

Yohimbine (alpha 2-antagonistic reversal agent) Effect on Return to Sensibility in Anesthetized Sows

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Summary and Implications

Swine may be anesthetized in order to complete routine production procedures or surgical operations. Swine are difficult to restrain, effectively anesthetize, and their response and reaction to anesthesia can vary substantially. The objective of this study was to determine if Y is an effective anesthetic reversal agent in mature sows. Twelve, clinically normal, mixed-parity, crossbred sows were purchased from a commercial producer in Iowa and housed in individual pens at Iowa State University. Anesthesia was induced with xylazine, ketamine and telazol injected intramuscularly. Following a twenty minute stabilization period, sows' palpebral reflex was evaluated, and if absent were injected with sterile saline (S; n=12) or yohimbine HCl (Y; n=12) at 0.1 mg/kg. Sensibility trait scores (palpebral reflex, jaw tone, nose prick, alertness to human approach test (HAT), and sow body position) were collected every 10-mins until each sow attained sensibility. Data were analyzed using the PROC MIXED procedure in SAS[®]. A P value of ≤ 0.05 was considered to be significant. There were no ($P>0.05$) differences between the times saline and yohimbine treatments were administered (average 24 min post anesthesia administration). Yohimbine treated sows recovered 172 minutes earlier ($P=0.002$) than S treated sows. Return to sensibility (score 0) for all measures were quicker ($P<0.003$) for Y treated sows compared to S treated sows. In conclusion, yohimbine is an effective reversal agent in sows anesthetized with xylazine, ketamine and telazol. This agent may be a tool used by veterinarians and researchers to ensure that sows have a quicker recovery from anesthesia with minimal complications.

Introduction

Swine may be anesthetized in order to complete routine production procedures or surgical operations. Swine are difficult to restrain, effectively anesthetize, and their response and reaction to anesthesia can vary substantially. Very little research has been conducted to outline proper anesthetic methods for use in swine in order to reduce complications during anesthesia and ensure an appropriate

recovery. Yohimbine (Y) is an alpha 2 adrenoreceptor antagonist that has been reported to be effective in reversing xylazine effects in nursery age swine and other food producing animals. Yohimbine has been reported to have stimulatory effects on cats sedated with ketamine, resulting in decreased recumbency time. No peer reviewed studies have evaluated Y efficacy as a reversal agent for anesthetized mature pigs. The objective of this study was to determine if Y is an effective anesthetic reversal agent in mature sows.

Materials and Methods

Treatments and Experimental design: Sows were blocked by BW and randomly allocated to one of two treatments. Treatments were as follows; Treatment One: Control (S): Sterile saline (0.1mg/kg) administered intramuscularly (IM) into the neck muscles (n=6). Treatment Two: Yohimbine (Y): Yohimbine HCl (0.1mg/kg) administered IM into the neck muscle (n=6). A 10 day washout period was allowed between treatments to avoid possible residual drug effects.

Animals and housing: Twelve healthy, multiparous, non-pregnant, Newsham sows, BW 233.6 (± 18.7) kg, were used. Sows were determined to be healthy based on physical examination which included chest and heart auscultation, rectal temperature, reproductive tract ultrasonography, and physical evaluation for disease. These sows were handled daily for research projects and were familiar with their environment and caretakers. The laboratory was located at Iowa State University, College of Veterinary Medicine, Ames, IA. To avoid confounding injury due to aggression, each sow was housed in an individual pen. Sows were provided *ad libitum* access to water via one nipple drinker. Sows were fed twice daily with a custom mixed diet composed of corn, soybean meal and soy hulls, designed to meet or exceed nutrient requirements for sows. Matrix was added to one kg of diet daily to prevent estrus cycle initiation.

Anesthesia: Sows were anesthetized using the following combination of anesthetic agents at the dosage indicated: Xylazine (4.4mg/kg), ketamine HCl (2.2mg/kg), and tiletamine HCl and zolazepam HCl (4.4mg/kg) used in combination (telazol[®]). Ten minutes after anesthesia onset, sows were placed in lateral recumbency and not moved unless their conformational position might have compromised their respiratory capability. Twenty minutes after anesthesia onset, sows were evaluated for a palpebral reflex. This was determined by placing a finger on the medial canthus of the accessible eye and gently running a

finger along the eyelashes. The presence or absence of the palpebral reflex was determined by attempting to elicit a blink response with three successive attempts. If absent, one of the two treatments was administered to the sow by the on-site veterinarian. If a palpebral reflex was present, the sow was monitored every 10 min until the palpebral reflex was absent and treatment was administered.

Measures: Sensibility measures were collected to determine anesthesia depth throughout the recovery process. Sensibility trait scores were measured immediately before anesthesia administration (Baseline) and every 10 minutes after anesthesia onset until sows reached a 0 sensibility score (Recovery). Sensibility measures collected included: human approach test (HAT), sow body posture, palpebral reflex, jaw tone, and nose prick. Each measure was scored on a 0 to 2 scale, with a score 2 representing no response, score 1 representing diminished response, and score 0 representing a normal response.

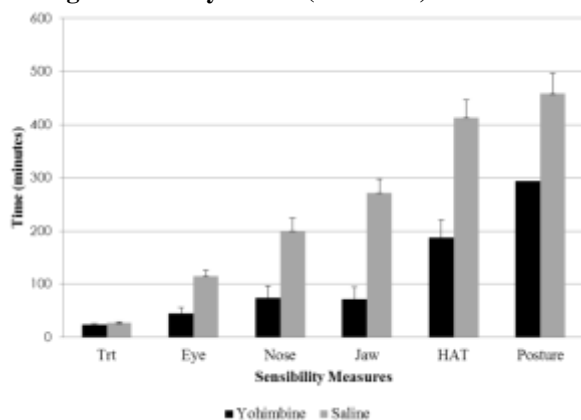
Statistical analysis

Data were analyzed using the PROC MIXED procedure in SAS for parametric data. The main effects of day, weight, treatment, time, time*treatment interaction and day*treatment interactions were compared. Weight was not significant and was removed. A P value of ≤ 0.05 was considered significant.

Results and Discussion

There were no ($P > 0.05$) differences between the times saline and yohimbine treatments were administered (average 24 min post anesthesia administration). Yohimbine treated sows recovered 172 minutes earlier ($P = 0.002$) than S treated sows. Return to sensibility (score 0) for all measures were quicker ($P < 0.003$) for Y treated sows compared to S treated sows (Figure 1).

Figure 1. Sensibility trait least squares means (\pm SD) for anesthetized sows that were administered Y or saline to mitigate recovery effects ($P < 0.003$).



In conclusion, Y is an effective reversal agent in healthy sows with overall anesthetic recovery time reduced. This agent may be a tool used by veterinarians and researchers to ensure that sows have a quicker recovery from anesthesia with minimal complications.

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