

Success Rate and Complications Associated with the Surgical Treatment of Cervical Spondylosis Myelopathy in Albania

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Received: 10 March 2022 / Accepted: 02 April 2022 / Published online: 20 July 2022

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Abstract

Background: Patients suffering from cervical spondylotic myelopathy (SCM) and that do not respond to conservative treatment could benefit from anterior cervical spine surgery. However, surgical intervention is associated with increased risk of complications and therefore the decision to operate should be weighed against benefits. The purpose of this study was to describe the effectiveness and the rate of complications of anterior cervical spine surgery among CSM who do not respond to conservative treatment in Albania.

Material and Methods: A total of 100 CSM patients who did not respond to conservative treatment and who showed up at our Service during 2014-2019 were subjected to anterior cervical spine surgery to resolve the CSM related signs and symptoms. The success rate as well as short-term and long-term complication of surgery were evaluated and reported.

Results: The mean age of CSM patients (59% males) in the study was 51.5 years. One surgical procedure was employed in 90% of CSM patients whereas two procedures were necessary in the remaining 10%. The overall success rate of anterior cervical spine surgery was 70% (excellent in 40% of CSM patients and good in 30% of patients) whereas in 30% of CSM patients' surgery did not bring any benefit or there were no changes compared to before the surgery. The overall rate of complications was 16%; no patients died following surgery. Specific complications were rare and varying from 1% of patients (Brown-Sequard syndrome, vocal cord paresis, wound infection) to 3% (subcutaneous hematoma).

Conclusion: Anterior cervical spine surgery is associated with a relatively high success rate and a low level of post-operative complications and it might be regarded as a safe treatment among these CSM patients who do not respond to conservative treatment.

Keywords: anterior cervical, spine surgery, complications, cervical spondylotic, myelopathy,

Introduction

Cervical spondylotic myelopathy (CSM) is the most common type of a group of degenerative conditions, described with the term Degenerative Cervical Myelopathy (DCM) [1, 2].

The prevalence of CSM is greatly increased with increasing age, and varying from 0.6% among individuals younger than 20 years and peaked to about 9% among those aged 70+ years [1]. The association with age is due to the increasing incidence of central disc herniation with increasing age [1].

The incidence of CSM appears to be steadily increasing, and this carries a significant risk of developing various disabilities. For example, Bakhsheshian and colleagues reported that the incidence and prevalence of CSM-related spinal cord injury in North America is 4.10 and 6.05 cases per 100,000 inhabitants, respectively, and CSM was the most common diagnosis (23.6 %) among 585 patients admitted to a hospital in the UK with tetra paresis or paraparesis [2]; further, they reported that in the United States, the number of CSM patients admitted by the emergency department doubled between 1993 and 2002, from 3.73 cases in 1993

Original article, no submission or publication in advance or in parallel

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to 7.88 cases per 100 inhabitants in 2002 and the number of patients who underwent surgical reconstruction of the cervical spine increased sevenfold during this period [2]. The incidence of CSM and the subsequent number of cervical spine surgeries may continue to increase worldwide as the elderly population is growing everywhere, but especially in developed and middle-income countries.

Patients with asymptomatic or mild CSM can be treated with conservative therapy. However, in case of progressive, moderate or severe cervical spondylotic myelopathy or in patients who do not respond to conservative therapies surgical decompression should be applied.

Various surgical techniques are at disposal, depending on the nature and severity of the damage, localization of the problem, and the state of signs and symptoms the patient experiences. Among these, anterior cervical spine surgery techniques are frequently applied. Anterior cervical spine surgery includes a range of surgical techniques, such as anterior cervical foraminotomy, anterior cervical discectomy with fusion or arthroplasty, and cervical corpectomy [3-6]. Anterior interventions resolve conditions involving the disc space and the vertebral body, playing a key role in correcting or maintaining the sagittal position of the spine. Before undertaking anterior surgical procedures, it is necessary to assess the functioning of the vocal cords of patients who have undergone previous neck surgery. Whereas patients with significant swallowing disorder or patients who have undergone extensive neck irradiation may not be suitable for anterior surgical procedures [3, 7].

