UNUSUAL ACCIDENTS AND INCIDENTS OF ANAESTHESIA*

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Any anaesthetist of long experience will bear testimony to the fact that when accidents or incidents occur during or after the administration of an anaesthetic, they invariably occur with dramatic suddenness. However careful and assiduous the anaesthetist might be, the unexpected or seemingly inexplicable accident or incident will crop up from time to time. Only recently, in an interesting publication,[1] Keating has comprehensively reviewed the causes and has endeavoured to indicate the possible prevention and treatment of these distressing accidents of anaesthesia.

Covering a period of 25 years, some of the episodes recorded here might well be regarded as being of academic interest only, because the probability of a similar occurrence in one's own practice may be remote or virtually non-existent; but the mere fact that they have occurred is nevertheless of some interest and may be of some importance.

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1. *Ether Explosion Caused by a Short-circuit*

An ether explosion at the New Somerset Hospital in 1937[2] brought home very vividly to me what a hazardous occupation anaesthesia as a speciality might be! This episode took place whilst we were engaged on the sixth tonsillectomy on a very hot and oppressive summer's day. The temperature recorded at the Royal Observatory was 80°F and the relative humidity 70°. The theatre was poorly ventilated, the temperature inside being well above 80°F. Anaesthesia was induced with ethyl chloride followed by ether on the open mask, and the anaesthetic was maintained with the Shipway apparatus.

The explosion occurred dramatically just as the surgeon was about to commence the operation. The flame appeared

to have travelled along the tube leading to the Shipway apparatus, which caught fire and blew up with a roar that shook the old-fashioned turreted New Somerset Hospital (built in 1856) to its very foundations. Miraculously the patient escaped injury. I was not quite so fortunate, for I was concussed by the blast, and received a 2-inch gash and glass embedded in my scalp.

On subsequent examination of the electrical equipment it was found that the lamp which reflected light on to the surgeon's head-mirror had developed a 'short' and, having been switched on for 2½ hours, had overheated. Incidentally, the atmosphere in the theatre was heavily laden with ether.

In view of the fact that the flame appeared to have started not in the patient's mouth, but at some point along the course of the tube leading from the Boyle-Davis gag to the Shipway apparatus, it must be assumed that a leak in the tube had produced a sufficient concentration of ether near the hot lamp for ignition to take place, followed by a chain reaction, the explosion proceeding to the hole in the tube and thence to the whole apparatus. The 'short' in the lamp may conceivably have caused an arc and produced a higher temperature, which would make this particular mechanism more probable.[3] In view of the high humidity, static electricity has been ruled out as a causal factor.

2. *Decomposition of Ether*

Opinions tend to differ on whether decomposition of ether is of clinical significance, but it now appears to be an accepted fact that unpleasant after-effects can be and are produced by the use of deteriorated ether.[4] Coste[5] has come to the conclusion that peroxides themselves are not the cause of these after-effects and that some undertermined substance, of which the presence of peroxides might be an index, may well be the cause. Wesley Bourne[6] comes to the following conclusions, viz. that up to 0·5% of acetaldehyde does not produce any significant changes, that ether peroxide can cause a lowering of blood pressure and pronounced respiratory disturbances, and that ethyl mercaptan, although a foul substance, does not have much influence up to 1%.

Symptoms simulating shock. In March 1946 the nursing staff at the Wynberg Military Hospital reported to me that post-operatively many of our patients were behaving 'peculiarly'. We had 3 anaesthetists on our staff at that time and the following complications were noticed by us all, viz. (1) a general tendency to profuse sweating on return to the wards and for several hours afterwards; (2) respiratory depression; (3) cyanosis lasting up to an hour or longer; and (4) prolongation of recovery time. Two patients had developed severe hypotension during the course of a tonsillectomy and appendicectomy respectively. The anaesthetic commonly used at that time was a sequence of pentothal, nitrous oxide, oxygen, and ether. There was no obvious causal factor, apart from the ether, since patients to whom pentothal, nitrous oxide and oxygen had been administered showed no untoward symptoms. Various samples were therefore sent to the Senior Government Analyst, who reported as follows: 'The samples do not comply with the standards for Aether Anaestheticus as laid down in the B.P.C. of 1932. The distilling ranges are all too high and all samples contain more or less excessive quantities of peroxides, aldehydes and acetone'. In view of this adverse report, the entire batch of ether was condemned by the D.G.M.S. and a fresh brand of ether substituted. This was followed by an immediate and total disappearance of all post-operative sequelae.

