

# Diagnostic problems in tumour of Th10 vertebra in a 10-year-old girl – Case study

Tomasz Lach<sup>1</sup>, Aleksandra Krywko<sup>2</sup>, Michał Latański<sup>3</sup>

<sup>1</sup> Student of the II Faculty of Medicine with English Language Division, Students' Scientific Orthopedic Group, Medical University of Lublin, Poland

<sup>2</sup> Student of the I Faculty of Medicine with Dentistry Division, Students' Scientific Orthopedic Group, Medical University of Lublin, Poland

<sup>3</sup> Paediatric Orthopedic Clinic, Medical University of Lublin, Poland

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## Abstract

**Introduction.** Despite a wide range of imaging modalities available today, clinically silent osteolytic changes in the skeletal system occurring in children are still a diagnostic challenge.

**Case report.** The study presents the case of 10-year-old girl with a tumour in a thoracic vertebra. The patient was admitted to the Paediatric Orthopedics Clinic in the Paediatric Clinical Hospital in Lublin suffering from severe pain in the thoracic and lumbar spine. The pain had started suddenly. Physical examination showed lumbar spine pain and a forced scoliotic position. To reduce the symptoms, spinal traction, analgetics and myorelaxing drugs were used. X-ray and CT of the spine showed congenital unfused S1-S3 vertebrae. An MRI was scheduled for further diagnosis. After treatment, the symptoms disappeared and the patient was discharged after 6 days. MRI showed an oval, well-demarcated lesion in the vertebra body and left side of the arch of the Th10 vertebra. The patient was admitted to the Clinic one again.

CT scan of the thoracic spine showed an osteolytic lesion in Th10 vertebra. In the spine X-ray irregular vertebral body contour in Th10 vertebra, was seen. There were no signs of neoplastic infiltration. Scintigraphy showed increased radioisotope uptake in spinal processes of Th10 and Th11 vertebrae, which confirmed the MRI results. A transpedicular trepanobiopsy of the Th10 vertebrae was performed to provide material for histopathological examination. Then, a transpedicular stabilization of Th9-Th11 vertebrae and posterior spondylosis with spinal autografts was performed. Histopathological examination showed no malignant cells but did not help to establish a diagnosis.

**Conclusion.** In spite of using all the available diagnostic methods it was impossible to determine the type of lesion in the patient's spine. Genetic tumour marker test can be considered.

## Key words

osteolytic lesion, aneurysmal cysts, osteoblastoma, diagnostic problems

## INTRODUCTION

Various lytic changes affecting the skeletal system are often observed in adolescents and young adults. They produce numerous manifestations during that dynamic phase of development [1, 2]. The changes may be clinically silent; however, a number of them can pose potential danger to life and further development. The article presents a case study of a 10-year-old girl with a tumour located in the Th10 thoracic vertebra.

## CASE STUDY

A 10-year-old girl was admitted as an emergency case to the Paediatric Orthopedic Clinic of the Children's Hospital in Lublin, Poland, suffering from severe sacro-lumbar pain. The history revealed the pain started suddenly after she lifted her younger brother. Clinical examination found pain on palpation of the lumbar spine affecting the spinous processes, supraspinous ligaments and paraspinal muscles,

accompanied by a left forced scoliotic position. Lasegue's sign was bilaterally negative. X-rays of the lumbar spine showed congenital unfused arches of S1-S3 vertebrae which, however, were of no clinical significance. To confirm diagnosis, a CT scan of L1 – S5 was taken. CT scan of the lumbar spine found no apparent pathological changes. The height of the vertebral bodies and intervertebral space was maintained.

The patient was given analgesics (Perfalgan, 600 mg, and later as requested) and Pershl's lift. The pain and discomfort disappeared after medication with painkillers and lift treatment. After 6 days in hospital, the patient was discharged home in good condition, and recommended to take (in 2 weeks) MRI. She was prescribed Mydocalm (2×50 mg) and Ibuprofen (3×200 mg).

MRI scan of Th 10 region showed oval, a well-demarcated area of pathologically-enhanced IS in T2 dependent view and suppressed IS in T1 dependent view, surrounded by a hyperintensive border in the Th 10 vertebral body on the left side of the arch. The change of 33×18 mm caused a subtle impression of the frontal part of the dural sac buffer zone. After intravenous injection of paramagnetic contrast, a marginal signal amplification was observed. The description of the result suggested differential diagnosis between aneurysmal cyst, giant-cell tumour, or compressive fracture due to hemangioma reconstruction.

