COLIC: When should I refer and what is the prognosis?

Frank M. Andrews, DVM, MS, Diplomate ACVIM
LVMA Equine Committee Professor and Head
Director, Equine Health Studies Program
Department of Veterinary Clinical Sciences
School of Veterinary Medicine
Louisiana State University
Baton Rouge, LA

Email: fandrews@lsu.edu

INTRODUCTION

Deciding when to refer a horse with colic can be a difficult decision and involves careful evaluation of clinical and laboratory parameters, surgical considerations, probability of survival, and other considerations that include worsening of clinical condition, unresolved pain, or to obtain a second opinion. The decision to refer also involves the willingness of the client to transport the horse and financial constraints, as referral can be a substantial economic investment for the client.

The most common reason for a veterinarian to refer a horse with colic is the presence of a surgical lesion. Certain clinical and laboratory parameters are important in making this decision. However, the other obligation that the referral veterinarian has is to determine if the horse has a reasonable probability of survival if transported. A careful and thorough examination of the horse and selected laboratory parameters can give the veterinarian important information regarding whether the horse should be referred for surgery and what are the chances that that horse will survive. This presentation is based on the following references (see end of page 3).

CLINICAL AND LABORATORY PARAMETERS (NOTES)

MAKING A DECISION TO REFER FOR SURGERY

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CLINICAL COLIC CASES: UTILIZING A SPREADSHEET TO MAKE DECISIONS

Surgery Model		
FOR DATA ENTRY HELP HIT <pg dn=""></pg>		
Variables	Enter Data	
Age in years	13	
Sex	g	
Breed	STB	
Rectal	2	
Frequency of pain	3	
Peripheral pulse	1	
Frequency of abdominal sounds	1	
Prevalence of surgery (%) =	20	
Likelihood ratio for surgery =	8.79	
Post-test odds surgery =	2.20	
Post-test probability surgery =	0.69	
DATA CODING INFORMATION - SURGERY MODEL		
AGE: Enter age in years		
SEX: Type "S" for stallion, "G" for gelding or "F" for female		
BREED: Type "Arab" for Arabian = 1		
"App" for Appaloosa = 2		
"AmSB" for American Saddlebred = 3		
"Morg" for Morgan = 4		
"Qtr" for Quarterhorse = 5		
"STB" for Standardbred = 6		
"TB" for Thoroughbred = 7		
"Other" for any other breed = 8		
RECTAL EXAM: Normal= 1, Abnormal= 2		
FREQ PAIN: Absent= 1, Intermittent= 2, Continuous= 3		
PERIPHERAL PULSE STRENGTH: Normal= 0, Weak= 1		
FREQ ABDOMINAL SOUNDS: Normal= 1, Increased= 2, Decreased= 3, Absent= 4		
Prognosis Model		

Age in years 12 Sex S Breed Q Peripheral pulse strength 11 Heart rate beats/min 50 Surgical or medical treatment? med Packed cell volume % 58 Self-inflicted trauma 0 0 Capillary refill time /sec 3.0 Prevalence of death (%) 55 Likelihood ratio for death 1.67 Post-test odds of death 0.09 Post-test probability of death 0.08 DATA CODING INFORMATION - PROGNOSIS MODEL AGE: Enter age in years 5EX: Type "S" for stallion, "G" for gelding or "F" for female 5EX: Type "S" for Stallion, "G" for gelding or "F" for female 5EX: Type "Arab" for Arabian = 1 "App" for Appaloosa = 2 "AmSB" for American Saddlebred = 3 "Morg" for Morgan = 4 "Qtr" for Quarterhorse = 5 "STB" for Standardbred = 6 "TB" for Thoroughbred = 7 "Other" for any other breed = 8 PERIPHERAL PULSE STRENGTH: normal= 0, weak= 1 TREATMENT?: Type "med" for medical or "surg" for surgical 5ELF-INFLICTED TRAUMA: absent= 0, present= 1	FOR DATA ENTRY HELP HIT <pg dn=""></pg>			
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REFERENCES:

- 1. Reeves MJ, Curtis CR, Salman MD, et al. A multivariable prognostic model for equine colic patients. Prev Vet Med 9:241-257, 1990.
- 2. Reeves MJ, Curtis CR, Salman MD, et al. Multivariable prediction model for the need for surgery in horses with colic. Am J Vet Res 52(11): 1903-1907, 1991.
- 3. Van der Linden, MA, Laffont CM, and van Oldruitenborgh-Oosterbaan, MMS. Prognosis in equine medical and surgical colic. J Vet Intern Med 17:343-348, 2003.
- 4. White NA. Equine Colic: How to make the decision for surgery. In Proceedings: AAEP Focus Equine Colic. Quebec City, Canada. 2005, 119-128.