

METHODS OF TUBE-FEEDING, FORCE-FEEDING, AND ASSIST-FEEDING REPTILES

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Anorexia is a symptom rather than a disease. All reptile patients requiring force-feeding should undergo appropriate diagnostic investigations and treatments of the underlying cause of anorexia. It is beyond the scope of this paper to discuss the relative merits of various force-feeding formulations, other than to suggest that diets should approximate the natural diet of the species being treated as much as possible. It is also beyond the scope of this paper to present a comprehensive discussion of anesthetic techniques and dosages, and the reader is referred to the reference list and other papers in these proceedings for more details.

One of the main factors to consider when choosing a method of force-feeding is minimizing stress to the patient. The more a patient is stressed, the less likely it will begin feeding voluntarily. There are three main methods of force-feeding. The most familiar is tube-feeding, which involves passing a tube down the throat and administering a liquid diet. A second method is force-feeding, in which whole food items are pushed down the throat until they are swallowed. The final method is assist-feeding, or hand-feeding. With this method food items are placed in the mouth gently until the patient swallows voluntarily. Assist-feeding is the least stressful, and should be used when the reptile still has enough strength and some desire to eat. Tube-feeding is mildly stressful but can be done without sedation in many cases. Force-feeding whole items is very stressful and often requires sedation of the patient.

Snakes

Tube-feeding a snake is a straight forward procedure. The tube should be flexible and should reach the stomach which is normally about halfway back from the head. Red rubber feeding tubes (Sovereign, Monoject Division of Sherwood Medical, St. Louis, Missouri 63103) are commonly used. Rigid tubes, such as ball-tipped stainless steel feeding and dosing needles (Ejay International, Inc., Glendora, California 91740) and so called pinkie pumps - a device that injects a prekilled pink mouse through a large-bore rigid feeding needle, somewhat liquefying it in the process - (various reptile wholesale dealers) should be used only with caution and adequate restraint or sedation, as the esophagus is thin-walled and easily perforated. Also, rigid tubes usually do not reach the stomach, and food deposited in the cranial esophagus is easily regurgitated. The tube should be well lubricated with water soluble lubricating jelly and introduced into the opening from which the tongue is protruding at the front of the mouth. Rarely is it necessary to use an oral speculum, but

if one is used, a rubber kitchen spatula is recommended. Alternatively, a piece of radiograph film, plastic card, wooden applicator stick or, in small specimens, a toothpick may be used. Rigid speculums should be avoided. If the snake's neck is held in one hand with the thumb of that hand extended along the lower jaw just ventral to the mouth, gentle downward pressure with the thumb will part the lips enough to allow verification that the tube was not inadvertently passed down the trachea. The snake must be gently but firmly restrained in a straight position as the tube is passed. Care must be taken to avoid damaging the delicate gingival tissues. Because tube-feeding is easily accomplished, the indications for a pharyngostomy tube are rare. Never the less, a pharyngostomy tube could be used in cases of trauma or infection where manipulation of the oral cavity must be avoided. Their use is described under chelonians below.

The force-feeding of prekilled whole prey items provides more natural nutrients and results in more formed stools than does tube-feeding. Likewise, healthy, wild-caught snakes which are anorexic because they have not yet acclimated to captivity begin voluntary acceptance of food sooner when force-fed by this method compared to tube-feeding. Injectable anesthesia is required to prevent stress and potential damage to the delicate snake esophagus. A prekilled rodent of appropriate size - somewhat narrower than the widest portion of the snake - is prepared by clipping off the incisor teeth to prevent throat lacerations in the snake. It then is lubricated with vegetable oil or water soluble lubricating jelly. The nose of the rodent is introduced into the snake's mouth and it is gently worked down the snake's throat. The rodent should be gripped with forceps caudal to the shoulder in such a manner that if the forceps slip, they push medial to the rodent's scapulae and not against the snake's esophagus. Once the rodent's pelvis is caudal to the mandibles of the snake, it may be worked further down the throat by the application of gentle pressure ventrally, sort of like squeezing toothpaste from a tube. Once the rodent reaches the mid body of the snake, the snake is allowed to recover in an incubator in the hospital over night before being discharged. Most healthy anorexic snakes will accept food after one or two force-feedings.

Newborn snakes born in captivity sometimes refuse food, although it is normal for them not to eat until they have shed for the first time 1-2 wk after birth. When anorexia continues after the first shed, assist-feeding is recommended. An appropriate sized, prekilled food item is gently worked into the back of the snake's mouth. The handler then relaxes his grip and holds very still. Usually this will induce a swallowing response. Once the item is swallowed, the snake is gently returned to his cage. Newborn pink mice are appropriate for hatchling corn and kingsnakes, but a severed tail from a dead adult mouse may be assist-fed to a baby snake as small as 5-6 g, such as a sand boa, Solomon Island boa, or milksnake. This method is frequently unsuccessful in wild-caught adult snakes, which regurgitate the food due to the stress of being manipulated.

Lizards

Tube-feeding in lizards requires methods similar to those used in snakes. A feeding tube of appropriate length to reach the stomach, which is located halfway between the front and rear legs, is required. Large lizards can bite down with more force than a snake, so a rigid speculum may be necessary to prevent occlusion of the tube. In smaller lizards, ball-tipped stainless steel feeding

needles may be used. Most reptiles have pleurodont teeth which are regularly replaced so, if a tooth is inadvertently broken on a rigid speculum or tube, it is of no consequence. Exceptions to this rule are the agamid (old world insectivorous lizards) and chameleon families which have acrodont teeth that are not replaced. More caution must be used to avoid breaking teeth when tube-feeding members of these two families. Tubes must be well lubricated. Adequate, nonstressful restraint is mandatory. Large, dangerous and aggressive lizards might be sedated to accomplish tube-feeding in a manner that is safe for the patient and the handler. As is the case for snakes, the ease of tube-feeding lizards means that pharyngostomy tubes are rarely indicated. They occasionally may be of use in cases of trauma or infection and are discussed under chelonians below.