Address for correspondence: Tomasz Lach, Student of the II Faculty of Medicine with English Language Division, Students' Scientific Orthopedic Group, Medical University, Lublin, Poland  
E-mail: tomaszlach@poczta.fm

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Next, a CT scan of Th2 – L3 spinal region was taken to visualize bony structures. CT confirmed osteolytic lesion in the body of the Th10, but did not give a definitive diagnosis. It also showed a narrowing of the intervertebral spaces between Th9-Th10 and Th10-Th11 of rough borders of the vertebral bodies, especially Th10 (Figs. 1 and 2). To exclude other pathological lesions, scintigraphy was performed, which showed only higher accumulation of the radioisotope uptake in view of the spinous processes of Th10 and Th11. However, no metastases were found.



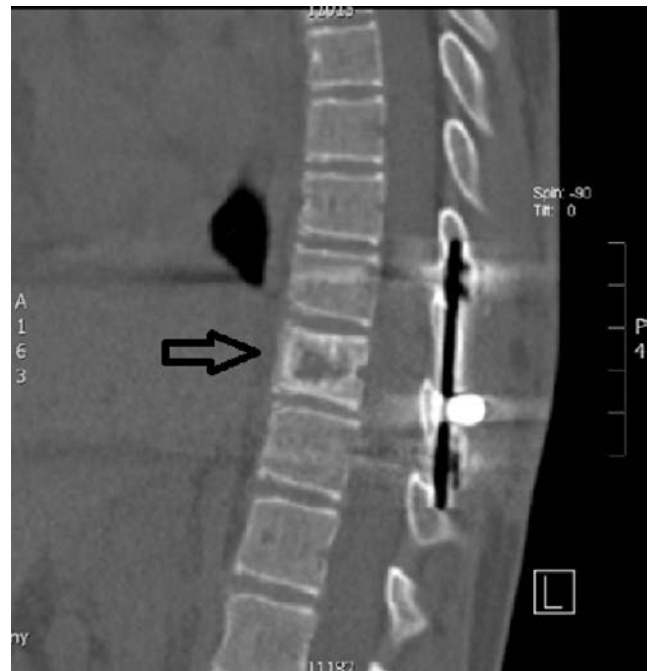
**Figure 1.** CT scan of patient before operation (sagittal projection)



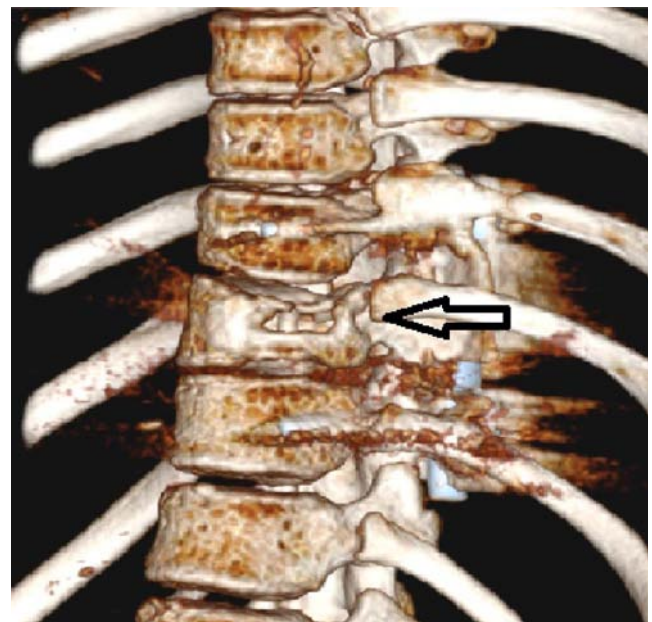
**Figure 2.** CT scan of patient before operation (cross-section)

The next step was to obtain material for histopathologic examination and the patient was qualified to transpedicular trepanobiopsy. Open left trans-body trepanobiopsy of the Th10 vertebra was carried out. Considering the size of the lesion and risk of pathological fracture that could have damaged the nervous structures, a transpedicular stabilization of the Th9–11 and posterior spondylosis with autologous transplantation of the spinous and transverse processes and vertebral arches was made. The patient was verticalized on day 2 and discharged home on postoperative day 5, in good condition.

