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Complications - Other

Cervical Myelopathy Doubles the Rate of Dislocation and Fracture After Total Hip Arthroplasty

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ABSTRACT

Background: Cervical spondylotic myelopathy (CSM) is a common and underdiagnosed cause of gait dysfunction, rigidity, and falls in the elderly. Given the frequent concurrency of CSM and hip osteoarthritis, this study is designed to evaluate the relative risk of CSM on perioperative and short-term outcomes after total hip arthroplasty (THA).
Methods: The Medicare Standard Analytical Files were searched from 2005 to 2012 to identify all patients undergoing primary THA and the subset of patients with preexisting CSM. Risk ratios with 95% confidence intervals were calculated for 90-day, 1-year, and overall follow-up for common postoperative complications: periprosthetic dislocation, fracture, infection, revision THA, and wound complications.
Results: The risk ratios of all surgical complications, including dislocation, periprosthetic fractures, and prosthetic joint infection, were increased approximately 2-fold at all postoperative time points for patients.
Conclusion: Preexisting CSM is a significant risk factor for primary THA complications including dislocation, periprosthetic fractures, and prosthetic joint infection.

Cervical spondylotic myelopathy (CSM) is a condition caused by degenerative disease in the cervical spine and is the most common cause of spinal cord dysfunction in the elderly [1,2]. In CSM, the spinal cord is compressed from congenital narrowing or stenosis of the cervical spinal canal, degeneration of vertebrae, intervertebral discs, and/or facet joints or from ossification of the posterior longitudinal ligament [3,4]. The resultant upper motor neuron dysfunction is manifested clinically through loss of balance, loss of fine motor control and dexterity, gait disturbances, spastic movements, rigidity, and hyperreflexia [5].

Gait disturbance is the most common presenting symptom in CSM patients and is present in greater than 75% of patients undergoing surgical decompression [6]. In CSM, the complex polysynaptic feedback mechanisms between afferent and efferent neurons required for normal gait are disrupted and result in deficient proprioception and spastic, rigid, and uncoordinated muscle movements. To compensate for imbalance, CSM patients adopt a gait pattern characterized by reduced velocity, stride length, and single-stance time and an increase in stride width and double-stance time [7-9].

Similar to CSM, hip osteoarthritis is a degenerative disease and can cause a significant level of dysfunction and disability. Although many patients respond well to conservative treatment measures including weight loss, exercise, and anti-inflammatory medications, total hip arthroplasty (THA) remains the gold standard for patients with severe osteoarthritis refractory to conservative treatment [10,11]. Despite high rates of patient satisfaction and low cost per quality-adjusted life year gained, complications after THA remain a major clinical problem especially as the incidence (IN) and prevalence of THA increase. Accordingly, it is essential to identify risk factors for complications and modify techniques and/or protocols correspondingly.

Although it is accepted that CSM causes significant gait disturbances and spasticity and that postoperative falls can cause devastating complications after THA, little is known about the effect of CSM on outcomes after THA. Even in instances where the

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Table 1
Patient Demographic Data Including Age and Gender for Total Hip Arthroplasty Patients With Cervical Myelopathy and Cervical Myelopathy With Decompression Compared to Controls.

Demographics and Comorbidities	Control		Cervical Myelopathy		Cervical Myelopathy With Decompression		*P* Value
	n	%	*n*	%	*n*	%	
Gender							
Female	424,615	60.02	3482	57.83	615	52.43	<.001
Male	274,912	38.86	2539	42.17	558	47.57	<.001
Age							
<65	67,287	9.51	1144	19.00	241	20.55	<.001
65-69	172,563	24.39	1835	30.48	403	34.36	<.001
70-74	156,004	22.05	2143	35.59	484	41.26	<.001
75-79	146,410	20.70	1712	28.43	338	28.82	<.001
80-84	109,212	15.44	983	16.33	165	14.07	<.001
>85	67,857	9.59	392	6.51	34	2.90	<.001
Unknown	10,181	1.44	228	3.79	60	5.12	<.001
Comorbidities							
CHF	60,144	8.5	923	15.3	156	13.3	<.001
PVD	73,742	10.4	1492	24.8	291	24.8	<.001
Hypertension	391,706	55.4	5021	83.4	984	83.9	<.001
Diabetes	121,051	17.1	1794	29.8	362	30.9	<.001
Solid tumor	69,279	9.8	876	14.5	170	14.5	<.001
Obesity	56,538	8.0	1110	18.4	251	21.4	<.001
Psychoses	24,543	3.5	682	11.3	134	11.4	<.001
Depression	63,228	8.9	1779	29.5	384	32.7	<.001
Smoking	99,738	14.1	2096	34.8	462	39.4	<.001
Total cohort size	707,460		6021		1173		

