



Variations in Practice among Asia–Pacific Surgeons and Recommendations for Managing Cervical Myelopathy: The First Asia–Pacific Spine Society Collaborative Study

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Study Design: Surgeon survey.

Purpose: To study the various surgical practices of different surgeons in the Asia–Pacific region.

Overview of Literature: Given the diversity among Asia–Pacific surgeons, there is no clear consensus on the preferred management strategies for cervical myelopathy. In particular, the role of prophylactic decompression for silent cervical spinal stenosis is under constant debate and should be addressed.

Methods: Surgeons from the Asia–Pacific Spine Society participated in an online questionnaire comprising 50 questions. Data on clinical diagnosis, investigations and outcome measures, approach to asymptomatic and silent cervical spinal stenosis, guidelines for surgical approach, and postoperative immobilization were recorded. All parameters were analyzed by the Mantel–Haenszel test.

Results: A total of 79 surgeons from 16 countries participated. Most surgeons used gait disturbance (60.5%) and dyskinetic hand movement (46.1%) for diagnosis. Up to 5.2% of surgeons would operate on asymptomatic spinal stenosis, and 18.2% would operate on silent spinal stenosis. Among those who would not operate, most (57.1%) advised patients on avoidance behavior and up to 9.5% prescribed neck collars. For ossification of the posterior longitudinal ligament (OPLL), anterior removal was most commonly performed for one-level disease ($p < 0.001$), whereas laminoplasty was most commonly performed for two- to four-level disease ($p = 0.036$). More surgeons considered laminectomy and fusion for multilevel OPLL. Most surgeons generally preferred to use a rigid neck collar for 6 weeks postoperatively ($p < 0.001$).

Conclusions: The pooled recommendations include prophylactic or early decompression surgery for patients with silent cervical spinal stenosis, particularly OPLL. Anterior decompression is primarily suggested for one- or two-level disease, whereas laminoplasty is preferred for multilevel disease.

Keywords: Cervical myelopathy; Asia–Pacific; Ossification of the posterior longitudinal ligament; Silent; Cervical stenosis

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Introduction

With an aging population, the number of patients presenting with cervical myelopathy is increasing worldwide. This disorder is characterized by upper and lower limb numbness and weakness, with difficulties in ambulation and sphincter control. Further, it is the leading cause of spinal cord dysfunction [1]. Loss of the ability to transfer loads through intervertebral discs and spinal segment hypermobility causes osteophyte formation and buckling of the ligamentum flavum as a result of loss of disc height. In Asia, ossification of the posterior longitudinal ligament (OPLL) is also an important and common cause of cervical myelopathy. The prevalence in the general Japanese population is reported as 1.9%–4.3% and up to 25% for patients with cervical myelopathy [2]. An international study reported that Asia–Pacific centers manage more cases of OPLL (35%) than North American centers (12%) [3].

Surgery is typically recommended for these patients, as most display neurological deterioration over time. Anterior, posterior, or combined approaches may adequately decompress the spinal canal. The choice of approach is variable and generally depends on factors such as cause of compression, number of affected segments, and the surgeon's experience. Anterior approaches are excellent for disc herniations and bone spurs but are less extensible than posterior approaches. However, posterior approaches usually permit only indirect decompression and may lead to further axial neck pain. In addition to the lack of consensus on surgical approaches, there is also a lack of consensus on preoperative assessment methods, imaging [4], and the need for postoperative immobilization [5]. Prophylactic decompression for silent cervical canal stenosis is performed by some surgeons but remains controversial [6].

The lack of definitive evidence for controversial areas of spine surgery and the variable distribution of pathology in different geographic regions lead to different practice patterns. Many spinal conditions are managed very differently depending on the region and the experience of the surgeon [7-9]. Cultural, ethnic, and socioeconomic factors may come into play to determine the treatment regimen. Given the diversity in the Asia–Pacific region, the mixed experiences and practice guidelines will provide an intriguing outlook of managing both spondylotic and OPLL causes of cervical myelopathy. Hence, this study aims to identify any consensus and to develop recommendations from Asia–Pacific surgeons.

