A Letter to the Editor Regarding "Fusion or Not for Degenerative Lumbar Spinal Stenosis: A Meta-Analysis and Systematic Review"

To the Editor:

We read with interest the systematic review of Shen et al (1) on "Fusion or Not for Degenerative Lumbar Spinal Stenosis: A Meta-Analysis and Systematic Review." The authors have systematically reviewed the published literature on the subject of the clinical outcomes of spinal decompression with or without spinal fusion for degenerative lumbar spinal stenosis (DLSS) to compare the efficacy of decompression alone and spinal fusion (1). They conducted a systematic electronic search from March 1976 to August 2016. The search analyzed a total of 5 randomized controlled trials (RCTs) (2-6) assessing the comparison between decompression and fusion surgery for DLSS, and 19 articles have been included in the reference list. On the basis of the results of Shen et al's study (1), additional fusion surgery seems unlikely to result in better outcomes for patients with DLSS, but it may increase additional risks and costs. We would like to voice some concerns regarding the methodology and results of this review.

It seems that the objective of the current systematic review, published in 2018, is the duplication of what has been reported in an article published by Wu et al (7) in 2016 in the *Journal of Evidence Based Medicine*. Surprisingly, Shen et al (1) have reviewed the findings of 5 RCTs (2-6). Of these 5 studies (2-6), the findings of 4 studies, including Grob et al (3), Hallett et al (4), Ghogawala et al (5), Försth et al (6), had been already reported by Wu et al (7) in a commentary entitled "A Rethink of Fusion Surgery for Lumbar Spinal Stenosis", and the only study (2) which had not been reported by Wu et al (7) was an old study published in 1991 on "Degenerative lumbar spondylolisthesis with spinal stenosis. A prospective study comparing decompression with decompression and intertransverse process arthrodesis." How to choose decompression alone or decompression plus fusion has been an old and persistent issue (3,4,8). Bae et al (9) in 2013 and Jancuska et al (10) in 2016 reported that the rate of decompression alone for lumbar stenosis was decreased, whereas the rate of decompression plus fusion was increased (9,10). However, these findings are in contrast to the findings of the study conducted by Wu et al (7) in which they reported 2 recent multicenter RCTs papers (5,6) published in the same issue of *New England Journal of Medicine* comparing the outcomes of decompression alone or decompression plus fusion for lumbar spinal stenosis. Wu et al (7) combined the results from these 2 studies using the Stata software and found that the decompression plus fusion had a significantly more blood loss and longer operative time, and no significant difference was found in the parameters of length of hospital stay, SF-36 Physical Component Summary, Oswestry Disability Index (ODI), visual analog scales (VAS) of back pain and leg pain between decompression alone group and decompression plus fusion group (Fig. 1). Therefore, based on the current evidence, Wu et al (7) advocated a rethink on the decompression plus fusion trend chosen by surgeons. Wu et al (7) concluded that the above 2 studies (5,6) have been the best evidence since 2016 to compare the outcomes of decompression alone or decompression plus fusion for lumbar spinal stenosis. Similar to the findings of Shen et al (1), Deyo et al (11) in 2010 had showed that the fusion means more short term direct cost and peri-operative life-threatening complications. Consequently, regarding the findings of other meta-analysis and systematic review articles (12) and the study of Wu et al (7) which is presenting the same 4 RCTs (3-6), what is the novelty of the Shen et al (1) article and its impact on the field? Chang et al (12) have done the same systematic review and meta-analysis on 5 studies and reported the same findings for each one of the same variables.

Shen et al's (1) review article does not cover the studies which have been published since August 2016. Dijkerman et al (13) compared the outcomes after decompression with and without concomitant instrumented fusion in patients with lumbar stenosis and degenerative spondylolisthesis to investigate if adding fusion to simple decompression leads to better results and, similar to the Shen et al (1), they concluded that the least invasive and least costly procedure is decompression alone. In a systematic review and meta-analysis

