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Full Length Research Paper

Oncologic Surgery of the Lower limb: Anatomical and Functional Results of Cementation Associated with Internal Fixation in the Teaching Hospital of Bobo-Dioulasso (Burkina Faso)

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Abstract

Objective: To evaluate the anatomical and functional results of reconstructive surgery in oncology at the Teaching Hospital of Bobo-Dioulasso. Population and method: It came from a retrospective study conducted in the orthopedics and trauma surgery at the Teaching Hospital of Bobo-Dioulasso from 1 January 2008 to 31 December 2012. He was recruited eight patients with a bone tumor of lower limbs. They all benefited from a conservative surgery with bone reconstruction by cementation associated with internal fixation. Functional rehabilitation was systematic. The anatomical treatment outcome was evaluated through visual observation and functional outcome of the score of the Musculoskeletal System. The average follow-up was 2 years. Results: He was recruited eight patients, including five men and three women. The average age was 39 years. We had three cases of bone metastases and five cases of primary tumors including two malignant. The postoperative anatomical result was good. The average score of the musculoskeletal system was 83.33% (25/30). The average follow up was two years. It was noted 25% (n = 2) early postoperative complications. In other cases the operated limb remained painless and functional. Conclusion: cementation associated with internal fixation by better therapeutic results it offers, appears to be an interesting approach in orthopedic oncology in countries with limited resources.

Key words: Bone tumors, cementation, and internal fixation.

INTRODUCTION

The current management of bone tumors is conceivable only within a multidisciplinary framework which surgical treatment is only one aspect. The definition of a therapeutic strategy involves a lesion assessment and extension made preoperatively. In addition to the chemotherapy or radiation therapy protocols, this strategy must include a first surgical procedure, fundamental for the exact diagnosis and determining lesion for subsequent surgical options: tumor biopsy. It must also take into account (Vichard, 2001) the possibility of adjuvant therapies such as preoperative embolization or radiation. The development of such cooperation, coupled with advances in surgical techniques has enabled the development of conservative surgery of members that currently dominates the therapeutic indications. At the Teaching Hospital of Bobo-Dioulasso, there is no oncology. The orthopedic-trauma service like other hospital services assures integrally the treatment of tumor cases under its jurisdiction. Reconstructive surgery, allowing morphological and functional restoration

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of the member holds a very important place in orthopedic oncology. For Anract (1999), means of reconstruction by Allograft or massive graft have proven their effectiveness worldwide. However, these means are not available in our country. Faced with this technical limitation, the alternative which is imposed on us is the use of cement as a means of filling the resulting bone loss to tumor resection. This cementation can be isolated, associated with bone or a standard arthroplasty. In all cases, a functional rehabilitation always accompanies either protocol. The results of this practice have not been evaluated in our hospital. This study aims to evaluate the one hand, efficiency through the anatomical and functional results and secondly, complications and overall survival.

MATERIALS AND METHODS

It came from a cross-sectional descriptive study conducted retrospective collection in the Department of Orthopaedic Surgery, Teaching Hospital of Bobo-Dioulasso from 1st January 2008 to 31st December 2012. We included all patients followed in the service musculoskeletal tumor and having had a bone tumor resection using the principles of Enneking (1986). Conservative surgery of members indicated after a clinical, radiological and Pathological review. The therapeutic protocol included a bone reconstruction by cementation coupled to an internal fixation and/or joint replacement. The Protocol combined systematic support in physiotherapy functional purpose. Intended to minimize the maximum time of immobilization, the rehabilitation mainly comprised a joint and muscle work, and gradual training to walking. By insufficient technical platform, no additional treatment like chemotherapy or radiation could be realized. Evaluation of anatomical results was made on radio-clinical criteria. The Musculoskeletal System Tumors Society Score (MSTS score) as described by William (1993), served as a basis for the functional evaluation.

