How to Help Your Client with Their Horse Following Colic Surgery: Expectations, Potential Complications, and Ongoing Care

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1. Introduction

It is critical for the client to develop an understanding of the short-term and long-term complications that may affect a horse that has just been through colic surgery in order to optimize management. An understanding of the owner’s expectation for return to performance is also crucial. For example, if the expectation is to save the horse’s life, this makes some complications such as incisional hernias a less pressing concern, and even low-level chronic laminitis can be managed. However, these same complications are highly problematic and impede long-term success in horses intended to return to athletic performance. These factors can be discussed with the owner in the immediate post-operative period.

2. Referral Time

The greatest opportunity for maximizing success and reducing complications is at the time of referral, meaning that horses referred early in the disease process will likely have less intestinal injury, faster and less intricate surgeries, and a more rapid recovery in the post-operative period. The universal problem most colic surgeons have to deal with is duration of colic. Studies have shown that even the most fatal forms of colic, such as large colon volvulus, can have a remarkably positive long-term outcome if they are referred rapidly. The aforementioned study is from a referral area that is unique in the United States (Lexington, KY), in that the value of the horses, the quality of the management, and the proximity to the referral hospital appears to reduce referral time down to a minimum. In other studies, the prognosis for large colon volvulus is notably lower, largely because of referral time. Therefore, equine veterinarians have to continue to work on early referral with their clients to improve long-term results. Because the current state of colic surgical management is rapid, technically proficient, and highly successful, the short-term survival rate (discharge from the hospital) is progressively increasing into the range of 75% or above, even with severe conditions like small intestinal strangulating obstruction. However, long-term survival continues to be more problematic, particularly in horses recovering from small intestinal surgery, because of complications such as adhesions.

3. Colic Surgery

To understand long-term management of horses following colic surgery, some understanding of what transpires within surgery is important. Once a
hernia. Infection rates tend to be up to 20% at most surgical hospitals, but should be monitored closely to make sure the prevalence is not increasing. An additional factor that likely has a role in incisional complications is trauma to the incision itself, which also relates to time and technical proficiency of the surgical team.

4. Post-Operative Complications
The initial objective following surgery is a satisfactory recovery from anesthesia. Although catastrophic injuries during anesthetic recovery, particularly fractures, have become more uncommon with advances in anesthetic techniques, nonetheless, colic patients that present with systemic compromise are at increased risk of complications, particularly following a long surgery for procedures such as a resection. Beyond anesthetic recovery, there are three major life-threatening complications of colic surgery that should be discussed with owners. First, assuming the horse recovers well from anesthesia, there is management of shock states (hypovolemia and endotoxemia [sepsis or systemic inflammatory response syndrome]). This includes optimal fluid and electrolyte administration, judicious use of non-steroidal anti-inflammatory drugs (NSAIDs), use of pain medications to optimize recovery, and use of collodion or plasma as needed to maintain oncotic pressure. Medications to specifically target endotoxemia, such as polymyxin B (5,000 u/Kg, IV),7 may be helpful, but remain largely unproven by clinical trials.8 The next phase of post-operative management tends to be post-operative ileus (POI). There is reasonably good evidence that early return to feeding reduces POI.9 Aside from this principal, for horses that do develop POI, current treatment includes continued use of anti-inflammatory drugs and intravenous (IV) lidocaine.10 Studies have shown that COX-2 inhibitors may be more beneficial than non-selective NSAIDs because they are capable of managing pain without inhibiting intestinal repair.11,12 Interestingly, concurrent use of IV lidocaine (1.3 mg/kg loading dose, 0.05 mg/mL controlled rate infusion [CRI]) also improves intestinal repair.13 There has also been one clinical trial showing that IV lidocaine reduced the length of time of POI and amount of reflux,14 but more rigorous clinical trials are needed to discern the utility of IV lidocaine. The latter phase of post-operative management in the hospital tends to relate to adhesion formation, particularly in patients treated for small intestinal obstruction. Development of adhesions are thought to be clinically evident based on recurrent episodes of colic in at-risk patients.15 One intra-operative treatment that is believed to reduce onset of adhesions, based in a reduction in incidence of post-operative colic in patients following small intestinal surgery, is carboxymethylcellulose,15 which can be used during surgery and following lavage of the abdomen with sterile saline in volumes of 500 mL to 1 L. In addition, post-operative peritoneal lavage and drainage has been found to mitigate adhesion formation in an experimental setting,16 and can be used clinically by infusing ~10 L balanced polyionic fluids into an abdominal drain, and retrieving these fluids after allowing approximately 20 minutes of time within the abdomen. There are also other post-operative complications that occur less frequently, including laminitis, which can be devastating. A relatively recent advance in treatment of laminitis has been the use of digital cryotherapy (continuous icing of the feet) in any horse at risk of laminitis,17 and this may improve long-term results. Importantly, a great deal of attention should also be paid to the midline incision. Incisional infection remains a relatively common post-operative complication, and in some cases is associated with hernia formation. Incisional infections are resolved by early removal of skin staples or sutures to allow for drainage, and lavage of the incision. Horses may continue to have clinical evidence of an incisional infection at the time of discharge, which will need to be attended to by the referring veterinarian. The incision will need to be carefully probed to determine the extent of infection, including whether or not the sutures within the linea alba are prematurely breaking down. If there is a concern that a hernia may develop, commercial hernia belts are recommended to reduce tension on the linea alba. Once a hernia has formed, it can be monitored ultrasonographically and decisions can be made as to whether to ultimately perform herniorrhaphy. Unfortunately, the best time to take these horses back to surgery is after the incision has healed to the greatest extent possible, forming a sufficient thickness of fibrous tissue to optimize the repair, at approximately 6 months following surgery. This can be very difficult for owners to understand, and can require a lot of additional communication between the veterinarian, surgeon, and owner.
5. What is the Expectation for Long-Term Outcome?
An understanding of the owner's expectations can make a big difference in how to define long-term outcome. For example, if the expectation is solely to save the horse's life, then considerations over incisional hernias or other long-term management problems such as laminitis can be more readily reconciled within the owner's expectations. Long-term analyses based on the type of lesion a horse has had can also be discussed to make sure expectations are realistic. For example, once a horse has been discharged from the hospital, the long-term prognosis is lower for horses with small intestinal strangulation obstruction as compared to other forms of obstruction. The principal reason for this appears to be recurrent colic, most likely associated with adhesions. When advising owners, it is helpful for them to know that if a horse is going to have problems with adhesions, it is typically within 3 months of surgery. Unfortunately, colic that requires a second surgery because of adhesions carries a fair-to-guarded prognosis. 

