

FATAL SAILPLANE ACCIDENTS

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In almost every country in the world between the Northpole and the Southpole, where the geographical and meteorological situation permits, gliding takes place. Since Lilienthal's first beginnings in the last century, this sport has found, especially since World War II, a large number of followers. As a result of tests in the windtunnel, the use of reinforced glassfiber, the use of the most modern instruments and the study of meteorological conditions, achievements have been reached, which were once thought to be impossible. However, since Lilienthal's time nothing has changed the factor

Human Being. So, it is not unexpected, that most of the regrettable accidents are due to human error.

While in literature and scientific writing many investigation results in the theme "Explanation of Flying Accidents" already exist. They deal mostly with the military and private sector of motor and jet-propelled aircraft; systematic investigations about flying accidents of gliders are rare. In Austria, the investigation of all flying accidents is compulsory. Particularly, fatal accidents are investigated by order of the Bundesministerium fuer Verkehr, either by specialists in that

Ministry or by other experts. The aim is to clear up the reason for the accident and, based on the findings, to make recommendations to prevent a similar accident in the future.

During my work as a Medical Advisor to the Law Courts in the Bundesrepublik Deutschland and Austria, I had to investigate many fatal gliding accidents, especially in the area around Innsbruck where very detailed examination was possible. It is very noticeable that most gliding accidents happen to pilots of between 50 and 60 years of age. In the whole observation, there was only one female pilot, compared to 40 male pilots. The majority of the gliding accidents occurred in the months of May, June, July and August (maximum in June). Another peak time is in October and November, due to the situation in Innsbruck with the regular "Foen" wind, which allows flights up to a great height in the wave. It should be mentioned that in the majority of accidents, the aircraft dropped out of the landing flare (stalled).

A further series of accidents happened during foen flights when sometimes the aircraft broke up in the air due to loading. Other quite frequent causes of accidents were mid-air collisions, ground contact in the rocky alpine area, or on the slope, as well as contact with cable ropes of lifts in the mountains. There is insufficient space here for full details noticed during the investigation of flying accidents. Therefore, I restrict myself to particular points, like pre-existing illness, time of survival and chance of survival after the accident, safety equipment and remarks on flight preparation.

The granting or renewal of a pilot's license is subject to the result of a medical test. If the doctor finds any disturbance or illness which precludes the suitability for piloting, no license will be granted or renewed. Such things are with younger people as impaired uncorrectable vision, diabetes or disturbances originating in the brain, etc. With older people they are mainly heart and circulation disorders. If a young pilot crashes, one has always to take into account the introduction of some new illness or other detractive element such as alcohol, drugs or medicine.

As an example, I would like to give the case of a 39 year old experienced pilot who started a foen flight in November 1977 with a glider SF26 in Innsbruck. As the barogram showed, he gained height quickly, encountered severe turbulence at about 5200m in which his right wing came off. The oxygen bottle was full, the parachute was not used, although the remainder of the glider approached the ground at only 115 km/h, so that there would have been plenty of time for parachuting.

The contusions found on the body showed without doubt, that the man was still alive when he reached the ground. An examination of the heart muscle showed many small, mainly fresh, but some previously existing necrosis. This shows that the man had a heart disease of which he must have been aware, since medication for heart disease was found in the cockpit. This confirms the assumption that the man at great height, possibly due to lack of oxygen, became unable to act or became unconscious and, therefore, the aircraft went out of control and broke up in midair in the foen turbulence. Owing to his inability to act, the man did not use the parachute, although doing so would have been easily possible at the given height, the rate of descent and the availability of the escape equipment.

A similar picture was seen in the case of a young female pilot who, after a winch launch, gained height quickly after

releasing and, according to eye witnesses, after 500 to 600 m height went into a steeper and steeper spiral dive and finally hit the ground almost vertically. In this case too, the examination of the heart muscle showed a very fresh inflammation like a florid myocarditis. The insidious manner of that illness is that it causes very little apparent trouble, even none at all, but that it involves the nervous system and leads quickly to death.

Unfortunately, there is always, still, the need to consider the effects of alcohol or medications. The record holder in the collection of air accidents is a motor pilot who, soon after a start in the early hours of the morning, crashed with 6 passengers on board after he had skied from a mountain guesthouse to the airport. He had 1.6% blood alcohol level. All glider pilots I have examined, however, have been exceptionally good, since in no case has a relevant amount of alcohol been found.

With older pilots, one has always to remember that arteriosclerosis or coronary heart disease might have been the reason for the detraction. Hence, the examination of the heart, the artery of the heart and the vascular system are of special interest. In this connection I would like to tell you about the case of an extremely experienced pilot with thousands of flying hours, who won national competitions in his class and who was known for completing many triangles of more than 500 km in the mountains. His last position report about 8 or 9 hours after the start came on his way back from an airport about 100 km away. The wreck was discovered and the pilot's body recovered only 2 days later in systematic search flights.

The coronary arteries of the heart showed passages partly clear and partly with calcareous deposition (hardening) on the sides of the vein. The opening was slightly narrowed as a result of disturbances in the blood flow. Small faults in the connecting tissue of the heart muscle were also observed. They also were the result either of a disturbance of the blood-flow or possibly of a previous inflammation.

