Movement of Critically Ill Patients Within Hospital

G. WADDELL

British Medical Journal, 1975, 2, 417-419

Summary

Critically ill patients were observed during routine movement inside the hospital to and from the intensive therapy unit. One patient a month suffered major cardiorespiratory collapse or death as a direct result of movement. Renewed bleeding of a pelvic fracture, cardiac arrhythmia, cardiac embarrassment due to a haemothorax, and cardiovascular decompensation were seen. It was difficult to continue treatment during movement, especially maintaining an airway or providing adequate intermittent positive pressure ventilation. Seventy postoperative patients suffered few ill effects on being moved.

Greater awareness of the dangers of moving critically ill patients within hospital is needed. Thorough preparation for the move and adequate maintenance of treatment during movement requires the skill of experienced medical staff.

Introduction

Recently there has been much interest in the effects of ambulance transport,[1-5] yet there is little information on the effect of moving critically ill patients within hospital. Taylor *et al.* electrocardiographically (E.C.G.) monitored high-risk cardiac patients moved within hospital and found that 90% had a rise in heart rate and two out of 50 seemed to develop arrhythmias in response to movement.[6] In 11 out of 22 patients moved from theatre to an intensive therapy unit (I.T.U.) after cardiopulmonary bypass blood pressure rose transiently while in three it fell by up to 15 mm Hg. There was a variable change in heart rate and no appreciable change in E.C.G.[7]

I report here a prospective clinical study of the effect of moving critically ill patients to and from the I.T.U. of the Western Infirmary, Glasgow (study 1), and a supplementary study on the effects of moving routine postoperative patients back to the ward (study 2).

Study 1

PATIENTS AND METHODS

In the five-month study 55 patients were admitted to the five-bed I.T.U. of the Western Infirmary, Glasgow. The unit has a particular interest in shock and respiratory failure, and there are separate units for coronary care, renal dialysis, and burns. No neurosurgery or cardiopulmonary bypass is performed in the hospital. Normal postoperative care is carried out in separate recovery rooms.

The 55 patients had 86 moves to or from the referring units or theatre during the acute phase of their illness. All moves were carried out routinely by the medical and nursing staff of the I.T.U. In 33 moves of the 20 most ill patients detailed clinical observations were made before, during, and after the move. No special measures were taken and so far as possible the observations did not interfere with the routine execution of the move. Baseline readings for an average of 30 minutes before movement allowed patients to act as their own controls.

University Department of Surgery, Western Infirmary, Glasgow G11 6NT
G. WADDELL, M.B., F.R.C.S., Senior Orthopaedic Registrar

RESULTS

Significant changes during and after movement were seen in seven patients, each of whom had been stable before movement (table I). These changes seemed to have been caused by the movement; the cardiovascular changes, transfusion requirements, and fall in haemoglobin from 12 to 6 g/dl seen in case 1 (fig. 1) were consistent with movement having caused renewed bleeding. Fig. 2 shows the recordings in case 2, and fig. 3 gives a sample of the E.C.G. before and after movement. Fig. 4 shows the blood pressure in case 5.

TABLE I—Study 1. *Effects of Movement within Hospital on Critically Ill Patients in Five Months*

Case No.	Age and Sex	Diagnosis	Move	Effect
1	11 M.	Fractured pelvis ..	Theatre to I.T.U.	Rebled, died
2	54 M.	Congestive cardiac failure, pulmonary emboli	Ward to I.T.U.	Atrial fibrillation, hypotension
3	56 M.	Mediastinal haemorrhage	Resuscitation room to ambulance	Airway obstruction
4	67 M.	Bleeding aortic aneurysm	Theatre to I.T.U.	Hypertension
5	46 F.	Right haemothorax ..	Rolled on to left side	Hypotension
6	91 M.	Pulmonary embolus ..	Ward to I.T.U.	Hypotension, died
7	38 M.	Crushed chest, haemothorax	I.T.U. to theatre	Cardiac arrest, died

