Minimally Invasive Tubular Access for Posterior Cervical Foraminotomy. An effective technique with low morbidity.

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Introduction

With the advent of microendoscopic discectomy (MED) in 1997 as a lumbar application by Foley and Smith, alternatives to the traditional open posterior cervical foraminotomy technique began to emerge [6] . A new approach was described in 2007 by Hilton which utilized the tubular retractor and surgical microscope thus allowing three-dimensional visualization as opposed to the two-dimensional option provided by the endoscope [10]. This technique also advocated the use of AP fluoroscopy for localization and tubular retractor positioning to protect the canal from inadvertent entry. As with any new innovation some have questioned the associated learning curve, a subjective limited exposure provided, and an argument that the risks and complications are largely unknown [4]. This study examines a large consecutive series of patients who have undergone minimally invasive tubular access for posterior cervical foraminotomy.

Methods

A retrospective chart review was performed from 1999 to 2013 capturing a single surgeon's experience with the minimally invasive tubular access posterior cervical foraminotomy technique. All patients in this series underwent this technique as previously described, patients were positioned prone and AP fluoroscopy was used for level localization and placement of the tubular retractor [10]. A total of 463 consecutive patients were identified having undergone this technique. Patient demographics and other variables including patient outcome at last follow up and complications were recorded from the chart review (Table 1). A change in our electronic medical record system precluded some variables from being obtained on patients undergoing this technique prior to 2007.

Table 1

Table 1. Demographic data on 463 subjects undergoing minimally invasive tubular access for posterior cervical foraminotomy.

Demographic		
Number of subjects	n=463	
Gender	Males	58.7%
	Females	41.3%
Mean age	49.6 years	
Diagnosis	Disk Herniation	58.3%
	Foraminal Stenosis	41.5%
Hospital Length of Stay	Outpatient	91.6%
	Admitted overnight	8.6%
Mean length of surgery	59.7 minutes	
Mean estimated blood loss	59.5 mL	

mL, milliliters

Table 2

Table 2. Distribution of affected level and side operated in 241 patients.

Anatomic Level		Side
C4	3.3%	Right (12.5%), Left (87.5%)
C5	5.4%	Right (53.8%), Left (46.2%)
C6	32.4%	Right (50.0%), Left (50.0%)
C7	58.1%	Right (39.3%), Left (60.7%)
C8	9.1%	Right (50.0%), Left (50.0%)

Table 3

Table 3. Complication and recurrence rates, and comparison with other techniques.

Complication	Present Study	Open Techniques*	Former MIS Techniques*
Durotomy	4 (0.8%)	Not reported	2.0%
Postoperative weakness	2 (0.4%)	0-5.0%	Not reported
Wound Infection	1 (0.2%)	0-2.2%	1.0%
Meningitis	1 (0.2%)	Not reported	Not reported
Unilateral vertebral artery occlusion	1 (0.2%)	Not reported	Not reported
Extubated intraoperatively	1 (0.2%)	Not reported	Not reported
Hematoma/Seroma	0	0-0.4%	0
Canal Dilated	0	n/a	Not reported
Poor Outcome	8 (1.7%)	0-4.5%	1%
Reoperation Rate	3.7%	1.0-14.0%	3.0-4.2%
Overall Complication Rate	2.2%	0-5.3%	1.0-3.0%

Table 4

Table 4. Outcome and follow-up data and comparison with other techniques.

Outcome	Present Study	Open Techniques*	Former MIS Techniques*
Surgical Outcome			
Complete relief of symptoms	92.2%	90.0-98.0%	91.0-95.0%
Residual pain/numbness but overall improved	6.0%	4.2%	6.0%
Unchanged or worse symptoms	1.7%	1.5-8.5%	3.0%
Admission Status			
Outpatient	91.6%	0-100%	90%
Inpatient	8.6%	0-100%	10%

Results

1. Four hundred and sixty three patients undergoing posterior cervical foraminotomy with minimally invasive tubular access by a single surgeon from 1999 to 2013 were identified. Patient demographics are displayed in **Table 1**.

Results

2. Detailed information was available on 241 patients undergoing this technique from 2008 to 2013. Of these 241 patients, 21 (8.7%) had 2 ipsilateral levels decompressed at the time of surgery, and 220 patients (91.3%) had a single level decompressed. There were no patients in which a bilateral decompression was attempted or performed. **Table 2** displays the relative frequency of cervical roots targeted for decompression.

3. Recurrent disk herniations requiring additional surgery occurred in 9 of the 241 patients (3.7%) with available electronic medical records from 2008-2013. There were 10 complications (2.2%) among the 463 patients undergoing this technique from 1999 to 2013. Complication and recurrence rates and a comparison with other techniques are displayed in **Table 3**.

4. Follow up data was available on 450 patients. Average follow up was 1 year and 2 months. A total of 415 patients were pleased with their result reporting complete relief of symptoms with no or mild residual discomfort. Outcome and follow-up data and a comparison with other techniques are displayed in **Table 4**.

Conclusions

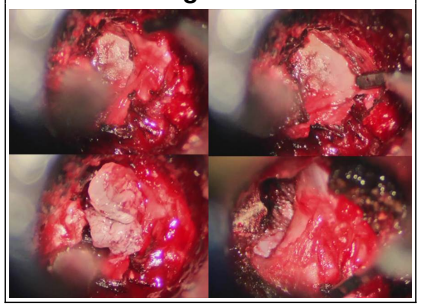
Compared to open techniques minimally invasive tubular access for posterior cervical foraminotomy shows comparable if not superior hospital length of stay, complication rates, and patient outcomes.

Learning Objectives

1) Understand the technical nuances critical to the safe performance of this technique.

2) Describe the expected outcomes and complications, and have perspective on how these relate to outcomes and complications of traditional cervical foraminotomy techniques.

Figure 1



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