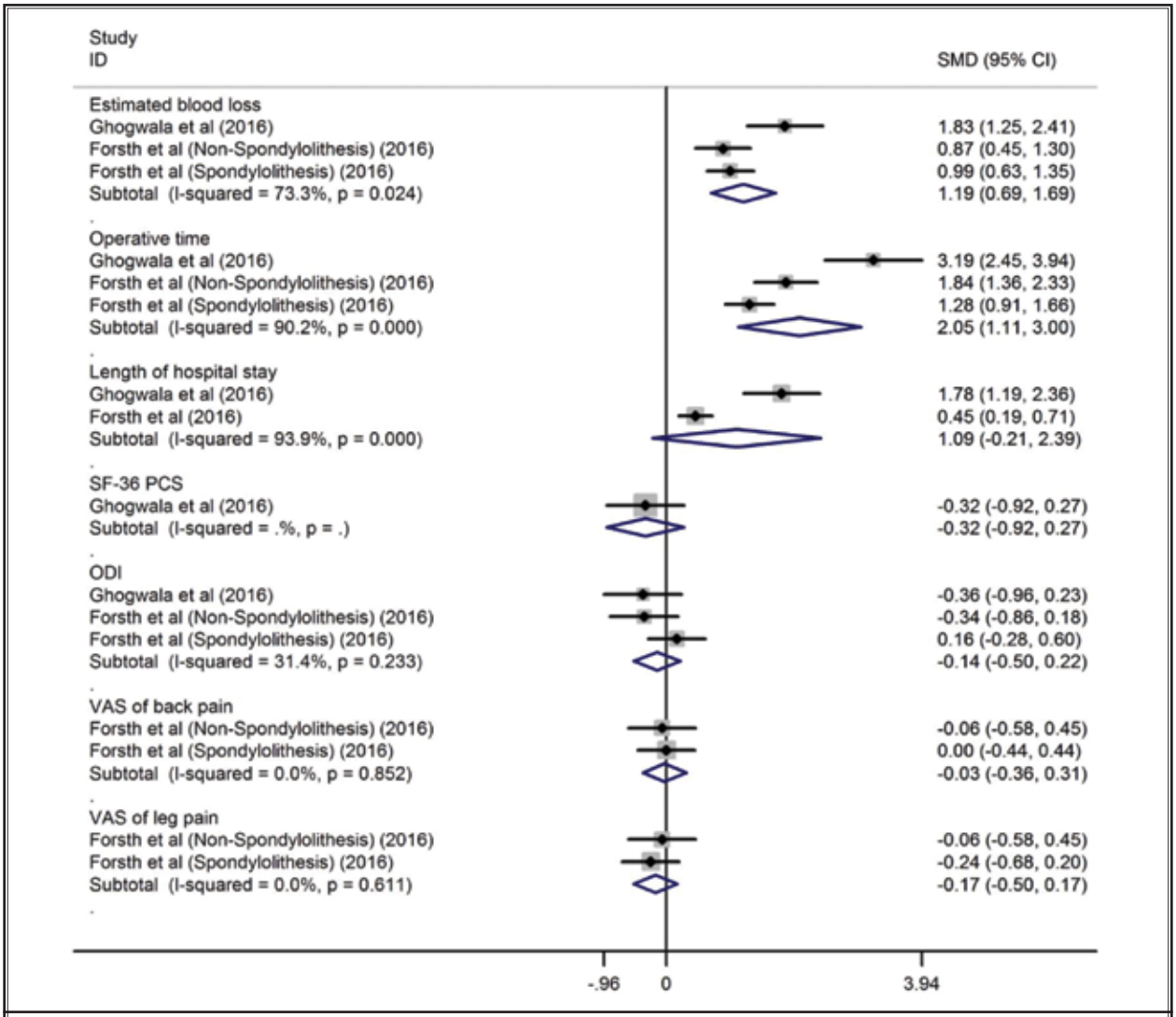

Fig. 1. *According to Wu et al (7), the combined results found that the decompression plus fusion had a significantly more blood loss (SMD 95% CI: 1.19 (0.69, 1.69)) and longer operative time (SMD 95% CI: 2.05 (1.11, 3.00)). No significant difference was found in the parameters of length of hospital stay, SF-36 PCS, ODI, VAS of back pain and leg pain between the decompression alone group and the decompression plus fusion group (7).*

conducted in 2017, Chang et al (12) compared the effectiveness of decompression versus decompression plus fusion in treating patients with LSS. Similar to the study of Shen et al (1), their primary outcomes analyzed were back pain, leg pain, ODI, the quality-of-life EuroQol-5 Dimensions (EQ-5D), duration of operation, intraoperative blood loss, length of hospital stay, major complications, walking ability, and number of reoperations (12). Similar to the findings reported by Shen et al (1), Chang et al (12) showed that the additional fusion in the management of LSS yielded no clinical improvements over decompression alone within a 2-year follow-up period, but fusion resulted in a longer duration of operation, more blood loss, and a higher risk of complications. One of the 5 articles, which Shen et al (1) included in their review, was the study conducted by Ghogawala et al (5). However, Ghogawala et al (5) had included the patients with degenerative grade I spondylolisthesis and their main objective was to compare laminectomy plus fusion with laminectomy alone for lumbar spondylolisthesis, but Shen et al's review (1) is about patients with DLSS without degenerative spondylolis-

