European Review for Medical and Pharmacological Sciences 2014; 18: 3898-3901

Musculo-skeletal tumors incidence and surgical treatment – A single center 5-year retrospective

J.M. PATRASCU, D. VERMESAN, M.L. MIOC, V. LAZUREANU, S. FLORESCU, A. TARULLO[1], M. TATULLO[2], A. ABBINANTE[1], M. CAPRIO[1], R. CAGIANO[1], H. HARAGUS

"Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania
[1]Dept of Biomedical Sciences and Human Oncology, Medical School, University of Bari, Bari, Italy
[2]Calabrodental Clinic, Oral and Maxillofacial Unit, Crotone, Italy

Abstract. – OBJECTIVE: Muscle-skeletal tumors represent a challenging pathology for orthopedic surgeons worldwide. The extremely invasive character, the local destruction, the high recurrence rate, the high incidence in young patients and the unfavorable prognosis are all very well known. For these patients it is very important to produce an accelerated functional, social and psychological postoperative rehabilitation. We studied 121 cases of muscle-skeletal tumors which were treated in our hospital over a 5 years period.

PATIENTS AND METHODS: We noticed a high prevalence in males and mainly between the 2nd-3rd and 5th-7th decades of their life. At our observation, most patients were suffering in advanced stages of malignant lesions.

RESULTS: We try to manage amputations below 5%, with a significant reduction in introducing reconstructive surgical methods as a choice of treatment (10 prostheses and 12 cases of filling with acrylic cement or bone substituent increased with internal fixation). In this way we could observe an unusual ratio between benign and malignant tumors, probably caused by the patient's lack of concern for minimal symptoms. The rural citizen's addressability towards the medical system is alarmingly low, due to the big gap existing from diagnosis to treatment.

CONCLUSIONS: There is still an hard effort to develop better reconstructive techniques for the treatment of muscle-skeletal tumors and more studies must be made in order to achieve this goal.

Key Words:
Muscle-skeletal tumors, Reconstructive surgery, Osteosarcoma, Fast rehabilitation.

Introduction

There are around 90 histopathology types of malignant tumors of the muscle-skeletal system forming an extremely heterogeneous group of affections. The extremely invasive character, the local destruction, the high recurrence rate, the high incidence in young patients and the low favorable prognosis are well known. Benign tumors are more common and most of them have a predictable evolution with limited symptomatology. According to the Italian Tumor Registry, in 2006 the primary muscle-skeletal tumors accounted for 0.2% of all tumor disease, with 1.3% new male cases each year and 1.1% new female cases each year. More than 50% of the tumors were met in patients younger than 59 yr[1]. The peaks of incidence are in the first 2 decades and between the 5th and 7th decades. Around 80% of the osteosarcoma cases are located in the long bone metaphysis such as the femur (distal and proximal), the tibia (proximal) and the humerus (proximal)[2]. Besides the pain, a tumor creates, in most of the patients, a psychological impairment. Their social re-integration component linked to the treatment is very important, often depending on the social group whose patient belongs to, to the type of treatment received, to its results and to the psychological particularities of each person. Due to the development of the surgical and adjuvant therapies, as well as the diagnosis methods, the 5-year survival rate of bone malignancies is 67.9%[1]. By combining multiple-agent chemotherapy and limb salvage techniques, the 5-year survival rate has increased to 70% over the last years[3]. In spite of the great progress made over the last decades regarding the treatment and management of these complicated patients, there are still different opinions and results of authors. Researches must be carried out in order to find a common point leading toward for its standardization and treatment improvement. The purpose of our paper was to determine the available types of treatments and to

Corresponding Author: Raffaele Cagiano, MD; e-mail: raffaele.cagiano@uniba.it

evaluate the surgical methods to be used on different age intervals depending from each staging and histo-pathological diagnosis.

Patients and Methods

This retrospective study was conducted between 15.09.2008 and 15.09.2013. We included all the admitted patients with muscle-skeletal disease in both of the Orthopedic and Traumatologic wards, belonging to the Emergency Clinical County Hospital in Timisoara. We have collected data from 121 patients that have undergone 152 surgical interventions during their treatment process. We used X-ray as the first method of diagnosis and then MRI or CT for definitive operative planning. The CT scans were performed on patients without MRI-compatibility or in order to obtain 3D reconstructions. Bone scintigraphy was not used as a standard method and it was performed only in few cases. We also used percutaneous biopsy and the open biopsy as standard diagnosis methods.

