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Squamous cell carcinoma arising in chronic osteomyelitis

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Abstract Squamous cell carcinoma (SCC) is a rare but well-documented complication of chronic osteomyelitis. Between February 1991 and March 1999, 13 cases (12 men and one woman) of SCC arising in chronic osteomyelitis were diagnosed and treated in our clinic. Mean age was 56.5 (38–70) years. Twelve patients underwent amputation and one underwent limb salvage. Average follow-up was 56 (24–121) months. Among the 13 patients two died of the disease. Treatment of choice for these tumours has been amputation.

Resume Carcinome cellulaire squameux est une complication d'ostéomyélite, peu fréquente, mais bien connue. Entre le février 91–mars 99, dans notre clinique, nous ont constate 13 malades (12 hommes et 1 femme) a qui nous ont vu la maladie développe a la base d'ostéomyélite chronique. L'age moyen était 56.5. (38–70) 12 malades ont subi une amputation et dans l'autre l'extrémité a été gardée. La surveillance a duré à peu près 56 (24–121) mois. Parmi ces 13 malades seulement deux sont morts. Pour ces tumeurs on peut dire que l'amputation est la méthode la plus efficace.

Introduction

The aim of this review is to analyse the patients with SCC arising in chronic osteomyelitis treated at our institution and to present our clinical results.

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Material and methods

Between February 1991 and March 1999, 13 patients (12 men and one woman) were diagnosed with histologically proven SCC complicating chronic osteomyelitis (Table 1). The mean age was 56.5 (38–70) years. The tibia and the foot were the most common sites of involvement, followed by the femur and the ankle. The aetiology of chronic osteomyelitis was posttraumatic in seven patients and hematogenous or spontaneous in six patients. SCC arising in chronic osteomyelitis developed in association with leprosy in one patient and burn-scar in the other. A time interval of an average of 27 years (range 4–50 years) existed between draining osteomyelitis and the diagnosis of the malignancy. The vast majority of the patients complained of chronic, foul smelling, and aching ulcerative lesions. A fungating mass was present on physical examination in seven patients and ulcerated lesions in six patients. All 13 patients had plain radiograms. In five patients magnetic resonance imaging (MRI) was performed as an additional imaging study to reveal bone lesions and soft tissue masses. MRI confirmed lymphadenopathy (LAP) in five patients (three inguinal and two popliteal), in whom physical examinations were consistent with lymphadenopathy. One patient presented with pulmonary metastases (1, 2, 3).

Nine patients underwent biopsy before surgery and the histologic diagnosis of SCC was proven. The remaining four patients underwent amputation on the basis of chronic osteomyelitis, and the pathologic examination of the specimens demonstrated SCC.

Bacterial cultures were obtained in nine cases. Most patients presented with mixed infections. *Staphylococcus* was the most common organism.

Results

Mean follow-up time was 56 (24–121) months. Twelve patients underwent amputation and one underwent wide resection. Above-knee amputation was performed in five patients, below-knee amputation in four, Syme amputation in two, and hip disarticulation in one. Regional lymph node clearance was performed in five cases. Pathological specimens showed metastases in two patients only and were compatible with a reactive inflammatory process in three. The two patients with confirmed diagnosis of malignant LAP underwent regional radiotherapy.

Two patients (cases 2 and 5) developed local recurrence at 19 months and 6 years, respectively, after the

Table 1 Patients' characteristics. (*M* male, *F* female, *DS* duration of symptoms, *LAP* lymphadenopathy, *RT* radiotherapy, *F-U* follow-up, *Amp*. amputation, *NED* no evidence of disease, *Ex* dead)

No	Age	Sex	Site	DS (years)	LAP	Pulmonary metastases	Trauma	Operation	RT	F-U (Months)	Results
1	58	M	Tibia	36	+	–	+	Above-knee amp. + lymphadenectomy	–	24	NED
2	54	M	Ankle	21	+	–	+	Below-knee amp. + lymphadenectomy	+	26	Ex
3	60	M	Foot	4	–	–	+	Below-knee amp.	–	68	NED
4	59	M	Tibia	32	–	+	–	Above-knee amp.+ metastatectomy	–	98	NED
5	43	M	Tibia	27	+	–	+	Below-knee amp.+ lymphadenectomy	+	83	Ex
6	62	M	Foot	36	+	–	–	Below-knee amp.+ lymphadenectomy	–	47	NED
7	50	M	Femur	30	–	–	+	Hip disarticulation	–	27	NED
8	70	M	Tibia	13	–	–	–	Above-knee amp.	–	115	NED
9	38	F	Tibia	26	–	–	+	Above-knee amp.+ lymphadenectomy	–	25	NED
10	62	M	Foot	18	+	–	–	Wide resection	–	121	NED
11	63	M	Femur	24	–	–	–	Above-knee amp.	–	32	NED
12	57	M	Foot	34	–	–	+	Syme amp.	–	33	NED
13	59	M	Foot	50	–	–	–	Syme amp.	–	29	NED

Fig. 1a,b Case 9. Anteroposterior and lateral radiographs demonstrate a soft tissue mass at the posterior aspect of the tibia and changes compatible with chronic osteomyelitis

primary operation. In both cases reamputation was performed and both patients died within a year due to dissemination of the malignancy. The patient having pulmonary metastasis (case 4) underwent metastatectomy synchronously with an above-knee amputation. He had no evidence of disease at the follow up of 98 months.