A cockroach in the ether. In August 1957, during the administration of two consecutive anaesthetics at a private nursing home, a peculiar unpleasant odour in the theatre was the subject of much comment and perplexity. It was similar to the smell of putrefying red-bait, well known to fishermen at the Cape. Both patients exhibited identical post-operative symptoms, viz. (1) profuse sweating, (2) excessive vomiting, and (3) marked pallor. Next day, at the same nursing home, I opened a sealed container of ether and, on pouring the contents into the ether bottle on the Boyle's machine, was amazed to see a cockroach suddenly appear, surrounded by an oily exudate the size of a two-shilling piece. In view of these two strange episodes, it was decided to send several bottles of ether for analysis. The Government analyst reported that (*a*) acetone and aldehydes were present, (*b*) tests for peroxides were negative, and (*c*) the residue on evaporation was *excessively high*, viz. 9, 19 and 58 mg., indicating the presence of an impurity (B.P.C. specification—not more than 1 mg.). The foul putrefying odour was identified as being probably due to ethyl mercaptan.[7] None of the samples submitted complied with the 1953 B.P.C. specification.

3. *Methylated Spirit mixed inadvertently with Ether*

During the administration of a sequence of pentothal nitrous oxide, oxygen, and ether, at a well-known teaching hospital, I was struck by the fact that the induction was uneven and unduly protracted; some second instinct made me take a sniff at the ether bottle on the Boyle's machine and to my surprise, mixed with the smell of ether, was a strong smell of methylated spirit.

Close investigation and inquiry elicited the information that white methylated spirit for cleansing purposes had been poured into an empty ether bottle, but had not been labelled as such. The 'anaesthetic nurse' had used this bottle in error to 'top-up' the ether pot in the Boyle's machine

Post-operatively the patient showed amusing signs of inebriation. He was kept under careful observation for some days, since it is known that methyl alcohol sometimes impairs vision by the development of an optic neuritis. Fortunately no complications ensued.

4. *Post-operative Cerebral Oedema*

This patient, aged 38, who was hypertensive (blood pressure 240/130 mm. Hg), had left the theatre at the termination of a hysterectomy in seemingly good condition—reflexes very active, almost, but not quite, awake. There had been a steady drop in blood pressure during the operation from 180 to 140 mm. Hg. Seen in the ward about ½ hour later, the patient was restless, confused and agitated, and presented the clinical symptoms of cerebral irritability. A diagnosis of cerebral oedema was considered, due possibly to one or other of the following two causes:

1. *Mechanical.* A steep Trendelenberg position[11] in a hypertensive patient.

2. *Anoxia.* The anaesthetic used had been pentothal, nitrous oxide, and oxygen and intermittent dilute scoline, with controlled and occasionally assisted respiration. A slow steady drop in pressure, plus the very steep Trendelenberg position and possibly inadequate assisted respiration, may well have produced a slight degree of undetected anoxia, with the resultant development of cerebral oedema.

An intravenous injection of 50 c.c. of 50% sucrose[12] brought about an immediate dramatic cessation of all symptoms and the patient became cooperative and comprehending. Subsequent recovery was uneventful.

Other Incidents

5. *Broken Intravenous Needles.* Two cases are recorded of an intravenous needle being snapped during the administration of pentothal by a sudden movement of the patient's arm. In both the nurse had been specifically instructed to hold the arm in case of any movement, and in both the nurse's attention had been momentarily diverted. In the first case the needle had to be removed subsequently under the screen, which proved to be a very difficult and protracted operation. In the other case the needle was located and removed within a few minutes of the mishap. The importance of tying down the arm during the administration of pentothal should be strongly emphasized.

6. *Granuloma of the Vocal Cord following Intubation.* After a tonsillectomy, carried out under endotracheal anaesthesia, the patient became hoarse and this hoarseness persisted. Subsequent laryngeal examination by the surgeon concerned revealed a granuloma of the cord.

7. *Obstruction due to Impaction of a small Dental Plate.* A small dental plate containing two teeth, which had not been removed pre-operatively, became dislodged during the recovery period, impacted over the cords, and very nearly caused a fatality.