Results

The gender distribution of our 121 patients was divided into 79 males and 42 females with a mean age of 53.1 years (range 14-87). The 5-year interval distribution shows 2 classic peak visualization, with the maximum incidence located in the 2nd and 3rd decade and after the 5th decade (Figure 1). The urban-rural ratio was 3.8:1.

It is known that benign tumors have a higher incidence rate than malignant ones, being the ratio 200:1. Our study's specific feature regarding the last remark showed an unusual ratio of 1:1.6. Therefore, many patients addressed the clinics with aggressive and malignant tumors with a great amount of symptoms, as shown by the Enneking staging distributions (Figure 2).

Common x-rays were used as a standard investigation for all our patients. The MRI was then required to further diagnose 72 (59.5%) affections, unless contraindicated, as MRI allows the best visualization of the tumor margins.The CT scan was used in order to obtain 3D reconstructions, additionally after MRI for 18 (14.8%) patients or as a sole investigation after x-rays for 42 (34.7%) patients.

Giant cell tumors were staged as benign, although their aggressive behavior which causes them to become malignant is well known. The choice of treatment for our 10 diagnosed patients was open biopsy and resection while, in 3 cases, additional acrylic cement filling and internal fixation was performed, as suggested by Pazionis et al[4]. There was a high malignant potential for 4 of our 10 patients, according to the histopathologic results. Most of our patients presented in our clinic with bone metastases (29 subjects) and osteosarcoma (15 subjects). The graphic distribution of tumor histology can be found in Figure 5.

The most often used treatment was the tumor excision within safety margins (according to Enneking classification) together with biopsy, carried out in 60 patients (49.5%). Acrylic cement or bone substitute augmentation (Figure 4), together with internal fixation, was used furthermore for 12 patients (9.9%). Internal prostheses were used after tumor resection in 10 patients. There were 6 standard total hip prostheses and 4 tumor reconstructive prostheses (3 hip prostheses and 1 knee prosthetic). We encountered secondary pathologic bone fractures in 8 patients (6.6%) and amputation was used only as a necessity treatment in extremely advanced cases for 5 (4.1%) patients.

Most of our considered patients come from an urban environment, although no known studies

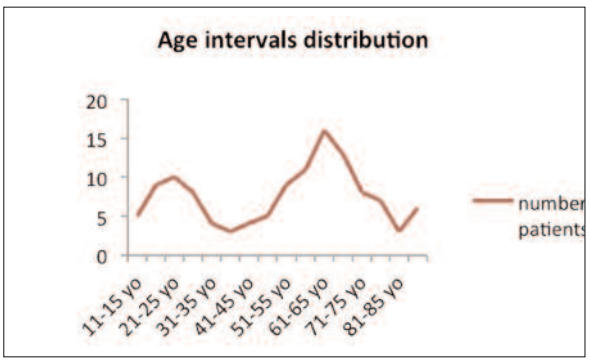

Figure 1. Age distribution graphic.

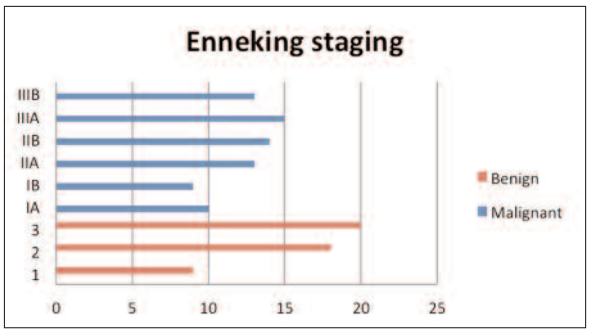

Figure 2. Distribution of our patients (according to the Enneking tumor staging).

Figure 3. 20-yrs female diagnosed with giant cell tumor; preoperative lateral view of the ankle with the tumor affecting the talus.

