MINIMALLY INVASIVE ORTHOPEDIC SURGERY: IS IT BETTER?
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Key points
- Minimally invasive orthopedic surgery is performed by equine surgeons to improve outcomes, reduce wound morbidity, recovery time and complication rates.
- The horse is well suited to minimally invasive orthopedic techniques due to a lack of soft tissue covering the distal limbs.
- Evidence that minimally invasive orthopedic surgery is better than traditional open techniques in horses is limited, and will require performing controlled, randomized clinical trials to compare specific procedures.

Equine surgeons have typically embraced minimally invasive surgery, particularly for orthopedic procedures. Recognition of the benefits of arthroscopic surgery in the horse soon after its introduction in humans is typical of the early adoption and development of minimally invasive approaches by equine surgeons. The vast majority of joint procedures in horses are now performed arthroscopically. When asking the question of whether minimally invasive surgery is better, the logical response is, better than what? Another logical question has to be answered before we can decide on this first question; and that is what is considered minimally invasive? While there is no universal definition of minimally invasive surgery, a practical one is any surgical technique that is less traumatic to the body, requiring much smaller incisions, than the traditional ‘open’ procedure. With this definition, the question of whether it is better can only be answered by direct comparison of the outcomes of traditional open procedures with a specific minimally invasive alternative. Unfortunately, randomized clinical trials, which provide a high level of clinical evidence to compare procedures, have not been performed in equine surgery for us to know whether minimally invasive techniques are superior to traditional open procedures. The equine literature abounds with retrospective case series of various surgical procedures, giving us insight into expected outcomes but there are few direct treatment comparisons with controlled trials. The answers to the question posed can, however, be tentatively gleaned from the available literature, the clinical experiences of surgeons and from examining other fields where better evidence is available.

Human orthopedic surgeons have embraced minimally invasive techniques, seemingly often due to pressures from their patients for less scarring and better cosmetic results. Some of the purported advantages of minimally invasive surgery include, but are not limited to, reduced tissue trauma, reduced operative time, reduced post-operative pain and analgesic use, reduced hospital stay, reduced infection rate, reduced cost, faster return to function and better long term outcome with less scarring. Recently, a number of systematic reviews have been performed, comparing surgical outcomes for a variety of common orthopedic procedures, such as lumbar discectomy techniques, total knee or hip arthroplasty, fracture repair, arthrodesis techniques, as well as resection of metastatic disease of the spine and Achilles tendon rupture repair. While these procedures are not directly applicable to the equine surgeon, some of the findings from studies involving thousands of patients and multiple randomized clinical trials can give us some insight into the potential benefits to be expected from minimally invasive approaches. The use of randomized clinical trials to directly compare techniques only enables recommendations to be made regarding the benefits of specific minimally invasive procedures. One thing that is clear
from these recent reviews is that the advantages of minimally invasive surgery vary greatly, often depending upon the type of procedure being performed. For example, when comparing minimally invasive techniques for Achilles tendon rupture repair with the traditional open method, a meta-analysis of recent clinical trials showed that the primary outcome variable of re-rupture was not different between groups. In fact all outcomes except for superficial infection and subjective patient ratings were similar. These outcomes did favor the minimally invasive procedure.\(^2\) Another example, comparing the standard medial parapatellar approach for total knee arthroplasty with a minimally invasive approach, through a systematic review and meta-analysis, showed that the primary outcome variables were no different between treatments but there was an increase in short term flexion (10 degrees greater at 1 week post-operatively) for patients undergoing the minimally invasive procedure. This increased flexion was not maintained beyond 3 months and the minimally invasive procedure had a significantly increased risk of intra-operative complications.\(^3\) A third example from the human literature shows that transfornaminal endoscopic surgery for the treatment of lumbar disc herniation is not different to standard open microdiscectomy techniques in terms of overall improvement (reduction in leg pain), re-operation rate or complication rate.\(^4\) While these studies are just a few examples, they do highlight that while primary outcome variables such as return to function may be similar between techniques, differences often exist in more specific comparisons between procedures. This is logical if we believe the outcome is often greatly determined by the nature of the disease being treated and not necessarily relatively minor differences in the method of treatment. The question then becomes if treatment outcomes are indeed similar between techniques, is it better to use minimally invasive surgery if other, less global outcome measures (such as superficial infection rate or short term degree of flexion) favor the minimally invasive technique?

The question of whether minimally invasive orthopedic surgery is better is a procedure specific question, even in the horse. There is not a clear yes or no answer at this time and further efforts towards valid comparisons of procedures are needed. The horse is well suited for minimally invasive approaches to fracture repair, joint surgery, arthrodesis and other procedures due to the lack of soft tissue coverage of the distal limbs and the preponderance of injuries that occur in the distal limb locations. Many minimally invasive approaches used in the horse, such as lag screw fixation of simple fractures or arthroscopy, are unlikely to be revisited to answer these questions in a controlled trial. So while the evidence, from an evidence-based medicine standpoint, is quite poor in the literature, the experiences of clinicians using these techniques are unlikely to allow them to revert back to more open techniques due to a lack of reported negative outcomes or complications with these approaches. For more challenging minimally invasive procedures such as plate fixation, as reported by James and Richardson,\(^5\) further use of these techniques by a wider spectrum of surgeons is needed to reveal if clear advantages exist.

References

