

ranger was inserted at the scene by heli-rappelling from the park contracted helicopter. When the victim was stabilized in a litter, a Navy UH-helicopter from NAS Lemoore attempted to evacuate him. However, the winds were too turbulent to attempt the hoist operation and it was aborted. A short time later the park contract helicopter was able to successfully short haul the victim from Half Dome directly to the Ahwahnee Meadow. The ranger and the victim's climbing partner then rappelled off the route and hiked out.

Analysis

While hiking down the trail from Half Dome, I interviewed Schempp's partner, Jurgen, who told me that they had planned to climb the standard Northwest Face of Half Dome in a day. They were traveling lightly, with minimal food, water and extra clothing. He felt they both were climbing safely and carefully, although he admitted that on the easy sections it was hard to concentrate on properly placing protection. He felt that both he and Rolf would just move quickly with minimal protection on easier sections. The pitch that Rolf fell on, the seventh pitch, is rated at 5.5 in difficulty. At 0910 Rolf fell from the seventh pitch approximately 30 feet before being stopped. Rolf had not placed any protection. Jurgen felt that Rolf used a loose rock as a hold, and when he raised himself on it, the rock detached from the mountain, along with Rolf. Rolf sustained injuries to his head, right hip, and right foot. He never lost consciousness, and moved a short distance from where he landed to the ledge I found him on.

Before I left the stance in the afternoon with Jurgen, I also spoke with John Terpening, a solo climber who was using the same belay stance. He told me that he observed Rolf fall above him, and the belay rope was between him and the wall. In effect, Terpening acted as an intermediate protection point for Rolf. Terpening also told me that this was the second climber he had observed fall past him in the five days he had been on the wall. (Source: Michael LaLone, Ranger, Yosemite National Park)

FALL ON RAPPEL—LOST CONTROL AND DESCENDED TOO RAPIDLY California, Yosemite Valley, El Capitan

On September 17, 1992, Robert Moore (42) was rappelling a single 7/16 inch, 820 meter rope down the face of El Capitan when he apparently lost control and slid to his death.

Moore was part of a group of about 20 people who had come and fixed ropes on both El Cap and Half Dome. Members of the group had varying goals, from rappelling and climbing both routes to just rappelling El Cap. Moore planned only to rappel El Cap.

Analysis

It appears several factors played a significant role in the accident. These include the specific mechanics of the accident, Moore's apparently casual attitude about safety, and the dynamics of the group of people who were involved with this project.

Moore, and most of the rappellers in his group, passed the top edge by "brute force." When beginning a rappel in this manner, the full weight of the rope must be held off the edge by the rappeller. This can require considerable effort with a heavy rope. On El Cap, the rope weighed 68 kilograms (150 pounds).

At the top edge of the rappel, the rappeller's weight is not supported by the friction of the rappel rack on the rope. The rappeller must adjust the rack to provide little enough friction that it can be pulled along the rope without using the rappeller's weight. Once the rappeller has passed the edge, it is necessary to add more friction to support the rappeller's

full weight. If the needed extra friction can't be provided by sliding the bottom bar up toward the rest of the bars, it is necessary to add another bar. It can be difficult to add a bar on a long rappel because the rappeller needs to push the heavy rope to the side while holding on to keep from sliding down the rope.

A haul system can be used to raise the weight of the rope, allowing the rappeller to pass the edge without lifting the rope. Because the weight of the rope is not pulling on the rack, more bars are used when backing over the edge. Once below the edge, a rappeller need only hold a stop long enough to allow the haul system to be released. Once the weight of the rope is back on the rack, the rappeller has more friction than will allow them to move. They can then reduce friction to a level that allows a comfortable descent.

Ted Farmer, a local caver who had rappelled El Capitan with Moore once before, was unable to stop on the rope for the first 250 meters when he did the rappel with Moore's group and brute forced the edge. He had no trouble during his previous rappels, where a haul system was used. He was also unable to stop during our tests where he used gear like Moore's. Starting in this manner could have put Moore into a situation where he was struggling from the start.

Moore passed the top edge with four bars on his rack engaged. At the base, he had four bars engaged. Based on our experiments, he probably would not have been comfortable free hanging with fewer than five bars. According to witnesses, who saw him only once, he was below the lip, Moore rappelled for about 100 meters (328 feet) at a moderate speed, then came to a stop. He may have been able to add a fifth bar just below the lip. It seems more likely that, like Farmer, he was unable to stop or add any bars until he was well below the lip. The exact mechanical means by which Moore lost control are not known. Several mechanisms seem to fit the data.

