MATERIAL & METHODS
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This study is conducted in elderly age group of patients (45 years and above) presenting themselves for major surgical operations at M.L.B. Medical College Hospital, Jhansi.

Selection of cases:

The study included elderly patients with or without pre-operative complication for routine elective and emergency operation.

Each patient was subjected to a detailed history and clinical examination, with a particular stress for diagnosis of any pre-existing disease or complication. These were such as:

a) Hypertension, dysrhythmia, congestive heart failure, myocardial ischaemia & infarction,

b) Chronic obstructive pulmonary diseases such as, chronic bronchitis, emphysema, bronchiectasis, previous pulmonary tuberculosis, bronchial asthma, bronchopneumonia,

c) Genitourinary diseases, renal insufficiencies, azotemia,

d) Hepatic disorders, jaundice—infective or obstructive,

e) Endocrinal diseases as, diabetes, hyperthyroidism,

f) Shock, blood loss and electrolytic imbalance as, in trauma or intestinal obstruction,
g) Anaemia, hypoproteinaemia, wasting, obesity, & debilitation,

h) Malignancy and Metastasis,

i) History of any drug intake as corticosteroids, antihypertensives, addiction to intoxicants as smoking and alcohol etc.

Any history of previous anaesthesia and its complications if any were particularly noted.

Investigations:

The following routine investigations were conducted:

(1) Total Leucocyte Count, Differential Leucocyte Count,
Haemoglobin estimation in gm% (Sahli's method),
Erythrocyte Sedimentation Rate (Wintrobe’s method).

(2) Complete Urine examination.

(3) The following specific investigations relevant to the diagnosis of any pre-existing complications were also conducted. These were as such:

a) X-ray of chest and abdomen.

b) B.sugar estimation: Random levels and glucose tolerance test.

c) B.urca estimations.

d) Electrocardiography.
e) Liver function tests, bilirubin estimations, serum-proteins, SGOT & SGPT levels.

f) Serum electrolytes.

g) Intravenous pyelogram, Cholecystography.

h) Miscellaneous investigations as serum Cholesterol, serum acid phosphatase, serum alkaline phosphatase levels etc.

The patients for emergency surgery, that could not be investigated in detail were subjected to haemoglobin estimations and complete urine examination, together with thorough clinical assessment.

Patients were graded for physical status (as per ASA classification) as follows:-

(1) Normal healthy patient, (Grade-I).

(2) Patient with mild systemic disease, (Grade-II).

(3) Patient with severe systemic disease that limits activity but is not incapacitating, (Grade-III).

(4) Patient with incapacitating disease that is a constant threat to life, (Grade-IV).

(5) Moribund patient not expected to survive 24 hours with or without an operation, (Grade-V).

In event of an emergency operation physical status grade was preceded with the prefix 'E'.
Body weight was measured in kilograms in elective surgical patients. Blood grouping and cross-matching was done always prior to surgery.

Patients were prepared for routine surgery (Nil orally 6 hours prior to anaesthesia).

General condition, pulse rates at rest, blood pressure at rest, rate of respiration, tidal volume, maximum breathing capacity (by Wright's anaemometer), temperature, pallor, hydration, oedema and cyanosis were all recorded before pre-medication.

**Technique of anaesthesia**

Anaesthetic record was maintained throughout the pre-operative, during operative and post-operative periods.

Premedication was given as inj. Atropine 0.65 mg IM about 45 minutes before the induction of anaesthesia. (It is subject to modification because of pre-existing tachycardia, raised body temperature or in emergency surgery). Combination of Atropine + Pethidine, Pethidine + Promethazine were also used for pre-medication in some cases.

Pre-oxygenation was done invariably in each case for five minutes. Induction of anaesthesia was done
only after an intravenous cannula was secured & Infusions of 5% D/W was started.

(A) **Induction of anaesthesia:**

Patients were induced by intravenous Thiopentone, (Intraval) 2.5% solution in asleep doses (equivalent to approx. 5 mg/kg.). This injection was delayed at any event of apnoea or yawning, and oxygen was supplemanted.

(B) **Intubation techniques:**

(1) Intubation was done by using Suxamethonium (Scoline) (1.5 mg/kg.) for muscular relaxation, it followed thiopentone immediately with a separate syringe. Respiration was assisted and at the end of fasciculations & twitches atraumatic intubation was done withuffed endotracheal tube of widest lumen (at 60-90 seconds).

(2) Intubation was also done by non-depolariser muscle relaxants. The relaxants used were:

(a) Pancuronium bromide (Pavulon) 0.1 mg/kg I/V.
(b) d-Tubocurarine chloride (Tubarine) 0.5 mg/kg I/V.
(c) Gallamine triethiodide (Flexidil) 3 mg/kg I/V.

Relative potencies of these drugs were taken as 1 for d-Tubocurarine and 5.6 & 0.15 for pancuronium and gallamine respectively (Buzello and Agoston, 1978).
In these cases of intubation with non-depolariser muscle relaxants, thiopentone injection followed immediately after them. Intubation was attempted at 150 seconds (Bobkin, 1971) & repeated at 30 seconds intervals (Katz, 1971). Intubation time was recorded and also the intubation conditions as:

(a) Good – vocal cords abducted, relaxed (no response to intubation),

(b) Fair – vocal cords moving (cough following intubation),

(c) Poor – difficulty in exposing larynx, vocal cords adducted, intubation not possible (McDowell & Clarke, 1969).

