MATERIAL AND METHODS

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The present study was conducted in the Department of Anaesthesiology in M.L.B. Medical College, Jhansi (U.P.) with the aim to observe the effects of the Self taming, as well as the precurarization, over the suxamethonium induced fasciculations, myalgia and hyperkalemia. The efficacy of both the measures was also evaluated in the prevention of these adverse effects of suxamethonium. The precurarization was performed either with Gallamine or with Pancuronium, so effects of both these drugs were analysed to compare with those of Self Taming.

Eighty indoor patients of either sex between 12 to 55 years comprised the material for the study. All patients undergone general anaesthesia for various types of surgical procedures, in which ambulation in post-operative period was predictable within 24 hours. Such selection was important for better understanding of suxamethonium induced myalgia as they are known to be common during first post-operative day. Obviously, the cases of major abdominal and orthopaedic surgical procedures were excluded from the study. Similarly, patients who might be susceptible for massive hyperkalemic response to suxamethonium were avoided. Thus, patients of burn, neurological disorders, massive muscular trauma, severe

infections and renal failure were not included while selecting the patients.

All the patients were of physical status A.S.A. Grade I or II. They were thoroughly examined pre-operatively to assess the clinical fitness. Routine investigations alongwith relevant special investigations were performed in all the patients and only patients with normal investigation were accepted for the purpose of the study. Written consent was obtained from every selected patients and they were kept empty stomach for at least 6 hours before the induction of anaesthesia.

Premedication consisted of only injection Atropine 0.6 mg I.M. approximately 30 - 45 minutes prior to the induction of anaesthesia. Hyphotic and narcotic analgesics were not administered as they might alter the incidence and severity of myalgia.

Venepuncture was performed aseptically and 5% Dextrose in D/W was started. Care was taken not to infuse only electrolyte containing solution as they might affect the plasma potassium concentrations. Preoxygenation with 100% O_2 was initiated about three minutes prior to the induction of anaesthesia. Induction of anaesthesia was performed with the 2.5% solution of Inj. Thiopentone 5 mg/kg (150-300 mg) intravenously slowly till abolition of eye lash reflex.

Initial anaesthetic management varied as patients were randomly allocated into four separate groups.

Group I (Control group) : Suxamethonium I.V. in dose of 1.5 mg/kg (50-100 mg) was administered as a bolus about 30 seconds after induction with Inj. Thiopentone.

Group II (Self Taming group) : Small dose of suxamethonium (10 mg.) was administered soon after the Inj. Thiopentone, but one minute prior to the full paralysing dose of suxamethonium (1.5 mg/kg.).

Group III (Gallamine group) ; Pre-treatment with injection Gallamine 20 mg I.V. was performed 2 minutes prior to the Inj. Thiopentone. The Suxamethonium (1.5 mg/kg) was administered 1 minute after the Inj. Thiopentone so that interval between precurarization and paralysing dose of suxamethonium remained to be 3 minutes.

Group IV (Pancuronium group) : Pre-treatment with Inj. Pancuronium 1 mg I.V. was performed 3 minutes prior to the administration of suxamethonium.

Subsequent management remained same in each group. Endotracheal intubation was performed in every patient as soon as abolition of suxamethonium fasciculation occurred. Connections were made to attach the patient with the Mapleson A circuit of Boyle's Apparatus. I.P.P.V. was continued till recovery from suxa-paralysis was evident.

Subsequently, spontaneous respiration was maintained till completion of the surgical procedure.

Anaesthesia was maintained with the mixture of O_2 + N_2O + Ether. Total gas flow rate was adjusted to remain between 7-9 litres/minute. The ratio of the oxygen and the nitrous oxide was kept to remain 33 : 67.

Besides parameters, stipulated for the present study, each patient was constantly monitored to assess the vital function including pulse, Blood Pressure and respiratory movements.

Fasciculations were observed after administration of suxamethonium to assess their extent and intensity. They were graded as follows :

0 : No visible fasciculations.

\+ : Very fine facial muscle and finger tips movements.

++ : Minimal contractions of the trunk and the extremities.

+++ Vigorous contractions of the Trunk and the extremities.

The magnitude of hyperkalemic response to suxamethonium was assessed by the estimation of serum potassium before and after the administration of the drug. Three blood samples were drawn from a separate venepuncture site with the help of dry autoclaved syringes.

1. 5 minutes before administration of Thiopentone.

2. 3 minutes after the Suxamethonium administration.

3. 10 minutes after the Suxamethonium administration.