RESULTS

During the study period, it was recorded in the service, 76 bone tumor patients. Eight of them met the criteria for inclusion has formed our analysis cohort. They were five men and three women, a sex ratio of 1.66. The average age was 39 years with extremes of 8 and75 years. The socio demographic and pathological characteristics of these patients are reported in Table I.

DISCUSSION

The prognosis of cancerous pathology experienced tremendous progress with the development of chemotherapy and radiotherapy. As reported by Rosen (1976), Delepine (1985) and Simon (1986), the radical punishment of amputation has therefore gradually up to conservative treatment. Current therapeutic approaches, after resection of bone tumor include many grafts and bone substitutes. All these approaches, although permitted some progress in the treatment of bone tumors, but each has shortcomings. To Khan et al., (2005), the incorporation of bone graft is limited in time and space. Massive allografts would experience by Wheeler (2005) a failure rate of around 60%. Our study sought to evaluate the anatomical and functional results of eight patients who underwent resection of a bone tumor of lower limb, followed by a reconstruction cementation associated with internal fixation. In epidemiological terms, the small size of our sample does not allow us statistically significant conclusions. This data which are also reported by Le Mouel (2008), Fraquet (2009) and Adam (2009), offers all the same the opportunity to identify the interest of cementing in oncological surgery in a system of care with limited resources.

Anatomical and functional results

In our experience, the cementation appears oncological surgery as a palliative treatment whose objective is twofold: analgesic and functional. Indeed, it can quickly relieve cancer pain and in the case of the lower limbs, early mobilization of the patient through the bone healing it provides. The anatomical results obtained through this study are overall good. Visual observation as postoperative radiographs reveal both a good anatomical reconstruction of bone pieces which have been curettage. We evaluated the functional result in a decline of two years by the method of Musculoskeletal Tumors Society. The median score was found in 83.33% (25/30). Our results are super imposable to those of Adam (2010), Kassab (2009) and Weitao (2012) which, by using different reconstruction techniques have found respectively a score of 80, 84 and 85%. Fraquet (2009) in an evaluation of the management of bone giant cell tumors by combining curettage and cementation, reported by against a much higher score of 93.33%. This difference would come from the nature of the sample which exclusively included giant cell tumors. This type of tumor is known to have very little postoperative complications and hence good functional outcome compared to other histological types.

Complications and overall survival

In cancer surgery, complications are usually distinguished into two groups, namely, early complications and late complications. In our series, it was observed both early complications all of the eight treated patients. This frequency is below that reported by Kassab

Table I: Socio-demographic and pathological characteristics of patients

No	Age in years	Sex	Location	Pathological types
1	8	Male	Right proximal femur	Essential cyst
2	52	Male	Right proximal femur and left femoral diaphysis	Clear cell carcinoma of the kidney
3	22	Female	Left proximal femur	Essential cyst
4	75	Male	Right proximal femur	Clear cell carcinoma of the kidney
5	14	Female	Left distaltibia	Essential cyst
6	49	Male	Right proximaltibia	Giant cell tumor
7	48	Male	left femoral diaphysis	Chondrosarcoma
8	44	Female	left femoral diaphysis	Clear cell carcinoma of the kidney

Therapeutically, it was performed in all eight patients conserving surgery, including bone reconstruction cementation associated with internal fixation. By cemented Moore prosthesis Arthroplasty was performed in patient 7 who benefited more from a reconstruction in the two lower limbs. The postoperative course was marked by complications that are reported in Table II.

