

Ketamine sedation for patients with acute agitation and psychiatric illness requiring aeromedical retrieval

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ABSTRACT

Objective Aeromedical retrieval services face the difficult problem of appropriate levels of sedation for transport of acutely agitated patients to definitive care. This paper describes a technique using ketamine, which is titratable and avoids problems associated with airway management.

Method A 3-year review of a new technique of ketamine sedation by aeromedical retrieval teams from the Cairns base of the Queensland section of the Royal Flying Doctor Service of Australia. Clinical records were systematically reviewed for ketamine administration and signs of adverse events during transport and in the subsequent 72 h.

Results 18 patients were sedated during retrieval with intravenous ketamine. Effective sedation was achieved in all cases, with no significant adverse events noted during retrieval or 72 h afterwards.

Conclusion Ketamine sedation is effective and safe in agitated patients with a psychiatric illness in the aeromedical setting and does not lead to worsening agitation in the subsequent 72-h period.

Although published guidelines exist for sedation of the acutely agitated patient in the hospital setting,¹ the optimal sedation strategy for the aeromedical transport of patients with acute mental illness remains unclear. The Royal Flying Doctor Service (RFDS) of Australia's base in Cairns services an area the size of Great Britain, yet has a population outside of the major centre of the greater Cairns area of only 20 000 people.² This includes mining centres such as Weipa, indigenous settlements such as Aurukun and Lockhart River and scattered cattle stations. If these sites have any health services at all, they are generally small community health centres staffed by remote-area nurses and visited by RFDS medical staff for several days a week only. These clinics are not staffed after hours, except for emergencies, and have no facilities to deal with acute presentations of major psychotic disorders. As a result, even a single presentation of a psychotic or suicidal patient places great strain on the local resources, especially if they require constant restraint and supervision after hours. When a patient is so acutely unwell that they are deemed a risk to themselves or others such that they require inpatient medical care or locked ward supervision, they are clearly a serious in-flight risk to aeromedical staff and the safety of the aircraft. Any patient who is deemed a risk to themselves or others such that they require transfer to a psychiatric facility is not, by definition, safe to travel on an aircraft. Most patients with acute agitation can be transported safely using conventional

benzodiazepine therapy. There is, however, a small subset of agitated patients who do not respond adequately to these first-line agents but require urgent air transport to progress their mental health care. In this situation the resort to general anaesthesia and intubation has often been made despite its attendant risks.

This study seeks to describe an alternative approach using ketamine sedation and outline its safety profile.

MATERIALS AND METHODS

The Cairns RFDS base transferred 135 patients with a mental health International Classification of Diseases, version 10 diagnosis between January 2007 and April 2010. During this period Cairns RFDS base began utilising ketamine sedation as an alternative strategy when first-line sedation (benzodiazepine and/or antipsychotic agents) had failed to control agitation. Due to weather conditions it is not uncommon for aeromedical retrievals to be delayed for up to 12 h and so first-line sedation of the patient would often be prescribed for the acute agitation well before the arrival of the retrieval team.

The initial ketamine dosing range given was 0.5–1 mg/kg. If two doses were required within the first 60 min of initiation of sedation then an infusion was started with an initial rate of 1–1.5 mg/kg per hour. The amount given was titrated to achieve a target sedation level that was a calm, cooperative patient who could still respond to verbal commands.

Ethics approval for the study was granted by the Queensland Health Human Research Ethics Committee (Cairns). The RFDS records were reviewed for the clinical factors outlined in table 1. The subsequent Cairns Base Hospital medical records for each case were then examined for the following 72 h after transport. For each patient both psychiatrists determined whether there was any significant change in the patient's mental state after treatment with ketamine, compared with their pre-retrieval mental state (BG and EH were also the primary psychiatric clinicians for most of these patients).

RESULTS

Nineteen retrieval cases were identified for the study period, involving 18 patients. The age range of the study group was from 12 to 43 years (see table 1). Sixteen patients had a primary retrieval diagnosis of exacerbation of schizophrenia. In each case the patients were transported as involuntary patients under the Queensland Mental Health Act.