Blood in each sample was allowed to clot till separation of serum in dry vials occurred. Serum of each vial was separated in different test tubes to be centrifuged for 20 minutes at the rate of 3000 rpm and 0.3 ml of clear serum was obtained for the measurement of serum potassium by the flame photometer.

Principle of the Flame Photometer :

The specimen solution is sprayed as a fine mist into a non-luminous flame which become coloured by characteristic emission of the metal. The first test in the estimation is to prepare a dilution of the specimen to bring the concentration of the element into correct range. Each sample is compared with the standard to eliminate the effects of slow drifts in the sensitivity, which are liable to result from the flame radiation. The whole basis of the method depends on the assumption that a given concentration of the element in the diluted test samples will produce the same amount of light as the same concentration in the standard.

Procedure :

0.2 ml of serum was diluted with 19.8 ml of double distilled water to make the ratio of 1 : 100. This diluted

specimen was compared with standard solutions of potassium chloride, which were made by diluting the stock potassium standard (10 m mol/L = 0.746 of Dry Potassium Chloride/L). Flame photometer was switched on and Potassium filter was inserted. Air pressure was adjusted to 10-16 lb/inch^2 and gas supply was ignited to obtain clear flame without any soot. Subsequently, the various standard solutions were placed in levelled beakers. Initially, high potassium standard (0.08 mEq/L) was sprayed and needle was adjusted to the mark of 100. Zero setting was checked with double distilled water. Each standard was sprayed in turn to confirm the even spread of the reading over the scale. The diluted specimen sample was spread and reading was noted, it was immediately followed by spraying the two nearest standard solutions which gave readings just higher and lower than unknown sample. After each reading, double distilled water was sprayed to confirm the zero setting and to rule out any error due to remaining potassium.

Assessment of suxa-myalgia was done by visiting the each patient after 24 hours of surgery. Initially, some non-specific enquiry was made regarding the post-operative status of patient. When patient complained about their aches and pains, the sites and severity of pains were recorded. In the cases of negative complaints, the specific quiery was made to ascertain the occurrence of muscle pains and stiffness.

The post-operative pains in the vicinity of surgery and injection sites were not considered as suxa-pains. Low backache in cases who undergone lithotomy position was also not included in the category of suxa-pains.

The intensity of pain was graded as under :

0 : No muscle pain.

+1 : Mild generalized or localized pain.

+2 : Pain at numerous sites/severe pain at a single site.

+3 : Severe pain at numerous sites.

The statistical analysis :

The observations, made during the study, were arranged in tabulated form to obtain the incidences and percentages of the post suxamethonium fasciculations and the post-operative myalgia, as per their intensities in each of the groups. The estimated plasma concentrations were also similarly arranged to express them as the mean values ($\pm$ standard deviation) as to find out any changes, from their respective pre-induction value, at the interval of 3 minutes and 10 minutes after the suxamethonium administration.

The comparative analysis was performed with the help of the following statistical equations.

1. 't' test for the proportionate values :- To compare the incidences of the fasciculations, as well as the myalgias, in between the patients of the control group and each of the pre-treatment group.

$$t = \frac{p_1 - p_2}{\sqrt{pq\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

degree of freedom = $|\ (n_1 + n_2) - 2\ |$

where

$$p_1 = \frac{\text{No. of patients with fasciculations or myalgia}}{\text{Total number of patients}} \quad \text{(in the control group)}.$$

$$p_2 = \frac{\text{No. of patients with fasciculations or myalgia}}{\text{Total number of patients}} \quad \text{(in pre-treatment group)}$$

n_1 = Total number of patients in control group.

n_2 = Total number of patients in pre-treatment group.

$$p = \frac{p_1\ (n_1-1) + p_2\ (n_2-1)}{(n_1 + n_2) - 2}$$

$q = (1 - p)$

2. Paired 't' test :- To analyse the pattern of the change in the mean plasma potassium concentration, in individual groups, from their pre-induction values.

$$t = \frac{\bar{d}}{sd\ /\ \sqrt{n}} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

degree of freedom = $(n - 1)$

where

$\bar{d}$ = mean of differences of the plasma potassium concentration between the values at

a) Pre-induction and at 3 minutes interval.

b) Pre-induction and at 10 minutes interval.

s.d. = Standard deviation of $\bar{d}$.

n = Number of patients in each group.

't' value, thus obtained from the equation (1) or (2) were utilized to find out the P value which denotes significance of the difference in the value as per under-mentioned criteria.

$P = \not< 0.05$: Insignificant.

$P = < 0.05$: Significant.

$P = < 0.02$: Highly significant.

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