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What is the interest of PMR after massive surgery for lower-limb sarcoma?

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Dear Editor. We report a series of 10 patients hospitalized in the locomotor physical medicine and rehabilitation (PMR) department of a university hospital after massive surgery for lower-limb sarcoma. For this work, we followed CARE case report guidelines. Sarcomas represent a rare type of cancer, about 0.2% of all cancers[1]. The most frequent location is the femur in 42% of cases, the pelvic location representing only 8% of cases [2]. Salvage of the concerned lower limb is always preferred when possible because it does not modify the risk of local recurrence or survival rate as compared with amputation [3,4]. Surgery is often responsible for substantial anatomical sacrifices due to the resection of bone, articular and contiguous soft tissues [5]. Pelvic sarcomas are responsible for more morbidity than are distal femoral tumors [6,7]. The consequences in terms of locomotor deficiencies are often at the origin of loss of autonomy. Early care in PMR is recommended to favour functional prognosis [8,9].

We evaluated 8 men and 2 women (mean [SD] age 53.6 years [18.4], range 20-76) who underwent PMR after surgery for lower-limb sarcoma from December 2011 to March 2016. The sarcoma characteristics are presented in Table 1. The initial surgical treatment had always been a tumor monobloc excision responsible for substantial anatomical sacrifices (Table 1, Figs. 1 and 2). Mean (SD) duration in the surgery department was 19.5 (12.5) days [range 8-46]. With pelvic sarcoma, an initial phase of immobilization with a hip brace was needed at the beginning of the PMR care. Also, one patient who had undergone distal femur surgery required a knee extension brace. The braces were made to measure and unarticulated. Immobilization with a hip brace was 45 days with hemi-pelvectomy type I-II, 30 days with type II and 15 days with type I. The braces were prescribed immediately after surgery. For patients who required bed rest periods (2 patients because of the initial fragility of the scar), PMR care consisted of one session of physiotherapy with joint mobilizations and muscular maintenance. After the potential bed rest period, patients performed 2 sessions a day, 5 days a week. The morning sessions were dedicated to neuro-functional analytic work adapted to deficiencies (range of motion gain, motor control of the hip or the knee); in the afternoon, a more global work was proposed with physiotherapists or occupational therapists and aimed at improving moving and walking abilities (transfers, weight bearing, balance and walking). A 1-hour wheelchair practice session per day was systematically proposed to permit wheelchair

autonomy. Sport practice was also proposed, initially in wheelchairs and then with weight-bearing exercises according to patients' abilities.

Six patients had isolated or associated complications (Table 1). The most frequent complication was infection on the operative site. In the 5 cases of infection, a new surgical procedure was performed. In these cases, the operated site was washed during, sometimes with the prosthetic replacement. Multiple antibiotic therapy was always prescribed. Two infections were associated with hip prosthesis luxation.

At the end of the hospitalization, 8 of 10 patients were able to go home: one had to live with his parents and one went to a care home for disabled adults (Table 2). Nevertheless, 3 patients needed help with showering and dressing at home, 2 patients needed the help of a housekeeper and 1 patient needed to have his meals delivered at home as well as help with showering and dressing and the help of a housekeeper because he had a hemi-pelvectomy with sacral fixation of the hip mega-prosthesis (Fig. 2). Eight of 10 patients were able to walk at the end of the therapy but had to use walking aids (Table 2); 4 had to use wheelchairs when going long distances. The 2 patients unable to walk had a pelvic sarcoma with major anatomical sacrifices. All patients were autonomous with their wheelchairs and the 7 youngest ones were able to step onto and off a sidewalk. Overall, the mean (SD) Barthel index measuring performance in activities of daily living was 22.5 (6) [range 20-40] at the beginning of the PMR care and 70.5 (13) [50-90] at the end. The mean (SD) stay in the PMR department was 85.8 (34) days [8-46] and the total mean (SD) stay at the hospital was 105.3 (39.6) days [49-184].

The challenges in the management of pelvic and femoral sarcomas are to increase the survival rate and to preserve function and quality of life [10]. PMR goals are restoration of the previous functional level and independence or to compensate independence loss to maintain quality of life [7]. These challenges and aims are usually studied with a follow-up of several months or years after treatment, so determining the contribution of early PMR care in the immediate aftermath of the surgical management is difficult.