Table II: Distribution of patients according to the type of treatment and the evolving profile

No	Type of resection	type of reconstruction	Complications mean follow
1	Intralesional	Iliacgraft+cementation	Any
2	Wide	Nailing+plate + cementation left femur Moore prosthesis+cementation the right femur	Deaths postoperative day 1
3	Intralesional	Osteosynthesis by blade-plaque+cementation	Any
4	Intralesional	Osteosynthesis DHS+cementation	tumor progression Loosening equipment Loss of autonomy+++
5	Intralesional	Cementation	Any
6	Intralesional	Osteosynthesis per plate+cementation	Flexumknee
7	Wide	Nailing +plate + cementation	Death from pulmonary metastasis
8	Intralesional	Plate osteosynthesis+cementation	Any

Image 1: (Patient2)

A: Pathological fracture of the femoral shaft left on bone metastasis of a clear cell carcinoma of the kidney.
B: Control radiograph after tumor resection and reconstruction within tramedullary nailing supplemented by a bone plate and cemented.
In the same patient 2 a reconstruction by the prosthesis of Moore mounted nail Küntscher was conducted right proximal femur as shown in the image 2.

Image 2 (Patient 2): Intraoperative view of the reconstruction prosthesis of Moore mounted nail Küntscher

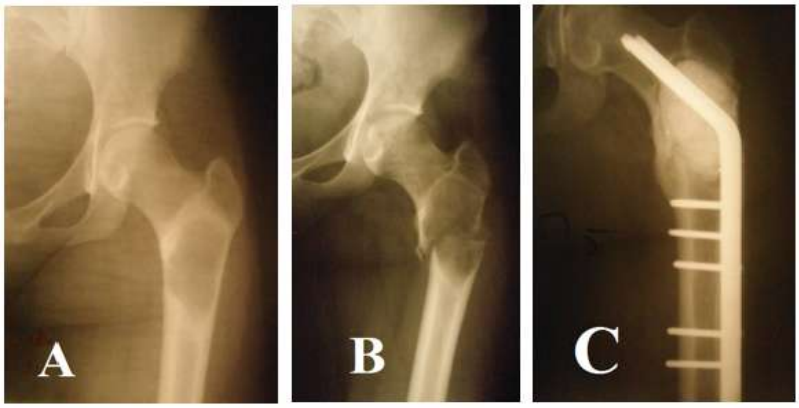

Image 3: (Patient 3)

A: Standard radiograph of the left hip showing a circumscribed osteolysis of the trochanteric region. This is an essential bone cyst.
B: standard radiography front of the left hip showing a pertrochanteric pathological fracture.
C: Postoperative radiograph showing the reconstruction associated cementation with osteosynthesis by blade-plate.

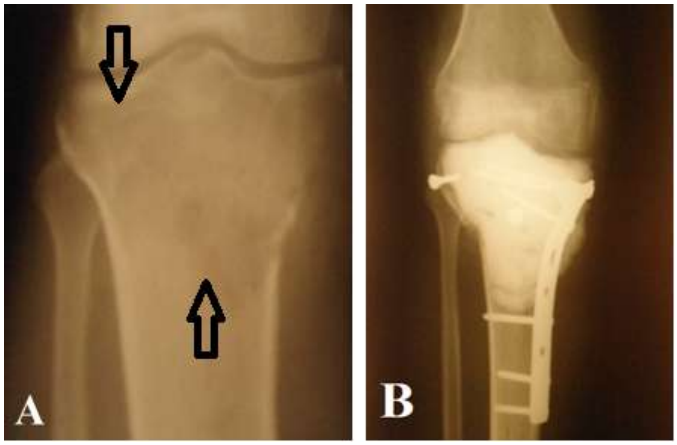

Image 4 (Patient 6)

A: Radiography front right leg showing osteolysis of the proximal end of the tibia.
B: Control X-ray after curettage and reconstruction.

Image 5 (Patient 3): Photographs of both lower limbs showing a good alignment of the tibial segment. A: extension; B: bending

Anatomically, six out of eight patients achieved correction of the morphology of the member as shown inpictures1, 3, 4 and 5. A shortening of 1.5 cm from the right lower limb and loosening of the osteosynthesis material concerned patients 1 and 4 respectively.
The anatomical treatment results are reported in Table III.
Functionally, the assessment to a mean of two years, gave a median MSTS score of 83.33% with a range of 66.66 and 96.66% (Table III).