If owners expect a return to athletic performance, management of long-term complications becomes that much more critical, and complications such as incisional hernia may require an additional surgery to enable athletic performance. Other surgical interventions that can potentially be performed to reduce repeat colic that might require surgery are ablation of the nephroplesic space in horses with repeat episodes of left dorsal displacement, and colopectomy in horses with repeat episodes of large colon volvulus. The latter tends to preclude athletic performance because of colic associated with adhesion of the colon to the ventral body wall, but is particularly useful in broodmares that are at greatest risk of large colon volvulus. Resection of the colon is an alternative consideration to colopectomy, allowing return to athletic performance. Larger studies to improve understanding of long-term outcome are needed, and beginning to be performed.

6. Helping Owners Return Their Horse to Performance
Return to intended use and performance following colic surgery is of major concern to horse owners. The potential for return to performance in an equine athlete is typically weighed against the cost of surgery, intensive post-operative care, and prolonged convalescence. In one published study on return to performance following colic surgery, 76% of horses discharged from the hospital had at least reached their pre-operative level of performance within 1 year. Another study on Thoroughbred racehorses showed that 69% of horses taken to surgery for colic returned to racing within 6 months. This illustrates how long it can take to fully rehabilitate a horse following colic surgery. Current recommendations are to stall rest horses following discharge from the hospital for colic surgery for 1 month, followed by 1 month of small paddock turnout, and a gradual return to exercise in the third month following colic surgery. This time frame approximately parallels the healing of the midline incision, which will have reached original strength in 8 weeks in the absence of any complications such as infection or repeat laparotomy. From this perspective owners can expect to be riding their horses at a reduced but escalating level after 2 months, with most sport horses attaining full athletic potential within 12 months, depending upon the discipline and extent of surgery. However, more recent studies on rehabilitation of horses with midline incisions suggest that practitioners could be advising clients differently in order to return to performance more rapidly. In particular, a recent study showed that having clients work with their horses in a controlled fashion in the post-operative period to reduce loss of muscle strength reduced the time to return to full performance, and resulted in more horses attaining a higher level of performance following colic surgery.

7. Conclusions
Preparing a client for the post-operative period following colic surgery includes an understanding of short- and long-term complications. Once a horse has been discharged, the veterinarian should have the client focus on any instances of recurrent colic and the appearance of the incision. A good working knowledge of post-operative complications that occurred during hospitalization is important to be able to guide the client following hospital discharge. Finally, the post-operative exercise program should be carefully controlled to allow time for the midline incision to heal, but can be modified to reduce loss of muscle tone in order to increase the chances of earlier return to performance. Attention to feeding for optimal retention and strengthening of muscle mass is also an important component of post-operative rehabilitation.

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Declaration of Ethics
The Author has adhered to the Principles of Veterinary Medical Ethics of the AVMA.

Conflict of Interest
The Author has no conflicts of interest.

References