Roentgenographic Findings of the Cervical Spine in Asymptomatic People, a 10-Year Follow Up
Donald R. Gore, MD (Sheboygan, WI)

INTRODUCTION: In 1986 we published the roentgenographic findings of the cervical spine in 200 asymptomatic people ages 20-65 years. We have had the opportunity to evaluate 159 of these people 10 years later. The purpose of this study is to describe the development and/or progression of degenerative changes during that 10-year period, document the number of people that developed pain and determine whether the development of pain is associated with roentgenographic findings.

METHODS: In our initial study, we had 200 asymptomatic people, 100 women and 100 men, equally divided in age groups of 20-25, 30-35, 40-45, 50-55 and 60-65. Observations were made on a lateral roentgenogram taken with each patient standing in a comfortable position looking straight ahead resting their shoulder against the film cassette. Cervical lordosis was measured as the angle formed by a line projected parallel to the posterior surface of the body of C2 and aligned parallel to the posterior surface of the body of C7. The four roentgenographic components of intervertebral disc degeneration: disc space narrowing, end plate sclerosis, and osteophyte formation both anterior and posterior were recorded for each disc space. A numerical grading system was designed and used to grade the severity of the degenerative changes at each intervertebral level.

In addition, congenital abnormalities and vertebral body subluxations were recorded.

The roentgenographic procedure was repeated 10 years later on all the people we could locate, and a short questionnaire was administered to determine if the patients had developed neck pain during that 10-year period.

STATISTICAL METHODS: For univariate relationships, Fisher's exact test was used to test for associations between two variables. Fisher's test is more reliable than the chi-squared statistics when there are small cell counts, which occur frequently in this data. The Odds ratio is reported for 2 by 2 tables.

Partial Spearman rank and Kendall's Tau-b correlation coefficients were used to measure correlations between Lordosis and the Degenerative Index while controlling for Age.

Binary logistic regression was used to analyze multivariate relationships for predicting pain and subluxations. Odds ratios are reported for significant relationships.

RESULTS: One hundred fifty-nine people, 82 women and 77 men, participated in the final part of this project. Initially, 2 people had forward subluxations of one vertebral body on the lower adjacent level and 11 on the final roentgenogram. The initial cervical lordosis was 18 degrees and final 19 degrees. The initial degenerative index for all levels combined was .55 and final 1.10. The most frequent sites of degenerative change and the most severe were at C5-6 and C6-7. Twenty-three people, 15 women and 8 men, developed pain in the 10-year interim.

STATISTICALLY SIGNIFICANT RESULTS: Cervical lordosis correlates with age, however, the difference between the initial and final lordosis was not significant. The difference between the number of initial and final subluxations was significant, and subluxations were significantly associated with age and location. People over 70 are 11.6 times more likely to have subluxations, and the most likely locations are C3-4 and C4-5, p=0.0492 and 0.006 respectively. Subluxation is not associated with degenerative changes as measured by degenerative index, p=0.2868. The increase in the degenerative index at levels C3-4, 4-5, 5-6 and 6-7 was significant, p values respectively were 0.005, 0.0012, 0.0001 and 0.0007. Initial degeneration at C6-7 was a significant predictor of pain. The odds of developing pain for those with an initial degenerative index greater than 0 are 4.025 times higher than those with no initial degeneration, p=0.0037.

DISCUSSION AND CONCLUSIONS: Degenerative changes at the intervertebral disc level and subluxations, which most likely are the result of facet degeneration, occur with greater frequency in older people. The presence of degenerative change at C6-7 is a significant predictor of neck pain development in previously asymptomatic people.