Materials and Methods

1. Subjects

Surgeons from the Asia–Pacific Spine Society (APSS) participated in an electronic survey exploring aspects of perioperative management of cervical myelopathy. Members of the APSS include surgeons from Australia, Bangladesh, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Taiwan, Turkey, and Vietnam. The questionnaire was distributed via REDCap (Vanderbilt, Nashville, TN, USA). All surgeons who were members of the APSS were invited to participate. The questionnaire was circulated during the period from January to April 2017.

2. Questionnaire

The online questionnaire contained 50 questions grouped into five sections based on the participant's background details, preoperative assessment principles (clinical diagnosis of cervical myelopathy, imaging methods, and outcome scores used), approach to asymptomatic and silent cervical spinal stenosis, surgical approach to non-OPLL and OPLL cases, and postoperative immobilization practice. The responses were based on 5-point Likert scales ('least important,' 'less important,' 'neutral,' 'more important,' or 'most important' for clinical and radiological parameters; and 'most favorable,' 'more favorable,' 'neutral,' 'less favorable,' or 'least favorable' for surgical techniques).

1) Background details

The participants provided information regarding their country of origin, years of experience practicing spine surgery, number of cases operated on per year, whether they managed cervical myelopathy on a daily basis, familiarity with anterior or posterior approaches or with both approaches, and whether they managed occipital–cervical junction pathologies.

2) Preoperative assessment

The participants reported whether they considered various clinical findings important for the diagnosis of cervical myelopathy. The clinical parameters included bilateral upper and lower limb numbness and weakness, gait disturbance, dyskinetic hand movement, hyperre-

flexia, and sphincter dysfunction. Clinical examination tests included neck range of motion, Spurling's sign, Lhermitte's sign, limb power, limb sensation, presence of brisk reflexes, finger escape sign, 10-second test, observed dyskinetic movements, Hoffman's sign, reverse supinator reflex, scapulohumeral reflex, upgoing Babinski response, clonus, unsteady gait, cerebellar signs, rectal examination, and functional testing (writing or buttoning). Methods of investigation were also assessed, including cervical spine radiographs (anteroposterior and lateral), dynamic flexion–extension lateral cervical spine radiographs, open mouth view, computed tomography (CT), magnetic resonance imaging (MRI), nerve conduction study, and electromyography. The outcome scores utilized, including the Nurick scale, Japanese Orthopaedic Association (JOA) score, and Neck Disability Index (NDI), were also reported.

3) Approach to cervical spinal stenosis

The participants were asked whether they operated on asymptomatic (only stenosis on imaging without any myelopathy symptoms) and/or silent (no significant functional deficit, JOA score >15) cervical spinal stenosis, and how they decided when to intervene. In addition, for participants who did not operate on these patients, how they advised patients regarding activities and risks was also investigated.

4) Surgical approach

The participants reported their approach to one-level, two-level, three-level, and four-level diseases of non-OPLL and OPLL origin. Anterior approaches included anterior discectomy and fusion (ACDF), corpectomy, and disc replacement. Posterior approaches included laminectomy, laminectomy and fusion, laminoplasty, and laminoplasty and fusion. The participants were also given an additional option of a combined approach. For ACDF or corpectomy, the participants reported whether they used bone graft or cage only or with plating. For posterior fusion, the participants reported whether they used lateral mass screws or pedicle screws. For laminoplasty, the participants reported whether they used the single-door technique with plating or suture fixation, or the double-door technique. For atlantoaxial surgery, the participants reported whether they used transarticular screws, C1 lateral mass screws, C2 pedicle screws, or laminar screws, or wiring techniques.

5) Postoperative management

The participants reported whether they used postoperative immobilization methods, including the soft or rigid neck collar and the Halo immobilization device, or allowed free mobilization for the following operations: ACDF, ACDF with plating, corpectomy, corpectomy with plating, laminectomy with fusion, laminectomy alone, laminoplasty, atlantoaxial fusion, and occipital–cervical fusion. The duration of immobilization was also reported.