8. *Persisting Tracheal Irritation caused by a Gauze Thread from an Oral Pack.* After an operation performed under endotracheal anaesthesia, the patient persisted in complaining intermittently of 'something irritating her throat'; this was accompanied by an irritant cough. On the 18th day she suddenly coughed up a thread of gauze about $1\frac{1}{4}$ inches long, which had obviously become loosened from the oral pack and had found its way down the trachea. It had become semi-rigid, acting as a chronic irritant.

9. *Nasal Endotracheal Tube slipping down into the Post-nasal Space.* About 10 years ago, at the completion of a thoracoplasty in which the patient had been intubated nasally because oral intubation had been technically difficult, I disconnected the Rowbotham connection in order to apply suction to the tube before removal. The patient's reflexes were much brisker than I had bargained for and, in the brief moment which elapsed whilst turning round to get the suction, the tube disappeared from view into the post-nasal space, impinging on the carina and initiating a very severe laryngeal and bronchial spasm; the patient's teeth were tightly clenched and oxygen under pressure failed to overcome the anoxia. 5 c.c. of pentothal was injected rapidly and the jaw relaxed sufficiently to enable me to extract the tube *via* the mouth and inflate the lungs with oxygen. Incidentally, scoline was not available at that time.

10. *Persistent Extubation Spasm after use of Scoline.* Pentothal-scoline sequence was used for a bronchoscopy, and after removal of the bronchoscope, as soon as the effects of the scoline started to wear off, a dangerously severe laryngospasm supervened. More scoline was given to overcome the spasm, but each time the effects of the scoline wore off a vicious circle of acute laryngospasm and anoxia supervened. Eventually nitrous oxide and deep ether anaesthesia successfully terminated the spasm.

11. *Cardiac Irregularity caused by an inflated Endotracheal Tube in a Patient under Light Anaesthesia.*[8,9] At the termination of an operation for excision of a pleurocutaneous fistula and decortication, the pulse suddenly slowed from 64 to 38 per minute and became irregular. At this stage the level of anaesthesia was very light and the reflexes were very active. *Prostigmin had not been used.* Deflation of the cuff caused a dramatic change—the pulse speeded up to 72 and the rhythm became perfectly regular.

12. *Fatal Air Embolism during Utero-tubal Insufflation.* A sad tragedy occurred suddenly during the course of a utero-tubal insufflation. The patient, who had been anaesthetized with pentothal, nitrous oxide, and oxygen, suddenly gave a few rapid gasps and cardiac failure supervened immediately afterwards. The surgeon had insufflated air instead of carbon dioxide and this was undoubtedly the cause of the fatality.[10] The post-mortem findings were as follows: (1) Frothy blood in the chambers of the right side of the heart and in the great veins and their tributaries; (2) air in the right parametrial tissues and neighbouring retroperitoneal haemorrhage; (3) death due to acute circulatory failure from air embolism.

13. *Fatal Spontaneous Perforation of an Atheromatous Ulcer in the Right External Iliac Artery.* This extraordinary episode occurred at University College Hospital, London, in 1939. A patient aged 59, to whom I was administering an anaesthetic for a cystoscopy, suddenly showed signs of impending peripheral failure. The patient was removed to the ward where, in spite of resuscitative measures, death occurred some 3 hours later. The post-mortem, performed by Prof. G. Cameron, revealed that death was due to a spontaneous perforation of an ulcer in the right external iliac artery. The full report reads as follows: 'The right external iliac artery showed a long deep wrinkle on its outer margin with a small perforation about 3 mm. in length amongst some atheromatous ulceration. This communicated with a huge retroperitoneal and pelvic haematoma, which had tracked along the right ureter to the pelvis of the right kidney and to the anterior abdominal wall, and also along the route of the mesentery, through which it had burst, so that the abdominal cavity contained about 40 ounces of free blood.'

