

Radiotherapy in the treatment of osteoblastoma - a report of five consecutive cases

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Osteoblastomas are rare, locally aggressive bone tumours, usually not giving distant metastases. The basic method of treatment is surgery. Radiotherapy is used for unresectable, recurrent and aggressive tumours or after an incomplete excision. We report five patients (age: 16-55 years). In 4 cases the lesions were located in long bones and in 1 case in the pelvis. In all cases curettages were performed, but in 3 we applied postoperative irradiation (45-50 Gy) because of non-radical surgery and aggressive histopathological form. The mean follow-up period was 28.3 months. In the group of irradiated patients we observed partial regression and pain relief in 2 cases and tumour and pain level stagnation in 1 case. We observed no pain relief in patients treated by surgery alone.

Rola radioterapii w leczeniu guzów typu osteoblastoma. Opis pięciu przypadków

Guzy typu osteoblastoma są rzadkimi nowotworami kości, zaliczanymi do guzów łagodnych. Formy miejscowo złośliwe, zwykle nie dające przerzutów odległych, należą do rzadkości. Podstawową metodą leczenia jest leczenie operacyjne, a radioterapia jest stosowana w przypadkach guzów nieoperacyjnych, form złośliwych, wznów oraz po nieradykalnych operacjach. W pracy zaprezentowano 5 chorych w wieku od 16 do 55 lat. W 4 przypadkach guzy były zlokalizowane w kościach długich, a w 1 w miednicy. Wszyscy chorzy byli leczeni miejscowym łuzeczkowaniem zmiany, a 3 z nich uzupełniająco napromieniano z powodu nieradykalności wykonanego zabiegu i złośliwej formy guza w 1 przypadku. Średni okres obserwacji wynosił 28,3 miesiąca. U dwóch napromienianych chorych uzyskano częściową regresję zmiany oraz zmniejszenie dolegliwości bólowych, a w jednym przypadku stagnację objawów. U chorych poddanych tylko leczeniu chirurgicznemu nie uzyskano zmniejszenia dolegliwości bólowych.

Key words: osteoblastoma, radiotherapy, bone tumours
Słowa kluczowe: osteoblastoma, radioterapia, guzy kości

Introduction

Osteoblastoma is one of the less common, benign bone tumours arising from the osteoblasts. The incidence of osteoblastoma is about 3% of all benign bone tumours with male predominance [1]. Some predilection for vertebral column involvement is observed (33-36%) [1, 2]. The morphology of osteoblastoma resembles osteoid osteoma, however its clinical features are less characteristic than those of the latter. The X-ray characteristics of this tumour are osteolytic lesions surrounded by a thin rim of sclerotic bone and, in some cases, (48%) one large or multiple nodules, resembling those found in osteoid osteomas. The tumour demonstrates an increased isotope uptake on bone scans.

Differential diagnosis includes osteoid osteoma, giant cell bone tumour, aneurysmal bone cyst and fibrous dysplasia.

Aggressive osteoblastoma occurs rarely [3, 4], covering about 1/4 of all osteoblastomas [1]. These tumours have some histological features of malignancy – spiculated bone, multiple giant cells and are more rich in cells than the ordinary forms. They also appear malignant on X-ray scans. This type of osteoblastoma is locally aggressive, involves surrounding tissues but usually does not give distant metastases.

The basic method of treatment is surgery [2, 3, 5-8] – usually total *en block* resection [6, 8, 9]. This treatment is usually radical, allowing for no recurrences [6]. Another common procedure, used mainly for tumours localised in the vertebral column is curettage or marginal resection [5]. On analysis of all patients treated by surgery alone, the relapse ratio is approx. 10% [6].

Radiotherapy is used only for unresectable or recurrent tumours [5, 7, 10], aggressive forms of disease [3, 4] or as adjuvant therapy after incomplete excision [3,

