

Determining Patient Satisfaction and Treatment Desires in Patients With Musculoskeletal Sarcoma of the Knee After Joint-preservation Surgery Using a Questionnaire Survey

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Abstract. *Background/Aim:* For cases of musculoskeletal sarcoma of the knee presenting to our institute, we prioritize joint preservation whenever possible. To investigate patient satisfaction and desire for joint preservation, a questionnaire survey was performed. *Patients and Methods:* Surveys were mailed to 62 patients with musculoskeletal sarcoma of the knee. Responses concerning the patient and their families' satisfaction were evaluated on a 5-point Likert scale and their priorities for the surgery were noted as well. *Results:* The survey response rate was 67.7%. All but one person were above neutral for the 5-point Likert scale. Overall, the first priority was tumor removal followed by preservation of function. *Conclusion:* Patients identified tumor removal as their first priority, which could increase satisfaction. Following that, better preservation of function could also increase patient satisfaction. Joint-preservation was consistent with these priorities.

At our institute, our first consideration for patients with musculoskeletal sarcomas around the knee is to completely remove the tumor, in order to reduce the risk of local recurrence. However, additional resection of normal tissue can jeopardize vital structures, including ligaments, tendons, and physes, which in turn could restrict limb function (1), and the traditional 2-3 cm margin has recently been questioned, with some researchers reporting methods using reduced margin with partial epiphyseal preservation (1-4). For cases of musculoskeletal sarcoma of the knee presenting to our institute, we prioritize joint preservation whenever possible,

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because emphasis must be placed on saving the knee joint (5). Thus, we have developed novel surgical procedures to achieve this goal, which involves reconstruction using frozen autografts (6, 7) and distraction osteogenesis (8), leading to good functional and oncological outcomes. Indeed, reconstruction with frozen autografts has been shown to improve functional and oncological outcomes (6, 7, 9-13). By sparing the articular end of the affected bone when resecting primary bone sarcomas, the native joints and ligaments can be preserved in patients (14), which can also lead to superior proprioception and joint function after reconstruction. This provides a better functional outcome for patients and is also an acceptable local disease management method.

But to date, function has been only assessed using the Musculoskeletal Tumor Society (MSTS) score (15), which is an investigator-initiated outcome. No reports of patient satisfaction and/or desire of the type of surgery can be found. Therefore, we administered a questionnaire survey on patients with musculoskeletal sarcoma of the knee after joint-preservation surgery to determine their satisfaction and better understand their desires.

Patients and Methods

This study was a single-center, case control study of patients treated for musculoskeletal sarcoma of the knee between January 1999 and December 2015. Because we aimed to evaluate the preservation of the knee joint, we excluded patients who underwent amputation, had life-threatening conditions (or were dead), or who could not be contacted. This study was approved by the Medical Ethics Committee of our institute (approval number: 1862). All patients gave written informed consent.

Surveys were mailed to all eligible patients and their family. The original patient satisfaction questionnaire comprised two questions: 1) a 5-point Likert scale to rate postoperative satisfaction (1=very satisfied, 2=satisfied, 3=neutral, 4=dissatisfied, 5=very dissatisfied) and 2) ranking their first to last priority for surgery among these five options: preservation of limb function, lowest cost, lowest strain on the body, pain relief, and tumor removal. Additionally, we evaluated the MSTS score, Toronto Extremity Salvage Score

(TESS) (16), and three component summaries from the 36-Item Short-Form Health Survey (SF-36; Japanese version 1.2) of the medical outcomes study (17, 18). The three component summaries are: physical component summary (PCS), mental component summary (MCS), and role/social component summary (RCS); each summary had a Japanese standard score for each age based on data from 2007 for healthy Japanese individuals (17). The association of present joint status (preservation or replacement) with patient satisfaction and their desire was primarily evaluated.

Statistical analysis. Statistical analyses were performed using Kruskal–Wallis test and Friedman’s test, as appropriate. All statistical analyses were performed using Statcel 3 (The Publisher OMS Ltd., Tokyo, Japan). A p -value of <0.05 was considered statistically significant.

