Original Research Article

Does curarisationbeforehandimprove ventilation by face mask? Prospective randomisedstudy

Abstract :

Prior verification of the effectiveness of face mask ventilation (FMV) before curarisation isoftendogmatic. It isoftenconsidered a safety factor. The main aim of ourstudywas to investigate the effect of prior curarisation on VMF conditions.
A prospective, randomised, double-blind studywasconducted in the operating theatre of the Mohammed V Military Training Hospital in Rabat. The inclusion criteriawere: patients aged over 18 years, ASA I and II scheduled for surgeryundergeneralanaesthesia (GA) and requiringtracheal intubation. Exclusion criteriawere: the presence of gastro-oesophageal reflux, the need for rapidsequence induction, the presence of criteria for FMV or difficult intubation and the need for vigorous intubation. The patients includedwererandomisedintotwogroups: the rocuronium group (Gr:R), in whom curarisation withrocuroniumprior to verification of the efficacy of VMF wasperformed, and the control group (Gr:S), in whom an equal volume of 0.9% saline wasadministered. Improvement in FMV wasourprimaryendpoint. It wasassessedusing the HAN FVM difficulty score and the expiratory tidal volume (ETV) during MV manoeuvres.
A significantimprovement in the Han score wasnoted at 2 min after administration of Rocuronium (Reference: 1.40 ± 0.50 vs 2 min: 1.17 ± 0.38, p: 0.017). There wasalso a significantimprovement in TEV at 1 min (117.9 ± 41.41 vs 289.33 ± 78.63, p: 0.004) and at 2 min afterearly curarisation (167.57 ± 59.7 vs 388.67 ± 38.85, p: 0.008).
Prior curarisation improves FMV in patients with a predictedeasyairway. Severalstudieswithdifferentmethodologiesfoundsimilarresults.

Key words : curarisation prior , ventilation

1. INTRODUCTION

Prior verification of the effectiveness of face mask ventilation (FMV) before curarisation is a practice whichismostoftendogmatic. It isoftenconsidered a safety factor [1]. The reason for this practice is the possibility of waking an uncurarised patient and re-establishingsufficientspontaneous ventilation before the onset of severehypoxaemia [1]. However, an inadequatelevel of anaesthesiaduring induction is a frequent cause of difficultywith FMV [2]. Consequently, manyauthors have questioned the validity of this practice [1,3,4,5]. Curarisation has been shown to have potentially positive effects:itincreases thoraco-pulmonary compliance and reducesmusculartone in the smallairways. Prior curarisation couldimprove the conditions for FMV. However, thisbeneficialrole of curarisation has been littlestudied. The main aim of ourstudyis to investigate the effect of prior curarisation on FMV conditions.

2. MATERIALS AND METHODS

Afterobtaining the approval of ourethicscommittee and the informed consent of the patients. A prospective, randomised, double-blind studywasconducted in the operating theatre of the Mohammed V Military Training Hospital in Rabat. All patients over 18 years of age, ASA I and II scheduled for surgeryundergeneralanaesthesia (GA) and requiringtracheal intubation wereincluded. Exclusion criteriawere: the presence of gastro-oesophageal reflux, the need for rapidsequence induction, the presence of criteria for FMV or difficult intubation and the need for vigorous intubation. The patients includedwererandomisedintotwogroups: the Rocuronium group (Gr:R), in whom curarisation (Rocuronium) wasadministeredprior to verification of the efficacy of VMF, and the control group (Gr:S), in whom an equal volume of 0.9% saline wasadministered. In the operating theatre, all patients werepremedicated (2 mg Midazolam). Standard monitoring wasapplied (ECG tracing, heart rate, non-

invasive blood pressure, pulse oximetry). The anaesthesia machine waschecked and calibratedbeforeuse for each patient. After 3 min of pre-oxygenationwith a target of 90% Fe. GA wasinducedwith Fentanyl 2-3 yg/kg and Propofol 2-3 mg/kg. 30 sec afterloss of the ciliary reflex, eitherRocuronium (0.6 mg / kg) or an equal volume of 0.9% saline wasadministered. Improvement in FMV wasourprimaryendpoint. It wasassessedusing the HAN FMV difficulty score (Table 1) [6] and the tidal volume exhaled (TEV) during FMV manoeuvres. Hemodynamic variations and the occurrence of desaturationwere the secondaryendpoints. The Han score and baseline ETV wererecorded 30 s afterloss of the ciliary reflex and thenevery 30 s for 2 min.