Short report

Table 1 Aeromedical retrieval sedation data

Aeromedical retrieval sedation details	Pre-flight sedatives administered (12 h pre-flight) + dosages	Total in-flight sedatives administered + cumulative dosages	Duration of flight	Diagnosis	Any recorded BP <90 or >140 systolic	Heart rate recorded >100	Oxygen saturation recorded <95	Vomiting or c/o nausea
Patient A Retrieval: 18/08/07	PO olanzapine 10 mg PO diazepam 10 mg	IV midazolam 9.5 mg + IV ketamine 30 mg	2 h	Acute mania	No	No	No	No
Patient B Retrieval: 24/10/07	IV midazolam 7.5 mg PO olanzapine 20 mg	IV midazolam 7 mg + IV ketamine 30 mg	1.5 h	Schizophrenia	No	No	No	No
Patient C Retrieval: 05/08/08	PO olanzapine 10 mg PO diazepam 20 mg	IV ketamine 420 mg + IV midazolam 6 mg	2 h	Psychosis	No	No	No	No
Patient D Retrieval: 10/10/08	PO olanzapine 10 mg on 9/10 and 10 mg on 10/10	IV midazolam 12 mg + IV ketamine 30 mg	1 h 15 min	Cannabis-induced psychosis	No	No	No	No
Patient E Retrieval: 6/12/08	IMI olanzapine 10 mg IMI diazepam 10 mg	IV ketamine 40 mg	30 min	Psychosis	No	No	No	No
Patient F Retrieval: 02/03/09	Olanzapine PO 20 mg Clonazepam PO 2 mg	IV midazolam 10 mg + IV ketamine 380 mg	2.5 h	Personality disorder	No	No	No	Yes, small vomit ×1
Patient G Retrieval: 08/03/09	PO valproate 1 g PO olanzapine 20 mg PO diazepam 190 mg	IV midazolam 7 mg + IV ketamine 600 mg	3 h	Schizoaffective	BP >140 once (last recording of flight)	Yes, whole retrieval duration	No	No
Patient H Retrieval: 28/4/09	IV haloperidol 5 mg + IMI haloperidol 10 mg + IV clonazepam 4 mg	IV ketamine 200 mg	30 min	Schizophrenia	BP 140-150	No	No	No
Patient I Retrieval: 18/07/09	PO Diazepam 20 mg PO Olanzapine 20 mg PO risperidone 2 mg	IV ketamine 90 mg	30 min	Schizophrenia	No	No	No	No
Patient J Retrieval: 25/8/09	PO haloperidol 10 mg + IV morphine 4 mg + IV midazolam 2 mg PO diazepam 20 mg	IV midazolam 2.5 mg	30 min	Schizophrenia	No	No	No	No
Patient K Retrieval: 26/08/09	PO olanzapine 20 mg PO diazepam 20 mg PO olanzapine 10 mg PO diazepam 20 mg	IV midazolam 19 mg + IV ketamine 160 mg	4 h	Schizophrenia	No	No	No	No
Patient L Retrieval: 03/09/09	PO olanzapine 20 mg + PO diazepam 20 mg 3/9 IMI olanzapine 10 mg + IV midazolam 1 mg PO olanzapine 10 mg	IV diazepam 20 mg + IV ketamine 400 mg + IV midazolam 59 mg + IV haloperidol 5 mg	2 h	Schizophrenia	BP 140-150 initially then reduced to 130	HR >100 for 30 min initially after initial ketamine IV	No	No
Patient M Retrieval: 16/10/09	PO olanzapine 10 mg	IV midazolam 6 mg + IV ketamine 630 mg	1 h 35 min	Suicide attempt	No	No	No	No
Patient N Retrieval: 21/01/10	PO olanzapine 10 mg ×4=40 mg PO diazepam 10 mg ×4=40 mg	IV midazolam 2.5 mg + IV ketamine 20 mg	1 h	Schizophrenia	No	No	No	No
Patient O Retrieval: 04/02/10	PO olanzapine 5 mg PO diazepam 10 mg IV diazepam 5 mg	IV midazolam 7 mg + IV ketamine 240 mg	2 h	Schizophrenia	No	No	No	No
Patient P Retrieval: 6/2/10	IMI haloperidol 10 mg IMI midazolam 10 mg IV Midazolam 5 mg IV diazepam 20 mg IV clonazepam 2 mg	IV ketamine 230 mg + IV midazolam 4 mg	3 h	Schizophrenia	Yes, BP >140/ for most of retrieval but note that BP >140/ pre-retrieval	Yes, HR >100 for 50% of retrieval	No	No
		IV ketamine 70 mg	1 h 50 min	Schizophrenia	No	No	No	No
		IV ketamine 240 mg	30 min	Schizophrenia	No	No	No	No