Posterior cervical interventions include posterior cervical foraminotomy, laminectomy, laminoplasty, and fusion [8-10]. These procedures are generally reserved for mild lateral disc herniation, foraminal stenosis, and myelopathy due to multilevel congenital stenosis, which cannot be safely or adequately treated with an anterior approach [8-10].

Although anterior and posterior approaches to treating cervical spondylotic myelopathy have been reported to be comparable in terms of efficacy and safety, an increasing number of studies support the anterior approach as associated with better neurological improvement, better positioning, increased cost-benefit and greater patient satisfaction [11, 12].

Despite the obvious benefits, spine surgery could be accompanied by various surgical complications. Whereas the international literature has reported on spine surgery complications, such information is lacking in Albania. In this context, the aim of this study was to describe the complications of anterior spine surgery among a group of patients diagnosed with CSM and not responding to conservative treatment in Albania.

Material and Methods:

This study represents a series of patients (cases) diagnosed with cervical spondylotic myelopathy (CSM) and treated surgically at the Neurology Service at the University Hospital Center "Mother Teresa", in Tirana, Albania, during the period 2014-2019.

Study population

The study population included all patients diagnosed with cervical spondylotic myelopathy and treated surgically for this health condition during 2014-2019. This study included only CSM patients that did not respond to conservative therapy through pharmacological drugs or other manipulative/rehabilitation procedures.

In total, during this period, 100 patients presented to our service with the diagnosis of cervical spondylotic myelopathy, the treatment of which required surgical intervention.

These patients also represent the final population of our study.

The surgical intervention

All CSM patients in this study were subjected to anterior cervical spine surgery. The patients who participated in the study were treated surgically, aggressively, with the aim of relieving them of symptoms and preventing their further neurological deterioration.

Patients were evaluated at different periods after the surgery to record their health status and the effectiveness of the intervention, including surgery complications. More specifically:

- 45 patients or 45% of participants were evaluated 1-3 years after surgery;
- 45 patients or 45% of participants were evaluated 3-6 years after surgery; AND
- 10 patients or 10% of participants were evaluated more than 6 years after surgery.

Part of this post-operative assessment was the assessment of mortality and morbidity rates. Persistent neurological complications were assessed including: Brown-Sequard syndrome, cervical pain, motor deficits, and radicular pain. Complications of operative techniques such as vocal cord paresis, subcutaneous hematoma, persistent dysfunction, graft extrusion, and operative exploration were also assessed.

This study was approved by the Bio-Medical Ethics Committee of the Faculty of Medicine, Tirana.

Statistical analysis

Absolute numbers and corresponding percentages were used to describe categorical variables; for describing continuous or discrete numerical variables, the arithmetic mean (magnitude of central tendency) and standard deviation (magnitude of dispersion) was used. The frequency and type of complications after cervical spine surgery has been reported. The data analysis was performed through the Statistical Package for Social Sciences software, version 26.

Results

This study included 100 patients diagnosed with cervical spondylotic myelopathy and treated with anterior surgery to alleviate their symptoms and prevent their neurological deterioration.

Among the patients who participated in this study 59 of them or 59% were male and the remaining 41 patients or

41% of all patients were female.

The mean age of CSM patients (59% males) was 51.5 ± 11.6 years with 87% of patients being 40-60 years old at the time of presentation to our service.

Table 1 presents information regarding cervical spine surgery among CSM patients included in our study. One surgical procedure has been employed in 90% of patients whereas two procedures were necessary in the remaining 10%. On the other hand, in 60% of cases only one cervical level has been explored, two levels have been explored in 30% of cases and three levels were explored in 10% of CSM patients.

Cervical spine surgery	Cases		Level	
	Absolute number	Percentage (%)	Absolute number	Percentage (%)
Number of surgical procedures				
One	90	90.0	123	80.0
Two	10	10.0	43	20.0
Number of explored levels				
One	60	60.0	60	20.0
Two	30	30.0	90	70.0
Three	10	10.0	30	10.0
Four	0	0.0	0	0.0

Table 1. Data related to surgical interventions among patients with cervical spondylotic myelopathy

Table 2 shows information on the success rate or effectiveness of anterior cervical spine surgery to resolve SCM among participants. More than two thirds (70%) of the patients who underwent the surgery had improved, while the remaining 30% did not have any improvement after the surgery.

