



AAC Publications

Fall on Rock — Belay Failure from Above

Mexico, Nuevo León, El Potrero Chico

On March 14, a friend (the belayer) and I (Liu Yuezhang, 26) headed to Time Wave Zero (2,000' III 5.12a or 5.11 A0) in El Potrero Chico to check out the approach and prepare for a full attempt a few days later. Our plan was to try the first two pitches before returning to the ground. While following the second pitch (95 feet, 5.11b, 9 bolts), I experienced a belay failure from above and hit my right lower back, head, and both elbows as I fell. I was rescued by the El Potrero rescue team and local climbers. Miraculously, I was not seriously injured.

We reached the crag around noon and were glad to meet two female climbers at an area close to our route. They eventually performed the rescue.

I led the first pitch (100 feet, 5.7, four bolts) and belayed my friend up. We switched leads, and my friend led the second pitch, set up a belay, and notified me to follow.

My partner was belaying with a Black Diamond ATC Guide, rigged in guide mode off a bolted anchor. (See Fig. 1, showing the anchor and belay configuration.) He had double-checked the system by pulling on the climber's side of the rope. I climbed to the eighth bolt, right before the crux on the pitch. I decided to hang to check out the moves. I said, "Take." I was on the rope for five to ten seconds when suddenly I began to free-fall. I remember the sky moving farther and farther away, so I must have been falling face up. I thought I was going die.

The belayer remembers releasing both hands at one point, after which the climber's side of rope began to run rapidly through the ATC. In a panic, the belayer attempted to hold the climber's rope (rather than the belayer's side) to stop the fall. His right hand got seriously burned. Eventually, the rope (9.5mm, 70 meters, almost new) stuck inside the belay device and I stopped falling in a slabby area, around ten feet below the pitch-one anchor. The falling distance was around 60 to 85 feet.

From my injuries, I inferred that I hit my lower right back on a bulge, then struck the back of my head and both elbows before sliding on the slab. My neck and tongue were slightly impaired by the impact. I could not recall some details of the fall. I was wearing a helmet, backpack, and long-sleeve jacket. I noticed climbers approaching on the ground. Then, in what seemed to be the next second, they were above, readying to lower me. According to the belayer, I repeatedly said things like "Where am I?" and "Record the accident scene."

The belayer spent around ten minutes trying to feed slack efficiently after I was connected to the rescuer, but I also did not recall this. My consciousness came back to normal while I was lowered to the ground, but I still experienced some long-term memory loss. The rescue team and local climbers performed a rapid response. I was sent to an emergency room in Monterrey and luckily was not seriously injured. I would like to express my utmost gratitude to the El Potrero rescue team and nearby climbers for the speedy rescue, especially to Juliet, who was one of the climbers we had met earlier and who re-led the first pitch to begin lowering me.

ANALYSIS

Yuezhang wrote:

"There were a few mistakes made. The most apparent was when the belayer released both hands while belaying. This should be strictly avoided even with an autoblock system. My fall could have been caught if the belayer had pulled on the correct (belayer's) side of the rope; unfortunately, he attempted to pull the climber's side.

"We also tried to analyze the cause of the autoblock-system failure. From the photo of the belay configuration, we can confirm the ATC was set up correctly. (The climber's strand initially was on top but got pulled down beside the belayer strand due to the falling impact.) After some experiments, we found that the autoblock system might fail if (1) there was a horizontal component of force pulling outward (which might have occurred since the belay station was above a bulge, causing the belay components to lie against the rock) and (2) the wire of the ATC was caught by some small structure on the cliff. (See Fig. 2.) This scenario is very unusual and, again, can be completely avoided by always keeping a hand on the belayer's side of the rope, but that's the best estimation based on our experiments.

"I was the more experienced climber in the team and the belayer was the stronger climber. To compensate for the experience difference, we held two educational sessions in a gym and completed two local multi-pitch routes together. At El Potrero, we did several multi-pitch routes, safely switching leads, before the accident. I emphasized the importance of keeping a hand on the belayer's rope during training, even while using an autoblock system. As a final note: Always wear a helmet. Mine saved me from more severe injuries." (Source: Liu Yuezhang.)

***Editor's Note:** It is possible that when Yuezhang called "take," the belayer may have grabbed the bight carabiner (or the ATC retaining wire) to disengage the rope/ carabiner/device in order to more easily take up slack through the device. While this is not recommended by the manufacturer, it is not an uncommon technique. Yuezhang recalls, "If my memory serves me, the belayer told me he first pulled the slack when I called 'take.'" Thus, it is plausible that the belayer, finding it difficult to pull in slack, disengaged the rope. When the bight carabiner or retaining wire is pulled upward, it also orients the rope perpendicular to the top of the ATC (as shown in Fig. 2). In this case, the ATC might have been pulled horizontally. If the belayer did just that, while Yuezhang momentarily shifted his weight on and off the rope, the rope could have begun to slip rapidly through the ATC.

We know that the belayer, now panicking, mistakenly grabbed the follower's side of the rope in a vain attempt to arrest the fall. His grip may have prevented the device from loading, that is until excruciating rope burns forced him to release the rope.

At this point, the rope locked in the now loaded ATC. The newness of the rope also probably played a role. Note that in Fig. 1, the climber's side of the rope is loaded adjacent to the brake side, not on top, as per the intended design. This is probably due to the force of the fall and the slickness/diameter of the fresh rope. Extra caution must be taken when using a thin and slick rope.

Images



Fig. 1: This is the actual anchor and belay configuration immediately following the accident on Time Wave Zero. Liu Yuezhang



Fig. 2: This shows how the ATC orientation can potentially allow the rope to run through the device in guide mode.

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