Table III. Anatomical and functional results at last follow

Patient	Follow up period	Anatomic result	functional outcome	Pathological types
1	5 years	Good Leg length: 1.5 cm	Limping type dip	96,66 %
2	4 months	Good returned morphology	Returned function	//
3	3 years	Good consolidation	Returned function	96,66 %
4	3 years	Bad Dismantling equipment	Perte d'autonomie.	66,66 %
5	2 years	Good returned morphology	Returned function	96,66 %
6	2 years	Good returned morphology	Flexum genou.	70 %
7	1 year	Very Good returned morphology	Very good functional results	//
8	3 years	Good returned morphology	Returned function	70 %

Table IV. Review of the literature on bone reconstruction techniques

Authors/date	Population	Tumoral type	Reconstruction	MSTS Score
Kassab (2005)	29	Malignant tumors	Cement + nailing	80% at 7 years
			composite prosthesis	76% at 7 years
			massive prosthesis	72.6% at 7 years
			reverse prosthesis	88% at 7 years
			arthrodesis	75% at 7 years
Fraquet (2009)	30	Giant cell tumor	Curettage and cementation	93.33% at 6 years
Adam (2010)	187	malignant tumors	cemented prosthesis	86.7% at 8 years
Adam (2010)	52	malignant tumors	Prosthesis	82% at 8 years
Weitao (2012)	15	Malignant tumors of the lower limbs	Allograft	85% at 2 years
Chotel (2012)	8	malignant tumors	induced membrane	84% at 2 years
Our study (2013)	8	Malignant and benign tumors	Cementation and osteosynthesis	83,33% at 2 years

(2005) which found themselves 28 complications in a series of 29 patients who underwent reconstruction with a bone prosthesis. Weitao (2012), reported complications in all 15 patients in its series who received a bone Allograft reconstruction. Finally, Brunet (2011) noted seven cases of complications in a group of 13 patients

who received bone reconstruction by the technique of the vascularized fibula. Despite the small number of our series and the heterogeneity of the type of tumor being treated, these results indicate that reconstruction by cementing technique associated with an internal fixation used in our study seems subject to fewer complications unlike reconstruction by prosthesis and bone grafting techniques.

At mean two years, overall survival in our series was 75%. These results seem unsatisfactory in view of the fact that they do not take into account the prognostic factors as benignity or a malignancy of tumors that can be confounding factors in the survival of patients. Moreover, these cancer patients require great means of resuscitation in pre, per and postoperative that are lacking in our work environment. This may negatively influence the postoperative course and explain the survival rate of less than that reported by Le Mouel et al., (2008) who used curettage technique associated with cementoplasty in 13 patients with bone metastases of clear cell carcinoma of the kidney.

At mean 1 year, they found a survival rate of 84%. Benign tumors have all evolved without significant complication while in the case of malignant tumors good morphological and functional results can be achieved, but the intrinsic tumor progression (progression, metastasis) will burden the prognosis. In these cases, the bone resection is very hemorrhagic and consequently requires large resuscitative measures. The indication force mentoplasty in these conditions must be well matured. Furthermore, it should be noted the possibility of replacing the mass reconstruction prosthesis by prosthesis of Moore mounted on a Kuntschernail.

This technique was performed on our patient2with satisfactory results morphologically and functionally. Ultimately the results obtained in our study show that bone reconstruction technique cementoplasty associated within ternal fixation is a feasible and effective alternative to our limited resources to working conditions. Bone reconstruction technique after bone tumor resection used in our framework gives satisfactory functional results. This preliminary result, however, needs to be validated by larger series with longer follow-up time.

CONCLUSION

Despite the many advances in medical oncology, the treatment of bone tumors remains a major challenge especially in developing countries. The use of cementation combined with internal fixation of its simplicity of implementation, appears as an interesting alternative to the much more demanding different protocols and technical equipment.

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