

Death of a Psychiatric Patient During Physical Restraint. Excited Delirium – A Case Report

AUDREY MORRISON, MB ChB MRCPGP MRCPsych Senior Registrar,
Teaching and Research Division, Royal Dundee Liff Hospital, Dundee, DD2 5NF

DAVID SADLER, MB ChB MRCPsych MD Senior Lecturer,
Department of Forensic Medicine, University of Dundee, Dundee, DD1 4HN

ABSTRACT

We report the case of a young man with a diagnosis of paranoid schizophrenia and multiple drug abuse who died in hospital following a period of prolonged physical restraint. The literature is reviewed, possible factors contributing to death discussed and measures which may reduce the incidence of such deaths in the future highlighted.

INTRODUCTION

Excited delirium is a state of extreme mental and physiological excitement, characterized by extreme agitation, hyperthermia, epiphoria, hostility, exceptional strength and endurance without apparent fatigue (Farnham and Kennedy, 1997). A similar syndrome, which may be fatal, was described as long ago as 1832 by Calmeil as 'life-threatening psychosis', and in 1849 by Bell as 'Bell's Mania'. It has subsequently become known by a variety of names, including 'fatal catatonia', 'psychotic exhaustion' and 'hypertoxic schizophrenia' (Mann et al., 1986). Management of individuals suffering from this syndrome may necessitate physical restraint by police or psychiatric hospital staff and this has also been associated with sudden death.

Some methods of physical restraint cause a form of positional asphyxia which has recently received considerable attention in the American literature. It has become known as 'restraint asphyxiation during excited delirium' (Bell et al., 1992; O'Halloran and Lewman, 1993; Milliken, 1998; Pollanen et al., 1998). In the police setting such deaths are frequently associated with high blood concentrations of cocaine or other stimulants (Wetli

and Fishbain, 1985; Pollanen et al., 1998), but sudden deaths have also been described in cases of hypomania and schizophrenia (Farnham and Kennedy, 1997).

Deaths associated with excited delirium may occur *during* physical restraint, with the victim either lying prone or subjected to neck pressure (Pollanen et al., 1998). Restraint holds such as the prone 'hog-tied' position (see Figure 1), in which the wrists and ankles are bound together behind the back, are regarded as being particularly dangerous since this impairs movement of the chest wall, diaphragm and accessory muscles of respiration (Reay et al., 1992; Roeggla et al., 1997). Although restraints are not used in psychiatric practice, the detrimental *positional* effect of

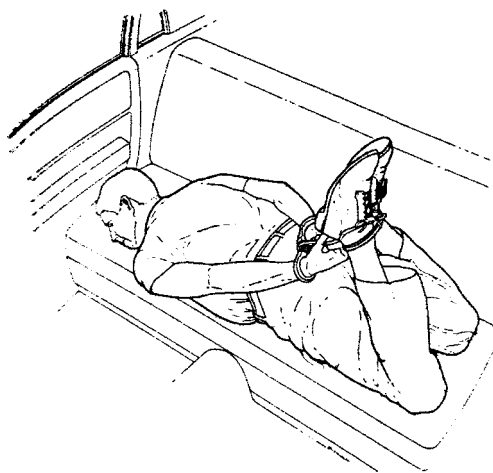


Figure 1. Restraint in 'hog-tied' position

manual restraint can be similar. The danger of improper use of neck holds has previously been reported in the context of law enforcement (Reay and Eisle, 1982).

We report the case of a young man with a diagnosis of paranoid schizophrenia and multiple drug abuse who died following a period of physical restraint. The literature is reviewed, factors contributing to death discussed and measures which may reduce the incidence of such deaths in the future highlighted.

CASE REPORT

The case concerns a 25-year-old man of muscular build. He was diagnosed as having paranoid schizophrenia at the age of 17 years and had required numerous admissions to psychiatric hospitals; he was last discharged three weeks prior to death. He had a documented history of amphetamine, LSD and cannabis abuse. For two months prior to death he was also thought to be using anabolic steroids.

