Spine Deformity
www.spine-deformity.org

Spine Deformity 6 (2018) 627–630

# Prone Position–Induced Quadriceps Transcranial Motor Evoked Potentials Signal Loss—A Case Report

Xudong J. Li, MD, PhD[a], Lawrence G. Lenke, MD[a,*], Earl Thuet, BS, CNIM[b], Lee A. Tan, MD[a], Alexander Tuchman, MD[a]

[a]*Department of Orthopedic Surgery, The Spine Hospital, Columbia University Medical Center, New York, NY, USA*
[b]*Intraoperative Monitoring Service, New York Presbyterian Hospitals/Columbia University Medical Center, New York, NY, USA*

Received 4 February 2018; accepted 14 February 2018

## Abstract

**Background:** Transcranial motor evoked potential (TcMEP) is widely used intraoperatively to monitor spinal cord and nerve root function. To our knowledge, there is no report regarding TcMEP signal loss purely caused by patient positioning during the spinal procedure.
**Purpose:** The objective of this article is to report an intraoperative TcMEP signal loss of a patient with fixed sagittal imbalance posture along with mild hip contractures.
**Study Design:** A retrospective case report.
**Methods:** A 57-year-old man had fixed sagittal imbalance and flexed hip contractures. For a reconstruction surgery of T10 to the sacrum/ilium and L5 pedicle subtraction osteotomy (PSO), he was put in a prone position on a Jackson table. In order to accommodate his fixed hip flexion contracture, thigh pads were not used and pillows were placed under his bilateral thighs for cushioning. TcMEPs were used to assess lumbar nerve root function. Ten minutes after incision, bilateral vastus medialis TcMEPs were lost during spine exposure whereas all other data remained normal at baseline. The bilateral lower extremities were repositioned, with the knees flexed into a sling position to increase hip flexion. Five minutes after repositioning, the bilateral vastus medialis TcMEPs gradually improved and maintained baseline amplitude during the remainder of the surgery.
**Results:** No muscle weakness was detected immediately after surgery. The patient was discharged day 6 postoperatively with markedly improved posture and alignment.
**Conclusion:** Insufficient hip flexion in patients with fixed sagittal imbalance and hip flexion contractures may cause TcMEP signal changes in the quadriceps response. TcMEP monitoring of bilateral lower extremities is highly recommended for patients with sagittal imbalance and hip contractures, with consideration for lower extremity repositioning when data degradation does not correlate with the actual spinal procedure being performed.


*Keywords:* Hip contracture; Spine deformity; Neuromonitoring

## Introduction

For deformity surgery, positioning is an important surgical step that should be exploited to achieve maximum postural correction [1-3]. The efficacy of transcranial motor evoked potentials (TcMEPs) in detecting isolated nerve root injury for surgery below

Author disclosures: XJL (none), LGL (other from Orthopaedic Research and Education Foundation [OREF] and Global Spine Outreach [GSO], other from Medtronic, DePuy-Synthes, K2M, grants from AOSpine, Setting Scoliosis Straight Foundation, EOS Imaging, Fox Family Foundation, Scoliosis Research Society, other from Medtronic, Quality Medical Publishing, other from BroadWater, AO Spine, other from Medtronic, outside the submitted work), ET (none), LAT (none), AT (none).

*Corresponding author. The Spine Hospital, New York Presbyterian/Allen, 5141 Broadway, New York, NY 10034, USA. Tel.: (212) 932-5082; fax: (212) 932-5097.
*E-mail address:* LL2989@columbia.edu (L.G. Lenke).

2212-134X/$ - see front matter 
https://doi.org/10.1016/j.jspd.2018.02.008

the conus has been demonstrated [4]. There was a report of position-induced TcMEP change of a patient who underwent an L3 pedicle subtraction osteotomy (PSO) [5]. The patient had an acute loss of TcMEP amplitudes of the left rectus femoris, adductor muscles, vastus medialis, vastus lateralis, and tibialis anterior during wound closure. After the patient was turned to the supine position, TcMEPs rapidly recovered. To our knowledge, there is no report of TcMEP signal loss purely caused by patient positioning occurring prior to spinal deformity correction.

## Materials and Methods

The patient was a 57-year-old man who had undergone more than 10 lumbar surgeries. On physical examination, he had a pitched forward posture (Fig. 1A). He was unable to stand upright, with flexed hips measuring approximately 45 degrees. Laying supine, he could get his hips down to approximately 20 degrees.

The C7–sagittal vertical axis (SVA) measured a +265 mm (Fig. 1B). He had implants posteriorly from T10 to S1 with 2 degrees of lumbar kyphosis and a pelvic incidence of 51 degrees and a pelvic tilt of 30 degrees. The surgical plan was for a revision posterior spinal reconstruction from T10 to the sacrum and ilium, with an L5 PSO.

