developed a locked right knee joint had to be taken to hospital where he gave a 5 week history of instability of the same knee.

Considering the number of runners and the often uneven road surface, the incidence of orthopaedic injuries was small and all the ones that presented had a significant past history relating to their complaint. This reflects the good state of musculoskeletal preparation of the participating athletes as a group.

Ligamentous injuries to the back or lower limb joints are bound to get worse during marathon runs where the state of the running surface and any prevailing winds increase the stress on the joints and their supporting ligaments.

Muscle cramps featured predominantly during the marathon run especially along the final 10 km. and at the finish. Muscle stretching exercises performed before the start, together with adequate fluid and electrolyte replacement during the run are simple precautions that runners should take in this regard.

It may thus be concluded that the medical facilities organised for a marathon event where 310 runners took part were adequate both for the number and variety of complaints. Although back-up facilities at the local general hospital were well geared for the event, no additional workload fell on the local health services.

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References


INFRA-RED WAVEGUIDE FOR BLOODLESS SURGERY

ERA Technology, in conjunction with the technology transfer organization Cogent, has developed a novel hollow glass waveguide for directing infra-red energy from CO₂ lasers. Several prototypes based on a non-toxic oxide glass have recently been fabricated at ERA's laboratories in Leatherhead and are currently being evaluated for surgical applications.

Carbon dioxide lasers, operating at mid-infra-red wavelengths of around 10μm are particularly useful for tissue cutting and cauterizing; they permit virtually bloodless surgery and thus reduce the immediate trauma and after-effects for the patient.

For a CO₂ laser to be used to the maximum effect, its energy needs to be transferred from the rather bulky laser itself to the precise point at which it's needed. The only problem is that radiation as long as 10μm cannot be transmitted along conventional optical fibres because of the extremely high attenuation due to molecular vibration or rotation.

ERA Technology has therefore adopted a different technique, replacing optical fibres with hollow glass optical waveguides. The air-cored waveguide, with an internal diameter of 1mm, uses a glass cladding whose optical properties have been tuned to ensure maximum internal reflection (i.e. minimum attenuation) of a wavelength near 10.6μm. Laboratory prototypes transmit about 80% of the incident energy through a straight waveguide one metre long, but this reduces to 40% when the waveguide is bent to a 50cm radius. It's Not marvellous compared to the performance of optical fibres at shorter wavelengths, but it should permit a whole new degree of freedom for surgeons using CO₂ lasers. What's more, ERA Technology and Cogent are already predicting considerably improved performance when the waveguide is manufactured using precision machine-drawn fibres. They are at present looking for suitable partners to develop the technology further.

Ultimately the development of disposable high-efficiency optical waveguides should make possible a whole range of virtually non-invasive surgical procedures. ERA believes that there is now a very real prospect that major heart surgery such as coronary bypass operations could be conducted on an out-patient basis. All a surgeon would need to do would be to feed the waveguide and an optical fibre viewing device into a major blood vessel through a small hole in the skin, and then direct it to the site of action. The rest could be done with little more than a screen, a mouse and a button marked 'zap'!