Case 2

Serious injuries suffered by one FA and slight injuries suffered by four passengers from the shaking of the aircraft caused by locally-occurring clear-air turbulence

Summary: On Wednesday April 27, 2011, a Boeing 767-300, operated by Company A, at 16:16 Japan Standard Time (JST: UTC+9hr, unless otherwise stated, all times are indicated in JST on a 24-hour clock), took off from Miyazaki Airport for Tokyo International Airport as a scheduled flight. While flying at 25,000 ft, 27 nm east-southeast of Kushimoto, around 16:53, the aircraft encountered turbulence and one cabin attendant was seriously injured in front of the left aft lavatory. Four other people consisting of passengers and cabin attendants were slightly injured. There were 119 people on board: a Pilot in Command (PIC), seven crew members and 111 passengers. The aircraft was not damaged.

Events leading to the Accident

Around 16:16
The aircraft took off from Miyazaki Airport.

Around 16:26
The aircraft maintained the cruising altitude of 27,000 ft.

Around 16:27
The seat belt sign had been turned off.

Around 16:40
The aircraft reached and levelled off at around 29,000 ft.

Around 16:42
The aircraft received permission to descend to 25,000 ft from ATC.

16:52:38
The aircraft was shaken when it encountered strong turbulence at 27 nm east-southeast of Kushimoto.

16:52:41
The seat belt sign had been turned on.

16:52:58
The First Officer (FO) reported to the Tokyo Area Control Center that the aircraft had encountered turbulence.

Domestic Significant Weather Analysis Chart (1500)

A radar echo area which developed along the forefront of the cold front extending from the low spread like a belt and was advancing to the east at 15 kt. The area of strong radar echo intensity and high top radar echo altitudes were observed along the area off the coast of Shikoku, Chugoku Region and off the coast of Hokuriku. However, there were very few echoes present with 5 mm/h or less in the airspace where the accident occurred, and their tops were as low as 2 to 4 km high.

Statements of Flight Crew Members (PIC)

He felt a "floating" sensation as if he had been riding on a big wave. Although the shaking was a light one, the PIC retarded the thrust lever to reduce speed as a precaution. Immediately following that, the aircraft was thrust upward all of a sudden, and then was violently thrust downward. The shaking lasted only an instant, and the suddenness and the intensity of the shaking was far greater than any other shaking he had experienced before.
Around 16:55
Cabin attendant (CA) reported to the PIC the situation observed in the cabin.

Around 16:56
The FO reported with company radio that the aircraft had encountered turbulence, and that several persons were injured.

Around 17:22
The PIC informed passengers over the Passenger Address (PA) system that the aircraft had encountered turbulence and it would not affect the scheduled flight.

Around 17:43
The aircraft landed at Tokyo International Airport.

She felt like she was lifted up very softly. Although the chief purser instantaneously grabbed a curtain in front of her, she was lifted up by 20 cm only to be dropped to the floor with the hem of the curtain over her arm. There was no report of damage observed in the cabin, though most of the in-flight magazines and headphone sets in the seat pockets were found scattered over the floor in the aft cabin.

Before the strong shaking she felt rolling and she anticipated another shaking in the aft lavatory, but her anticipation was betrayed by the pitching by which she was thrown upward to have her head hit against the ceiling, and was dropped on the floor.

Location where a CA was seriously injured

Chief Purser

CA-B head, bruised

Passenger C both shanks, bruised

CA-A right pubis, fractured

Left aft lavatory

Passenger A (in a right aft lavatory) head, bruised

Right aft lavatory

CA-C both knees and head, bruised

The area where in-flight magazine in the seat pockets escaped from and scattered on the floor

location of the CA seriously injured
location of the slightly injured
Seat occupied by passengers
The investigation report of this case is published on the Board's website (issued on Jun. 29, 2012).
(This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.)

Causal Factors of the Accident

Convective Clouds
Observing no clouds at their altitudes while flying between the thin cloud layers.

Winds
The existence of layers in the accident airspace, whose temperature and atmospheric pressure values were different, accompanied by wind velocity difference (wind shear), generated the unsteady air conditions where turbulence was likely to occur near the layer boundary.

The Turbulence
The aircraft gradually approached the frontal zone under the jet stream.

- Nothing more than a weak vertical shear with 0 to 6kt was analyzed at the occurrence point.
- The strong shaking lasted only for a very short period and ended without recurring.
- The flight encountered it while flying through cloudless airspace.

The Shaking
The combination of the aircraft motion around the center of gravity caused by the increase in the pitch angle and the sharp descent of the aircraft by 80 ft gave the aft section of the aircraft a sudden lowering.

Probable Causes:
It is highly probable that the accident occurred as follows:
The aircraft encountered atmospheric disturbance all of a sudden during flight, and was shaken so severely that one of the cabin attendants in the aft section of the aircraft was seriously injured when she was thrown up in the air and fell on the floor.
It is possible that the atmospheric disturbance the aircraft encountered were CAT which was created locally and temporarily by a wind shear judged from the findings.

In order to Prevent Recurrence

- It would be recommended to continue to examine the effectiveness of measures such as the installation of handrails at locations where passengers pass by and consider taking further safety measures to prevent accidents.
- It is desired that the Company's adoption of such a procedure should be considered as advising passengers in advance of preventive measures in case of a shaking.
- It would be recommended to promote studies on and development of an airborne Doppler light detection and ranging (LIDAR) to detect CAT.
- It is expected that providing meteorological organizations with access to analyze more detailed information including accelerated velocity suffered by the aircraft involved in a turbulence of MODERATE intensity or more, will contribute to the improvement of more accurate CAT prediction.