CASE REPORT

Somatosensory-Evoked Potentials and MRI in Tuberculous Spondylodiscitis

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Abstract

Early diagnosis of spondylodiscitis is a condition of efficient conservative treatment. Somatosensory-evoked potentials with clinical examination results are used in assessing the diagnosis, as well as in monitoring the course of disease and healing. MRI clearly shows the inflammatory process, healing and scars. We report a 46-year-old woman suffering from non-specific interscapular pains. The evoked somatosensory potentials of the tibial nerves show potential conductivity being slowed down through the thoracic spine, which is clearly evident from the prolonged latency and the decreased amplitude of the evoked response. The performed thoracic MRI shows spondylodiscitis at the Th10–11 level. The subject is a nurse administering BCG therapy at a urology clinic, due to the fact of which this was deemed to have been a case of tuberculous spondylodiscitis. Due to the possibility of scattering the causative agent by needle, the biopsy was given up and antitubercular therapy was administered ex juvantibus. The disease was followed up by clinical examinations, somatosensory-evoked potentials and MRI up to fully successful and final recovery from spondylodiscitis. The above examinations are of great help in diagnosing the tuberculous spondylodiscitis and monitoring the recovery (Fig. 6, Ref. 16).

Key words: spondylodiscitis, SSEP, MRI, tuberculosis.

It is very difficult to diagnose spondylodiscitis at the first medical examination. Its clinical state is non-specific. Only highly differentiated diagnostic procedures can help to diagnose the disease early and thereafter commence the appropriate therapy. Spondylodiscitis is caused by pyogenic bacteria, mycobacterium tuberculosis, fungi, rheumatic and aseptic changes, or malignant diseases, etc. (1–3). Somatosensory-evoked potential (SSEP) is a biopotential through the spinal chord. Its image, in form of waves, has its quantitative and qualitative characteristics. Changes in latency and amplitude of particular evoked potentials indicate a pathological change (4, 5). MRI in sagital, transverse and coronary cross-sections clearly shows pathological processes and has an important role in solving the diagnostic dilemmas and monitoring the development of the disease (6). We present our experience in the diagnosis and treatment of spondylodiscitis.

Case study

46-year-old woman, a nurse administering BCG therapy at a urology Clinic for many years, suffering from pains in the lumbar spine with occasional paresthesias down her right leg. The diagnostic treatment revealed dorsolateral i.v. disc protrusion at the level of L5–S1 and disc bulging at the level of L4–L5. During the past twenty days she feels pains in her neck, paresthesias down both of her arms and interscapular pain. In her neurological state, there has been found only painful percussion of spinous processes in the interscapular area and tense paravertebral muscle. The right hand muscle strength is significantly decreased, the flexors force appearing preserved. There is hypeaesthesia of the dermatomes C4 to C8 and L4, L5 and S1 on the right. The EMNG indicates a grave radicular lesion of C6 and C7 on the right. The SSEP were done by Medelec Synergy – Oxford Instruments apparatus. SSEP of the median nerve were

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of adequate amplitude and latency. SSEP of the tibial nerve were obtained by stimulating both tibial nerves behind the medial malleolus. The neurograms were detected in the popliteal fossa, the spinograms at S1, Th12, Th 6, and cortical responses above the leg sensory region. The tibial nerve stimulations produced normal neurograms, left thoracic spinograms were not registered with certainty, whereas the cortical response is bilaterally of normal latencies and amplitudes. The findings thus indicate impeded conductivity of somatic sensation brought about by the tibial nerve through the left thoracic segment (Fig. 1). SSEP of tibial nerve – conductivity impediments through the left thoracic segment, decreased amplitude of the evoked response in the left thoracic segment, normal findings on the right.

In the ventral half of vertebral bodies of Th10 and Th11 by the intervertebral space, the MRI of the thoracic spine, made by Shimatzu EPILS 0.5T showed a decrease in signal intensity in T1 and marginally an increase in T2 with an impact on the ventral half of the intervertebral disc. Intravenous application of the contrast agent showed marginal imbibition, the change of which corresponds to spondylodiscitis (Fig. 2). MRI of the thoracic spine – spondylodiscitis Th 10–Th11 in the ventral half of the body, imbibed with the contrast agent.

Subsequently, MRI of the cervical spine was performed as well, which showed a wide dorsomedial disc protrusion with caudal and prevalently right bilateral spreading and a larger right part of dorsolateral thorny osteophyte of the C5 inferior ephiphseal plate. At the level of C6–C7 i.v. spaces, significant spondylodgenerative changes and a dorsomedial disc protrusion are visible.

Fig. 1. SSEP of the tibial nerve – impeded conductivity through the thoracic spine at left, lowered amplitude of the evoked response at left, the right side findings being normal.

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Having in mind the spondylodiscitis appearance as well as the fact that the subject was a nurse performing intravesical applications of BCG therapy at a urology clinic, this was deemed to have been a case of tuberculous spondylodiscitis. PPD with 3 IU caused a 20x20-mm erythema. There was considered a CT-
controlled needle biopsy of the discitis contents, aimed at ascertaining the cause, but was given up due to the possibility of scattering the causative agent. A triple antituberculous therapy was administered: isoniazid with piridoxine, rifampicine and pyrazinamide. The follow-up of neurological tests made two months later revealed painful percussion of spinous processes of the lower thoracic vertebrae. SSEP of the n. tibialis was unchanged. MRI of the thoracic spine was identical as before.

Five months after introducing the antituberculous therapy, pyrazinamide was excluded because of the significant rise in aminotransferases values, and etambutol was introduced into the therapy. Two months after this replacement, AST and ALT liver enzymes were normal.