(C) **Maintenance of Anaesthesia:**

All patients were maintained by Oxygen and Nitrous oxide in ratio of 3:5, (Fresh gas flows used were more than minute volume recorded earlier).

I.P.P.V. was maintained by semi-closed circuit as Mapelson-A circuit (with Heidbrink’s expiratory valve) or with Bain’s circuit. With Mapelson-A circuit the fresh gas flows were more than minute volume of the patient recorded pre-operatively, slight hyperventilation was maintained with increased tidal volumes, less inflation rates & high pressures in initial phase of inflation. This ensured against
hypercapnia and rebreathing (Conway, 1974).

(a) Muscle relaxants as Pancuronium, d-Tubocurarine & Gallamine were used at the end of Suxamethonium apnoea (In case intubation was done with Suxamethonium) in initial maintenance doses I/V as:

(i) Pancuronium (0.08 mg/kg) = 4 mg/50 kg. wt.
   (Foldes F.F., 1972).
(ii) d-Tubocurarine (0.4 mg/kg) = 20 mg/50 kg. wt.
(iii) Gallamine (2.5 mg/kg) = 120 mg/50 kg. wt.

(b) Second and further maintenance doses of relaxants were used as:

(i) Pancuronium, 1–2 mg.
(ii) d-Tubocurarine, 3–5 mg.
(iii) Gallamine, 20–40 mg.

In debilitated patients, in presence of electrolyte imbalance or when using with potentiating antibiotics, the doses of relaxant were reduced (Foldes F.F., 1972).

Necessity of repeat dose was judged by peripheral nerve stimulation, incomplete muscular relaxation, respiratory efforts of diaphragm, and other clinical parameters.

Analgesics as, Pethidine (40–120 mg) and pentazocine (12–36 mg) were administered intravenously in
divided dose. The requirements of analgesics were judged by clinical signs of sympathetic stimulation, frowning, muscular twitches etc. Inadequate relaxation and hypercapnia were ruled out simultaneously.

Blood volume was maintained with adequate fluid and blood transfusions as needed.

(D) **Reversal of N₂M Blockade:**

Reversal was attempted only after the presence of spontaneous respiration was apparent, and this was also judged with help of peripheral nerve stimulator. Adequate oxygenation was ensured prior to reversal with Neostigmine (0.5–2.5 mg) and Atropine (0.4–1.2 mg). Injection of Atropine, preceded Neostigmine which was diluted upto 10 ml. It was given intravenously very slowly over period of 60 seconds and reversal was assessed at 5 minutes from the end of this injection (Feldes, 1972).

**Reversal of N₂M Blockade was graded as:**

(a) Easy - If respiration was adequate at 5 minutes of reversal.

(b) Difficult - If respiration was still inadequate at 5 minutes (McDowell and Clarke, 1969).

**Assessment of clinical recovery**

Recovery was assessed by following signs:

1. Adequate tidal volume,
2. Response to peripheral nerve stimulator as, sustained
tetanus for 5 seconds at 50 Hz (Savarese and Ali, 1978).

3. Absence of F.T.P. and Fade phenomenon,

4. Head lifting closed mouthed & maintenance upto 5
seconds (Kallos, 1972).

5. Eye opening & movements,

6. Level of consciousness,

7. Limb activities on command.

Extubation was done when patient was assessed
as fully reversed, proper oro-tracheal and pharangeal toilet
was done. Cough reflex and deglutition reflexes were in-
variably present at reversal.

Post operatively any complications as prolonged
apnoea, bradycardia or hypotension were particularly noticed.

(E) Monitoring during operative & post operative periods:

Cardiovascular dynamics was continuously
monitored by various clinical parameters as, pulse rate,
blood pressure (Systolic, Diastolic & MAP = mean arterial
pressures equal to diastolic pressure + 1/3 pulse pressure),
state of peripheral circulation, presence of pallor &
cyanosis, (Kelman and Kennedy, 1971).

These were recorded at 2 minutes interval
initially (after start of induction of anesthesia), upto 15
minutes and then at 5 minutes interval till the end of
Any event of bronchoospasm or lung crepitations developing during anaesthesia were noted immediately.

A peripheral nerve stimulator (providing twitch rates 2 Hz/Sec., tetanic rates—50 Hz/Sec., of range 0–200 volts D.C. output) with square wave pattern of duration 0.2 m.sec. was used. Ulnar nerve at wrist joint was stimulated by surface electrodes and action of adductor pollicis muscle (Thumb adduction) was observed, (Saverese & Ali, 1978).

Various muscular relaxation parameters as the onset of action of non-depolariser muscle relaxants, total duration of neuromuscular blockade, return of diaphragmatic action, time taken for reversal of blockade by anticholine- esterases as Neostigmine were noted.

Again post-operatively all the clinical variables were recorded as in pre-operative & intra-operative period.

The duration of operation and anaesthesia, total doses of anaesthetic drugs used, total volume of intravenous infusions, blood loss estimation, any other drug or anaesthetic agent used were also recorded.