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Surgical treated cervical degenerative disk disease is not hereditary: results from a national twin cohort study

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Background: Genetic factors are considered important in the development of degenerative disk disease. However, the concordance rates for the phenotypes requiring surgical treatment for the common spine diseases cervical disk herniation (CDH), cervical foraminal stenosis (CFS), and degenerative cervical myelopathy (DCM), are unknown. The aim of this study was to determine the concordance rates for CDH, CFS, and DCM conditions requiring surgical treatment by studying monozygotic (MZ) and dizygotic (DZ) twin pairs.

Research question: Are genetic factors important in developing cervical degenerative spine diseases requiring surgical treatment?

Design: A national observational cohort study based on the Swedish spine register and the Swedish twin registry.

Methods: Patients, aged 18 to 85 years, surgically treated for CDH, CFS, or DCM between 1996 and 2022 were identified in Swespine (5962 CDH, 3801 CFS, and 3131 DCM patients) and matched with the STR to identify MZ and DZ twins. Concordance rates were calculated.

Results: There were 64 twin pairs (15 MZ, 49 DZ) where one or both twins had surgical treatment for CDH. The corresponding numbers for surgically treated CFS and DCM were 37 twin pairs (13 MZ, 24 DZ) and 44 twin pairs (11 MZ, 33 DZ), respectively. For twins with CDH there were one concordant MZ pair and no concordant DZ pair (MZ probandwise concordance rate 0.12 [95% CI 0-0.33]). For twins with CFS there were one concordant MZ pair and no concordant DZ pair (MZ probandwise concordance rate 0.14 [95% CI 0-0.38]). In DCM patients there were no concordant twin pairs.

Discussion: If a condition is exclusively genetic in origin, the MZ concordance, in theory, will approach 100%. However, in this national observational study, including 145 twin pairs, the concordance rates were low for surgically treated CDH, CFS, and DCM conditions. Our findings suggest that genetic factors are probably not of major etiologic importance in cervical degenerative spine diseases.