At approximately 01.30 hours one October morning he was the victim of a witnessed street assault. He was stripped to the waist and exhibiting violent, aggressive and threatening behaviour. He was extremely agitated, running around, punching house and car windows and repeatedly chanting 'Vietnam' and 'Space'. He was apprehended by two police officers but slipped from their grasp due to his upper torso and arms being heavily smeared with his own blood. When apprehended again he was struck twice with a truncheon and finally handcuffed by the collective efforts of nine police officers. He was placed prone in a police van for transport to the local police station. Examination by the duty police surgeon was limited to observation through the cell door hatch and the prisoner's agitation was believed to be drug-induced. Overnight his mental state varied from calm to agitated with incoherent chanting of 'Motorbike' and 'LSD'.

The police surgeon attended again at 08.30 and arranged admission to a local psychiatric hospital under the Mental Health Act (Scotland) 1984. Following an intramuscular injection of Droperidol 20mg, he

remained calm during transfer and also throughout the afternoon, accepting two further oral doses of Droperidol 20mg. However, at 21.00 he became aggressively threatening and was given 20mg of Droperidol without effect. He struggled against physical restraint for a period of approximately 90 minutes, during which time he was given two injections of Chlorpromazine, 50mg.

The method of restraint used throughout by the nursing staff was later reconstructed at the direction of the police officer who had taken their statements. Although positions and grips altered, the patient spent most of this time pinned on his right side with his torso twisted so that the pelvis and anterior thighs were flat on the bed. Both legs and the right arm were held flat on the bed by a nurse at each site, a fourth nurse held the left arm obliquely across the left side of the chest and a fifth nurse applied a neck hold to prevent him from biting. During controlled release, after he had finally quieted, it was noticed that the patient had stopped breathing. Attempts at resuscitation were unsuccessful. The case was referred to the Procurator Fiscal and presented for autopsy.

AUTOPSY FINDINGS

On examination, there were numerous scattered bruises and abrasions to the head, torso and limbs. Most of these were non-specific but probably resulted from the initial assault, his subsequent arrest and his vigorous struggle against restraint, both in police custody and in hospital. Some of the injuries could reasonably be ascribed to specific events detailed in the police report. These included minor superficial abrasions and bruises to both wrists (due to the application of handcuffs), a sutured incision and scattered scratch-type abrasions on the right forearm (due to punching through glass), bruises and abrasions to the knuckles of both hands (due to throwing fist blows), and two irregular abrasions on the right shoulder (due to truncheon blows).

The most significant injuries were to the left side of the chest. On the skin surface there was a triangular bruise, imprinted with a pattern

resembling the weave of the jumper provided to him on arrival at hospital. Reflection of the skin revealed deep bruising in the left lateral pectoralis muscle, dislocations of the left second, fourth and fifth costochondral junctions and fractures of the left third and sixth ribs anteriorly. There was bruising in the subcutaneous fat and muscle along the medial aspect of the left upper arm. Together, these injuries can be simply explained by the left upper arm being pulled obliquely across the left chest during restraint.

Autopsy disclosed no significant acute natural disease or internal trauma to account for death. In particular there was no head or neck injury and no trauma to the lungs beneath the injured ribs.

Toxicological analyses revealed a subtherapeutic level of paracetamol in the blood and therapeutic levels of chlorpromazine in the blood and liver. Screening for Droperidol and drugs of abuse was negative.

The cause of death was given as 'positional and restraint asphyxiation in acute psychotic delirium', the latter due to an acute exacerbation of his pre-existing psychiatric illness and concomitant drug abuse.