Eight months after the latter change in therapy the patient suffered from limited mobility of the thoracic spine, however the percussion of spinous processes was less painful. The follow-up tests included SSEP of the tibial nerve and MRI of the thoracic spine. As to SSEP stimulation of both tibial nerves neither neurogram nor spinogram were registered, and the cortical response was of markedly low amplitude and extended latency (Fig. 3). The findings indicate polyneuropathy caused by antitubercular drugs, as confirmed by electromyograph. SSEP of the tibial nerve – neither neurograms nor spinograms are differentiated, whereas the cortical response is of low amplitude and extended latency.

The follow-up MRI of the thoracic spine shows vertebral bodies to be of normal height, shape and structure; with ventral hypointensity of the signal in T1 weighted ventral part of Th10 and Th11 bodies. In T2 there is an evident marginally elevated signal, whereas the application of contrast agent shows marginal

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**Fig. 3.** SSEP of the tibial nerve – there are neither neurograms nor spinograms differentiated, whereas the cortical response is of low amplitude and extended latency.

**Fig. 4.** MRI of the thoracic spine with contrast agent applied – there is evident marginal imbibition at the Th10 and Th11 levels, ventral segment, recovery from spondylodiscitis.
imbibition. As compared to the images made eight months earlier, there is a noticeable improvement (Fig. 4). MRI of the thoracic spine with contrast agent – visible marginal imbibition at Th10 and Th11 levels in the ventral segment, spondylodiscitis undergoing improvement.

The antituberculous therapy was terminated after nine months. Thiamine and pyridoxine therapy in form of infusion was administered twice followed by continuous oral administration.

Five months after the termination of the antituberculous therapy and fourteen months after diagnosing the disease, the clinical status is dominated only by pain in the thoracic segment at stronger physical efforts and mildly limited inclination. The SSEP Follow-up of the tibial nerve and MRI of the thoracic spine were made. SSEP of the tibial nerve shows improving findings and evoked neurogram and spinogram (Fig. 5). SSEP of the tibial nerve five months after the introduction of antituberculous therapy – there are no neurogram or spinogram recorded, whereas the cortical response is of extended latency.

MRI of the ventral and marginal parts of corresponding Th10 and Th11 vertebrae shows a change in their spongy bone structure. At each examination it was hypointensive, thus indicative of sclerosis. Marginally, there are visible signs of fat marrow, with a mere indication of oedema, the corticais is preserved (Fig. 6). MRI of Th10 and Th11 in T2, sagital cross-section, fourteen months after diagnosing the tuberculous process and five months after the termination of antituberculous therapy – scars after spondylodiscitis.

Discussion

Tuberculous spondylodiscitis called Pott’s disease is the most common presentation of vertebral tuberculosis. Clinical features vary from incomplete tetraplegia, complete or incomplete paraplegia, to paresthesia. MRI is very useful to determine the extent of the lesions. Bacteriological and histological diagnoses can be deficient (6, 7). Early diagnosis of spondylodiscitis is often difficult because of its long latent period. Radiographs of the spine, bone scans, and computed tomographies provide insufficient data. MRI is the investigation method of choice in the diagnosis of spondylodiscitis, especially in very early stages of the disorder, when other investigations still yield negative results. Radiological evaluations have gained importance in the diagnosis, treatment planning, treatment and treatment monitoring of spinal infections. MRI is sensitive and specific for spondylitis. In T1-weighted images there was a decrease in signal intensity of the involved bone and soft tissues; in T2-weighted images there was an increase in signal intensity, which thereafter enhanced the contrast agent gadolinium administration (8–12). This implies that MRI of the involved spinal segment is necessary when there is a clinical suspicion of spondylodiscitis, as well as during conservative disease treatment. Nene and Bhongraj think that tuberculous spondylodiscitis in adults can be well managed with conservative treatment in a vast majority of cases, and that indications for surgery are few and specific (13). Pursuant to the above, in a case of clinically suspected spondylodiscitis, supported by SSEP of the tibial nerve, the application of MRI in
the diagnosis of spondylodiscitis proved to be correct. The subject was a nurse applying BCG at a urology clinic, due to the fact of which this was deemed to have been a case of tuberculous spondylodiscitis. A complication could result from scattering the causative agent by the i.v. disc needle biopsy, wherefore we administered antituberculous therapy without biopsy findings. The MRI follow-ups show the course of healing up to full recovery, with residual scars. More successful treatment and recovery are possible in patients when the disease is diagnosed in its early stage prior to the development of the neurological deficit. Our goal is, therefore, to state the diagnosis of spondylodiscitis as soon as possible i.e. to base it on the first early entirely nonspecific symptoms available. In the reviewed case they were the mild interscapular pain, stronger at pressure, no neurological deficit and of great help were the somatosensory-evoked potentials of the tibial nerve. The damaged somatic sensations of numerous pathological processes are evident from the prolonged latency of evoked response and decreased amplitude. Changes in the evoked response may be caused by degenerative changes, idiopathic scoliosis, multiple sclerosis, tumorous process, syringomyelia, etc. (14–16). Pathological changes of the somatosensory-evoked potentials indicate that an additional radiological treatment is required. MRI makes a sensitive and specific diagnosis of spondylodiscitis. Thus, the scarce clinical symptomatology with pathological changes of SSEP of the tibial nerve at the thoracic spine level have directed us to further diagnostic treatment, the above presented MRI of the thoracic spine. SEP is a sensitive treatment summing up its significant diagnostic potential with that of scarce symptomatology prior to the stage of developed neurological deficit. Therefore, SSEP and MRI are methods of choice in early diagnosis of spondylodiscitis, enabling both timely treatment and monitoring of the disease and the healing.

References


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