CARDIAC ARREST DURING INDUCED HYPOTENSION. CASE REPORTS

S. L. VANDEWATER, M.D.¹

THIS IS A REPORT of two cases of cardiac arrest occurring during induced hypotension. The technique of induced hypotension, carries an increased risk to the patient, well documented by Little (1). This is a calculated risk which should be justified by the nature of the operation and the benefits to the patient.

Case 1

M F, female, age, 18 Diagnosis, cerebral arterio-venous malformation

History intermittent severe throbbing headaches for one year, patient suddenly became unconscious on the day prior to operation

Physical examination The patient was rather thin, drowsy but co-operative, neck stiff, dysphasic A bruit was heard over the left eye Right facial weakness, right hemiparesis, right extensor plantar response Arteriogram showed a large A.V. malformation in the left frontal lobe near the mid-line with evidence of clot formation Blood pressure was 120/60, pulse 100, haemoglobin 76 per cent Examination was otherwise negative

Premedication atropine 0.04 mg.

Anaesthesia thiopentone 400 mg, succinethionium 30 mg, N₂O, trichlorethylene

Induced hypotension was initiated, as the dura was opened, with a 0.05 per cent solution of Arfonad, and the blood pressure fell to and was maintained at 75/50 for 1½ hours. During this time 425 mg Arfonad and 50 mg. hexamethonium bromide were given During evacuation of a large clot beneath the A.V. malformation, cardiac arrest occurred. Cardiac massage was begun in 4 minutes and the heart, previously in standstill, began to fibrillate Cardiac massage was continued for 28 minutes, during which time the systolic blood pressure was 100 mm Hg Intracardiac adrenalin, KCL, and CaCl₂ resulted in no change. Four repeated attempts at electrical defibrillation made no change, but the fifth attempt, consisting of five shocks led to the onset of a regular cardiac beat The operation was then carried to its conclusion, total elapse of time was 5¼ hours During this time the patient received 2,000 cc. of blood and 500 cc. of plasma expander and an intermittent noradrenalin drip

Postoperatively

Immediately pupils fixed and dilated (Arfonad?), corneal reflexes absent, both plantar responses extensor This was shortly followed by decerebrate rigidity.

24 hours rigidity decreasing, moving left arm and leg with stimulation, unconscious

5 days talking, but disorientated and aphasic, moving all four limbs spontaneously.

14 days able to answer questions intelligently, some right hemiparesis

21 days discharged, alert, cheerful, able to write legibly, slow with conversation with slight dysphasia and some residual weakness on the right side, ECG normal.

6 months complete recovery, mentally alert and family report normal mental behaviour, persistent weakness in the right arm and leg, ECG normal

15 months complete mental recovery and normal power in all muscle groups and able to carry on with high school education

¹Department of Anaesthesia, University of Toronto, and Toronto General Hospital

Case 2

E.C., male; age, 34. Diagnosis secondary melanotic sarcoma, left inguinal glands

History malignant melanoma resected from left calf with dermatone graft, 3 months prior

Physical examination. Patient was well developed, physically fit, cardio-vascular and respiratory systems were normal. He had firm enlarged glands in left groin, and a recent skin graft left calf (healed). He had diabetes mellitus, mild, diet controlled until previous operation, now taking 15 units pz insulin daily. Blood pressure was 118/70, pulse 72, haemoglobin 75 per cent.

Premedication Demerol 100 mg, atropine 0.06 mg

Anaesthesia thiopentone 500 mg, d-tubocurarine 12 mg, N₂O, and trichlorethylene

A radical block dissection of the left inguinal region was performed under hypotension induced with a 0.1 per cent solution of Arfonad, and the blood pressure was maintained at 75/58 for a period of 1 hour and 50 minutes. During this time 205 mg Arfonad were required. The patient was lying supine with the pelvis elevated. On exposure of the common iliac artery, the patient suddenly became pale and cardiac arrest was diagnosed. At this time, the blood in the wound was pink and blood loss had been minimal. Cardiac massage was begun within three minutes from the time of arrest and ventricular fibrillation ensued within moments. Attempted chemical defibrillation with KCl and CaCl₂ was unsuccessful. Electrical defibrillation was successful and a regular rhythm was restored 40 minutes after arrest. Myocardial tone was weak but improved immediately with intracardial injection of 8 cc of 1/10,000 adrenalin and systolic blood pressure rose from 52 to 140 and then remained at 110/80. The operation was completed and total elapsed time from induction was 5 hours, with O₂ administration only, after cardiac arrest occurred.

Postoperatively

10 minutes after completion of operation, there was generalized clonic convulsion with extensor rigidity present, pupils dilated, fixed (Arfonad)

30 minutes corneal reflexes present, plantar response absent

1 hour rigidity decreasing, moving arms spontaneously, biting endotracheal tube and becoming very restless.

2 hours very restless, sodium luminal 120 mg intramuscularly

3 hours extubated, patient quieter with less movement and less rigidity, but resists flexion, plantar response bilaterally extensor, blood pressure 100-110/75-80, pupils smaller and reacting to light, temperature 101 (R), blood sugar 200 mg per cent

24 hours drowsy (sodium luminal), talking, moderate orientation, recognized relatives, urine output 700 cc /24 hours

48 hours fully conscious, remembers events up to going to the operating room

1 week appears well, chest clear, ECG repeatedly normal and no mental change according to relatives

3 months completely well

9 months completely well, no mental change

DISCUSSION

The use of induced hypotension in surgery has not retained its popularity in most centres, in the ten years since introduction by Gillies and Griffiths (2). In this centre, induced hypotension is reserved for certain types of major surgery,

where it is thought to be beneficial to both surgeon and patient. The above two cases appear to fall into that category. Both patients were physically fit, and suitable candidates to sustain a lowered blood pressure, although one might question the advisability of the technique in patients with haemoglobin of 76 and 75 per cent respectively. Cardiac arrest represents a 1.3 per cent occurrence in this writer's personal series of induced hypotension. I wish to thank my surgical colleagues, Drs. E. H. Botterell and J. E. Mullens for permission to report these cases.

REFERENCES

1. LITTLE, D M Controlled Hypotension in Anesthesia and Surgery. Am Lecture Series Springfield, Ill C C Thomas (1956).
2. GRIFFITHS, H W C, & GILLIES, JOHN Thoraco-lumbar Splanchnicectomy and Sympathectomy Anaesthetic Procedure Anaesthesia 3 134 (1948)