One patient with foot involvement had a wide resection. He had no local recurrences and no metastases after 121 months.

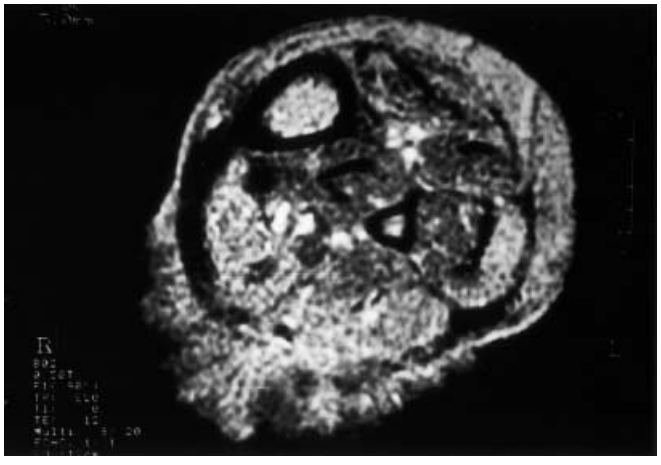

Fig. 2 T2-weighted axial MR image shows a large fungating mass extended beyond the subcutaneous tissue and skin

Fig. 3 T1-weighted coronal MR image of the pelvis revealed enlarge inguinal lymph nodes

Discussion

SCC is the most common type of malignant tumour that evolves at the site of chronic osteomyelitis [3, 8, 11]. Fibrosarcoma [1, 9, 12, 13], myeloma [7], lymphoma [7, 12], plasmacytoma [15] angiosarcoma [2, 4, 14, 16], rhabdomyosarcoma [7], and malignant fibrous histiocytoma [4, 6, 10] also have been reported. The latency period is between 20 and 50 years [7, 8, 20]. The prevalence of malignant lesions arising in chronic osteomyelitis has been reported variously [5, 7, 20, 21]. The incidence of malignant development was indicated by an analysis from the Mayo Clinic of approximately 4,000 cases of osteomyelitis in which carcinomatous changes were found in 0.23% [13]. Male patients are affected more than female patients. The lower extremities, in particular the tibial region, are most commonly affected [5, 7, 12].

Clinical signs that should arouse suspicion of malignant transformation include increased pain with foul or bloody discharge from the sinus, a progressively enlarging mass in and around the sinus tract opening, and progressive bone destruction [5, 7, 12]. Biopsy should include tissue from all portions of the sinus or ulcer, including the marrow space [18]. The site of the biopsy should be well distal to the level of the flap planned for closure of the amputation site [1].

SCC complicating chronic osteomyelitis is generally of low-grade malignancy [8, 19]. However, it has a definite tendency to metastasize (range 11.5%–30%) [8, 17, 19]. Sedling and Fleming, reviewing the literature on 102 patients, noted that, when metastases occurred, the patient died within 18 months of ablative surgery. Patients who survived 3 years after amputation had a good prognosis [18].

The choice of treatment is amputation [6, 8, 13]. The reasons behind this recommendation are probably the tendency for the disease to metastasize early, the incidence of poor results after local excision, and difficulties in reconstructing the massive excised defect. In selected cases amputation is not the only choice [19]. After the advent of modern reconstructive surgical techniques, successful local excision and limb salvage have been achieved in managing many kinds of malignant tumours [19]. Local excision of these tumours may increase the rate of metastatic spread to 50% [20].

In our study two local recurrences and distant metastases were observed. Both of them were invasive and poorly differentiated, and the patients died with disseminated metastases.

It remains controversial whether a regional lymphadenectomy is necessary at the time of amputation [20]. Not every lymph node enlargement can be categorized as metastasis; it can be a reaction to the inflammatory process [18]. Lymph node metastasis has been observed in only 10–20% of patients. Regional LAP persisting for 6–12 weeks after amputation warrants surgical treatment [16]. In this report two patients had lymph node metastasis that was confirmed histologically. This is compatible with the literature. Lymph node metastasis carries a poorer prognosis and frequently is seen together with visceral metastasis. Early recognition and definitive treatment improve the prognosis considerably.

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