Results

Over the study period, we performed surgery on 116 patients with musculoskeletal sarcomas of the knee. After excluding those with limb amputation and other exclusion conditions, surveys were mailed to 62 eligible patients. The response rate was 67.7% (42/62), with 31 treated for osteosarcoma. Among the 42 cases, both the patient and the patient’s family provided responses in 39 cases and either the patient or the patient’s family provided responses in three cases.

In the first questionnaire, for patients who underwent joint-preservation surgery, the following responses were obtained: eight cases (34.8%), very satisfied; 11 cases (47.8%), satisfied; three cases (13.0%), neutral; and one (4.3%) case, dissatisfied. For patients with joint-replacement surgery, the following responses were obtained: four cases (25.0%), very satisfied; eight cases (50.0%), satisfied, and four cases (25.0%), neutral. For responses from the family of the patients who underwent joint-preservation surgery, 12 cases (52.2%) were very satisfied and 11 cases (47.8%) were satisfied. For responses from the family of the patients who underwent joint-replacement surgery, seven cases (43.8%) were very satisfied, four (25.0%) were satisfied, and five (31.3%) were neutral (Figure 1). In statistical analysis using Kruskal–Wallis test, no significant differences in satisfaction between joint-preservation and joint-replacement were noted (patient, $p=0.50$; family, $p=0.18$). In the cases who reported less than neutral satisfaction, 6 cases (46.2%; one case (1/3) was duplicated in patient and family) had an adverse event (three cases, infection; one case, fracture; and one case, loosening of total knee arthroplasty). Moreover, most scores (MSTS, TESS, PCS, MCS, and RCS) of the 13 cases, that reported less than neutral satisfaction, were less than the mean score of the all cases in each group (joint-preservation, 25 cases; joint-replacement, 17 cases). In particular, the TESS and PCS scores were less than the mean score in cases without an adverse event (Table I).

In the second questionnaire, for all cases (patient or family, joint-preservation, or joint replacement), the first

priority was tumor removal, the second priority was preservation of function, and the last priority was lowest cost (Figure 2). In statistical analysis using Friedman’s test, significant differences were noted among the five priorities (all cases, $p<0.001$).

Discussion

The MSTS, TESS, or SF-36 scores have been used to evaluate postoperative outcomes in patients with musculoskeletal sarcomas. Various operative methods have been evaluated using these scores, including comparisons between limb salvage and amputation (19-24). Evaluation of rotationplasty has also been reported (25, 26). However, very little research can be found regarding the assessment of joint preservation, particularly using a Likert scale, which is a simple and clear method to evaluate patient-reported satisfaction and priority for surgery.

On the Likert scale, regardless of patient/family response or joint-preservation/replacement procedure, all but one report was above neutral. Although complete tumor resection is the primary objective of surgical treatment for musculoskeletal sarcoma (27), there have been no prior studies investigating in detail if patients and their families actually desire this. Our study confirms the generally held view that patients and their family prioritize complete tumor resection. Thus, surgeons and patients share the same aims, with 79.5% of patients satisfied with the treatment outcomes and only one being dissatisfied.

Although there was no statistically significant difference (patient, $p=0.50$; family, $p=0.18$), there was a tendency toward higher satisfaction with joint-preservation. Considering the cases who responded “below neutral,” in cases without adverse events, the TESS and PCS score showed low values in activity of daily living (ADL) and limb function evaluation of patient-based outcomes. Moreover, the second priority of patients and their family was the preservation of function. Therefore, improvement in ADL and function was considered to be related to satisfaction. The average value of the joint-preservation group was higher than that of the joint-replacement group, so functional prognosis is likely better with joint-preservation surgery, thus leading to better patient and family satisfaction.

Barr and Wunder (28) reported that formal economic evaluation might contribute to future decision-making by patients, healthcare providers, surgeons, and other stakeholders. Given that several patients in this study prioritized reducing financial costs more than tumor removal or preserved limb function, it is important for clinicians and staff to consider this point in the future. This suggests a correlation with socioeconomic factors.