3. Analysis

After all the questionnaires had been completed, the results and analyses were discussed among the investigators of the study to provide recommendations based on the data. Statistical analysis was performed by IBM SPSS ver. 23.0 (IBM Corp., Armonk, NY, USA). Basic demographics and relationships between study parameters were investigated by the chi-square test of independence. Fisher's exact test was used for parameter values less than 5. After the relationships between the level of disease and the surgical approach for OPLL and non-OPLL cases had been established, the Mantel–Haenszel test was used to assess the relationships between the surgeon's experience (in years) and the surgical approach, and management of silent and asymptomatic cervical spinal stenosis, while controlling for the level of disease. Statistical significance was set at $p < 0.05$.

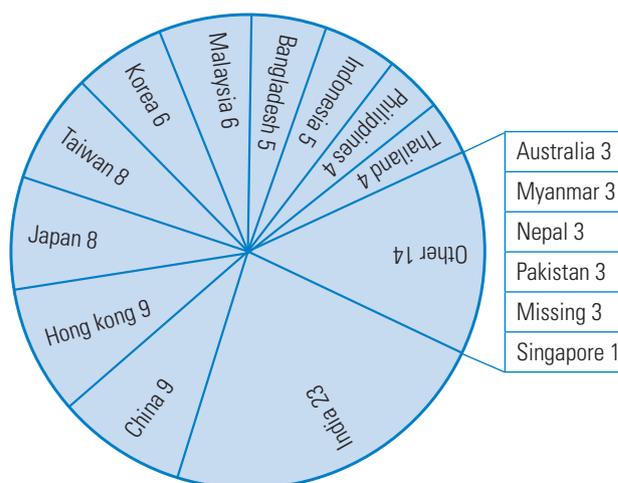


Fig. 1. Frequency of participation of members of the Asia-Pacific Spine Society (unit: %).

Results

Surgeons from all countries in the APSS were represented (n=16) except Indonesia, Turkey, and Vietnam (Fig. 1). Among the participants, there was a good spread of surgical experience: 47.0% had practiced for ≤ 10 years, 24.1% had practiced for 11 to 20 years, and 22.9% had practiced for >20 years. Most surgeons (84.2%) operated on fewer than 40 cervical myelopathy cases a year, 9.2% operated on 41 to 60 cases a year, 2.6% operated on 61 to 80 cases a year, and 2.6% operated on 81 to 100 cases a year. Participants who were more experienced were more likely to operate on the occipital–cervical junction (≤ 10 years experience, 47.4%; 11 to 20 years experience, 80.0%; >20 years experience, 78.9%; $p=0.014$).

Most surgeons (60.5%) felt that gait disturbance was ‘most important’ for the diagnosis of cervical myelopathy, followed by dyskinetic hand movement (46.1%), hyper-reflexia (44.7%), and sphincter dysfunction (35.1%). None of the surgeons believed that bilateral upper and lower limb numbness was ‘most important.’ Only 35% to 45% felt these symptoms to be ‘more important’ than other symptoms. Hoffman’s sign (64.9%), unsteady gait (63.6%), and brisk reflexes (49.4%) were the three ‘most important’ clinical signs for diagnosis. All surgeons would obtain an MRI in their preoperative investigation, but only 81.8% would obtain a lateral cervical spine radiograph and 76.6% would obtain dynamic flexion–extension radiographs. Up to 41.6% of participants would perform CT preoperatively, and 14.3% would obtain nerve conduction studies routinely. Not all participants utilized objective outcome scores. Of those who did, most (83.1%) utilized the JOA score, whereas 23.4% utilized the Nurick scale and 22.1% utilized the NDI.

