Influence of etorphine acepromazine and diprenorphine on respiratory function in ponies

C.J. HILLIDGE & P. LEES*

Department of Physiology, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts AL9 7TA

Although a neuroleptanalgesic drug combination (Large Animal Immobilon: Reckitt & Colman Ltd.) containing etorphine and acepromazine has been used in veterinary medicine for several years, its effects on respiratory function have not been reported in detail. In this study the drug combination was administered i.v. (25 μg/kg etorphine and 100 μg/kg acepromazine) to twelve Welsh Mountain ponies ranging from 185 to 336 kg bodyweight. Arterial blood samples were collected for analysis before and at fixed times after the injection. An antagonist to etorphine, diprenorphine (Revivon; Reckitt and Colman Ltd.), was then administered i.v. at a dose level of 30 μg/kg and further blood samples were obtained.

Respiration was depressed throughout the period of neuroleptanalgesia with the ponies lying in lateral recumbency, as indicated by pronounced reductions in respiratory rate and arterial oxygen tension (P_{O_2}), although arterial carbon dioxide tension (P_{CO_2}) was increased only slightly (Table 1). The decrease in P_{CO_2}) was attributed to the etorphine-induced reduction in respiratory rate, the position of lateral recumbency which produces ventilation/perfusion abnormalities in large species, and the laboured breathing pattern which accompanied the etorphine-induced increase in voluntary muscle tone. In spite of the pronounced hypoxic hypoxia, arterial oxygen content (C_{O_2}) was not reduced significantly and arterial oxygen flux (F_{O_2}) actually increased as a result of compensatory rises in Hb concentration and cardiac output.

Following diprenorphine injection, P_{CO_2} and P_{O_2} returned to near normal levels but C_{O_2} and F_{O_2} fell progressively as a result of a gradual reduction in Hb concentration.

Table 1 Effects of etorphine, acepromazine and diprenorphine on respiratory function

Time (min)	P_{O_2} *(mmHg)*	P_{CO_2} *(mmHg)*	C_{O_2} *(ml/100 ml)*	F_{O_2} *(l/min)*
Control	96 ± 1	44 ± 1	16.1 ± 0.4	2.51 ± 0.25
E + 5	50 ± 2**	51 ± 2**	15.9 ± 0.6	3.64 ± 0.34*
E + 15	51 ± 2**	52 ± 2**	14.9 ± 0.4	3.01 ± 0.20*
E + 30	53 ± 3**	50 ± 2**	14.7 ± 0.6	3.19 ± 0.32**
D + 5	83 ± 4**	45 ± 2	16.0 ± 0.5	3.16 ± 0.49
D + 15	88 ± 3*	46 ± 1	14.5 ± 0.3**	2.54 ± 0.27
D + 30	86 ± 3*	47 ± 1*	13.3 ± 0.3**	2.10 ± 0.27
D + 60	85 ± 3**	46 ± 1	12.7 ± 0.3**	1.89 ± 0.16**

Values are means with s.e. mean for twelve ponies. Times refer to the i.v. administration of etorphine and acepromazine (E) or the i.v. injection of diprenorphine (D). The significance of differences from control values was assessed by paired *t*-tests and is indicated by asterisks: *, $P < 0.05$; **, $P < 0.01$.

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