14. *Self-asphyxia in an Obese Patient.* A huge, obese, bull-necked individual underwent a haemorrhoidectomy at 4 p.m. The anaesthetic was uneventful and had been combined with a local infiltration. The patient left the theatre a 5 p.m. and within a few minutes was awake and talking. At 7 p.m. $\frac{1}{4}$ gr. of morphine was administered and at 11 p.m. the night sister reported that he was fast asleep and snoring heavily. When revisited at 2.30 a.m. he was dead. At the special request of the relatives no post-mortem was held, but the opinion expressed by the Government pathologist was that the appearance of the body was consistent with that of asphyxia. Naturally the question of a coronary thrombosis or a cerebral vascular accident was at first uppermost in one's mind as the cause of death. The patient's wife then volunteered the information that even during normal sleep her husband would frequently 'frighten the life out of her' by going very blue, struggling for breath whilst breathing very stertorously. It is quite possible that the patient's absorption of morphia occurred very slowly and as he was bull-necked and edentulous a slow chronic anoxia supervened during the night, caused by obstruction of the jaw, finally terminating in cardiac failure.

15. *Radial Nerve Palsy caused by Pressure of the Operating-Table Screen.* A very obese middle-aged patient, after an emergency appendicectomy, developed a left wrist drop and months of physiotherapy were required before movement and sensation returned. The cause of this unfortunate accident was pressure over the left musculo-spiral nerve, the left arm having been compressed between the screen of the operating table and the patient's body.

16. *Post-anaesthetic Aphasia.* A male patient aged 51, normotensive, underwent lower lobectomy in 1948 for a carcinoma of the left lung. The anaesthetic then used was pentothal-cyclopropane. On waking up the patient was found to be aphasic. The neurologist reported as follows: 'This is almost certainly a vascular lesion of either embolic or thrombotic type, which must have occurred at the time of the operation or immediately thereafter.' The only unusual episode during the operation was an unexplained rise in blood pressure.

17. *An Overdosage with Cyclopropane* was caused by a nurse accidentally brushing against the cyclopropane cylinder key. The Boyle's machine used at that time had no fine adjustment valve.

18. *Patient falling off the Operating Table.* At the completion of a tonsillectomy an adult patient was turned on his side after having been entrusted to the staff nurse for transference to the trolley. The nurse unfortunately had her attention distracted for a few seconds, during which time the patient suddenly vomited, heaved, and overbalanced, crashing to the theatre floor with a sickening thud. Very fortunately, apart from extensive bruising, no serious injury was sustained.

19. *Postural Cerebral Anaemia.* After pneumonectomy the patient left the theatre at 12.35 p.m., reflexes very brisk. On being returned to the ward she was placed bolt upright and her level of unconsciousness, according to the sister, appeared to deepen. When seen at 4.45 p.m. she had apparently not yet regained consciousness. I ordered her to be placed flat in the bed and gave her a few whiffs of carbon dioxide, and within 2 minutes she was wide awake and able to converse perfectly normally with her husband, who had been waiting anxiously at the door of the ward for some hours.

20. *A Fracture-dislocation of the Metacarpo-phalangeal Joint of the Right Thumb* was sustained by the writer whilst using his hand to open the key of an oxygen cylinder.

21. *Inadvertent Injection of Sterile Water instead of Pentothal*; and the patient wondered why she had not fallen asleep after counting ten!

22. *Dislocation of Jaw.* After having received 4 c.c. of pentothal during induction, the patient, a very husky male, gave a tremendous yawn and dislocated his jaw! More pentothal was given and the dislocation reduced.

23. *Loosened Suction Tip.* A missing suction tip was found in the patient's mouth after a submucous resection of the nose; it had inadvertently slipped off during post-operative toilet of the post-nasal space.

24. *Trauma to the Right Pillar of the Fauces necessitating Suturing.* This episode occurred during a technically difficult oral intubation, in the days long before scoline and the Macintosh laryngoscope were in general use. The right pillar was lacerated and several stitches were inserted to control the persistent ooze.

CONCLUSION

In reviewing this series of mishaps in retrospect, it is evident that whilst certain accidents of anaesthesia occur spontaneously and are unavoidable, some are preventable and in the final instance the anaesthetist should trust nobody but himself. Our watchwords should be 'Constant, diligent vigilance.'

SUMMARY

When accidents or incidents occur during or after the administration of an anaesthetic, they invariably occur with dramatic suddenness. However careful or assiduous an anaesthetist might be, the seemingly unexpected or inexplicable accident or incident will crop up from time to time.

The episodes described in this paper cover a period of 25 years.

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