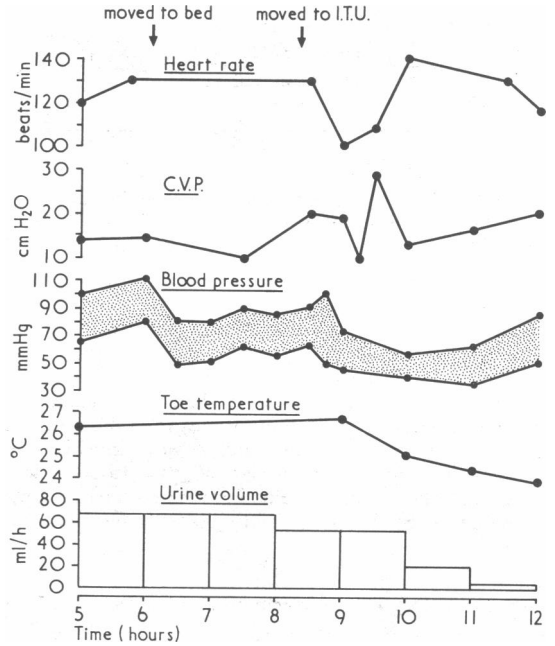

FIG. 1—Case 1. Recordings when moved from theatre to I.T.U. Patient had lain undisturbed on operating table for six hours after the end of an operation for pelvic bleeding.

During the baseline period only one patient showed progressive terminal hypotension and no other cases of sudden collapse or cardiac arrest were observed. Two patients had a transient fall in

systolic blood pressure to 70-75 mm Hg, and another two showed a rise of 30-50 mm Hg, all related to changes in artificial ventilation. One patient showed spontaneous reversion from supraventricular tachycardia to sinus rhythm.

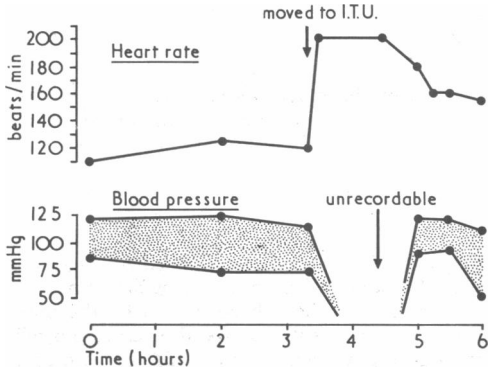

FIG. 2—Case 2. Cardiovascular recordings in patient with cardiac failure and pulmonary emboli moved from ward to I.T.U.

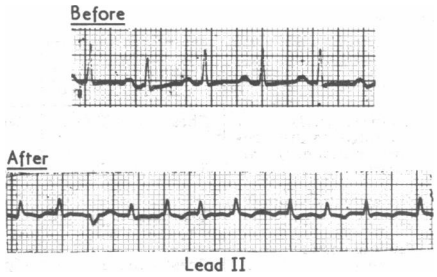

FIG. 3—Case 2. E.C.G. 30 minutes before and 15 minutes after movement.

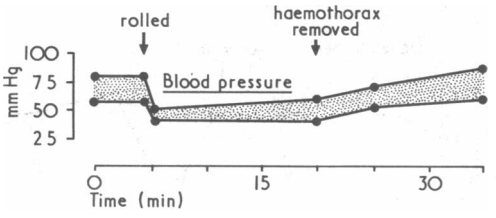

FIG. 4—Case 5. Blood pressure recording in theatre. Effect of rolling patient on to side with haemothorax uppermost.

Study 2

PATIENTS AND METHODS

Seventy postoperative surgical patients were studied during various stages of their return from the operating theatre to the ward (table II). Most had had major elective surgery such as gastrointestinal resection, joint replacement, thoracotomy, or arterial graft. In 60 patients three clinical readings of heart rate and blood pressure—the last immediately before movement—confirmed stability before movement. Readings were repeated immediately after they had been moved and 5, 15, and 30 minutes after. All readings were made by one observer who did not interfere with the usual routine of the staff executing the move.

