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PRELIMINARY OBSERVATIONS CONCERNING A METHOD
FOR INTRODUCTION OF A TUBE FOR ANAESTHESIA
IN SMALL DELPHINIDS

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PRELIMINARY OBSERVATIONS CONCERNING A METHOD
FOR INTRODUCTION OF A TUBE FOR ANAESTHESIA
IN SMALL DELPHINIDS

M. RIEU and B. GAUTHERON *

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A technique for passing a tube into the larynx has been described recently by different authors (1) and (2), for the larger Delphinids, such as Tursiops truncatus and Lagenorhynchus obliquidens, but it is apparently impracticable among the other, smaller, species, where the buccal orifice is too narrow to permit the introduction of a hand, in order to separate the larynx from its naso-pharyngeal setting, and to introduce the tube.

METHODS.

We have experimented with two species of small Delphinids : Delphinus delphis and Stenella styx ; the average length being 165 cm., and the average weight 50 kgs. In these species it seems to be possible to pass the probe through the blowhole and to push it directly into the larynx. As a result of this introduction one is enabled to conduct an anaesthesia, in accordance with the acido-basic equilibrium of the blood, and the proportion of PO_2 in the arterial blood ; the blood-samples have been taken at the level of the central caudal artery.

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The probe is composed of a polyethylene tube, slightly bent, of diameter 10 mm. and length 35 cm., chamfered at one end. The artificial ventilation is produced manually with a classical apparatus for anaesthesia, in a halfclosed circuit, comprising a pot of sodium carbonate, a gas-bag, flowmeters to measure the gas output, and a safety valve.

RESULTS

Firstly one applies a local anaesthetic directly to the periphery of the blowhole, then to the interior, at different levels of the respiratory sacs and the nasal folds, by means of a fine metal cannula mounted on a syringe (2 % solution of Xylocaine). After several minutes' delay the tube for anaesthesia is introduced into the orifice, with the concave surface outside. It is pushed through the nasal passages to the front of the laryngeal orifice.

Secondly, some Xylocaine is injected into the tube to produce an effective laryngeal and tracheal anaesthesia, a necessary state if a spasm of the glottis is to be avoided. A few moments later, the tube is given a quarter turn, and at the moment of a respiratory motion, it is pushed past the laryngeal obstacle. On is then able without effort to ventilate the animal in striving to comply with the physiological respiratory cycle (in reality this is an assisted breathing, the animal preserving its natural rhythm). It is possible to proceed with the anaesthesia in a second phase.

Here, as examples, are the reports of two attempts :

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- Observation n° 1 :

Stenella styx * ♀ : 65 kg., measuring 178 cm.

12 hr 15 - Respiratory rhythm : 3/mn

12 hr 30 - Animal placed on the operating table

12 hr 55 - Introduction of tube and manual ventilation

13 hr 20 - I. V. injection into the caudal vein of 25 cg. of penthotal
(5 % solution)

and administration of a respiratory gaseous mixture
containing 70 % N₂O :

- Arrest spontaneous respiratory movements

- Reaction to pinching = 0

- Arrest of blinking of the eyes

- Corneal reflex greatly diminished

13 hr 32 - Returned to ventilation with pure oxygen

13 hr 55 - Reaction to pinching = ++

Recovery of blinking of eyes

Corneal reflexes = +++

Recovery of respiratory movements

13 hr 40 - Removal of tube

Respiratory stoppage for 30 seconds, then return to a
rhythm of 4/mn.

15 hr - Animal in good condition - respiratory rhythm 3/mn.

- Observation n° 2 :

Delphinus delphis ** ♂ : 43 Kg, measuring 148 cm.

* Captured 20/7/1967 in the vicinity of Gibraltar

** Captured 23/7/1967 off Marbella (Spain)

Taking of specimens of arterial blood at the level of the central artery in the tail.

16 hr 02 - Arterial blood taken, the animal being placed on the operating table (respiratory rhythm : 4 movements/mn.)

PO_2 : 90 mmHg ; pH : 7.35 ; PCO_2 : 30 mmHg ;

CO_3H^- : 15 mEq/l ; Lactic acid : 31 mg %

16 hr 15 - Introduction of tube and manual ventilation

16 hr 17 - Arterial blood taken :

PO_2 : 78 mmHg ; pH : 7.40 ; PCO_2 : 24 mmHg ;

CO_3H^- : 14 mEq/l

16 hr 18 - Ventilation in pure oxygen

16 hr 22 - Arterial blood taken :

PO_2 : 113 mmHg ; pH : 7.32 ; PCO_2 : 28 mmHg ;

CO_3H^- : 14 mEq/l

16 hr 34 - An attempt at anaesthetising is made by injecting 30 cg of pentotal in 1 % solution into the caudal vein : the result is an immediate coma with arrest of the respiratory movements and cessation of the corneal reflex and blinking of the eyes ; no response to pinching. Utilisation of a mixture of oxygen and nitrous oxide permitted the prolongation of the anaesthesia.

16 hr 43 - Arterial blood taken :

PO_2 : 93 mmHg ; pH : 7.13 ; PCO_2 : 40 mmHg ;

CO_3H^- : 30 mEq/l

.../...

16 hr 55 - Recovery of the spontaneous respiratory movements, all within 10 seconds

17 hr 05 - Resumption of the original spontaneous respiratory rhythm of 4/mn. Reappearance of the corneal reflex and eye-blinking ; one observes the important response to pinching.

On the other hand, it has been possible to establish the inefficacy of spontaneous respiratory movements in this animal when a tube for anaesthesia is in position and one neglects to give assistance in ventilation : death by asphyxia is rapid, examination of the gas of the blood giving then the following results :

PO_2 : 66 mmHg ; pH : 6.84 ; PCO_2 : 61 mmHg ; CO_3H^- : 11.5 mEq/l

Lactic acid : 66 mg %.

DISCUSSION

This technique for placement of a tube for anaesthesia has been tried with four animals. In three cases it was very successful ; many incidents at the withdrawal of the tube were able to be stopped by an immediate reintroduction. The use of a probe with gasbags permitted a better fit and diminished this source of incidents. In one case there was total failure. In effect, a laryngeal spasm which could not be checked was triggered at the introduction of the probe into the blowhole. This phenomenon was probably caused by the absence of a previous local anaesthesia, the careful practice of which determines, to our mind, the success of the operation.

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CONCLUSION

For anaesthetising small Delphinids where it is difficult to introduce the tube orally, satisfactory preliminary attempts at introduction into the larynx by the naso-pharyngeal passage are reported.

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BIBLIOGRAPHY

1. NAGEL E. L. - MORGANE P. J. - McFARLAND W. L.
Anesthesia for the bottlenose dolphin, Tursiops truncatus.
Science, 1964, 146 : 1591-1593.

 2. RIDGWAY S. H. - Mc CORMICK J. G.
Anesthetization of Porpoises for major surgery.
Science, 1967, 158 : 510-512.

 3. RIDGWAY S. H.
Medical care of Marine Mammals
J. Amer. Vet. Med. Ass., 1965, 147 : 1077-1085.
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