Histopathological examination showed no presence of cells indicating malignant tumour; however, it also did not produce findings relevant for a definitive diagnosis. Repeated, postoperative CT scans taken 6 and 9 months (Fig. 3 and 4) after discharge revealed progressive bone remodeling at the site.



**Figure 3.** CT scan of patient's spine 6 months after operation



**Figure 4.** CT (3D projection) of patient's spine 9 months after operation

After a year of follow-up, the patient continues to feel good and has no neurological deficits. Since the first visit, her back pain has not recurred.

## DISCUSSION

The patient's age provides the essential basis for prompt diagnosis of tumour as some changes are more frequent in certain age groups [2, 3]. It should be noted that the changes may have different locations in patients of different age [2]. Benign lesions dominate in 10-year-olds; the exceptions include Ewing's sarcoma and typical bone sarcoma [4]. Typical characteristic lesions of the spine in children are shown in Table 1 [4, 5]. Moreover, it is also important to



determine whether the change is single or multiple, and if it is located within the skeleton, which allows the exclusion of some types of diseases with higher probability, e.g. diagnosis of tumour should not be considered if the change does not affect the articulating end of the bone [5, 6, 7].

**Table 1.** Location and character of neoplastic changes in 10-year-olds

Location	Spine	
Neoplasms	Tumor and tumor-like lesions	
	Benign	Malignant
	Aneurysmal cysts	chordoma
	osteoblastoma and osteoid osteoma	myeloma
	osteochondroma	lymphoma
	LCH Langerhans cell histiocytosis	osteosarcoma
	angioma	chondrosarcoma

Tumours and tumour-like lesions can be benign or malignant, and malignancies can be further subdivided into primary, secondary (transformation of benign process) and metastases [3, 4, 8]. Radiological assessment helps in differential diagnosis to determine the features of malignancy [3, 8, 9, 10].

In the group of 0 – 20-year-old patients, the most frequently observed tumours are Ewing's sarcoma, osteosarcoma, eosinophilic granuloma, osteoblastoma, aneurysmal cyst and exostoses. Imaging techniques which allow determination of the characteristic features of changes help narrow down the search to a smaller group of possible diagnoses [11]. Typically, benign lesions are of IA type (according to the system of classification of margins of lucent/lytic bone lesions) of a narrow transition zone, while malignant and aggressive lesions usually have a wider transition zone. Another feature likely to be identified by imaging are lucent foci or enhanced opacity, which allows specification of the type of primary tumour [12].

Periosteal manifestations without interrupted continuity of the periosteum usually indicate a benign lesion, whereas discontinuity of the periosteum signifies malignancy. If soft tissues are affected, malignant tumour is usually suspected, with the exception of giant-cell tumour, aneurysmal cyst and osteoblastoma.

The development of imaging techniques has allowed for more accurate visualization of tumours and the likely changes within the osteoarticular system, and thus their better detection [10]. Despite a wide range of imaging modalities it is still a diagnostic challenge [7]. Particularly difficult cases are clinically silent, produce no pain or neurological deficits, and are detected accidentally, as in the case described above [1]. The last word belongs to histopathologist evaluating the specimen although, unfortunately, the diagnosis is not always conclusive.

Genetic tumour markers can also be considered. Tumour markers are substances that are produced by cancer or by other cells of the body in response to cancer or certain benign (noncancerous) conditions. Most tumour markers are produced by normal cells as well as by cancer cells; however, they are produced at much higher levels in

cancerous conditions. These substances can be found in the blood, urine, stool, tumour tissue, or other tissues or bodily fluids of some patients with cancer. Most tumour markers are proteins.

Considering the above data, differential diagnosis can be narrowed down to osteoblastoma, aneurysmal cyst, osteosarcoma, single bone cysts (of atypical location), chondromyxoid fibroma, or giant-cell tumour (in rare cases may occur before skeletal maturity has been reached) [6]. As the number of malignancies in children has been increasing, potential metastasis originating in other sites should also be considered; however, in this case, imaging examinations excluded neoplasms at other locations.

## CONCLUSIONS

Despite better diagnostic methods available it was impossible to determine conclusively the type of lesion in the patient's spine. Therefore, diagnosis can possibly also consider testing for genetic markers of malignancies. At the same time, surgical stabilization of the spine with an osteolytic lesion allowed the avoidance of any further pathological fractures of the spine or serious neurological consequences.

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