On the cerebellum, comparable changes in the form of incomplete necrosis with the loss of 'purkinje' cells were found. Since the muscle showed very fresh variations, one should ask oneself whether they occurred during the flight or after the crash. This question I would like to discuss later. In any case, considering the findings, there is no doubt that previous damage existed, which was not found at the last medical examination by a flight doctor, and, perhaps in conjunction with a long and strenuous flight partly at great height without oxygen led to such a detraction that the man possibly hit the rock with a wing while circling and crashed.

Another case concerns a 61 year old flying instructor who, on a flight in foen wind and strong turbulence in April, crashed 5 hours after the start, unfortunately in a narrow valley so that he could not be recovered before the next day. The examination showed in this case, two peculiar faults in the connecting tissue of the heart muscle and masses of corpora amylacea (starch) in the cerebrum as a result of advanced degeneration. It is difficult to judge from the forum of the brain functions; however, the result of the brain test throws a significant light on the fact that the man had been retired some years ago. Also, in this case the flight doctor obviously did not notice it, otherwise he would not have renewed the license. In this case too fresh changes on the heart muscle were noticeable, about which I shall report later.

The last two observations make me very thoughtful and lead on to the question of safety regulations.

While in the majority of the cases examined, there is no doubt that death occurred very quickly while the pilot was still at the site of the crash, some signs of a vital reaction suggest a certain survival time. The quick finding of the injured man, a professional salvage operation and rapid transport to professional medical treatment is essential for the survival and further prognosis. This I shall illustrate at the end for a typical case. If, however, the finding of the crashed aircraft and the injured crew takes hours or days, the further prognosis becomes difficult, even if there were originally only relatively small injuries.

To support this sad result, I refer again to two cases mentioned already where in a post mortem certain bruises and the extent of the fat embolism as well as shock changes to the kidneys leave no doubt that the crash had been survived for some time, so that quick enough salvage would have given a real chance of survival. From those considerations, it is compulsory in Austria to take an ELT (crash transmitter) in every aircraft, including gliders when they leave the area of the airfield. In some cases, the ELT has proved to be life saving, especially after a crash in the mountains in deep winter.

The location of a crashed aircraft can, however, be made considerably more difficult. For instance, after a crash into a gorge the signals cannot be received by a ground station or, as in another case, the crash transmitter itself breaks up. With regard to these last observations, consideration should be given to installing the transmitters in strong cases so that they can sustain great acceleration of loads. Also they should be placed in the most solid part of the aircraft. Clearly, the functioning of the ELT should be checked at regular intervals. For myself, I shall install a second one in a different place, especially since the price of an ELT relative to the aircraft and the other instrumental equipment is to my mind insignificant. It is obvious also to take a parachute, certainly since I have used one before to my full satisfaction.

Finally, before I speak about the importance of quick and organized salvage in case of an accident, another word about gliding in a foen, particularly in the wave and at great heights. As you all know, a normal pilot unlike Reinhold Messner, who reached diamond heights easily on foot in the Himalayas, needs oxygen from a bottle which he has to take with him in sufficient quantities. If, however, at the height of Mount Everest or above, oxygen unexpectedly runs out, some disturbance in the system occurs or one has to leave the

aircraft, there is insufficient time left for thinking about just what to do in the given situation.

At such great heights, one must always expect, because of the lack of oxygen, to lose consciousness within one minute. For such cases it is advisable to consider an emergency procedure before starting the flight. That could also mean using a manual parachute in order to be able to reach denser air layers quickly in freefall, which would not be possible with an automatic parachute opening immediately. It stands to reason also, that with only a minor impediment such as a common cold, because of the greater oxygen need, such an undertaking should not be entered into.

As I said before, quick location of the aircraft professional salvage, quick transport and proper medical care are paramount to the survival and further prognosis. As an example, I would like to mention a young fellow pilot who, on his flight back from the mountains into the flat country in search for thermals, flew into the cables of a cable car and crashed. Many spectators at the mountain station saw the accident and alerted the rescue team. Shortly afterwards, a helicopter was there, picked him up and took him directly to the clinic in Innsbruck, where he could be looked after at once and be operated on during the normal working hours of the doctors.

Unfortunately, one cable had hit him on the head and a second on the arms and the upper part of the body. At first the case seemed hopeless because of the very severe facial and head injuries. However, the doctors won the first race against death and a second round repaired a number of injuries, including one to the palate. Finally, in a third round his outer appearance was restored so magnificently that all his friends recognized him after he was discharged from the hospital. And, what is so very pleasing, he has taken up his studies of technical science again, has become a gliding instructor and you might meet him one day on a large international airport, for he has become a captain with a large airline.

It has been my aim to show you how much a pathologist or consultant to the Law Courts can contribute to the clarification of flying accidents. In my opinion, every fatal air accident should be investigated medically, in order to clarify the question of detraction, be it by acute illness, degenerative damage or for other reasons. The role of the flight accident pathologist should also be taken to heart. In addition, it would be desirable for examining doctors to elucidate the various considerations to people more to prevent further disaster. If those consultations find their way into the daily flying practice and only a single fatal accident would be prevented by them, they would be very much worth while.