

Complex diagnostics of common conditions of the motor organ of the developmental age

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Abstract

Some muscular and osteoarticular diseases pose serious diagnostic problems, e.g. subsequent recurrent or persistent conditions of isolated pain in the extremities, most frequently – in the lower extremities, especially knee joints, and isolated pain in the back, usually in the lumbosacral spine. They are often accompanied by gait abnormalities.

The paper herein presents a complex differential diagnosis of these conditions, the presented diseases that can cause them, and the role of the family doctor, paediatrician, orthopaedist, and rheumatologist in the diagnosis.

A detailed history of the presented complaints, accurate physical examination, plus extensive biochemical and immunological diagnostics, and microbiological and imaging techniques usually allow a diagnosis to be made.

Attention was paid to the sequence of imaging procedures conducted in the differential diagnosis of pains of the extremities and the spine and not to overuse procedures that involve exposure to ionising radiation.

Key words: differential diagnosis, pains in the lower extremities in children, pains in the spine in children.

Paediatric rheumatology departments primarily deal with inflammatory diseases of the motor organ. Detailed history of presenting complaints, accurate physical examination, plus extensive biochemical and immunological diagnostics, and microbiological and imaging techniques usually allow a diagnosis to be made.

Some muscular and osteoarticular diseases pose significant diagnostic problems, e.g. the following recurrent or persistent conditions:

- isolated pains in the extremities, most frequently in the lower extremities,
- isolated pains in the back, usually in the lumbosacral spine.

The above described complaints are often accompanied by gait abnormalities.

Frequent incidence of such conditions is confirmed by my own observations (several hundred orthopaedic consultations conducted at the Department and Out-

patient Clinic of Rheumatology of Developmental Age, National Institute of Geriatrics, Rheumatology, and Rehabilitation in Warsaw during the past 10 years).

A child is referred to the Clinic after being consulted by a primary care physician or paediatrician, and quite often by an orthopaedist at a hospital emergency ward or in an outpatient clinic.

Orthopaedic, surgical, and paediatric consultation aims to exclude injuries that might have resulted in intra-articular extravasation, adjacent bone fractures, rupture of ligaments and entheses, or the presence of foreign bodies in the joint.

At that point, the physician should also have excluded pyogenic and transitory inflammation within the joints, bones, bone marrow, adjacent muscles and soft tissue, as well as avascular necrosis [1].

During the child's stay at the clinic, the paediatric rheumatologist continues the diagnostics to exclude

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growing pains, excessive mobility of ligaments, rheumatic inflammatory conditions, especially juvenile idiopathic arthritis (the diagnosis covering seven clinical presentations of the disease), reactive arthritis, more complex infections (TBC, viral infections), and benign and malignant systemic or focal cancers (leukaemia, lymphoma, osteoblastoma, osteoid osteoma, Ewing's sarcoma, or osteosarcoma) [2].

In many cases, it transpires that the pre-admission paediatric and orthopaedic diagnostics was superficial; in such cases it is necessary to perform detailed history-taking and medical imaging.

When describing their child's medical history, parents often leave out facts that are vital to the doctor, e.g. overloads connected with sports or recreational activities (dance, yoga).

Initial imaging examinations sometimes do not reveal signs of stress fractures, e.g. non-displaced tibia fracture, avascular necrosis of bones (usually Os-good-Schlatter disease, Legga-Calve-Perthes disease, or Haglund-Sever disease), chondromalacia patellae, or enthesopathy of the knee [3, 4]. Pain in the knee joint can be a referred pain in the case of pathological lesions related to adjacent joints. It should not be overlooked that pains in the knee joints and gait disorders can be caused by lesions in the region of hip joints and/or inflammation of vertebrae and intervertebral discs, or spinal cord tumours.

The discussed pain symptoms of the knee joint and their related gait abnormalities have an antalgic (i.e. compensatory) nature: they save the painful extremity.