The result of the surgical intervention to resolve SCM	Cases	
	Absolute number	Percentage (%)
Excellent	40	40.0
Good	30	30.0
Bad/no change	30	30.0

Table 2. The result of anterior cervical spine surgery among patients with cervical spondylotic myelopathy

Table 3 shows the information regarding cervical spine surgery complications. No patient has lost his/her life as a result of surgical intervention to address cervical spondylotic myelopathy. However, 16 patients or 16% of all patients in the study experienced at least one complication.

A permanent neurological complication has been Brown Sequard syndrome. On the other hand, 8 patients had transient radicular pain, sensory disturbances, muscle deficits, and cervical pain after surgery. Also, 4 patients

had subcutaneous hematomas without having to be treated with surgery. One case had an operative wound infection. No case of graft extrusion was noticed. Meanwhile, two patients experienced dysphagia (Table 3).

Complications	Cases	
	Absolute number	Percentage (%)
Mortality	0	0.0
Morbidity (at least one complication)	16	16.0
Permanent neurological complications		
Brown - Sequard Syndrome	1	1.0
Cervical pain	2	2.0
Sensor deficit	2	2.0
Motor deficit	2	2.0
Radicular pain	2	2.0
Complications of operating techniques		
Vocal cord paresis	1	1.0
Subcutaneous hematoma	3	3.0
Persistent dysphagia	2	2.0
Wound infections	1	1.0
Graft extrusion	0	0.0
Reoperation	0	0.0

Table 3. Complications of surgical intervention in patients with cervical spondylotic myelopathy

Discussion

The current study has reported novel information about the effectiveness of anterior cervical spine surgery and related complications among patients with CSM in Albania. To our knowledge, this is the first scientific report documenting these processes and outcomes in Albania. Our findings suggest that anterior cervical spine surgery is effective in resolving CSM in the majority of patients and the related surgical complications are rather rare and in line with international reports.

There is already ample scientific evidence that surgical decompression of the cervical spinal cord is an effective alternative to treating cervical spondylotic myelopathy that, at the very least, can stop the progression of symptoms and also promote functional recovery.

There is still a strong debate over the optimal surgical approach to the most effective treatment of cervical spondylotic myelopathy and to the timing of conservative treatment before turning to the surgical option. However, a randomized clinical trial suggested that perhaps conservative treatment could be continued for up to three years after the diagnosis of cervical spondylotic myelopathy [13]; afterwards, surgery is needed to address the neurological signs and symptoms and to prevent neurological

deterioration. Other studies have reported the superiority of surgical treatment to resolve the signs and symptoms related to CSM compared to conservative treatment [14, 15].

Regarding the level of success of anterior cervical surgery to resolve compression in CSM in our study we reported that 40% of patients had excellent results, 30% had good results and 30% have no improvement or benefit from these procedures; this means that the success rate of anterior surgery to resolve the CSM in Albania is 70%. This finding is comparable to reports in the international literature. For example, a retrospective study among 69 CSM patients reported that 81.2% of them had excellent and good outcome after anterior surgery [16]. Another study among 120 CSM patients who underwent anterior surgery reported a success rate (excellent and good) of surgery at 79% [17]. Success rates of about 80% of anterior surgery for the treatment of CSM have been reported by other studies in the international arena [18]. Several other studies have reported a success rate of surgery for treating CSM signs and symptoms comparable to the level reported in our study, about 70%; this includes the study by Gao and his colleagues where a success rate of about 74% was reported [19] and the study conducted by Sarkar and his colleagues who reported a surgery success rate of about 72% [20]. Meanwhile, there are also studies that report a success rate of surgery lower than the success rate reported in our study: for example, a study among 248 CSM patients who underwent surgery reported a success rate of surgical procedures in low level of about 59% [21]. It is clear that the level of success of anterior surgery to resolve the signs and symptoms of CSM in Albania is comparable to the success levels of these procedures in the international arena.