This study had certain limitations. First, the timing of the questionnaire evaluation varied from patient to patient in terms of the postoperative time. We evaluated only one time

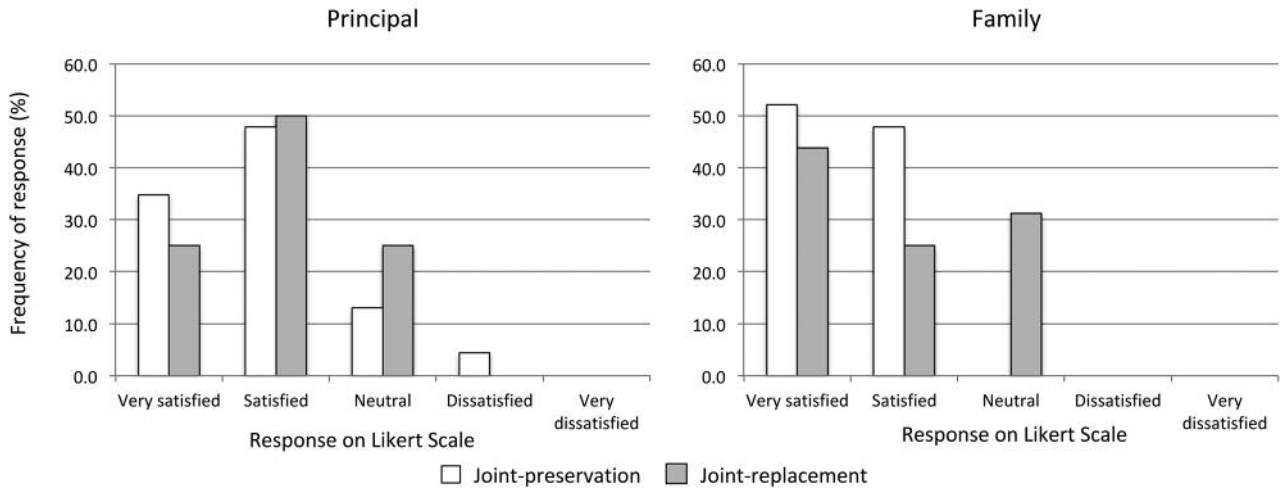


Figure 1. Frequency of scores on 5-point Likert scale by patients and their family.

Table I. Detail of cases reporting below neutral satisfaction.

	Assessment	Age	Gender	Diagnosis	Adverse event	MSTS score	TESS	PCS	MCS	RCS
Principal										
Joint-preservation										
Case 1	Neutral	60	F	Metastatic tumor	Fracture	36	27.6	11.5	48.3	26.5
Case 2	Neutral	6	F	Osteosarcoma	N/A	100	72.1	38.6	83.3	26.9
Case 3	Neutral	62	M	Metastatic tumor	N/A	36	27.6	22.2	69.9	-8.5
Case 4	Dissatisfied	67	M	Osteosarcoma	Infection	60	77.6	36.8	55.3	27.4
Principal										
Joint-replacement										
Case 5	Neutral	51	M	Osteosarcoma	Infection	68	78.4	31.7	56.8	53.4
Case 6	Neutral	18	M	Osteosarcoma	Infection	92	91.3	38.3	40.6	65.5
Case 7	Neutral	60	M	Osteosarcoma	N/A	52	26.7	2.2	63.2	7.4
Case 8	Neutral	18	F	Osteosarcoma	N/A	80	58.6	18.6	55.7	31.5
Family										
Joint-replacement										
Case 9	Neutral	35	M	UPS (bone)	Loosening	72	100	35.9	41.7	52.8
Case 10	Neutral	63	M	Fibrosarcoma (bone)	N/A	84	71.6	25.1	48.1	52.3
Case 5	Neutral	51	M	Osteosarcoma	Infection	68	78.4	31.7	56.8	53.4
Case 7	Neutral	60	M	Osteosarcoma	N/A	52	26.7	2.2	63.2	7.4
Case 8	Neutral	18	F	Osteosarcoma	N/A	80	58.6	18.6	55.7	31.5
Mean score										
Joint-preservation										
25 Cases	N/A	24.8	N/A	N/A	6 Cases (24 %)	84	81.7	40.6	59.9	39.5
Mean score										
Joint-replacement										
17 Cases	N/A	33.1	N/A	N/A	8 Cases (47 %)	79.8	77.7	32.7	54	48.8

F: Female; M: male; MSTS: Musculoskeletal Tumor Society; TESS: Toronto Extremity Salvage Score; PCS: physical component summary; MCS: mental component summary; RCS: role/social component summary.

point for the final observation. Second, we conducted a retrospective cohort study with a small sample of patients from a single institute. Future studies should be performed in more patients; given the simplicity of these questionnaires,

this would provide a vast amount of information to better inform clinicians of patient priority and desire.