Only 5.2% of participants would operate on asymptomatic spinal stenosis, and 18.2% would operate on silent spinal stenosis. Most of those who would perform surgery for asymptomatic stenosis were from Thailand (33.3%), China (28.6%), and Korea (20.0%). The decision for surgery was based on the patient’s decision after the MRI findings were explained to the patient. Among those who would operate on silent stenosis, most were from Hong Kong (71.4%), Japan (16.7%), and India (16.7%). The decision for surgery was based on the patient’s decision after the MRI findings were explained and also on whether the patient reported functional difficulties. Among those who would not operate on silent stenosis, most (57.1%)

Table 1. Surgical approach for non-ossification of posterior longitudinal ligament causes of cervical myelopathy

Levels of disease	Surgical approach		p-value
	Yes	No	
Anterior discectomy and fusion			<0.001*
1	57	22	
2	32	47	
3	13	66	
4	4	75	
Anterior corpectomy			0.001*
1	1	78	
2	16	63	
3	3	76	
4	0	79	
Posterior laminectomy			0.762
1	3	76	
2	4	75	
3	6	73	
4	5	74	
Posterior laminectomy and fusion			0.001*
1	0	79	
2	3	76	
3	7	72	
4	11	68	
Posterior laminoplasty			<0.001*
1	0	79	
2	4	75	
3	23	56	
4	30	49	
Posterior laminoplasty and fusion			0.001*
1	1	78	
2	0	79	
3	7	72	
4	5	74	

* $p<0.05$ (statistical significance).

advised avoiding extreme activities and sports, and up to 9.5% prescribed neck collars. There was no relationship between the decision to operate and the surgeon’s experience for asymptomatic ($p=0.515$) or silent ($p=0.521$) stenosis.

Most surgeons (77.9%) performed both anterior and posterior surgery without a definite preference for either ($p=0.383$). The overall practice differed between non-

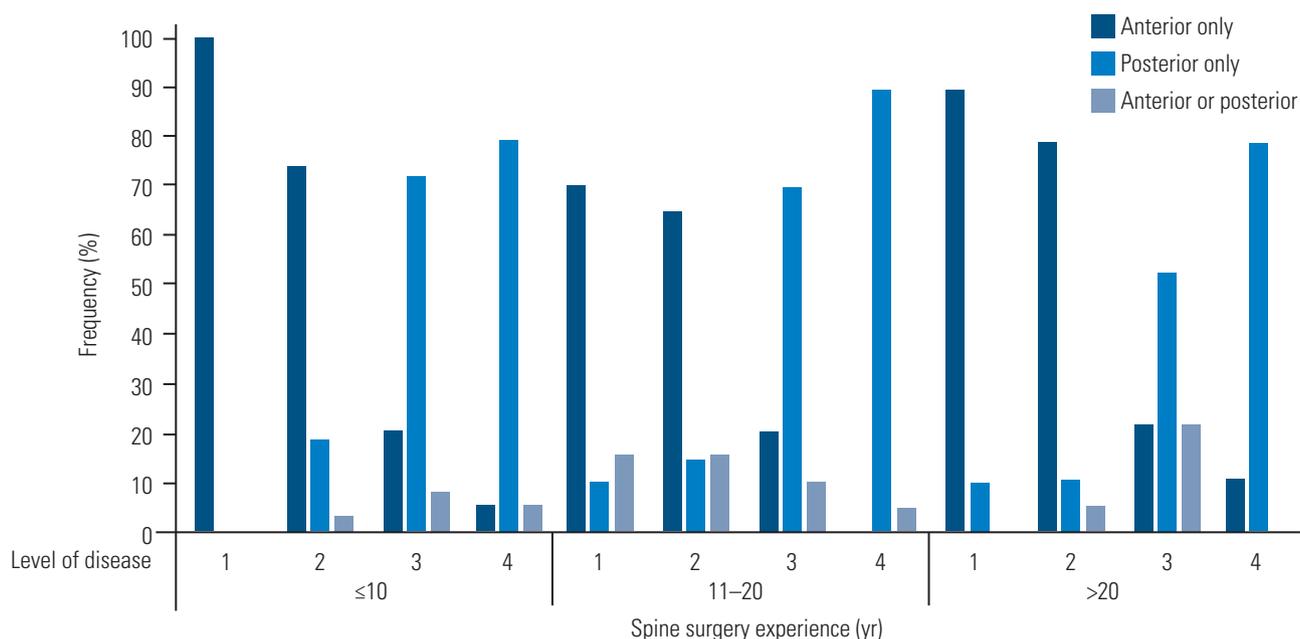


Fig. 2. Years of surgeon’s experience in relation to choice of surgical approach for cervical myelopathy not caused by ossification of the posterior longitudinal ligament.