In the diagnostic process, paediatric rheumatologist and orthopaedic co-ordination is necessary especially in cases of non-antalgic gait pattern and the symptoms listed below:

- congenital dysplastic lesions of the hip joint (Trendelenburg gait pattern),
- congenital clubfoot,
- cerebral palsy (toe walking),
- uneven length of the legs (hemiplegic gait),
- neurological conditions (steppage gait),
- scoliosis or abnormal spinal curvatures,
- flat feet or other postural abnormalities [5–7].

Where the onset of the pain is sudden, the consulting orthopaedist should exclude fractures caused by injury or overload resulting from repetitive non-physiological movements, e.g. excessive lordosis and spinal rotation while practising sports, ballet, dancing, or martial arts.

Back pain is not always a result of a backbone disease.

If it is chronic, the main task of the primary care doctor or paediatrist is to exclude any existing faulty posture including scoliosis, as well as pyelonephritis,

referred pains in abdominal diseases, and sickle-cell anaemia.

Spinal pain can result from overload of paraspinal muscles, possibly related to sitting too long (school, computer) or carrying a rucksack too big for the child's weight.

Differential diagnosis should exclude Scheuermann's disease.

The paediatric rheumatologist should exclude juvenile idiopathic osteoporosis and inflammatory conditions within the spine, i.e. infection-related inflammation (discitis) and inflammatory spondyloarthropathies (ankylosing spondylitis, psoriatic arthritis, reactive arthritis, or immunologically conditioned intestinal diseases).

Further diagnostics should also exclude intervertebral disc hernia, aneurysmal bone cysts, angioma of bones, benign neoplasms (osteoid osteoma and osteoblastoma), and malignant neoplasms (Ewing's sarcoma, lymphoma, neuroblastoma, metastases of cancers [often from soft organs]) [8–10].

A consulting orthopaedist is expected to diagnose possible conditions that have not been diagnosed at emergency wards, like sprains in the ligament system, pars fractures, and spondylolisthesis, because such conditions are not identified by routine radiography. The diagnostics will be assisted by extended imaging procedures (high-resolution ultrasound scanning, oblique-projection radiography, SPECT, computed tomography, magnetic resonance imaging).

Pains, both in the extremities and in the back, especially in adolescents, may accompany some psychological (emotional or behavioural) problems.

In this paper, I would also like to point out the sequence in which imaging procedures should be conducted in the differential diagnosis of pains of the lower extremities and the spine.

There are many medical imaging options available nowadays, and since children are specific patients it is vital not to overuse procedures that involve exposure to ionising radiation.

Ultrasonography is a very sensitive but non-specific technique used to detect exudates from the knee, hip, and talar joints. It is, however, impossible to identify the type of exuding fluid by means of ultrasound only. Ultrasound can be used to evaluate the ligament system, articular cartilage, patella, meniscus, entheses, and thickness of the synovial membrane, including its vascularity when the power-Doppler option is available.

It should be remembered that due to the specificity of the developmental age, inflammatory signs visible in a child's ultrasound scan may be overstated.

Bone scintigraphy is a sensitive but non-specific technique. It enables examination of the whole skele-

ton simultaneously, which makes it possible to detect hidden fractures, especially stress fractures, as well as inflammatory lesions of bone marrow and bones, and cancerous lesions.

Single photon emission computed tomography (SPECT) will complete the bone scan with possible diagnosis of increased bone turnover in the affected region.

The above-mentioned techniques are appreciably replaced by magnetic resonance imaging (MRI) together with its TIRM option (total body scan).

However, where it is necessary to examine new bone layers, computed tomography (CT) remains indispensable.

Methods of choice are still standard radiographs made on two perpendicular planes (AP and lateral projections), and exceptionally – oblique projections when a pars fracture is suspected.

To sum up, isolated pains especially the lower limbs but also lumbosacral spine are common problems at developmental age. It is therefore very important to perform differential diagnosis and to exclude conditions that may permanently damage the motion system as well as being symptoms for other organ or system disorders and fractures. Classic radiographs should still be done as a first between image studies [6, 8].

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