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NEURORADIOLOGY
CASE REPORT

Postoperative spinal ultrasonography findings in spinal dysraphia

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ABSTRACT
Diastematomyelia is a form of spinal dysraphism involving sagittal clefting of the spinal cord, conus medullaris, and/or filum terminale into two hemicords. It can be an isolated finding or can be associated with meningomyelocele or meningocele. In this report, we present postoperative spinal ultrasonography findings in a patient with diastematomyelia and a tethered cord.

Key words: • *spina bifida* • *ultrasonography*

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Spinal dysraphia includes all the congenital anomalies characterized by abnormal or insufficient closure of the neural tube (1). Diastematomyelia is also a kind of spinal dysraphia that is characterized by the sagittal clefting of the spinal cord (2). Diastematomyelia can be a completely isolated finding, although meningocele or meningomyelocele frequently accompany diastematomyelia.

Diastematomyelia can be diagnosed with prenatal ultrasonography. During the postnatal period, isolated diastematomyelia can be entirely free of symptoms, or cutaneous findings and neurological-orthopedic complaints can exist.

Finding myelomeningocele or meningocele in prenatal ultrasonography is important in determining the postnatal surgical approach. Spinal defects should be closed after birth. Neural placode is replaced within the canal after dissecting it from the surrounding tissues. Dura is freed, skin is mobilized and the surface is closed. At times, vertebral dissection may be required (2).

Detailed evaluation of congenital spinal anomalies is possible by virtue of advances in magnetic resonance (MR) imaging techniques. However, since MR imaging in early childhood requires sedation and is an expensive imaging method, it has been suggested that using ultrasonography in the evaluation of the spinal cord, particularly in the postoperative period, can be an effective method (3).

In this report, we present the postoperative spinal ultrasonography findings of a case with diastematomyelia and a tethered cord.

Case report

A 14-year-old girl who had undergone surgery two years ago for meningocele repair and freeing of the tethered cord was evaluated with spinal ultrasonography during the routine neurosurgery follow-up.

Laboratory findings were within normal limits, although physical examination revealed thoracolumbar kyphoscoliosis, shortness of height, loss of about 3/5 of normal strength in both extremities that was more evident in left leg, and enuresis.

In the thoracolumbar plain films, the patient had thoracic scoliosis, hemivertebra, and butterfly deformities in the lower thoracic vertebrae (Figure 1).

In the spinal MR examination, kyphoscoliosis with an aperture to the right side, butterfly appearance in the body of T12 vertebra, caudal regression below L2 vertebral body (Figure 2), and two hemicord appearance consistent with diastematomyelia below the level of T12 vertebral body were noted (Figure 3). There was a lipoma in the right hemicord (Figure 4). When examining the region from the beginning of the diastematomyelia till its distal end, an appearance in the vertebrae consistent with posterior fusion or postoperative defect was noted. In these

Figure 1. Anteroposterior thoracolumbar spinal radiograph shows the anomalies in the ribs and the vertebrae, rotokyphoscoliosis, and bone anomalies in the diastematomyelia level.

Figure 2. Sagittal T2 weighted MR image reveals the caudal regression, distal dilatation in the dural sac, bone anomalies, and a bone spur at the diastematomyelia level.

Figure 3. Coronal precontrast T1 weighted MR image shows the two hemicords clearly.

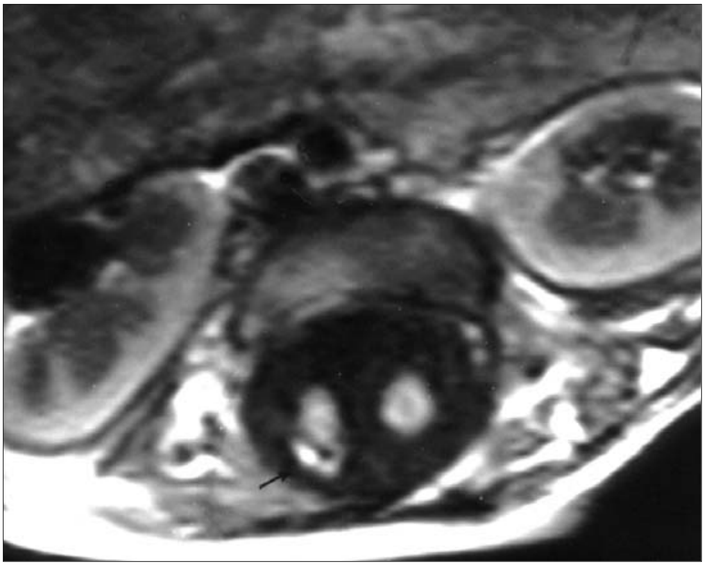

Figure 4. Transverse precontrast T1 weighted MR image demonstrates the two hemicords and a lipoma *(arrow)* in the right hemicord.

levels, it was seen that the marked dilation in the thecal sac extended to the paraspinal muscle planes through the defect in the posterior vertebral elements.