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7, 10]. The results presented in literature show that radiotherapy is highly effective for osteoblastoma [3, 4, 9]. Long-term relapse-free survival reported in the literature [3-5, 10] varied from 2 [3] to 10 [10] and even 25 years [5]. The most popular fractionation scheme is irradiation using the fraction dose of 2 Gy up to a total dose of 50 Gy delivered in 5 weeks [3, 10]. On the other hand some authors do not report any improvement from radiation treatment even in large groups of patients [6]. One possible reason for this could be that the total delivered dose was too low (between 23 and 36 Gy). Unfortunately, there is no data regarding to dose-effect relationship in osteoblastoma allowing to verify this possibility. There exist literature reports of failures even after relatively high doses (60 Gy) [4], but in view of the cited data, it seems that a total dose of 50 Gy delivered in conventional schemes is, probably, the most effective. Tumour growth stagnation or partial tumour regression should be considered a positive result of radiotherapy. Tumours localised in the bone very rarely regresses immediately after radiotherapy completion and reossification develops slowly. This phenomenon also occurs in other more common tumours, as for example in giant cell bone tumours [11]. It is important to note that pain relief correlates with radiographic tumour regression. It seems that the anti-inflammatory, analgetic effect of radiotherapy as observed, for example, in cases of vertebral body haemangiomas [12] probably does not play an important role in the case of osteoblastomas.

Chemotherapy is reserved mainly for multiple tumors or aggressive types of osteoblastoma [3, 4].

Case reports

Between 1997 and 2001 five patients (3 men, 2 women; mean age 30 years; range 16-55 years) with osteoblastoma were treated at the Regional Hospital of Orthopaedic Surgery in Piekary Śląskie and in the Maria Skłodowska-Curie Memorial Cancer Centre and Institute of Oncology in Gliwice. All 5 patients were in a very good performance status (Zubrod 0) with an average haemoglobin level of 12.8 g%. In 3 cases the lesion was located in the tibia, in 1 case in the ischium and in 1 case in the femur. The tumour size was similar in all cases, ranging between 3 and 4 cm (mean: 3.5 cm). Patient data is presented in Table I.

In all cases surgery was the first-line treatment. Time from the onset of symptoms to surgery ranged from 3 to

36 months (mean 12 months). Surgery was considered radical in all cases, however in three cases it was found not to be radical microscopically.

Radiographic features and pathological examinations showed an aggressive type in one case – the first radiogram showed an osteolytic 3 x 4 cm tumour with a 1.5 cm spherical nidus in its central part, located proximally in the tibia. One year after treatment the tumour size was 7 x 8 cm with partial destruction of the cortical part of the bone, a spiculated bone formation and unshaped ossification (max. 3.5 cm) in the surrounding soft tissues (Figure 1) (stable X-ray image registered from treatment time). Because of a malignant character of the tumour as seen on the radiograms, an open biopsy specimen was examined by two independent groups of pathologists experienced in bone pathology.

Because of non-radical surgery in 2 cases and an aggressive character of the tumour in 1 case, 3 of our patients were irradiated. The time interval between surgery and radiotherapy was 3.5, 4 and 23 months, respectively. Radiation treatment was performed using high energy photons in 2 cases and ⁶⁰Co in 1 case. Patients were treated using dose per fraction (1.5 – 2 Gy) to a total dose of 45 – 50 Gy given over 33 – 40 days. The follow-up period ranged from 8 to 68 months (mean – 28.3).

Two patients were treated by surgery alone – one by curettage and one by radical resection. The follow-up was 1 and 39 months, respectively.

During the follow-up period the patients were examined once a month. Local control and pain level were assessed after 1, 2, 6 and 12 months and during the last control. Tumour regression was considered as the level of reossification manifested on the X-ray scan as compared to the X-ray scan performed prior to treatment.

No tumour regrowth was found.

In the group of irradiated patients during control examinations 1, 2 and 6 months after treatment we observed partial regression in 1 case and stagnation in 2 cases. Tumour regression was parallel to pain relief, while radiographic tumour stagnation correlated with a stable level of pain (in 1 case we observed such a state for the entire follow-up of 68 months).

In the case of one irradiated patient with tumour and pain level stagnation reported over the first six months, on last examination (i.e. 8 months after treatment) tumour reossification and pain decrease were observed.

Table I. The detailed data of analysed patients

The patient number	Age	Sex	The haemoglobin level [g%]	Location	Average size of the tumour [cm]	Time from the first symptom to the surgery [months]	Radiotherapy	Fraction dose [Gy]	Total dose [Gy]
1	21	M	12.3	ischium	3.0	6	yes	1.5	45.0
2	55	M	12.8	tibia	3.5	7	yes	2.0	50.0
3	24	F	13.3	tibia	3.0	3	yes	2.0	50.0
4	16	M	12.0	tibia	4.0	36	no		
5	32	F	13.6	femur	4.0	6	no		



Figure 1. Radiogram of an aggressive osteoblastoma of the tibia

In the 2 cases radically treated by surgery, the pain intensity localised around the lesion remained unchanged during the follow-up period, as compared to the level prior to treatment.

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