Table 1. HAN VMF difficulty score

Classification	Description
Grade 1	Mask only ventilation
Grade 2	Difficultyventilating, oropharyngealcannulainserted
Grade 3	Mask ventilation withmandibular mobilisation, externallaryngealmanoeuvres and two-hand technique
Grade 4	Mask ventilation not possible

The data wereenteredusing SPSS 20.0 software. Qualitative variables wereexpressed as headcount and percentage, and quantitative variables as mean and standard deviation or median and quartiles. Pearson's χ^2 testwasused to compare percentages and the Student t test and Mann Whitney test to compare quantitative variables according to their distribution. A value of $p < 0.05$ wasconsidered the threshold of significance.

3. RESULTS

A total of 60 patients wereincluded (30 patients in each group).
Demographiccharacteristics, comorbidities and criteria for difficult intubation were comparable between the two groups (Table 2).

Table 2. Basic characteristics

	All patients (n:60)	**Control group (n:30)**	**Rocuronium Group (n:30)**	**P**
Age	55.27±13.64	56±14.43	54,53±13	0.468
man	36(60)	19(52.8)	17(47.2)	0.598
woman	24(40)	11(45.8)	13(54.2)	
BMI (Kg/m2)	25.4±2.45	25±1.74	25.8±2.97	0.203
ASA class				
ASA I	41(68.3)	19(46.3)	22(53.7)	0.405
ASA II	19(31.7)	11(58)	8(42.1)	
HTA	12(20)	7(58.3)	5(41.7)	0.52
Diabetes	10(16.7)	6(60)	4(40)	0.488
Asthma	4(6.7)	1(25)	3(75)	0.301
Mouthopening (mm)	33.08±2.45	33.5±2.33	32.67±2.53	0.064
Thyromental distance (mm)	64.08±2	64.17±1.9	64±2	0.744
Mallampati Class				
Class 1	11(18.3)	16(61,5)	10(38,5)	0.118
Class 2	49(81.7)	14(41,2)	20(58,8)	
Neck circumference (cm)	40.02±3.55	39.76±4.14	40.40±2.47	0.058

FMV wasimprovedafterprior curarisation. A significantimprovement in the Han score wasnoted at 2 min after administration of Rocuronium (Reference: 1.40 ± 0.50 vs 2 min: 1.17 ± 0.38, p: 0.017) (table 3).

Table 3. Effect of prior curarisation on face mask ventilation (Modification of HAN FVM difficulty score)

	Control group (n: 30)		
	Reference	2 min	P
Han's score	1.60±0.56	1,40±0.50	0.151
	Rocuronium group (n: 30)		
	Reference	2 min	P
Han's score	1.40±0.50	1.17±0.38	0.017

There wasalso a significantimprovement in TEV at 1 min (117.9 ± 41.41 vs 289.33 ± 78.63, p: 0.004) and at 2 min afterearly curarisation (167.57 ± 59.7 vs 388.67 ± 38.85, p: 0.008) (Table 4).

Table 4. Effect of prior curarisation on face mask ventilation (Variations in meanexpiratory tidal volume ETV)

	Serum Salé Group (n: 30)	Rocuronium Group (n : 30)	P
Reference	72.40±13,43	80.60±10,72	0.426
1 min	117.9±41,41	289.33±78,63	0.004
2 min	167.57±59,7	388.67±38,85	0.008

Onlytwo patients showeddesaturation in Gr: R comparedwith one in GR: S (p: 0.554). The incidence of hypertension and tachycardiawas comparable between the two groups, withrespectively (p: 0.640) and (p: 0.554).

