Fagron academy

INDUSTRY EDUCATION

The Evolution of Wildlife Veterinary Anesthesia

January 16, 2024

Dr. Liesel Laubscher

Introduction:

The inception of veterinary anesthesia dates back to 1836, when Dr. William Sewell of the Royal Veterinary College in London administered curare, a South American arrow poison, to a donkey—a landmark moment in veterinary history. While the donkey survived with intra-tracheal artificial ventilation, subsequent trials in horses revealed the limitations of curare. This led to further exploration, including experiments with inhalation anesthesia in horses and the successful use of intravenously administered anesthetic medicines like chloral hydrate in domestic animals from the 1870s to the 1950s.

The "Paralytic Era" and Wildlife Medicine:

However, the application of inhalation or intravenous anesthesia in wildlife posed practical challenges due to the inability to approach animals and administer medication as with domestic animals. However, the invention of the modern dart gun in 1959 by New Zealander, Collin Murdoch, created a solution to this problem by allowing the administration of medicines from a distance. It was during this period that what is often referred to as the "paralyticera" in wildlife medicine began. Muscle relaxants like succinylcholine and gallamine were studied and used in wildlife, providing effective handling capabilities through paralysis following intramuscular administration. Despite these advancements, concerns arose regarding the adverse effects of induced paralysis without unconsciousness which often led to high animal mortalities, not to mention the concern for animal welfare.

The Pioneering Work of Dr. Toni Harthoorn and Ian Player:

In response to the challenges faced during the "paralytic era," renowned veterinarian Dr. Toni Harthoorn and conservationist Ian Player initiated groundbreaking work in wildlife anesthesia. Dr. Harthoorn's seminal textbook, "The Chemical Capture of Animals," laid the groundwork for pharmaceutical product development in this specialized field. This foundational work emphasized several key attributes essential for an ideal wildlife immobilizing medicine:

1. Wide Margin of Safety: Given the challenge of accurately estimating wild animal weights, a wide margin of safety is crucial to prevent overdosing.
2. Suitability for Diverse Species: The medicine must be versatile and effective across a wide range of wildlife species.
3. Water Solubility: The active ingredient should be water-soluble, allowing administration in solution via projectile dart.
4. High Concentration Formulation: Formulation in high concentrations is vital, considering the limited injection volume achievable with standard dart sizes.
5. Minimal Tissue Irritation: As administration is intramuscular, the medicine should cause minimal skin and tissue irritation.
6. Rapid Onset of Action: Quick onset is essential to immobilize wildlife rapidly, considering their ability to cover long distances shortly after darting.
7. Complete Antagonizability: The medicine should be completely antagonizable with an antidote, ensuring no lingering sedative effects that could compromise the animal's safety in the field.

Opioids Enter the Scene:

In 1960,Reckitt & Sons introduced M99 and M183—potent opioids investigated for their analgesic and anesthetic properties. Dr. Harthoorn imported both opioids into South Africa in 1963 for research. M183 was essentially the acetylated form of M99 but its potency was significantly less than that ofM99 and it only proved useful in specific scenarios, such as when animals needed to remain on their feet or were in poor condition. Despite the discontinuation of M183, research on M99persisted. It soon gained prominence due to its potency and water solubility, enabling its use in small volumes. Originally, stable aqueous solutions containing 4-5 mg/ml of the powdered base were prepared and later, DMSO(dimethyl sulphoxide) was used to prepare solutions containing 10 mg/ml or more. DMSO is a solvent that penetrates intact skin and can carry opioids across the skin barrier, making these products extremely dangerous to handle. Dr. Harthoorn and his team went on to explore etorphine's use in combination with tranquilizers and sedatives, mitigating the initial excitement that often resulted from the opioids and enhancing recovery from anesthesia by providing a tranquilized plane into which the animal was raised when the etorphine was antagonized.

Thiafentanil – a newer generation potent opioid:

In the early 1990s, Dr. Don Janssen and Prof. Gerry Swan investigated thiafentanil as a newer generation of potent opioid for wildlife anesthesia. Synthesized by Dr.William Lance from Wildlife Pharmaceuticals Inc. in the USA, thiafentanil boasted twice the potency of etorphine, resulting in quicker inductions, shorter duration of action, and synergistic effects when combined with etorphine or other sedatives and tranquilizers. However, it was only available as a compounded product in the USA which limited its availability to other countries.

The birth of Wildlife Pharmaceuticals South Africa:

In 1997,Wildlife Pharmaceuticals in South Africa was started as a distributor for Wildlife Pharmaceuticals Inc. Its founder, Dr. Cobus Raath, a former head veterinarian in the Kruger National Park, recognized the shortage of wildlife immobilizing medicines at the time. Dr. Raath aimed to make thiafentanil more readily available and sought to develop a route of synthesis for etorphine as well as its formulation in a high concentration without the use of DMSO. Collaborating with locally renowned chemist Dr. Johan Koekemoer, they achieved a

breakthrough in 2006 with the registration of Captivon 98 (9,8mg/ml etorphine HCl) and its antagonist Activon (12 mg/ml diprenorphine HCl). This marked a significant leap in revolutionizing wildlife immobilization and expanding the availability of potent opioids for wildlife veterinary practitioners globally. In2009, Dr. Raath registered the company's second flagship product, Thianil (10mg/ml thiafentanil oxalate) and its antagonist, Trexonil (50 mg/ml naltrexoneHCl).

Continued Innovation and Growth:

Since then, Wildlife Pharmaceuticals has evolved into a fully independent company, comprising three distinct sections. It boasts a fully equipped active pharmaceutical ingredient (API) manufacturing facility, capable of developing and improving synthetic routes. Additionally, a GMP-accredited sterile filling facility caters to small-batch manufacturing of specialized medicines, especially tailored for niche markets such as wildlife. The company also houses an in-house regulatory affairs department and sales pharmacy, responsible for registered product life cycle management, local sales, and exports. Dr. Raath has ensured robust support from a dedicated research and development team, focusing on both molecular and clinical research. The company's product portfolio continues to expand, with several registration dossiers currently under review. In 2023, Wildlife Pharmaceuticals joined the global Fagron family and their journey from historical milestones to contemporary innovations continues to grow and expand.

For further information or questions, please feel free to reach out to us by heading to www.fagronacademy.us!