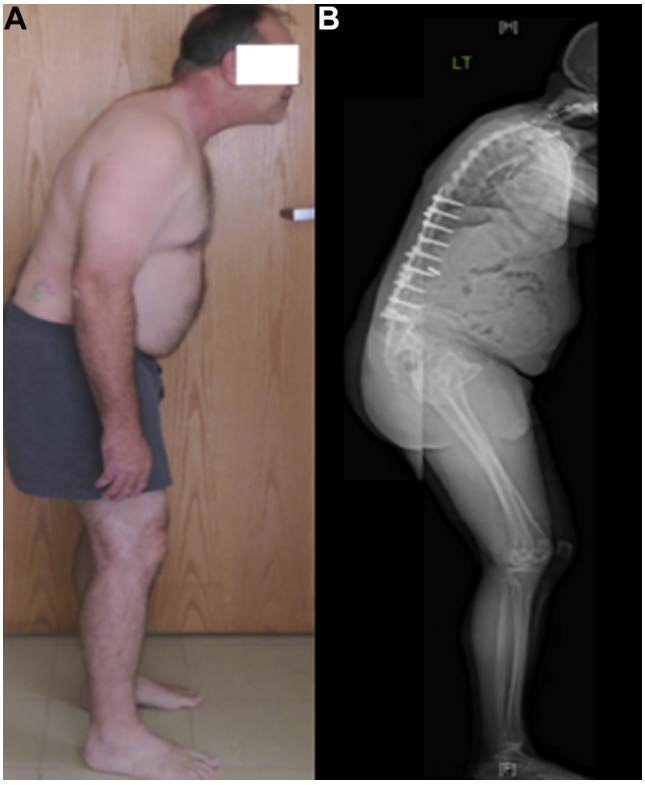


Fig. 1. Clinical picture (A) and lateral total body radiograph (B). Note that the patient had a pitched-forward posture with hip flexion of approximately 45 degrees.

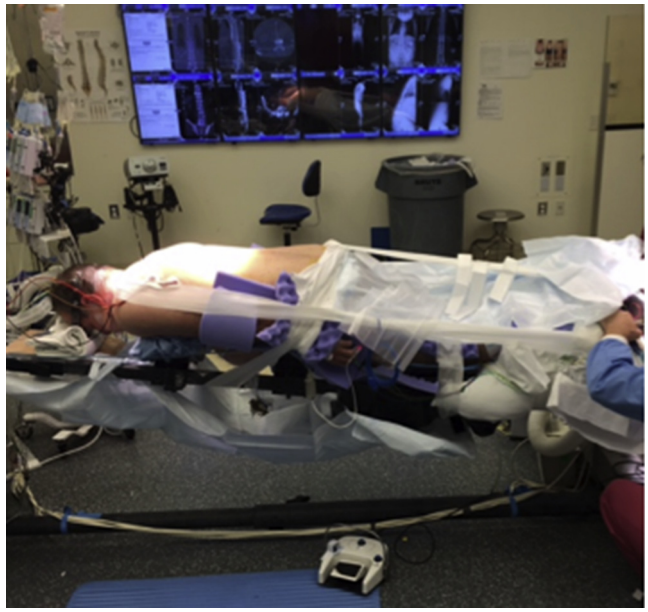

Fig. 2. Patient was positioned in a prone position on a Jackson table without thigh pads, but with a cushioned pillow placed under his thighs to accommodate his flexed hip contracture.

In the operative room, he was positioned in a prone position on a Jackson (OSI) frame. In order to accommodate his fixed hip flexion contractures, thigh pads were not used and pillows were placed under the thighs bilaterally (Fig. 2). Blankets and pillows were placed around his knees to support his legs. For TcMEP monitoring, subdermal needle electrodes were placed into the iliopsoas, quadriceps femoris, tibialis anterior, medial gastrocnemius, abductor halluces brevis, and extensor hallucis longus muscles. Preoperative neuromonitoring showed well-formed TcMEPs in the bilateral lower extremities (Fig. 3A). Ten minutes after the incision, bilateral vastus medialis TcMEP responses were lost during spine exposure whereas all other data remained normal including the tibialis anterior responses (Fig. 3B). After the electrode placement was checked and confirmed to be in good position, the bilateral lower extremities were repositioned. His knees were flexed into a sling device that allowed for a marked increase in hip flexion. Five minutes after the repositioning, bilateral vastus medialis TcMEPs gradually improved (Fig. 3C) and maintained baseline amplitude during the rest of the surgery.