Table 2. Surgical approach for non-ossification of posterior longitudinal ligament causes of cervical myelopathy with reference to surgical experience

Years of practicing spine surgery	Levels of disease	Surgical approach	<i>p</i> -value
≤10	1 to 4 levels	ACDF	0.055
		Anterior corpectomy	0.855
		Posterior laminectomy	0.990
		Posterior laminectomy and fusion	0.299
		Posterior laminoplasty	0.347
		Laminoplasty and fusion	0.782
11-20	1 to 4 levels	ACDF	0.013*
		Anterior corpectomy	0.598
		Posterior laminectomy	0.857
		Posterior laminectomy and fusion	0.304
		Posterior laminoplasty	0.168
		Laminoplasty and fusion	0.955
>20	1 to 4 levels	ACDF	0.912
		Anterior corpectomy	0.558
		Posterior laminectomy	0.938
		Posterior laminectomy and fusion	0.939
		Posterior laminoplasty	0.900
		Laminoplasty and fusion	0.954

ACDF, anterior cervical discectomy and fusion.

**p*<0.05 (statistical significance).

OPLL and OPLL myelopathy. For non-OPLL cases (Table 1), there was a significant correlation between the number of levels of disease to be treated and the surgical method. There was no relationship with surgical experience (Fig. 2). However, surgeons with 11 to 20 years of experience tended to favor ACDF as their primary surgical approach (Table 2). Surgeons generally preferred anterior approaches, namely ACDF (93.4%) for one- or two-level disease ($p < 0.001$), while posterior approaches, especially laminoplasty, were far more prevalent for three- and four-level disease ($p < 0.001$) (Table 3). Posterior laminectomy (with or without fusion) was a rare option for surgeons. None of the participants performed disc replacement for cervical myelopathy. For ACDF, most utilized a cage with plating (40.8%), followed by graft and plating (33.8%), graft only (16.9%), and cage only (8.5%). Most surgeons preferred single-door laminoplasty for their posterior approach, using miniplates to hold the hinge open (59.2%), followed by double-door laminoplasty (22.4%) and single-door laminoplasty with suture fixation (20.4%).

For OPLL myelopathy (Table 4), anterior removal (43.5%) or floating surgery was reserved for one-level ($p < 0.001$) disease, whereas posterior laminoplasty or laminectomy with fusion was preferred for two- to four-level disease ($p = 0.003$). More surgeons (43 versus 21) considered laminectomy and fusion for OPLL as compared with non-OPLL cases. There was no obvious relationship between surgical experience and the choice of surgical approach for these cases (Fig. 3). Most surgeons, regardless of experience, tended to utilize posterior approaches, either laminoplasty or laminectomy with fusion, for OPLL cases involving more than two levels (Table 5). For anterior surgery, 16.9% elected graft only, 8.5% cage only, 33.8% graft and plating, and 40.8% cage and plating. For laminoplasty, most surgeons performed single-door

laminoplasty with miniplates (59.2%), followed by single-door laminoplasty with sutures (20.4%) and double-door laminoplasty (22.4%). For posterior fusion, lateral mass

Table 3. Grouping of surgical approaches based on level of disease

Level of disease	Surgical approach			<i>p</i> -value
	Anterior	Posterior	Anterior and posterior	
1	69	4	3	<0.001*
2	58	12	5	
3	17	52	9	
4	4	64	3	

* $p < 0.05$ (statistical significance).