Continued

Table 1 Continued

Aeromedical retrieval sedation details	Pre-flight sedatives administered (12 h pre-flight) + dosages	Total in-flight sedatives administered + cumulative dosages	Duration of flight	Diagnosis	Any recorded BP <90 or >140 systolic	Heart rate recorded >100	Oxygen saturation recorded <95	Vomiting or c/o nausea
Patient Q Retrieval: 18/02/10	10 mg PO diazepam on admission, then 2 mg IV clonazepam + 10 mg IV haloperidol, then over 12 h further 20 mg IV diazepam	3 mg IV midazolam + 20 mg IV ketamine	35 min	Suicidal ideation/intentional self-harm	No	No	No	No
Patient R Retrieval: 19/02/10	PO olanzapine 30 mg PO diazepam 90 mg IV diazepam 15 mg	IV midazolam 9 mg + IV ketamine 270 mg	3 h	Schizophrenia	No	No	No	No

Adverse events were defined as blood pressure readings of systolic less than 90 mm Hg or greater than 140 mm Hg, pulse rate greater than 100/minute, oxygen saturation less than 95% and episodes of vomiting or complaints of nausea. BP, blood pressure; HR, heart rate; IMI, intramuscular injection; IV, intravenous; IM, intravenous injection; PO, by mouth.

Adverse events

See table 1 for definition.

Hypertension or tachycardia occurred in four patients but no treatment was required. One patient vomited a small amount of gastric contents but did not require active intervention. None of the cases required airway intervention and there were no cases of pulmonary aspiration of gastric contents. During the 72 h after retrieval, 10 patients had at least one abnormal blood pressure or heart rate recording that resolved spontaneously within the first 24 h.

Effect on mental state

No cases were identified in which agitation or psychiatric symptoms were deemed to have worsened as a result of ketamine administration. One patient had three retrievals alone during the study period, which was attributed to the cessation of his chronic parenteral depot antipsychotic medication regimen.

DISCUSSION

The use of ketamine as a sedating agent for the acutely disturbed patient with a psychiatric diagnosis in the aeromedical setting has not been reported or previously described. However, ketamine has been viewed as being capable of triggering acute agitation and frank psychoses and is therefore contraindicated in patients with known or suspected psychotic disorders. Indeed, the Australian Medicines Handbook, a national drug formulary, recommends avoiding the use of ketamine with coexisting psychiatric disorders due to the risk of hallucinations and irrational behaviour.³ Studies investigating ketamine challenge in patients with schizophrenia have not found long-term adverse effects or ketamine-induced relapse of psychosis.⁴ Its use as emergency sedation for acute agitation has been described in the military, prehospital and emergency department setting.⁵⁻⁷

Our experience is that ketamine sedation is a valid and safe strategy for managing the agitation of psychiatric patients requiring aeromedical transport. It should reduce the need to resort to measures such as tracheal intubation and general anaesthesia in this setting.

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Competing interests None.

Ethics approval This study was conducted with the approval of the Queensland Health Human Research Ethics Committee (Cairns).

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