DISCUSSION

O'Halloran and Lewman (1993) suggest that the final common mechanism of death during restraint of an individual in an excited state is a cardiac arrhythmia, induced by a combination of at least three factors leading to decreased oxygen delivery at a time of high oxygen demand. Firstly, the state of excited delirium and confrontation places a catecholamine stress on the heart. Secondly, physical activity and the struggle against restraint increase oxygen demand. Finally, the prone restraint position impairs movement of the chest wall, diaphragm and accessory muscles of respiration. The combination of high circulating levels of catecholamines, lactic acidosis and dehydration are thought to be important factors contributing to the development of a lethal ventricular tachyarrhythmia. In the present case, the twisted position of the torso with pinning of the chest under the left arm, rib injuries, application of neck holds and

phenothiazine medication were important additional factors.

Studies of the physiological effects of exercise and restraint, including positions similar to the 'hog-tied' or 'hobble' restraint have shown conflicting results. Reay et al. (1988) demonstrated that post-exercise recovery times for heart rate and oxygen saturation were significantly prolonged when subjects were placed prone in the 'hog-tied' restraint position. Possible explanations for this were restriction of thoracic movement, airway obstruction and catecholamine release. Roeggla et al. (1997) similarly demonstrated that subjects restrained for three minutes in a prone 'hobble' position showed a dramatic impairment of their haemodynamics and respiration. However, Chan et al. (1997) challenged the methods used earlier by Reay et al. and found conflicting results. Similar experiments, in which 15 healthy adult males were monitored during four minutes of exercise and 15 minutes of restraint, failed to demonstrate any 'clinically relevant' changes in heart rate, oxygen saturation or ventilation parameters. However, studies of this type contribute little to our understanding of restraint-related fatalities since they cannot reproduce the extreme physiological changes, psychological stresses, struggle and exhaustion of a prolonged real-life capture-restraint situation. The struggle against restraint which occurs as a natural response to the subjective sensation of being unable to breathe is typically met with the application of increased pressure by those restraining (Pounder, 1998). Deaths occurring under such circumstances are clearly multifactorial (Figure 2) and probably owe more to the phenomenon of 'restraint stress' than to 'clinically relevant' alterations in measurable physiological parameters (Howard and Reay, 1998).

There is a higher than expected rate of sudden, unexplained death in psychiatric patients across all diagnostic groups (Sims, 1987; Ruschena et al., 1998) which is not fully explained by the known increased risk of suicide (Harris and Barraclough, 1997). Antidepressant and antipsychotic medication, the phenothiazines in particular, have been

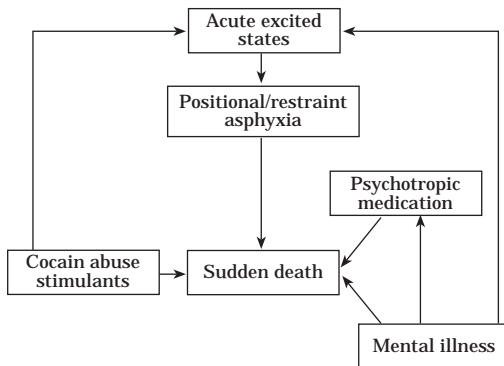


Figure 2. Factors contributing to death in acute excited states.

associated with sudden deaths (Nedzara and Lader, 1994; Buckley and McManus, 1998), but the issue of causality remains controversial and sudden death in this group predates the advent of psychotropic medication (Mehtonen et al., 1991). Documented life-threatening adverse effects of neuroleptics include hyperthermia, neuroleptic malignant syndrome, respiratory and laryngeal-pharyngeal dyskinesias, anti-adrenergic-mediated vasodilation with hypotension and lowered seizure threshold (Kumar, 1997). Cardiac adverse effects include arrhythmias, prolonged QT interval and other electrocardiograph changes, congestive cardiac failure and angina (Laposata et al., 1998). This may suggest medication effects are strongly implicated in the mechanism of sudden death in psychiatric patients, but Laposata (1988), warned of the importance of guarding against 'indiscriminate diagnosis' of phenothiazine associated sudden cardiac death in psychiatric patients with negative autopsies, particularly when restraint and other mechanisms are involved. Further, the interpretation of post-mortem blood and tissue drug levels is both difficult and unreliable due to the wide range of therapeutic doses used, the multiplicity of active and inactive metabolites and, perhaps most importantly, the phenomenon of post-mortem drug redistribution (Pounder, 1998).