CHF, congestive heart failure; PVD, peripheral vascular disease.

coexistence of CSM and hip osteoarthritis is known, the effect of CSM on mobility can be forgotten and the degree of imbalance conferred by CSM can be masked by assistive aids and pain-limited gait adaptations. The aim of this study is to compare the rates of perioperative and postoperative complications after primary THA between patients with and without cervical myelopathy. We hypothesize that the gait dysfunction and muscle spasticity caused by cervical myelopathy will cause increased rates of postoperative complications including prosthetic joint dislocations, periprosthetic fractures, and revision surgery.

Methods

The Medicare Standard Analytical Files, encompassing 100% of Medicare beneficiaries, were reviewed using the PearlDiver Patient Records Database (PearlDiver Technologies, Inc, West Conshohocken, PA) from January 1, 2005, through December 31, 2012. This study was investigational review board exempt as data provided in the Standard Analytical Files are anonymized without protected health information. International Classification of Diseases, Ninth Revision (ICD-9) procedure code 81.51 was used to identify all patients undergoing primary THA from January 1, 2005, through December 31, 2011, ensuring a minimum of 1-year follow-up for all patients in the study. The subset of patients undergoing primary THA with a preexisting diagnosis of CSM was identified with the ICD-9 diagnosis codes ICD-9-D-722.71 and ICD-9-D-721.1. Additionally, the subset of patients undergoing primary THA with a preexisting diagnosis of CSM who also underwent cervical decompressive surgery (CSM + D) before primary THA was identified with the ICD codes for CSM with the procedural codes ICD-9-P-0309, ICD-9-P-8050, and ICD-9-P-8051. The control was defined as all patients undergoing primary THA without a diagnosis of myelopathy either before or after primary THA.

These cohorts were then cross-referenced with ICD-9 and Current Procedural Terminology codes for medical and surgical complications of interest after THA. The rates of surgical complications including periprosthetic infection, prosthetic hip dislocation, periprosthetic fracture, THA revision, arthrotomy or irrigation and debridement, and wound complications in the first 90 days postoperative and overall (greater than 1 year) were calculated for the CSM, CSM + D, and control groups. Similarly, medical complications including myocardial infarction, heart failure, arrhythmia, deep venous thrombosis, pulmonary embolus, stroke, pneumonia, urinary tract infection (UTI), and blood transfusion occurring in the first 90 days postoperative were calculated for each group. Demographic data including age range, gender, and comorbidities present before THA were collected for each group. Comparison of gender between groups was performed using a chi-square test, whereas differences in age range (reported in 5-year increments) were assessed using the Mann–Whitney *U* test for nonparametric data; the IN, risk ratios (RRs), and respective 95% confidence intervals were determined for postoperative complications. RRs were determined by calculating the ratio of the IN rate for each pair of groups. All analyses were performed using the R statistical package, version 3.0.2 (Vienna, Austria) [12-14]. No funding was utilized to conduct this study.

Results

Overall, 6021 patients were identified with preexisting CSM before undergoing primary THA. An additional 1173 patients were identified with preexisting CSM and subsequent cervical decompression (CSM + D) before undergoing primary THA. The control group consisted of 707,460 patients without a diagnosis of myelopathy before or after primary THA (Table 1). Significant

Table 2
Age and Gender Statistical Comparison.

Demographics and Comorbidities	Control	Cervical Myelopathy	Cervical Myelopathy With Decompression
Age	72.75 (72.74, 72.77)	71.48 (71.35, 71.60)	70.72 (70.49, 70.97)
% Female	0.61	0.58	0.52

Control group significantly older than myelopathy groups, with no difference between myelopathy groups. Significantly fewer females in myelopathy with surgery group when compared to the other 2 groups.