Spinal ultrasound examination was performed with a 10 MHz probe, with the patient lying in the lateral decubitus position. In spinal ultrasonography, both hemicords, as well as the contents of the dural sac, were evaluated and both hemicords were in central position. Nerve roots extending within the dural sac along the hemicords, and thin septal structures were noted (Figure 5). There was a bone spur proximally (Figure 6). In the level where the myelomeningocele was closed, where both hemicords ended, and pulsation was evaluated subjectively, it was decided that there was hemicord adhesion since there was no pulsation (Figure 7).

Discussion

Diastematomyelia, one of the double cord malformations, indicates the existence of two hemicords within two dural sacs, which are transfixed to each other through an osteocartilaginous spur that is positioned in the midline (4). The basic embryogenetic mechanism responsible is mesodermal invasion of the neural tube, as can be deducted from the existence of the midline-positioned bone spur (4, 5). The reason for such invasion is an ontogenetic error during the closure of the primitive neurenteric canal. Median septum is generally located in the lumbar region. Diastematomyelia is a tethering-forming lesion. Findings indicating this tethering can be seen in the clinical picture. Spina bifida, myelocele, meningomyelocele, myeloschisis, thick filum terminale, costal anomalies, lipomas, dermoid tumors, dermoid cysts, and dermal sinus tracts can accompany diastematomyelia (5).

In the evaluation of spinal dysraphism, ultrasonographic examination in the prenatal period and MR imaging in the postnatal period are common in practice. However, MR imaging during the early childhood period is controversial, since it requires sedation, is an expensive method, and there are difficulties in evaluating the spinal cord displaced towards posterior, in terms

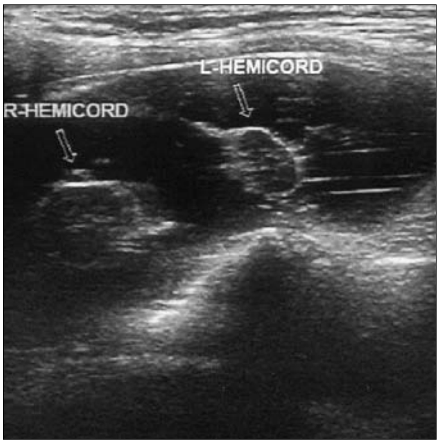

Figure 5. Transverse ultrasonographic image reveals the right and left hemicord in central position, with nerve roots extending along both hemicords. Thin septal structures within the dural sac are also noted.

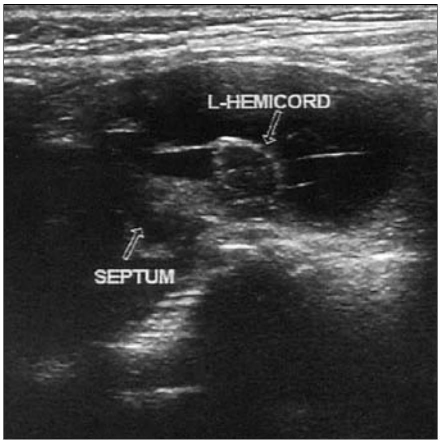

Figure 6. Transverse ultrasonographic image shows a bony spur (septum) between the two hemicords.

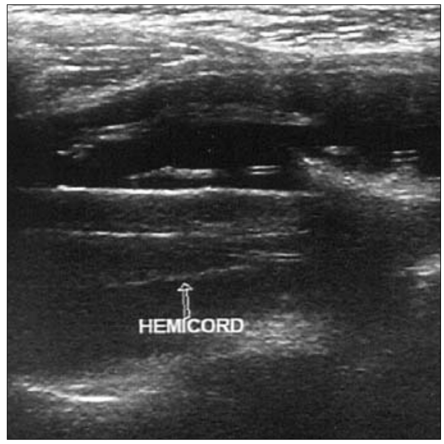

Figure 7. Transverse ultrasonographic image shows the hemicord terminating in the sacral region accompanied by adhesion.

of the cord adhesions, when the patient lies in a supine position (3).

Ultrasound in the evaluation of a postoperative dysraphic spinal cord can be an effective method. However, the success of this method depends upon the presence of sufficient interlaminar space or bone defect (3).

Since there was a sufficient bone defect in our case, ultrasonographic evaluation of the lumbosacral region was successful. It could be seen that both hemicords were centrally located, since the patient was lying in a lateral decubitus position. However, both hemicords had displayed posterior location in the previous control MR images and computed tomography (CT) examinations. In this instance, evaluation of the cord adhesions, which are frequently dorsally positioned, could not be done satisfactorily with MR imaging and CT. Positioning the patient in a lateral decubitus position, and not in a supine position, during spinal ultrasound will be more effective in imaging dorsal cord lesions. Furthermore, ability to monitor the cord pulsation during spinal ultrasound, although a subjective method, is rather significant in terms of a tethered cord (3).

Diastematomyelia and accompanying bony-cartilaginous defect can be imaged without any problems with postoperative spinal ultrasound, in the presence of sufficient bone defect. Nerve roots extending through the spinal cord and the contents of the dural sac, as well as septal deformities, can be evaluated.

We conclude that using spinal ultrasonography in postoperative spinal dysraphism cases for the evaluation of the spinal cord, particularly in terms of adhesion, is quite an effective method in the presence of a sufficient imaging window.

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