Correct post-mortem diagnosis of the cause and mechanism of death following restraint relies heavily on full knowledge of the circumstances preceding death. Of particular

significance is the accurate documentation of terminal events, including the patient's behaviour and mental state as well as the positions and duration of all restraint procedures used (Reay et al., 1992). This, together with exhaustive autopsy and toxicological analyses, will be vital to the investigation of these most challenging cases. The cause of most such deaths is multifactorial and the use of a situational type of conclusion such as 'cardiorespiratory arrest associated with struggle, positional restraint and drug use' may be appropriate for certification (Laposata, 1988). Such a conclusion is probably preferable to leaving the cause of death as 'unascertained'.

PREVENTION

Acute excited states should be regarded as a psychiatric emergency with an associated mortality. Although cases such as the one reported are uncommon, they attract considerable media attention and cause grave concern to both the public and the professionals involved (Levine, 1998). Increased awareness of the features of acute excited states and adequate training of exposed clinical staff in the use of de-escalation skills and safe control and restraint techniques are essential to the safe management of excited states. The most important practical measures are to minimize the length of time an individual is held prone and to avoid direct neck or chest pressure. Written guidelines for the management of acute excited states, including the circumstances that demand a medical presence, have already been established in some centres (Patterson and Mc Cormish, 1998).

The use of antipsychotic medication, particularly at high doses, requires vigilance, following guidelines recommended by The Royal College of Psychiatrists and summarized in the *British National Formulary* (1998). All adverse drug reactions should be documented and reported.

In cases where rapid tranquilization of the acutely disturbed patient is required, intravenous or intramuscular benzodiazepines, in conjunction with proportionately lower doses of neuroleptics, has become more common

practice (Pilowsky et al., 1992). Methods other than physical restraint should also be considered, for example electroconvulsive therapy for acute mania (Small et al., 1988). Despite recent criticisms in the report on the Ashworth Hospital (Blom-Cooper et al., 1992), seclusion remains an alternative to physical restraint. Patients at high risk of requiring rapid intervention should have easy access to a well-staffed local Intensive Psychiatric Care Unit (Farnham and Kennedy, 1997).

All sudden unexplained psychiatric deaths should be reported to the Procurator Fiscal or Coroner so that a clear view of their true incidence and causative factors can be established. Medico-legal investigation requires detailed witness accounts, photographic evidence of the scene, full post-mortem examination and toxicology. Only with such complete information can the pathophysiology and mechanism of death be reconstructed.