In our study the prevalence of complications after anterior cervical surgery was 16%. This result is completely consistent with the literature reports, which suggest that the level of complications after anterior surgical interventions for the correction of cervical spondylotic myelopathy varies from about 2% to about 31% [22, 23]. Complications of anterior cervical surgery for the correction of cervical spondylotic myelopathy include a range of medical conditions such as neurological and vascular injury, esophageal injury, respiratory distress, implant-related complications, displacement of the graft from the right position, cerebrospinal fluid leakage, operative wound infection, etc. [23, 24].

In a study in the US and Canada, the prevalence of postoperative complications after anterior cervical surgical techniques was 11% [23], a finding similar to the 16% prevalence of complications among our CSM patients treated with anterior operative procedure. In the study in the US and Canada the surgical approach was associated with a mortality rate of 0.3%, or one case died while in hospital after surgery due to cardiopulmonary arrest [23], whereas in our study none loss of life during and after surgery in MSC patients.

In our study operative wound infection was encountered in 1% of patients with CSM treated with surgery whereas

in the study in the US and Canada this complication was evidenced in 0.6% of patients treated with anterior cervical surgery [23]. The incidence of post-operative infection was reported at 1.2% also by a systematic review of the literature that included 240 different articles [25]. It is a well-known fact that anterior cervical surgery is associated with a lower incidence of post-operative infections compared to posterior surgical procedures [26].

The incidence of persistent dysphagia in our study was 2% after anterior surgery, and this finding is almost identical to the incidence of this complication identified among CSM patients treated with anterior surgery in the US and Canada, where a level of 2.3 was reported [23]. In the international literature, the levels of dysphagia after surgical treatment with MSC anterior, posterior, or combined anterior-posterior techniques range from 0% to 24% [23]. A recently published (2020) systematic review of the literature on complications of anterior cervical surgery reported an overall dysphagia rate of 5.3% [25].

Postoperative cervical pain was reported in approximately 1% of CSM patients in the study in the US and Canada [23], similar to the finding of our study (2%).

Subcutaneous hematoma was reported in 3% of patients in our study whereas the overall hematoma level was reported 1% from a systematic literature review that included 240 different articles [25].

Likewise, about 0.3% of CSM patients treated with surgery need reoperation [23], whereas in our study no CSM patient needed reoperation.

Radiculopathy was encountered in 1.7%-8.5% of CSM patients treated with surgery, based on the international literature [23, 27-29], a finding similar to that reported in our study (2%).

In our study 1 patient out of 100 CSM patients who underwent anterior cervical surgery resulted in permanent Brown-Sequard syndrome even after surgery. The international literature has also described cases of occurrence or development of this syndrome after surgical decompression [30], but these are rare cases.

In our study the presence of permanent motor deficits was evident in 2% of all CSM patients who underwent anterior cervical surgery; this constitutes a low level of this condition. Anterior surgery is reported to bring good benefits in reducing motor deficits in these patients, especially those who present with a significant level of preoperative physical weakness as reported in a study of 1001 patients who underwent anterior cervical fusion discectomy between 2010-2013 and were followed for two years after the intervention; among 54 patients with pronounced physical weakness before surgery, about 87% of them experienced a good recovery of motor functions even two years after the intervention [31].

Overall, in our study we noticed a fairly low incidence of permanent neurological complications and a low level of post-operative complications, compared to other studies in the international arena [25].

Conclusion

Anterior cervical spine surgery is effective in resolving CSM signs and symptoms in the majority of Albanian CSM patients that do not respond to conservative treatment. Also, anterior cervical spine surgery is associated with a low level of post-operative complications thus it might be regarded as a safe treatment among these patients.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding

We have no sources of funding to declare in this study.

Authors' contributions

AXH conceived and drafted the manuscript. NH designed and revised the work. AXH participated in the sequence alignment and performed statistical analysis. AXH participated in the design of the study and performed the laboratory analysis. AXH participated in its coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

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