PMR care presents several overall benefits for patients with cancers, particularly concerning the improvement of psychological health and pain management (neuropathic and/or nociceptive pain), which are unique to these patients [11]. Rehabilitation programs provided during PMR care could have a decisive impact on the ability to return to work [12].

Eight of our 10 patients were able to walk and return home after PMR despite major complications. Technical walking aids were always necessary, but for all patients, including the most dependent ones, wheelchairs always gave them autonomy of movement. In terms of function, surgery for pelvis and femoral sarcoma affects patients' autonomy owing to anatomical sacrifices. The worst results are at the pelvic level because of substantial anatomical sacrifices, which depend on tumor location and local invasion [7].

PMR care must be individualized because deficiencies secondary to the surgery vary widely among patients [8,9,13]. An articular immobilization by hip brace is usually necessary with a pelvic or proximal femur lesion because of the lack of hip articular stability [7]. The duration of wearing these splints is empirical; they are rarely maintained for more than 6 weeks and can be removed as soon as articular motor control is restored.

At the hip level, function usually decreases because of the loss of articular mobility and adductor weakness [10,14]. Modifications of the hip's center of rotation after megaprosthesis explain these deficiencies [15].

Numerous complications are associated with surgery, especially infection on the operative site, which usually requires a new surgical intervention. Many complications occur in the same patient [15]. Infection occurs in 17% to 60% of cases and may have several causes, such as surgery duration, blood loss, vacuity caused by the tumor resection and the use of neo-adjuvant treatments [15].

In terms of autonomy, for 8 of 10 patients, the Barthel index increased during the hospitalization to reach independency (score ≥ 60) after a mean stay of 85.8 days in the PMR department. For patients with pelvectomy, Beck et al. reported an increase in score from 10 before surgery to 40 at hospital discharge and then 90 after a 6-year follow-up [6]. Nevertheless, only 50% to 70% of the patients were independent and had a mean maximal walking distance of 45 m. The duration of hospital stay in PMR is explained by the period required to obtain functional independency permitting a return home or a move to an appropriate living place. The duration is also increased because of the complications. For ethical reasons due to patients' severe clinical condition and the potential risks after surgery, comparison with another comparable group was not possible because of different PMR management (external care). Because of the complexity and specificity of the management of sarcoma — short- and medium-term complications such as infections, persistent deficiencies and long-term oncological follow-up — specific network organizations with surgeons, oncologists and PMR physicians seem necessary [11].

This series of patients with pelvic or femoral bone sarcomas presented good functional results after PMR care, allowing for a return home for most, despite the severity of the tumor, and a 60% rate of serious complications. Sarcomas in pelvic and proximal femoral locations were responsible for more loss of autonomy than were those in distal femoral locations.

Figure legends

Figure 1. Total hip megaprosthesis for leiomyosarcoma grade III.

Figure 2. Hip megaprosthesis with acetabulum fixation on L5-S1 for chondrosarcoma grade 1.

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Table 1. Characteristics of sarcomas, treatments and complications in patients with lower-limb sarcoma.