In 10 patients blood pressure was recorded by a radial artery catheter, capacitance transducer (Elema Schonander EMT 35), and an Elema Schonander ink-writing recorder (Mingograph 81). After baseline readings at the end of the operation a continuous record was made while the patient was lifted by stretcher from the operating table to a trolley.

RESULTS

All patients were stable during the baseline period, and mean heart rate and blood pressure remained stable. In the 60 patients with clinical readings mean heart rates immediately before and after movement were 89/min and 91/min respectively. The corresponding blood pressure readings were 127/74 mm Hg and 128/73 mm Hg. None of the intra-arterial recordings showed any significant change. Three patients had a rise in heart rate of 24-40/min. Systolic blood pressure rose 15-20 mm Hg in two patients and fell 14 mm Hg in one. Heart rate and blood pressure returned to previous levels within five minutes of stopping movement. No other patient had a rise or fall in heart rate of more than 12/min or in blood pressure of more than 10 mm Hg. Two patients vomited, one while being wheeled to the ward in bed, the other two minutes after being lifted from trolley to bed in the recovery room. In one patient a suction drain caught in a doorway and was disconnected.

Discussion

In study 1 about one critically ill patient a month suffered major cardiorespiratory collapse or death as a result of movement within hospital. Though similar incidents occur in other hospitals,[8 9] this was a surprisingly high incidence. So far as possible the study reflected normal routine in this hospital. Any unintentional influence the observer might have had would probably have improved standards, so this incidence will tend to be an underestimate rather than an overestimate.

Many of these patients might have died anyway, even though only one patient progressively deteriorated and died during the control period. Baseline readings showed that most patients were relatively stable, and the changes seen seemed to be a direct result of movement. The mechanisms were varied: in case 1 movement of a major fracture caused renewed bleeding[8 10]; in case 2 movement seemed to precipitate cardiac arrhythmia[6 11 12]; in case 5 the haemothorax seemed to cause direct pressure on the heart or great veins when the patient was rolled on to her side; and in cases 1 and 6 movement may have precipitated cardiovascular decompensation with a fall in blood pressure and a rise in central venous pressure (C.V.P.). The frequency of collapse in patients with intrathoracic bleeding (cases 3, 5, and 7) supports the observation that patients with major chest injuries are particularly vulnerable to movement.[5]

The effects of movement may be direct or indirect[3]: discomfort, pain, and the physical stimuli of movement may directly affect the patient's condition while lack of facilities and the limitations of movement may reduce the ability of attendants to provide continuing life support. Such indirect effects were clearly illustrated by the difficulty of maintaining an airway (case 3) or intermittent positive pressure ventilation (cases 4

TABLE II—Study 2. *Details of Postoperative Patients Moved within Hospital*

Type of Surgery	No. of Patients	Mean Age (years)	No. of Men	Mean Time from Operation (h)	Movement			Mean Duration of Movement (min)
					Lifted on/off Trolley	Moved to Ward	Lift between Floors	
General (Western Infirmary)	20	55	10	2·8		+		2
General and thoracic (Gartnavel Hospital)	10	47	5	1·5	+	+	+	4·75
Paediatric	10	8	6	0·25	+	+	+	2
Orthopaedic	20	57	5	2	+	+	+	3·25
Vascular	10	59	8	0·1	+*			3 seconds

* Intravascular recording of blood pressure.

and 7). Even such simple measures as traction for a fracture (case 1) or a suction drain (study 2) can easily be disturbed while moving along narrow corridors or into lifts.

The incidence of serious effects due to intrahospital movement in critically ill patients (study 1) was much higher than that previously seen during ambulance transport of similar patients.[5] This may be partly due to a willingness to move patients within hospital who would be considered too moribund to subject to an ambulance journey. It is probably due also to less thorough preparation and less adequate maintenance of treatment during movement. In the ambulance study every possible care was taken to stabilize the patient and then maintain treatment throughout the journey. When simply wheeling a patient along a corridor it is tempting to imagine that there is less opportunity for misfortune and that a few minutes gap in treatment will do no harm. The results of study 1 suggest that in critically ill patients this is untrue; their movement within hospital may be as hazardous as an ambulance journey, and it should be seriously considered whether they need to be moved at all. Adequate preparation is essential and every possible care should be taken to maintain treatment and forestall "accidents" during the move. Such patients should not be consigned to the care of non-medical or inexperienced staff.