Force-feeding and assist-feeding techniques in lizards overlap somewhat and will be discussed together. It is easy to place food in the large oral cavity of lizards. Candidates for this technique must be chosen with care, as weak and debilitated individuals often fail to swallow and have a high risk of aspiration. Those patients should be fed by tube. Other lizards may be anorexic but still are strong with swallowing reflexes, and these may be force- or assist-fed. The mouth of a lizard should be opened with the least amount of force necessary to prevent stress and damage to the gingiva and teeth. In most cases a toothpick or wooden applicator stick is effective and atraumatic. The stick may be placed against the front of the mouth and inserted with a rolling motion. Placing the thumb against the side of the lower jaw and applying gentle downward pressure, applying gentle pressure against the ventral throat, or pulling gently on the dewlap are other ways of opening the mouth enough to introduce a speculum or food item.

Insectivorous lizards may be force fed using a 1 ml syringe with the hub cut off. Crickets are euthanized by crushing their heads with forceps, after which the jumping legs are removed. The bodies are loaded into the barrel of the syringe and they are injected into the oral cavity of the lizard. A single cricket may be force-fed by crushing its head with forceps, impaling it on a toothpick, and inserting the cricket and toothpick into the lizard's oral cavity. The toothpick is then withdrawn from the side of the lizard's mouth, dislodging the cricket in the process. Small lizards may be assist-fed by crushing the head of a wax worm and squeezing the body fluids out onto the lizard's lips. All but the most debilitated lizards lap up these juices. Tiny lizards may be force-fed viscous liquids, whether medication or food, using a toothpick. The end of the toothpick will hold a fraction of a drop, and is used as a dropper to dose the lizard. Otherwise healthy lizards which are reluctant feeders may be hand-fed with the insect in a pair of forceps. The insect can be moved to stimulate a feeding response. Hand feeding also allows close monitoring of the amount consumed, and is useful when several lizards share a cage.

Chelonians

Turtles and tortoises are among the most difficult reptiles to force-feed because of the difficulty in extracting the head from the shell and restraining it. This is easily accomplished in small patients under 500 g, tame individuals, or weak and moribund larger chelonians. However, large, strong, or shy chelonians generally require chemical restraint. In either case, the head is grasped behind the angle of the mandibles, and the mouth is forced open. Aggressive turtles readily open their mouths

as they attempt to bite. In small, nonaggressive turtles the mouth may be opened with a toothpick. Larger specimens require larger speculums, such as a wooden applicator stick or parrot beak speculum. Because of the strength of the jaws, a rigid speculum or ball-tipped stainless steel feeding needle is necessary to prevent occlusion of the tube in large chelonians. In stubborn patients, a dental pick may be necessary to force the jaws apart. Extreme caution must be used not to force the sharp end of the pick into the occlusal face of the jaws, which are vascular and bleed copiously. The stomach tube should be well lubricated and premeasured to reach the stomach at the level of the middle of the shell.

Chelonians which require both long term force-feeding and sedation to accomplish it benefit from a pharyngostomy or esophagostomy tube. Likewise, owners who are force-feeding a turtle or tortoise at home will be able to use a pharyngostomy tube more readily than passing a stomach tube frequently. Under appropriate anesthesia and aseptic conditions, a curved hemostat or carmalt clamp is inserted into the oral cavity and tented against the wall of the neck caudolateral to the mandible and hyoid apparatus. A stab incision is made over the hemostat. This incision should be as far caudally as possible to prevent tube movement as the turtle extends and withdraws its head, especially in long-necked, side-necked turtles. A premeasured red rubber feeding tube is inserted through the incision, down the throat, to a level just beyond the cardia of the stomach. A pursestring suture is placed in the skin around the tube. The tube may be anchored to the skin using an adhesive tape anchor sutured to the skin, or using a Chinese finger trap suture pattern. The end of the tube is capped and taped to the carapace. The tube is flushed with water and capped after each feeding. The tube may be used even with the head fully retracted into the shell. Broad spectrum antibiotics are recommended for the first 2-3 wk a tube is in place. Normally a fistula forms around the tube, allowing it to be left in place 6 mo or longer. After removal of the tube, the stoma normally closes on its own. Occasionally, surgical repair of the fistula is necessary.

Small chelonians may be force- or assist-fed in the same manner as lizards. Weak and moribund patients at risk of aspiration should be fed by tube rather than by this method. Food items skewered on a toothpick may be placed into the mouth of small chelonians. Alternatively, food items may be introduced with a forceps or syringe, as described under lizards above.

Crocodilians

Methods and principles of force-feeding described under snakes, lizards, and chelonians above are for the most part applicable to crocodilians. Anatomical peculiarities of this group include strong jaws and sharp teeth, necessitating good restraint during handling. Sedation of large and dangerous specimens is recommended for safe handling. Likewise, rigid stainless steel feeding catheters or oral speculums are recommended to prevent biting down on the feeding tube. Crocodilians have thecodont teeth which are regularly replaced, so breaking a tooth during manipulation results in no long term defects. Folds of tissue form flaps which seal off the caudal buccal cavity, allowing crocodilians to open their mouths under water without water pouring down their throats. The ventral flap must be depressed to allow introduction of a feeding tube down the esophagus.

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