REFERENCES

- Bell M.D., Rae V.T. and Wetli C.V. (1992) Positional asphyxia in adults: A series of 30 cases from Dade and Broward County Medical Examiners Office. *Am. J. Forens. Med. Pathol.* **13**, 101–7.
- Blom-Cooper L., Brown M., Dolan R. and Murphy E. (1992) *Report of the Committee of the Inquiry into Complaints About the Ashworth Hospital*. (Vols 1 and 2). London HMSO.
- British National Formulary* **35** (March 1998) Section 4.2. The British Medical Association and The Royal Pharmaceutical Society of Great Britain.
- Buckley N. and McManus P. (1998) Fatal toxicity of drugs used in the treatment of psychotic illness. *Br. J. Psychiat.* **172**, 461–4.
- Chan T.C., Vilke G.M., Neuman T. and Clausen J.L. (1997) Restraint position and positional asphyxia. *Ann. Emerg. Med.* **30**, 578–86.
- Farnham F.R. and Kennedy H.G. (1997) Acute excited states and sudden death – much journalism, little evidence. *BMJ* **315**, 1107–8.
- Harris E.C. and Barraclough B.M. (1997) Suicide as an outcome of mental disorder. A meta-analysis. *Br. J. Psychiat.* **170**, 205–28.
- Howard J.D. and Raey D.T. (1998) Positional asphyxia (letter). *Ann. Emerg. Med.* **32**, 116–7.
- Kumar A. (1997) Sudden unexplained death in a psychiatric patient – a case report: the role of phenothiazines and physical restraint. *Med. Sci. Law* **37**, 170–5.
- Laposata E.A., Hale P. and Poklis A. (1988) Evaluation of sudden death in psychiatric patients with special reference to phenothiazine therapy and forensic pathology. *J. Forens. Sci.* **33**(2), 432–40.
- Levine M. (1998) The Medico-legal Society – Deaths in police custody. *Medico-Legal J.* **66**(3), 97–108.
- Mann S.C., Caroff S.N., Blier H.R., Welz W.K.R., Kling M.A. and Hayashida M. (1986) Lethal Catatonia. *Am. J. Psychiat.* **143**, 1374–81.
- Mehtonen O.P., Arenko K. and Vapatalo H. (1991) A survey of sudden death associated with the use of antipsychotic or antidepressant drugs: 49 cases in Finland. *Acta. Psychiat. Scand.* **84**, 58–64.
- Milliken D. (1998) Death by restraint. *Can. Med. Ass. J.* **158**, 1611–12.
- Nedzara J. and Lader M. (1994) Post-mortem antipsychotic drug concentrations and unexplained deaths. *Br. J. Psychiat.* **165**, 787–91.
- O'Halloran R.L. and Lewman L.V. (1993) Restraint asphyxiation in excited delirium. *Am. J. Forens. Med. Pathol.* **14** (4), 289–95.
- Patterson B. and McComish S. (1998) The physical management of violent behaviour. *Psychiat. Care* **5**(6), 228–31.
- Pilowsky L.S., Ring H. and Shine P.J. (1992) Rapid tranquilisation. A survey of prescribing in a general hospital setting. *Br. J. Psychiat.* **160**, 831–5.
- Pollanen M.S., Chiasson D.A., Cairns J.T. and Young G.J. (1998) Unexpected deaths related to restraint for excited delirium: a retrospective study of death in police custody. *Can. Med. Ass. J.* **158**, 1603–7.
- Pounder D.J. (1998) Acute excited states and sudden death. *BMJ* **316**, 1171.
- Reay D.T., Howard J.D., Fligner G.L. and Ward R.J. (1998) Effects of positional restraint on oxygen saturation and heart rate following exercise. *Am. J. Forens. Med. Pathol.* **9** (1), 16–18.
- Reay D.T., Fligner C.L., Stilwell A.D. and Arnold J. (1992) Positional Asphyxia during law enforcement transport. *Am. J. Forens. Med. Pathol.* **13** (2), 90–7.
- Reay D.T. and Eisle J.W. (1982) Death from law enforcement neck holds. *Am. J. Forens. Med. Pathol.* **3**, 253–8.
- Roeggla M., Wagner A., Meullner M., Bur A., Hirsch H.M., Laggner A.N. and Roeggla G. (1997) Cardiorespiratory consequences to hobble restraint. *Wein Klin. Wochenschr* **109** (10), 359–61.
- Ruschena D., Mullen P.E., Burgess P., Cordner S.M., Barry-Walsh J., Drummer H., Palmer S., Browne C. and Wallace C. (1998) Sudden death in psychiatric patients. *Br. J. Psychiat.* **172**, 331–6.
- Sim S.A. (1987) Why the excess mortality from psychiatric illness? *BMJ* **294**, 986–7.
- Small J.G., Klapper M.H. and Kellams J.J. (1988) ECT compared to Lithium in the management of manic states. *Arch. Gen. Psychiat.* **45**, 727–32.
- Wetli C.V. and Fishbain D.A. (1985) Cocaine-induced psychosis and sudden death in recreational cocaine users. *J. Forens. Sci.* **30**, 873–80.

ACTS

Mental Health Act (Scotland) 1984