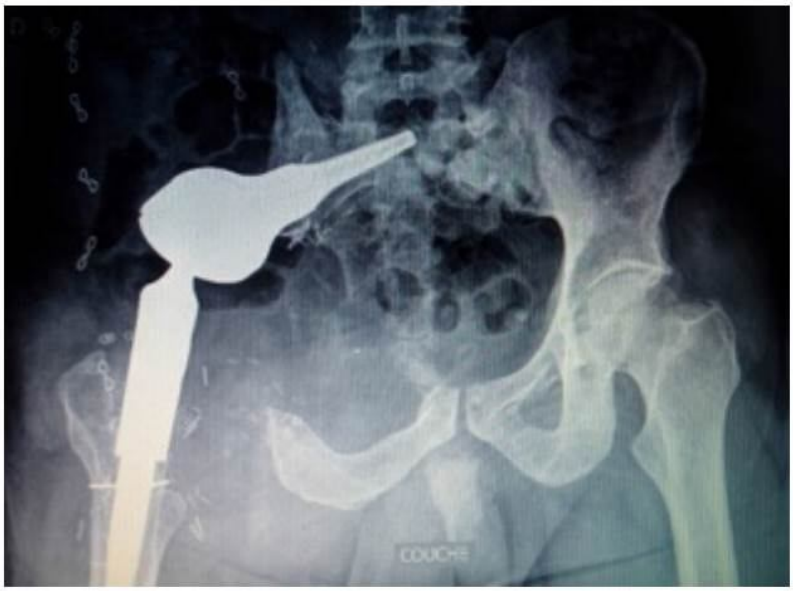
Patient no.	Sex Age (years)	Histology	Location (resection)	Surgery	Neo-adjuvant treatment	Anatomical sacrifice	Complications (delay from surgery, days)	Admission in PMR after surgery (days)
1	Female 76	Chondrosarcoma grade III	Pelvis (R0)	Pelvectomy I-II Mega-THA	0	Femoral n. Iliopsoas m., Gluteus minimus m.	0 (0)	16
2	Male 56	Chondrosarcoma grade I	Pelvis (R0)	Pelvectomy I-II Mega-THA	0	Gluteal superior and inferior n.; Femoral n.	0 (0)	10
3	Male 65	Chondrosarcoma garde III	DF (R0)	Allo and auto graft synthesis	CT	Fibularis communis n.	Fibular palsy (0), phlebitis (11)	9
4	Male 59	Chondrosarcoma grade I	Pelvis (R1)	Pelvectomy I-II Mega-THA L5-S1 Arthrodesis	0	Pelvitrochanteric m.	Infection (21), THA Luxation (21)	16
5	Male 49	Chondrosarcoma grade III	Pelvis (R1)	Pelvectomy II Mega-THA	0	Pelvitrochanteric m.	Infection (12) THA Luxation (12)	20
6	Male 45	Chondroblastic osteosarcoma	PF (R1)	Mega-THA	CT	Gluteus maximus m.	0 (0)	8
7	Male 20	Leiomyosarcoma grade III	Pelvis (R1)	Pelvectomy II Mega-THA	RT CT	Pelvitrochanteric m.	0 (0)	10
8	Male 65	Osteosarcoma grade I	DF (R1)	Mega-TKA	0	Fibularis communis n., Quadriceps m.	Infection (40), Fibular palsy (0), Acute compartment syndrome (1)	30
9	Female 75	Myxofibrosarcoma grade III	PF (R0)	PTH massive	RT	Pelvitrochanteric m.	Infection (15), Phlebitis (22)	46
10	Male 29	Fusiform and epithelioïd cells sarcoma	Pelvis and spine (R1)	Pelvectomy I L2-S1Arthrodesis	CT	L2-L4 r. Iliopsoas m.	Infection (10)	30

DF, distal femur; PF, proximal femur; Pelvectomy I (ilium); Pelvectomy II (acetabulum); Pelvectomy I-II (ilium + acetabulum); TKA, total knee arthroplasty; THA, total hip arthroplasty; CT, chemotherapy; RT, radiotherapy; m., muscle; n., nerve; r., roots.

Table 2. Details on the management and future of patients.

Patient no.	Sex Age (years)	Bed rest period (days)	Joint immobilization after surgery (days)	PMR hospitalization duration (days)	Total hospitalization duration (days)	Return home	Aids	MWD	Barthel index Initial / Final
1	Female 76	0	45	168	184	No (care home for disabled person)	Wh	MW 0	20 / 50
2	Male 56	0	45	39	49	Yes	2 Cr	MW 2	40 /70
3	Male 65	0	0	62	71	Yes	1 Cr + ankle foot orthosis	MW 3	20 / 85
4	Male 59	21	45	75	91	Yes	2 Cr	MW 2	20 / 70
5	Male 49	0	30	77	97	Yes	2 Cr	MW 3	20 / 90
6	Male 45	0	15	70	78	Yes	2 Cr	MW 1	25 / 65
7	Male 20	0	30	94	104	Yes	2 Cr	MW 3	20 / 85
8	Male 65	45	21	69	99	Yes	2 Cr + ankle foot orthosis	MW 2	20 / 70
9	Female 75	0	45	101	147	Yes	walker	MW 1	20 / 65
10	Male 29	0	15	103	133	No (parents' home)	Wh	MW 0	20 / 55

PMR, physical medicine and rehabilitation; Wh, wheelchair; Cr, crutch(es); MWD, maximal walking distance; MW 0, transfers autonomous; MW 1, maximal walking distance > 50 m; MW 2 maximal walking distance > 300 m; MW 3, maximal walking distance > 1000 m.



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