Table 1. *Clinical outcomes in the patients of the 2 groups (17).*

Parameters	PLF Group (n = 44)	PLIF Group (n = 44)	*P* -value
LBP, VAS score			<.001*
Preop	7.87 ± 1.07	8.01 ± 1.56	
24 h postop	4.86 ± 1.83	4.98 ± 1.84	
3 mos postop	4.48 ± 1.75	4.57 ± 1.73	
6 mos postop	4.02 ± 1.49	4.23 ± 1.51	
12 mos postop	3.27 ± 1.21	3.85 ± 1.28	
24 mos postop	2.20 ± 1.15	2.53 ± 1.09	
Radicular pain			< .001
Preop	6.73 ± 2.23	6.82 ± 2.31	
24 h postop	3.25 ± 1.67	3.58 ± 1.58	
3 mos postop	2.55 ± 1.16	2.59 ± 1.22	
6 mos postop	2.05 ± 1.07	2.23 ± 1.09	
12 mos postop	2 ± 1.03	2.15 ± 1.04	
24 mos postop	1.04 ± 1.02	1.30 ± 1.06	
ODI			< .001
Preop	61.06 ± 12.28	62.18 ± 12.25	
3 mos postop	43.36 ± 13.01	49.81 ± 16.04	
6 mos postop	34.45 ± 15.68	37.53 ± 15.84	
12 mos postop	26.88 ± 12.95	29.20 ± 13.15	
24 mos postop	18.31 ± 8.94	21.24 ± 4.67	
Functional disability after 3 mos†			< .001
0–20%: Minimal	14 (31.8%)	11 (25%)	
21–40%: Moderate	27 (61.4%)	28 (63.6%)	
41–60%: Severe	3 (6.8%)	5 (11.4%)	
Functional disability after 6 mos†			< .001
0–20%: Minimal	20 (45.5%)	17 (38.6%)	
21–40%: Moderate	21 (47.7%)	23 (52.3%)	
41–60%: Severe	3 (6.8%)	4 (9.1%)	
Functional disability after 12 mos†			< .001
0–20%: Minimal	27 (61.4%)	24 (54.5%)	
21–40%: Moderate	16 (36.4%)	18 (40.9%)	
41–60%: Severe	1 (2.3%)	2 (4.5%)	
Functional disability after 24 mos†			< .001
0–20%: Minimal	42 (95.5%)	39 (88.6%)	
21–40%: Moderate	2 (4.5%)	4 (9.1%)	
41–60%: Severe	0	1 (2.3%)	

* Indicates a significant difference.
† There were no patients in either group with functional disability 61–80% (crippled) or 81–100%.

thesis. Therefore, Shen et al's should not overgeneralize the findings of patients with spondylolisthesis to those without spondylolisthesis.

Wu et al. (7) suggested that the indications of fusion should be restricted to the lumbar stenosis patients accompanied with spinal instability or deformity (7). Our recent findings suggest that decompression and posterior fusion and using methylene blue on the soft tissue around fusion site during spinal surgeries are effective surgical methods which are associated with satisfying clinical results in terms of improvement of

postoperative low back pain (LBP), radicular pain, and quality of life (QOL) (14–16). Our 2018 randomized prospective controlled clinical study (17), which has been recently accepted for publication in PAIN PHYSICIAN, compared the clinical outcomes of posterolateral fusion (PLF) with posterior lumbar interbody fusion (PLIF) with posterior instrumentation after lumbar decompression surgery for lumbar spinal stenosis (LSS) and degenerative lumbar spine instability. Our findings showed that compared with PLIF, PLF with posterior instrumentation in patients with LSS and degenerative lumbar spine instability provides better clinical outcomes and improvement in the LBP, radicular pain, and functional QOL (Table 1). Our results showed that the visual analogue scale (VAS) scores in the PLF group improved significantly. Consequently, when the pain is reduced, the patients' social burden will decrease and they can return to work or other normal activities. There is no conflict of interest to be declared regarding the manuscript.

Majid Reza Farrokhi, MD
Professor of Neurosurgery
Shiraz Neuroscience Research Center,
Shiraz University of Medical Sciences,
Shiraz, Iran
Department of Neurosurgery,
Shiraz University of Medical Sciences,
Shiraz, Iran
PO Box: 7194815644
E-mail: farrokhimr@yahoo.com

Mehrnaz Gholami, MA
Shiraz Neuroscience Research Center,
Shiraz University of Medical Sciences,
Chamran Hospital
Chamran Boulevard
Shiraz, Iran
PO Box: 7194815644
E-mail: mehrnaz.gholami@yahoo.com

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