the patient roll paravertebrally from the 7th cervical (C7) to the 3rd sacral (S3) vertebra. Using the SpinalMouse®, we also measured each intersegmental angle while the patient was in the following positions : a neutral crawling on hands and knees position (NCP), a maximum extension position (MEP), and a maximum flexion position (MFP) to evaluate thoracic, lumbar, and total spinal mobility (Figure 2). In addition, motion analyses were performed using the Vicon system (Vicon Motion Systems, Oxford, United Kingdom) before and 2 weeks after beginning the rehabilitation program.

Two weeks after the patient began the rehabilitation program, thoracic and lumbar mobility improved from 77° to 86° and 17° to 31° , respectively, on the SpinalMouse®. The thoracic extension angle and spine extension angle improved from 4.6° to 2.9° and 29.0° to 17.5° , respectively, according to the Vicon system. His LBP improved from 56 to 21/100 on a visual analogue scale.

He has continued with this conditioning for 2 years since the first visit to our clinic. He has been able to continue participating in karate as a top-level competitor at the national level, with no LBP.

DISCUSSION

Spina bifida occulta (SBO), which is frequently seen in the lumbosacral area, is considered a developmental failure of osseous union between the two halves of the posterior arch. In this report, we presented a case with SBO in the thoracolumbar junction. To our knowledge, no report has described SBO in the thoracolumbar junction, though the probable incidence is regarded as < 5% (2). The thoracolumbar spine is the focal point of stress during various spinal movements. Specifically, the central point of this girdling structure is the thoracolumbar fascia, which is a complex of aponeurotic and fascial planes that forms the retinaculum around the paraspinal muscles of the lower back and sacral region (3). This complex is continuous with the paraspinal fascia in the cervical, thoracic, and lumbo-pelvic regions, eventually fusing to the cranial base and iliac crest. Based on these anatomical features, a loss of normal structure in the thoracolumbar spine may cause discoordination of motion in this region and related functions, which results in LBP. Proctor, *et al*. reported a case series on thoracolumbar syndrome as a cause of LBP (4).

In this case, we hypothesized that discoordination of the muscles and skeletal structures caused by the SBO at T11-L1 were a main factor in his LBP. Generally, the coordination pattern between adjacent joint angles reflects motor control of the organizing adjacent structures. Accordingly, in this case, immediately after the spinal mobility measured by SpinalMouse® improved by the rehabilitation program, his LBP has disappeared. This result suggests that the coordination of the muscles and skeletal structures that was compromised, due to the SBO at T11-L1, had recovered.

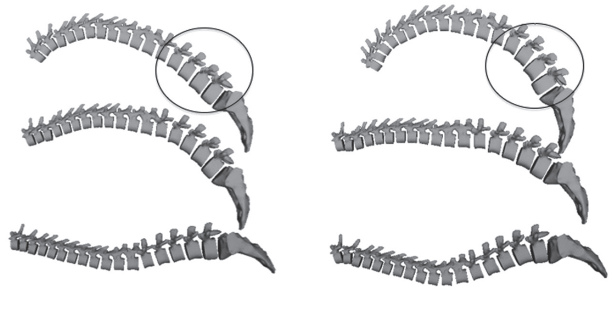

Figure 2 SpinalMouse® images of the thoracolumbar spine showing a change in spinal movement from pre- to post-intervention. An increase in the lumbar flexion angle was especially noteworthy (circle).

CONCLUSION

These results suggest that evaluation of the coordination of the muscles and skeletal structures has an important role in the treatment of cases with an anatomical abnormality such as SBO.

DISCLOSURE

All authors confirm that there are no conflicts of interest with regard to persons or organizations that could have influenced our study findings.

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