If Moore had five bars on, he probably removed one when he was stopped. If the spacers on his rack compressed during the upper part of his rappel, that could have increased the friction enough that he decided to continue the rappel with four bars. This would account for his moving so slowly, seemingly pushing the rope through the rack, just before he stopped, as was described by one witness. Moore's grip may then have slipped on the rope with the reduced friction of four bars or he may have just been unable to hold on.

If Moore had four bars engaged, he may have lost his grip while trying to add a fifth bar. He may have been pushing the rope in the wrong direction while attempting to add a fifth bar, allowing a fourth bar to fall to the bottom of the rack and greatly reducing the friction. His grip may have slipped either immediately or while attempting to bring the fourth bar back up. This mechanism, of pushing the rope in the wrong direction when trying to add a bar, has been implicated in some caving accidents in the Tennessee-Alabama-Georgia area.

The following items suggest that Moore had a relaxed attitude about his personal safety: (1) The handout that had been distributed to Moore's group stated that everyone rappelling, whether they planned on climbing or not, would do the rappel with full rope climbing gear. Moore rappelled without any climbing gear. He did not have anything with which to grab the rope. (2) Moore rappelled to the edge on a short tail rope, then switched his rappel rack over to the main line without clipping in a separate safety. (3) When Moore found it difficult to move at the edge with six bars, he dropped the friction immediately to four bars without trying five. (He may have mistakenly gone to three bars before correcting to four.) (4) Moore seems not to have passed the tail of the waist loop on his harness back through the buckle as it should have been. (5) Moore may have been wishing to

celebrate his birthday, the day of the rappel, with a very fast descent.

There are some observations regarding the group that may also have had some bearing on the situation. Moore was not involved at all in fixing the ropes. The ropes had been in place for nearly a week when Moore and Doherty arrived in the park. There may have been a sense of competitiveness among various members of the group, particularly since they seem to have been concerned with record setting. Because he didn't know Moore better, one of the people at the top, Coney, did not feel comfortable telling Moore that he was being unsafe, or that he should have rope climbing gear with him. The group was not a team but rather a collection of individuals. In such a group, people are not as careful to "watch out" for others in the party, and do not feel responsible for doing so.

Whatever the mechanism of the failure or the influence of his attitude or that of the group, we know Moore was making adjustments to his belay chain without being backed up by another system. A spelean shunt could have been on the rope as a safety during his entire rappel. If he had a Jumar or similar ascender, which can be placed on the rope with one hand, he could have set that as a back up when he stopped to make adjustments. (Source: Michael D. Ray, SAR Ranger, Yosemite National Park)

(Editor's Note: Many non-climbers attempt a variety of feats in the mountain environment. The National Park Service—and custodians of climbing areas in general—have little choice but to categorize any incidents that result from these feats as mountain/climbing accidents. Scramblers, "rappellers," individuals who decide to try climbing—on an impulse, and so forth, continue to draw the attention of the media when they get in trouble and require rescue.)

FALLING ROCK

California, Yosemite National Park, Mount Dana

On September 27, 1992, John Hart (44) was belaying David Sanger (43) one pitch above the bergschrund on the left hand side of the Couloir on the Dana Glacier. Hart was about 20 to 30 feet away from the rock wall and anchored. He was unable to dodge a football sized rock that was coming down the Couloir. The rock struck his right patella. The force also resulted in fractures to the shaft and medial condyle of the femur and to the top of the tibia.

Hart continued to belay his partner up to his position. A rescue operation ensued, involving other climbers, two rangers, a helicopter, and an ambulance. (Source: K. L. O'Connor-Henry, Ranger, Yosemite National Park)

Analysis

While there was no comment provided regarding (a) the position of the climber in the couloir or (b) whether this is an area of known spontaneous rockfall, it is an illustrative accident for consideration of the common factors, either of which can result in injury. (Source: Jed Williamson)

PROTECTION PULLED OUT, FALL ON ROCK

California, Yosemite Valley, El Capitan

On October 12, 1992, at 0730, Doug Chabot (28) was leading the 26th pitch of the Nose Route, El Capitan. He was aiding up a crack 40 feet out from the belay ledge (Camp