An injured mountaineer at high altitude

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This case report is presented as a problem-solving exercise for the reader. As you read the unfolding details of the incident, you are invited to consider how you would handle the critical decisions required at each stage of this mountain rescue. ***ADF Health 2002; 3: 22-24.***

THE DRAKENSBERG MOUNTAIN range stretches in a chain down the southeast coast of Africa to the Cape. Formed by seismic activity hundreds of millions of years ago and now eroded into a jumble of jagged peaks and precipitous rock faces, the Drakensberg range now presents many places of great beauty and grandeur — a magnet to mountaineers, rock climbers and hikers from around the world. It is a wonderland for the experienced, a death trap for the inexperienced and foolhardy.

The stretch of mountains covered by the Mountain Rescue team of the KwaZulu Natal Section of the Mountain Club of South Africa reaches over 3200 m, with vertical rock walls up to 900 m high. The area includes 138 peaks above 3000 m; the Zulus called it Quathlamba (pronounced "kwath-lumber"), meaning "the barrier of spears". Drakensberg is Afrikaans for "dragon mountains".

On his 21st birthday, Easter Sunday, a Young Mountaineer (YM) joined an experienced Mountain Club group of about 10 for an ascent to the top of the Drakensberg and a four-day traverse along the range. The group included four members of the mountain search team — intelligent and resourceful mountaineers, but without rescue training. One was a trained first-aider (TFA), another was Meet Leader (ML).

Their route took them up a steep rocky gully, with high banks and a small stream of very cold water at the bottom. The banks were of loose soil, with large boulders loosely embedded in rocks and gravel. At about 2770 m altitude YM scrambled up the steep bank to admire the view. He pulled on a huge boulder, which dislodged and rolled down. YM tumbled down the bank, landing on his back in the stream. The boulder landed partly on his left leg.

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Hearing a scream, his companions ran back to help. YM was lying in a few centimetres of water, but with his face just submerged in a deeper pool. One held his face above water, while others managed to tilt the boulder enough to extricate his leg.

What would you do if you were Meet Leader? What would you do if you were Trained First-Aider?
Write down your immediate actions before reading the next section.

The Drakensberg mountain range. The accident reported here occurred towards the upper end of the gully below the rescue helicopter in this picture. This gully runs from altitude 1500 m to 3000 m.

Immediate actions

TFA found YM breathing rapidly and deeply, gasping from the cold water. His pulse was fast and strong. He was dazed but able to talk. TFA could see that his left thigh was twisted and deformed. An attempt to lift him carefully from the stream caused screams of pain. He was already so cold that he did not know if anything else was hurting.

While TFA supported YM's head, dry clothes were wrapped around his head, and a sleeping bag spread over him. While ML immediately got everyone else collecting fist-sized stones in the river bed, YM was tilted as gently as possible to his uninjured side, a longitudinally folded insulating sleeping mat was placed under him, and stones were packed up under that side. He was tilted towards the injured side, the insulating mat unfolded to

cover both sides of his back, and stones were pushed under him. In this manner a platform of stones was built up beneath him, lifting him above the water in the stream.

YM's wet clothing was removed as TFA examined him. As TFA finished examining each part of YM he was dried, and dry clothing was put on his head and upper body, and pulled up over his uninjured leg. His injured leg was straightened as gently as possible, and splinted to his other leg using bandages, clothing, and sticks. He was covered with down sleeping bags.

What would you do next?

It is now 1130 hrs. No wind, bright sunshine, light cloud, occasional light rain. Warm in the sunshine further up the gully; about 8 ℃ in the shade where the patient is; water in the stream about 4 ℃. A clear night is expected, about 3–4 ℃. Rain is possible. You have:

- *Minimal basic first aid equipment, including intravenous cannulae, one litre saline and administration set.*
- *No communications. Nearest telephone and radio are at Tugela River police post, 2000 m and at least five hours down. When you logged in, the Mountain Rescue Register showed no other groups in your area.*

Write down your actions before reading the next section.

Next steps

TFA and a helper assumed care of the patient. TFA ensured that YM was well protected from the cold, and asked for a tent fly to be suspended above him in case of rain. He remained with YM, monitoring his level of awareness and respiratory function by talking to him, and periodically checked his wrist pulse. Fortunately YM had only moderate pain while lying still.

Once YM was warm, TFA carried out a slower, complete and careful examination. The left thigh was swollen, with superficial abrasions. The knee and calf seemed uninjured, and the foot was neither cold nor white. Otherwise, TFA found only a generous selection of bruises and superficial abrasions. He asked the group for medical supplies, and was given assorted dressings, bandages and oral analgesics.

Should TFA put in an IV line, and give his one and only litre of saline?

What else should TFA do?

What should ML and the others do?

Write down your actions before reading the next section.

In search of rescue

Two mountaineers who knew the area well were nominated by ML to descend and call for assistance. They left at about 1230 hrs, carrying only survival gear and torches.