In conclusion, patients who undergo knee surgery for musculoskeletal sarcoma prioritize tumor removal; thus, our

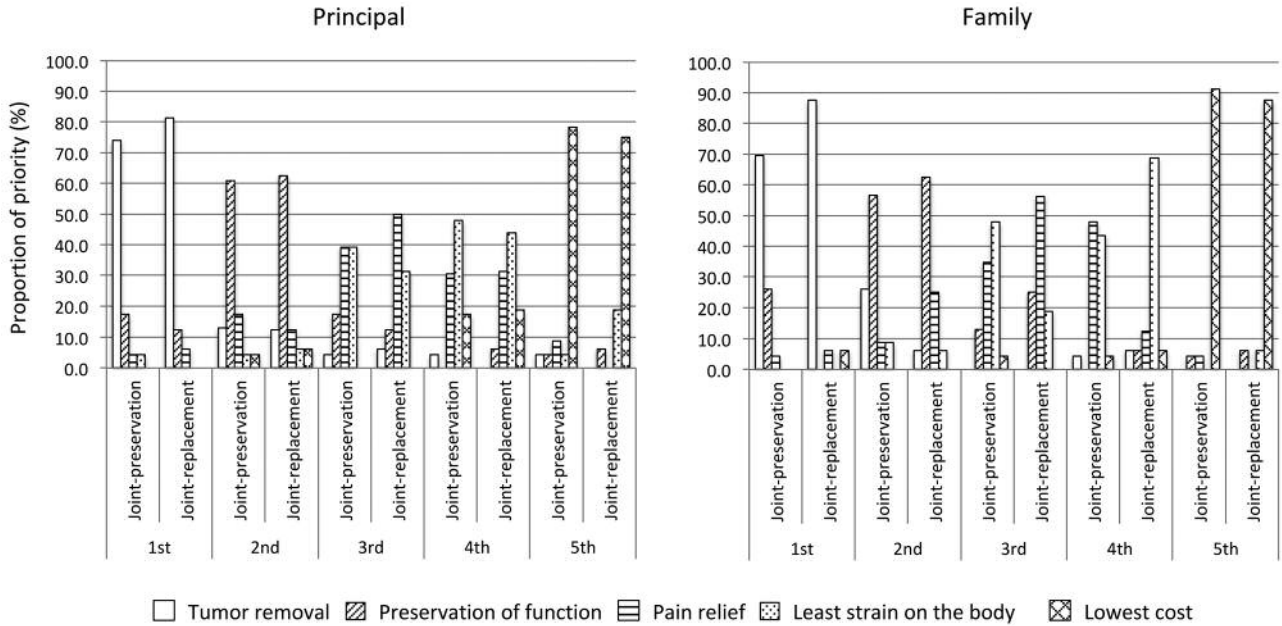


Figure 2. Frequency of priorities by the patients and their family.

first priority as clinicians should of course be tumor removal. Second, fulfilling the priority of preservation of function could also improve patient satisfaction. Joint-preservation surgery is more consistent with these priorities compared to joint-replacement, which might improve patient satisfaction overall, although there was no significant difference.

Conflicts of Interest

There are no conflicts of interest to declare regarding this study.

Authors' Contributions

All listed Authors have substantially contributed to the following aspects of the manuscript: KA, NY, KH, AT, SK, SM, KI, and HT participated in diagnosing and treating the patient and in acquisition of data. KA, HI, YA, TH and YT collected the findings and drafted the manuscript. NY and HT revised the manuscript. All Authors read and approved the final manuscript. Dr. Norio Yamamoto and Dr. Hiroyuki Tsuchiya guarantee the integrity of this work.

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