Sir,

Klippel-Feil Syndrome (KFS) is a complex, congenital condition, originally described by Maurice Klippel and Andre Feil in 1912. It is characterized by congenital fusion of two or more cervical vertebrae. Because of the abnormal fusion process and altered spinal biomechanics with undue motion at the non-fused cervical segment, adjacent to fused segments, such individuals are predisposed to abnormal cervical spine degeneration that could lead to canal stenosis at the level of a non-fused cervical segment, resulting later in undesirable instability and potential injury to neural elements. We present a rare case of multiple vertebral fusions of cervical segment, thoracic segment and lumbar segment with multiple level vertebral canal stenosis in a patient with KFS.

A 28-year male presented with bilateral hypoesthesia of the areas below the neck, gait disturbance, and weakness in bilateral lower extremities developed gradually over a two-month period. The patient was born with thoracic deformity that remained untreated due to the lack of obvious symptoms in daily life activities. There was no history of trauma preceding development of these symptoms. The patient showed typical triad of a very short neck, a low occipital hairline and reduced neck movement. His physical examination showed bilateral hypoesthesia of the areas below the neck, bilateral lower extremities muscle strength decreased, and were regarded as IV grade by manual muscle test. He had an unsteady gait. Visual Analogue Scale Score was 3 point and Japanese Orthopaedic Association Scores for assessment of cervical myelopathy was 8 points.

Dynamic X-ray of the spine demonstrated lordosis of the spine (Figure 1A and 1B). Computed tomography (CT) demonstrated multiple level fusions of C3-T1, T2-T5, T6-T7, T9-T10, loss of cervical lordosis and thoracic kyphosis (Figure 1C). Magnetic resonance imaging (MRI) showed multiple fusions and loss of normal disc height of C3-T1, T2-T5, T6-T7, T9-T10, T11-L1 and L2-L3 levels, canal stenosis at C2-C3 and T1-T2 levels (Figure 1D).

Surgical canal decompression and intervertebral autologous bone graft at the level of C2-C3 and T1-T2 was successful. The patient reported a complete disappearance of hypoesthesia of both sides while bilateral lower extremities muscle strength were unchanged. The patient was followed-up for 36 months. Visual Analogue Scale Score was 0 point and Japanese Orthopaedic Association Scores for assessment of cervical myelopathy was 15 points at the 9th post-operative month. Three-dimensional reconstruction CT demonstrated a large number of bone which had notable grown in the bone graft area at that time.

This case is very rare and interesting because it demonstrated a large amount of fusion of C3-T1, T2-T5, T6-T7, T9-T10, T11-L1 and L2-L3 levels and a great range of fused segments including cervical segments, thoracic segments, and lumbar segments. The amount of fused segments was extremely large, which was never seen in KFS patients reported earlier. In a case of this complexity, educational value increased still further because the fused segments were far apart from each other and in such a great number. Multiple studies demonstrated that KFS patients possess altered spinal biomechanics and motion. When multiple segments were fused, the adjacent normal levels might become hypermobile and were exposed to significantly increased stresses. The resultant degenerative changes
led to potential neurologic compromise.\textsuperscript{4,5} This case represented several typical adjacent non-fused levels disease including canal stenosis at C2-C3 and T1-T2 levels due to altered spinal biomechanics as the fusions of C3-T1 and T2-T5 resulted in increase stress at adjacent levels.

**REFERENCES**


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Received: January 27, 2015; Accepted: April 15, 2016.