A group checked the bank above the patient for further hazards, marked off no-go areas to prevent another rock rolling down, and then explored up and down the gully to identify a camping area for the rest of the group.

Others set off up the gully in search of a possible helicopter landing site. When they found one on a flat shoulder, they tramped back and forth to flatten the long grass. They moved rocks to create a path along which YM could be carried to the helicopter landing site. They commandeered everyone's toilet paper, and used it to mark out a large "H", weighted with stones. A piece of clothing was hung from a small tree as a wind indicator.

The volunteers descended and reached the Tugela police post in darkness at 1730 hrs, to find it attended only by a police dog, which understood only Zulu and would not let them enter the station to use the telephone, until the police returned at 1830 hrs.

The Mountain Rescue Team organiser in Durban who received their telephone call arranged a rescue team, and a South African Air Force rescue flight.

Meanwhile, in the mountains, TFA had a roster of people looking after YM. Once TFA was confident that YM was stable, a cooker was set up nearby, and at least every two hours he was given a hot drink, with food and oral analgesics as requested. YM's urine was collected in a plastic bag and kept.

In view of the likelihood of surgery, would you have given food and drink?

TFA decided against giving his one litre of saline. He felt that YM was stable, his pulse was not very fast, the fluid was very cold, and he only had one litre. He did put in an intravenous line, in case YM deteriorated and a vein could not be found in the cold and dark of night. He planned to warm the bag of saline in hot water in the cooking pot if it was needed.

The Alouette III helicopter was airborne just before first light, carrying pilot, engineer, and three rescue team members, including the team doctor (TD). The rescue equipment included a purpose-built stretcher, and TD had a fairly comprehensive medical pack, including pneumatic splints, morphine and intravenous fluids.

The team reached YM mid-morning, about 22 hours after his injury. He was conscious, in good spirits, well hydrated, with little pain. He was warm, despite ice on the rocks nearby. TFA presented TD with a bag containing all of YM's urine. Total urine output in the 22 hours since the injury was about 700 mL. The urine appeared to be free of blood.

As TD, what would you do now?

Write down your actions before reading the next section.

Rescue management

Since TFA had already done most of his job for him, TD put up a litre of Hartmann's solution, warmed inside his shirt during the flight up. Thorough examination revealed no other injuries. YM was not hypovolaemic, was not cold, and was in little pain. TD began to titrate morphine intravenously, one milligram every few minutes, in anticipation of moving YM onto the stretcher and up the gully to the helicopter. After one litre of fluid and 6 mg of morphine, YM was very drowsy. Respiration was 12 breaths per minute, with good tidal volume; pulse eighty per minute, of good volume; peripheries well perfused.

The leg splint was left as it was. YM was lifted onto the rescue stretcher, well wrapped and well secured, and carried to the helicopter. He remained stable in flight, and was flown straight to a tertiary hospital. On arrival his cardivascular condition was stable, he was normothermic and in moderate pain.

The patient on the morning of rescue, about 22 hours after injury. Note the dry clothing, sleeping bags, protection from the elements, and cooking pot.

Postscript

YM reached hospital in surprisingly good condition. No other injuries were found. The following day he underwent open reduction and internal fixation of a comminuted fractured femur. No other injuries were found. After a short period of hospitalisation and a long convalescence he returned to full activity, with no residua of his close escape from death. Like most people rescued by such teams, he made no contact later and offered no thanks.

Difficult terrain. This photograph of a South African Air Force Alouette III was taken while on another mission, to retrieve the body of a South African Navy serviceman. He had been thrown alive from the escarpment 370 m above by a Lesotho tribesman, who wanted his scalp for traditional tribal medicine. Note the close proximity of the helicopter rotors to the pilots' enemy, "cumulus granitus".

Comment

YM's decision to join a group of highly experienced mountaineers was a sound one. Most had seen accidents or injuries in the mountains, and a number had experience in dealing with them and assisting the Mountain Rescue team. They had a designated Meet Leader, and followed his plan as it evolved. The Meet Leader had ensured there would be a trained first-aider on the trip. Of course, every person pursuing such activities should have a current first aid certificate.

The Meet Leader's method of dealing with the accident may or may not have been the best one. More important was the fact that he did develop a plan, accepting suggestions from his capable team members, and that plan was collectively applied.

The medical management would be hard to improve upon under the circumstances. Even if people had been sent down the mountain as soon as the accident occurred, and a message had reached the rescue organiser earlier, a helicopter still could not have reached the patient before dark.

The decision to give oral fluids was correct given that TFA was confident that injury was restricted to the leg, and that rescue would not be possible that day. It would have been better to withhold food, which would be absorbed more slowly, especially in the presence of pain or shock, and so reduce the risk of aspiration. The greatest risks to the patient were hypotension, from blood loss into surrounding tissue, and hypothermia. As gastric absorption decreases or stops in the presence of pain and shock, insertion of an intravenous cannula and early administration of the limited fluid available would have been appropriate.

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