Table 4. Surgical approach for OPLL in relation to level of disease

Levels of disease	Surgical approach		<i>p</i> -value
	Yes	No	
Anterior removal			<0.001*
1	21	58	
2	2	77	
3	0	79	
4	0	79	
Anterior floating of OPLL			<0.001*
1	14	65	
2	16	63	
3	1	78	
4	1	78	
Posterior laminectomy			0.807
1	4	75	
2	6	73	
3	7	72	
4	5	74	
Posterior laminectomy and fusion			0.291
1	6	73	
2	12	67	
3	11	68	
4	14	65	
Posterior laminoplasty			0.036*
1	13	66	
2	19	60	
3	28	51	
4	25	54	
Posterior laminoplasty and fusion			0.006*
1	0	79	
2	1	78	
3	5	74	
4	5	74	
Combined anterior and posterior			0.649
1	0	79	
2	0	79	
3	2	77	
4	3	76	

OPLL, ossification of posterior longitudinal ligament.

* $p < 0.05$ (statistical significance).

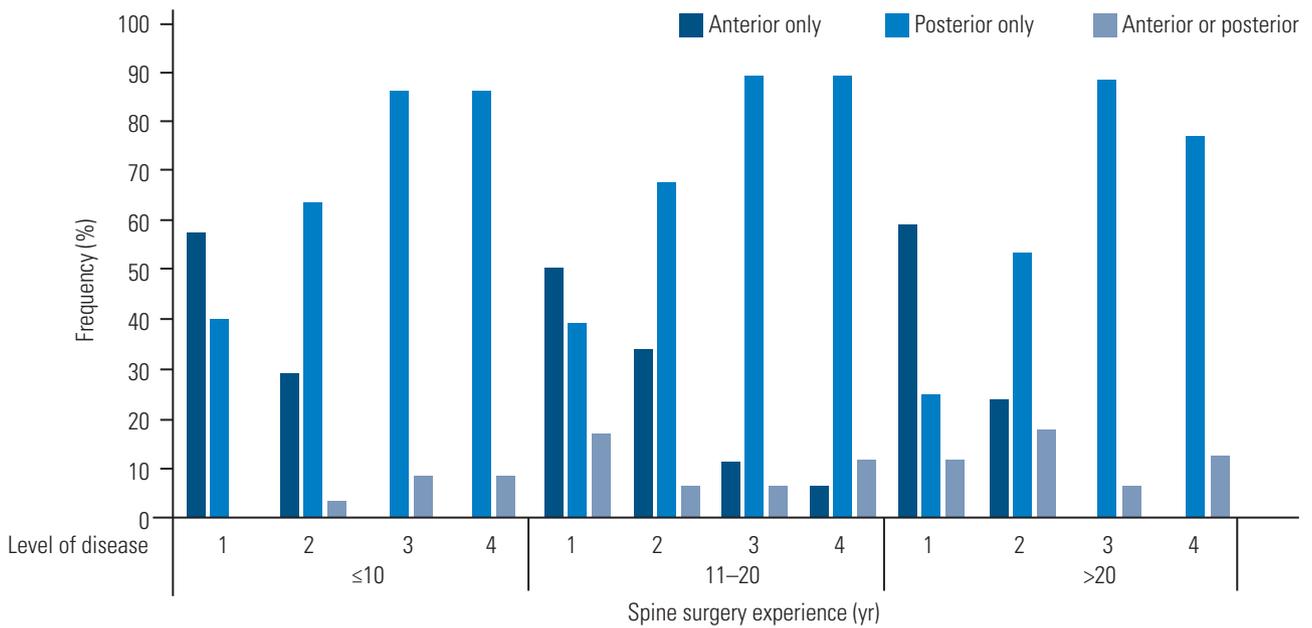


Fig. 3. Years of surgeon's experience in relation to choice of surgical approach for cervical myelopathy caused by ossification of the posterior longitudinal ligament.

