Pedicle screw stimulation (PSS) has long been used to guide and ascertain the placement of pedicle screw during spine surgery. If compound muscle action potential (CMAP) from related myotomes is recorded at a low stimulation threshold during PSS, it indicates a proximity of pedicle screw to the spinal root and possible medial wall breach, which requires redirection and replacement of the screw by the surgeon. However, it’s not that easily accessible in terms of trunk muscles, with the intercostal muscles (IC) in particular when T2-5 pedicle screws are needed to be placed. In the present study, we used musculoskeletal ultrasound (US) to guide needle placement over trunk muscles when doing PSS during spine surgery.

METHODS
Besides from routine somatosensory evoked potential (SSEP) and motor evoked potential (MEP) monitoring, a pair of recording needle electrodes would be left at the myotome of the particular spinal level that pedicle screw would be placed. For muscles supplied by T2 to L1 that were not that readily accessible, including intercostal muscles (T2 to T5), rectus abdominis (T6 to T12), internal oblique muscle and psoas muscle (L1), we would use ultrasound guidance to define the location and depth of the muscles for precise needle placement so as to avoid possible puncture of pulmonary and nearby neurovascular structures, or false negative result during PSS (Figure 1, 2, 3,4). The placement of pedicle screw was then confirmed by PSS.

RESULT
Forty one cases, aged 5 to 80 were enrolled in this study, including 17 with idiopathic scoliosis, 7 congenital scoliosis, 12 neuromuscular scoliosis, 1 with Marfan syndrome, 1 pars fracture, 1 spondylolisthesis, and 2 cases with degenerative scoliosis. Preoperative spinal curve ranged from 33 to 98 degree, postoperative curve ranged from < 10 to 82 degree. Number of pedicle screws used or spinal fixation ranged from 4 to 22. Threshold of stimulus to obtain a CMAP ranged from 2 to > 20 mA during PSS. After operation, none of our patients sustained new postoperative deficits related directly to pedicel screw placement.

CONCLUSION
Under ultrasound guidance, it will be much more precise regarding the placement of recording electrodes, which in turn reduce the false negative interpretation of PSS and unexpected postoperative deficits. Ultrasound guidance proved to be a feasible and simple tool to improve the outcome and safety of the spine surgery.