Experience of both ambulance transport and moving patients within hospital suggested that patients recovering from a recent operation and anaesthetic more often showed cardiovascular effects of movement, but the results of study 2 provide no evidence to support this hypothesis, all 70 patients showing remarkable stability. Weller also observed only minor effects of moving patients after cardiopulmonary bypass.[7] Only two of the seven very ill patients affected by movement (study 1) were recovering from an operation. Provided adequate care is taken postoperative patients do not seem to be particularly vulnerable to movement.

I thank Dr. I. McA. Ledingham, consultant clinical physiologist, Western Infirmary, Glasgow, for his advice, encouragement, and help in organizing this study. The staff of the shock team and the I.T.U. helped greatly in the collection of data on the critically ill patients. In study 2 the recovery room staff, porters, and ward staff of the Western Infirmary, Gartnavel General Hospital, and the Royal Hospital for Sick Children, Glasgow, were unfailingly patient and helpful. Drs. G. Smith and D. Proctor, consultant anaesthetists, and Mr. J. Airnes, chief physics technician, kindly set up the intra-arterial recordings.

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Cushing's Syndrome and Pituitary-Adrenal Suppression due to Clobetasol Propionate

R. C. D. STAUGHTON, P. J. AUGUST

British Medical Journal, 1975, 2, 419-421

Summary

Widespread application of clobetasol propionate resulted in suppression of the hypothalamic pituitary axis in four patients. Three patients showed Cushingoid features and developed symptoms of adrenocortical insufficiency on withdrawal of clobetasol.

Introduction

Features of Cushing's syndrome due to topical corticosteroid application are rarely recorded[1] except in children[2] and patients with advanced liver disease.[3] Transient pituitary-adrenal suppression has been reported, especially when percutaneous absorption has been enhanced by polyethylene occlusion.[4-7] Thus our interest was stimulated when we saw three patients who developed gross Cushingoid signs after using the potent new topical corticosteroid,[8] clobetasol (Dermovate), particularly as it has been claimed to have little systemic effect.[9] We examined the pituitary-adrenal status of these three patients and one other.

Skin Department, St. Thomas's Hospital, London SE1 7EH
R. C. D. STAUGHTON, M.A., M.R.C.P., Registrar
P. J. AUGUST, M.B., M.R.C.P., Senior Registrar

Methods

Serum cortisols were measured using Murphy's competitive protein binding technique,[10] slightly modified. The normal range at 9 a.m. is 138-442 nmol/l (5-16 μg/100 ml). On the insulin tolerance test[11] all patients experienced hypoglycaemia of less than 1·67 mmol/l (30 mg/100 ml), which is an adequate stimulus for maximal rise in serum cortisol levels.[11] Tetracosactrin tests were also performed.

Case 1

In July 1973 this 53-year-old woman first used clobetasol cream, which controlled her chronic severe psoriasis (covering 10% of her body surface) better than any other topical agent. She applied 300 g/week for the next year. By this time she was floridly Cushingoid with a moon face, hirsutes of the forehead, buffalo hump, truncal obesity, and wasted limbs and hypertensive (blood pressure 180/100-110 mm Hg). Widespread cutaneous atrophy was also present. She was admitted to hospital for investigation of her pituitary-adrenal status while clobetasol was continued. Serum cortisols were consistently less than 27·6 nmol/l (1 μg/100 ml) and there was no rise in response to the stress of hypoglycaemia induced by the insulin tolerance test. The long tetracosactrin test was normal with cortisol levels of 414 nmol/l (15 μg/100 ml) at 24 hours and a peak of over 690 nmol/l (25 μg/