



# Applications of a High Definition Exoscope System in Spine Surgery

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## Introduction

The surgical operating microscope (OM) has been the mainstay of modern microneurosurgery. However, this system is expensive, cumbersome, and is ergonomically disadvantageous. The Video Telescope Operating Monitor (VITOM) is a novel telescope based system providing high definition images of the operative field. We set out to characterize the efficacy of this system in spinal surgery.

## Methods

Patients requiring complex spinal procedures were excluded from the study. A 10mm diameter rigid lens telescope with a focal distance of 200mm attached to a 3-chip high definition digital camera with high definition video monitor was placed in front of the surgeon. A pneumatic scope holder was employed to position the scope. Operative time, complications, hospital stay, and long-term follow-up were assessed and compared using a paired t-test to case-matched controls. Surgeons were also asked to objectively assess the ease of use, optical quality and overall experience with the VITOM system.



Figure 1. Positioning of the High Definition monitors relative to the surgeon in the VITOM system was optimized when placed on the opposite side of the operating room table, just to the right of the assistant. Surgeon is approximately 3ft away from the screen, allowing for optimal visualization of the high definition monitor in a comfortable position.

## Results

The mean  $\pm$  standard deviation age of the VITOM cohort was  $63 \pm 15$  years ( $66 \pm 15$  years for case matched controls). Patients underwent either single level decompression (n=3), two-level decompression (n=6), single level TLIF (n=7), or two level TLIF (n=2) using the VITOM. There was no statistical difference in average operative time (p=0.38) with hospital stay being equivocal for the VITOM (3 days) and OM (2.8 days) (p=0.75). Ease of use, image quality, maneuverability in the operating room, and surgeon comfort were objectively assessed to be advantageous when using the VITOM.

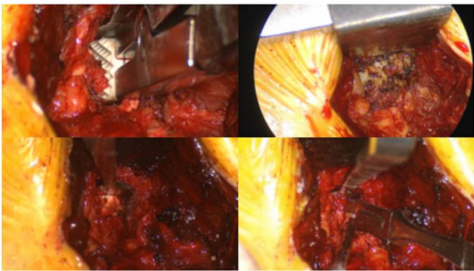


Figure 2. Traditional spinal instruments could be efficiently placed in the operative field using the VITOM system during manipulation of the vertebral body without obstructing visualization of the field.

Table 1

	VITOM	OM
Focal Length (mm)	200 to 300	200 to 400
Magnification	12x	12x
Surgeon discomfort	Low	Medium/High
Cost	<\$75,000	>\$200,000
Stereopsis	no	yes
Depth of Field (mm)	12	<12
Field of view (mm)	600	600
Ease of use	Easy	Varies
Learning curve	Low	Low
Teaching aid	High	Lower
Portability	High	Low

Comparisons between the OM and VITOM

## Conclusions

The VITOM system for spinal surgery provides outstanding image quality and ease of manipulation that rivals the OM, with reduced cost and increased maneuverability with no difference in operative time, hospital stay, or major complications. Further refinement of this system may have widespread application in neurosurgery.

## Learning Objectives

To understand the potential uses and advantages of the VITOM system over traditional OM in spinal neurosurgery

## References

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