were found to sustain a low addressability in the rural environment. This situation can be caused by a possible low socio-economic substrate. We observed an unusual high amount of malignant tumors, although, statistically, benign tumors are more frequently met[2]. This may be due to the therapeutic option chosen in the ambulatory clinic before admittance, in which most patients, refusing a surgical procedure, were diagnosed or observed clinically as benign lesions. A high amount of patients were affected by malign lesions, which produce a greater impact on daily activities. We also put in evidence that many patients addressed us on late stage, terminal stage or close to terminal stages, as seen in Figure 2, most of the tumors being classified as Enneking IIB, IIIA and IIIB. Another argument towards late doctor presentation is strongly sustained by the high amount of bone metastases due to undiagnosed primary malignant tumors. Standard x-rays were used as a screening method and most of them were enough in order to set a reliable diagnosis. MRI and CT played a big part in staging the tumor and in establishing the correct resection margins. Bone scintigraphy was rarely used as a diagnosis tool, being it used mostly by our oncologist colleagues for tumor recurrence. PET and CT were unavailable in our service, although it was proved to have a greater sensitivity and accuracy then bone scintigraphy. These two investigations work best when used together[5]. Different surgical techniques were used and, as a recent indication, we used acrylic cement filling, a cheap, feasible, efficient and low-risk treatment[6]. This type of treatment is perfectly framed within the reconstructive surgical way of treating, allowing the addiction of further bone grafting and reconstructive tumor prosthesis. The treatment methods, which included prosthetic tumor reconstructions (6 total hip replacements, 3 long-stemmed bi-polar hip prosthesis, one reconstruction knee prosthesis) are part of the new trend of tumoral surgery which proved good outcomes over the last years[7]. The low rate of secondary pathologic fractures, although dependent from the individual pathology, is a progress when compared with the already known studies (54.54% prevalence rate)[8]. Another contribution of the study is the low amputation rate achieved, thus, allowing for a hastened social, economical and psychological rehabilitation of the patient. Greenberg et al[9] reported a 15% of psychological stress occurrence rate on a lot of osteosarcoma patients, being this percentage somewhat similar to the standard population. Sugarbaker et al[10] examined the quality of life in 29 patients treated in different ways (reconstructive surgery, disarticulation, amputation), without managing in order to find clear distinctions between the 3 groups. Teall et al[11] conducted a study on 28 patients, aged 18-32 yr, diagnosed with lower limb malignant tumors. They concluded that mostly males show a great amount of psychosocial resilience due to the incoming social support, acting as a protective agent for a good psychological and sexual behavior. From our results we noticed a higher prevalence of tumors in males and during the 2nd-3rd and 5th-7th decades of

Figure 4. AP and lateral ankle postoperative x-ray; the preferred treatment was lesion resection and bone substitute filling with Vitoss Bone Graft.

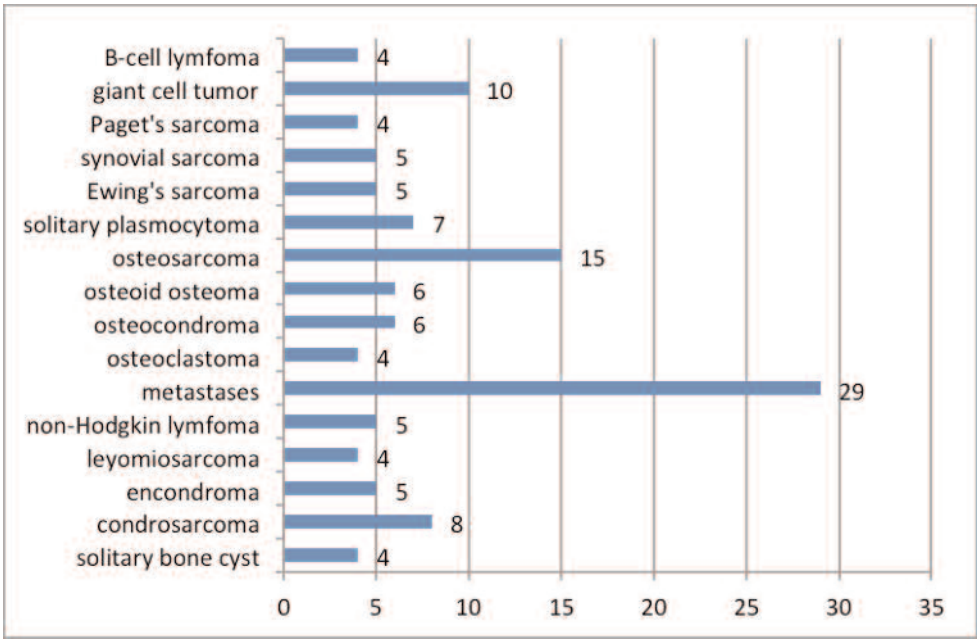

Figure 5. Histologic repartition of patients.

life. The introduction of the new reconstructive surgery treatments markedly decreases the amputation rate (below 5%) setting a new trend in tumor orthopedic surgery in the western part of our country. Furthermore, the most common treatment become the safety marginal resection of the tumor. Pathologic fractures, caused by bone metastases, were encountered in a large amount of patients as the main reason of presentation, usually without a primary tumor diagnosed. The ratio between benign and malignant tumors was 1:1.6, most of the patients being staged with advanced tumor progression and with increased symptomatology. A large point of interest is represented by the low rate of rural citizens come under our observation and for their provided medical care.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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