Table 5. Surgical approach for ossification of posterior longitudinal ligament based on surgical experience

Years of practicing spine surgery	Disease extent/levels of disease	Surgical approach	p-value
≤10	1 to 4 levels	Anterior removal	-
		Anterior floating	0.545
		Posterior laminectomy	0.123
		Posterior laminectomy and fusion	0.022*
		Posterior laminoplasty	0.005*
		Posterior laminoplasty and fusion	0.063
		No preference for anterior or posterior	0.003*
11-20	1 to 4 levels	Anterior removal	-
		Anterior floating	0.581
		Posterior laminectomy	0.564
		Posterior laminectomy and fusion	0.859
		Posterior laminoplasty	0.427
		Posterior laminoplasty and fusion	0.822
		No preference for anterior or posterior	0.043*
>20	1 to 4 levels	Anterior removal	-
		Anterior floating	0.928
		Posterior laminectomy	0.564
		Posterior laminectomy and fusion	0.002*
		Posterior laminoplasty	0.020*
		Posterior laminoplasty and fusion	-
		No preference for anterior or posterior	0.210

No reports of anterior removal for more than 1-level disease, none of the >20 years of experience surgeons selected posterior laminoplasty and fusion.

*p<0.05 (statistical significance).

fixation was preferred (86.5%).

For atlantoaxial instrumentation, C1 lateral mass screws and C2 pedicle screws were rated as most favorable (64.6%) among the surgeons. Up to 46.9% reported C1/2 transarticular screws as their second most favorable instrumentation method, followed by C1 lateral mass screws and C2 laminar screws (52.0%) and wiring (63.2%). However, up to 51.9% reported wiring methods as their least favorable technique.

Most surgeons preferred to use the rigid neck collar for ACDF (59.4%), corpectomy (62.3%), corpectomy with plating (57.1%), laminectomy (50.0%), laminectomy with fusion (58.8%), laminoplasty (47.6%), C1/2 fusion (65.7%), and occipital–cervical fusion (61.9%). If plating was used with ACDF, the soft neck collar was most often prescribed (52.1%). Halo immobilization was utilized in 20.6% of occipital–cervical fusions. Only 12.7% and 12.3% of surgeons allowed free mobilization after laminoplasty and ACDF with plating, respectively ($p < 0.001$). Most surgeons prescribed 6 weeks of rigid collar immobilization after surgery, except for ACDF with plating, for which 3 weeks was most commonly prescribed ($p < 0.001$).

Discussion

Being able to generalize the clinical approaches of a heterogeneous population helps surgeons to provide the best or most recommended practice. Identifying similar strategies in this highly diverse region delivers a consensus-like recommendation from a collection of 16 nations. Hence, this study imparts expert evidence from a large and assorted group of surgeons from the Asia–Pacific region. Relatively good consensus was achieved for clinical diagnosis, methods of investigation, and surgical treatment.

Despite the lack of evidence to support a particular sign or symptom for predicting outcome after treatment, the symptoms and signs necessary for the diagnosis of cervical myelopathy are quite consistent throughout the region. Previous interviews with international spine surgeons suggest that impaired gait, clumsy hands, muscle weakness, intrinsic muscle atrophy, broad-based unstable gait, and motor deficits with corticospinal distribution are the main symptoms and signs for predicting outcomes [10]. Apart from muscle weakness and motor deficits, the key clinical features reported include dexterity problems with hand function, hyperreflexia, and unsteady gait. All of these features indicate an upper motor neuron lesion,

which consistently appears to be the most important to surgeons, regardless of their background or surgical experience. Similarly, nearly all surgeons utilized MRI for diagnosis and prognosis [11], and JOA score for assessment of disease severity. In addition to measuring disease severity, outcome scores are crucial for monitoring recovery after treatment. Given the strong influence of Japan in the management of cervical myelopathy in this region, it is not unexpected that most surgeons will utilize outcome assessments developed here [12–15]. Furthermore, there are some cultural similarities between several Asian countries, thereby increasing the applicability of the JOA score in this region as compared with Western countries. The JOA score has since become an important indicator of surgical treatment because of its usefulness for prognostication [16].