Table 5. Haemodynamic and respiratory variations

	Saline group (n: 30)	Rocuronium group (n : 30)	P
Desaturation	2(66.7)	1(33.3)	0.554
Tachycardia	2(66.7)	1(33.3)	0.554
Bradycardia	1(100)	0	0.313
Hypertension	3(60)	2(40)	0.640

4. DISCUSSION

The main finding of ourstudywas a significantimprovement in FMV afterprior curarisation, as measured by the HAN score and TEV. Severalstudieswithdifferentmethodologiesfoundsimilarresults. Sachdeva et al, in a prospective study of 125 patients, found a significantimprovement in FMV afterearly curarisation. Theynoted a significant 12% increase in VTE. FVM wasperformedtwo-handedwith pressure-controlled ventilation (PI at 15 cm H2O). The sameresultwasalsoobserved in the group of obese patients (BMI ≥ 30 kg/m2) [7]. In the samecontext, Ikeda et al. used a VMF separating the oral and nasal routes. He demonstrated a significantincrease in oral and nasal tidal volumes aftersuccinylcholine administration. Dilatation of the upperairway, observedendoscopicallyduringpharyngeal fasciculations aftersuccinylcholine, has been suggested as the main mechanism for the improvement in FMV [8]. However, there are somereservations about thisstudy. It was a non-randomisedstudy and only 31 patients wereincluded. FVM wasperformedwith the head in the neutral position, withoutadditionalmanoeuvres to optimise ventilation. The target tidal volume waslow (2 ml/Kg) and endoscopywasonlyperformedin 6 patients receivingsuccinylcholine. Furthermore, the reference values for oral and nasal tidal volumes differedbetween patients receivingRocuronium and succinylcholine [8]. In their prospective randomisedstudy of 90 patients, Warters et al. used an alternative score to assess FMV after curarisation. Theyconcludedthatearly administration of Rocuroniumsignificantlyimproved FMV, even in the subgroup of patients withdifficult initial FMV (Warters score ≥ 3). However, no change in Han score wasnoted [9]. In ourstudy, weused the Han score to assess FMV. Wefoundthis score lesscomplex and easier to use than the Warters score [6]. To ourknowledge, thereisonly one study in which curarisation did not improve FMV. The authorsused a ratio of expiratory to tidal volumes as the endpoint [10]. However, the ability of this ratio to reflect the efficacy of FVM has been questioned by Orbany et al. intheirreview of FVM [2]. Indeed, itmaybeaffected by leakage in the respiratory system [1,7]. Despitedifferences in methodology and

criteria for judging the efficacy of VMF. The results of ourstudy and previousstudies [1,7-10] agreethatpriorcurarisation beforetesting the efficacy of VMF issafe practice. Indeed, Amathieu et al, usingsuccinycholine in patients withdifficult VMF prior to curarisation, notedthat the quality of VMF neverdeteriorated but improved in the majority of cases [11]. Consequently, manyauthors have questioned the value of testing the efficacy of FVM before curarisation [1,3,4]. Furthermore, this practice isless and lesssupported by experiencedanaesthetists. Indeed, in an online survey of 136 anaesthetistsworking in hospitals at the Central London School of Anesthesia. Broomhead et all. foundthatonly 57% of anaesthetistsreported checking the effectiveness of VMF before curarisation. [12]. Our study has several limitations. The sample size wassmall. Patients withdifficult intubation and VMF criteriawereexcluded. Our patients weremanuallyventilated and therefore the ETVscollectedcouldbeaffected by leaks [1]. The Han score wasused to assess the effectiveness of VMF. Interpretation of the degree of difficultyis subjective and depends on the operator [2].

5. CONCLUSION

Prior curarisation improves FMV in patients with a predictedeasyairway. Moreover, this practice remainssafe.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

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