Posterior Micro-Endoscopic Discectomy vs. ACDF for Single-level Radiculopathy: Comparative Effectiveness and Cost-Utility Analysis

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Introduction

- Cervical radiculopathy remains highly prevalent and costly in the U.S. healthcare system.

- While ACDF has remained the most popular surgical treatment modality, minimally invasive advancements such as posterior micro-endoscopic discectomy/foraminotomy(pMED) has emerged as a motion preserving and less invasive alternative.

- To date, the comparative-effectiveness and cost-effectiveness of pMED vs. ACDF remains unclear.

Methods

- Patients undergoing surgery for single-level radiculopathy without myelopathy resulting from foraminal stenosis or foraminal disc herniation without instability over a one-year period were prospectively enrolled into an institutional database.

- Baseline, post-operative 3-months, and 12-months VAS-Arm and Neck, NDI, EQ-5D, and return to work(RTW) status were collected.

- Direct healthcare cost(payer perspective) and indirect cost (work-day losses multiplied by median gross-of-tax wage and benefits rate) was assessed.

Results

- A total 20 ACDF and 28 pMED patients were identified.

- Baseline demographics, symptomatology, and co-morbidities were similar between the cohorts.

- For pMED vs. ACDF, mean length of surgery (48.1±20.0 vs. 69.9±11.6 minutes, p<0.0001) and estimated blood loss (20.3±9.3 vs. 31.8±15.4 mL,p=0.04) was reduced.

Results

- There was no 90-day morbidity or re-admission for either cohort.

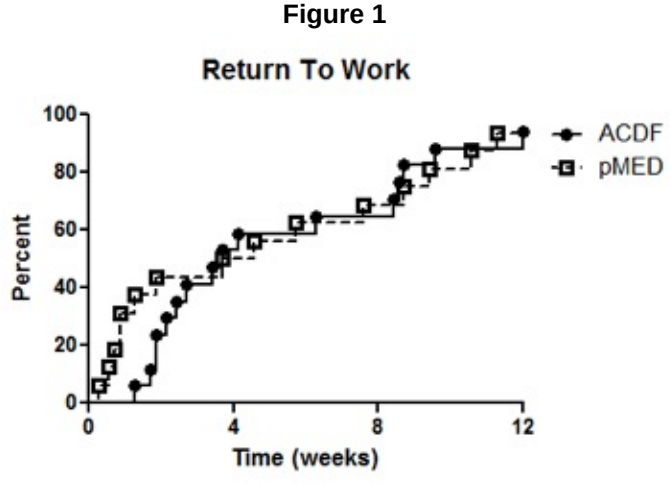
- One(3.6%) pMED patient required a subsequent ACDF; no patients in the ACDF cohort required re-operation by one-year.

- pMED and ACDF cohorts demonstrated similar improvement in all PROs.
  - arm-VAS : 3.1 vs. 2.6, p=0.66
  - neck-VAS: 2.0 vs. 3.2,p =0.24
  - NDI: 9.0 vs. 6.8 p=0.24
  - EQ-5D: 0.17 vs. 0.15, p=0.82.

- Ability to RTW(93.8% vs. 94.1%,p=1.0) and median time to RTW(3.7[0.9-8.1] vs. 3.6[2.1-8.5] weeks,p=0.85) were similar, Figure 1.

- pMED was associated with significantly reduced direct cost(p>0.001) but similar indirect cost(p=0.43), resulting in an average total cost savings of $7,689(p<0.01) per case with similar QALY-gain (0.17 vs. 0.15,p=0.82).

Figure 1



Postoperative return to work by 12-month

Conclusions

- For single-level unilateral-radiculopathy resulting from foraminal stenosis or lateral disc herniation without segmental instability, pMED was equivalent to ACDF in safety and effectiveness.

- pMED represents a minimally invasive, motion preserving alternative to select patients with cervical radiculopathy without the need for implant costs with concomitant significant cost saving.

Learning Objectives

- The comparative-effectiveness and cost-effectiveness research have emerged as an important tool to determine value of spine care by merging patient-centered outcomes with responsible use of societal health care resources.

- To date, the comparative effectiveness and cost effectiveness of pMED vs. ACDF remains unclear.

- In this study, we demonstrate that for single-level unilateral-radiculopathy resulting from foraminal stenosis or lateral disc herniation without segmental instability, pMED was equivalent to ACDF in safety and effectiveness.

- pMED had significant cost saving benefit compared to ACDF.