Some aspects of the treatment of cervical myelopathy are still controversial due to lack of solid evidence supporting one treatment over another. This is particularly true for more controversial issues such as surgery on asymptomatic and silent cervical spinal stenosis, which, although it warrants serious consideration because of its severe sequelae with minor trauma, has yet to gain significant popularity [6,17]. This is due to the unknown denominator of patients with cervical stenosis who do not experience any events. Given the higher prevalence of OPLL in the Asian continent [3], some surgeons appear to be more liberal with ‘prophylactic’ decompression in patients with silent cervical spinal canal stenosis. Based on knowledge of the natural history of OPLL with progressive enlargement [18], early intervention may help prevent significant sequelae, such as rapidly deteriorating cervical myelopathy or acute spinal cord injuries.

Despite some studies suggesting that anterior surgery reduces functional recovery (2.5 versus 3.6 points in the JOA score) at 1-year follow-up [19], surgical decisions are still individualized, as the overall outcomes of anterior and posterior surgery remain similar with regard to effectiveness and safety [20]. However, there are some indications for one or the other of these approaches that are well highlighted in this study. The decision for an anterior or posterior approach relies heavily on the level of disease involvement. Regardless of whether or not OPLL is present, anterior approaches are much more popular for one-level disease. ACDF and anterior removal of OPLL are most commonly utilized. The preferences for fusion options are highly variable, with equal preference for the graft or

cage and the plate fixation methods. Without significant variability between countries or surgeon experience, it appears that the indications for anterior surgery are representative of the entire region.

Most surgeons elected posterior approaches for multilevel stenosis, with a preponderance for laminoplasty (motion-preservation) as the option of choice. For OPLL, more surgeons elected to perform posterior laminectomy and fusion to halt OPLL growth [21]. Because of the commonly observed development of narrowing in Asian cervical spines [22,23], enlargement of the spinal canal at multiple segments may provide better outcomes according to postoperative JOA scores and neurofunctional recovery rates [24]. Posterior indirect decompression may also be safer for multilevel OPLL involvement [25]. Most surgeons selected miniplates for fixation in laminoplasty. Variations in fixation methods due to cost concerns have been reported, but use of these rigid devices was the preferred option for most surgeons.

The use of postoperative immobilization was highly variable among the participants. About half the surgeons utilized rigid neck collars for any surgical procedure. In anterior surgery, and particularly in fusion operations, the use of collars had no effect on clinical outcomes or complication rates [26]. However, early use of collars may improve axial neck pain in laminoplasty [5]. Most surgeons suggest 6 weeks of collar use only to protect their fixation or fusion procedures. The duration of use is relatively short, and prolonged use may cause more postoperative axial neck pain [27-29].

Surgeons from three countries in the Asia-Pacific region did not participate in this study. However, most of the highly populated countries, including China, India, Japan, and Korea, were included, and thus the results should well represent this vastly diverse region. This study provides a general overview of various aspects of cervical myelopathy treatment, but further investigation into more intricate details of the surgical approaches should be performed. These may include the practice of minimally invasive surgery, routine decompression lateral to the uncovertebral joints during anterior discectomy, and methods of neuromonitoring.

Conclusions

The Asia-Pacific region comprises many countries with different ethnic and cultural backgrounds. Providing an

overview of expert opinions in this region helps this large, diverse group of surgeons streamline their management strategies to fit the common norm or generally accepted practice. This study provides the first comprehensive assessment of Asia-Pacific surgeons' view of cervical myelopathy treatment, and from our results, several treatment recommendations have been generated. Cervical myelopathy is commonly diagnosed by the presence of finger dexterity problems, hyperreflexia, and gait disturbances. Prophylactic or early decompression surgery should be considered for patients with silent cervical spinal stenosis, particularly in the presence of OPLL. In such cases, posterior canal-widening surgery by means of laminoplasty or laminectomy with fusion is preferred. Anterior decompression is suggested primarily for one-level OPLL disease.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Author Contributions

All authors contributed to the study design, interpretation, drafting and final approval of the work.

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