

КОРОТКІ ПОВІДОМЛЕННЯ ТА НОТАТКИ З ПРАКТИКИ

УДК 616-006.33-003.8-089.2:[615.277.3546.17-14]](045)

DOI: <http://dx.doi.org/10.15674/0030-59872026191-95>

Cryosurgical Management of Extraskeletal Myxoid Chondrosarcoma: A Case Report with Long-term Functional Outcomes

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Introduction. Extraskeletal myxoid chondrosarcoma (EMC) is a rare soft-tissue sarcoma with a substantial risk of local recurrence and distant metastasis. Liquid-nitrogen cryosurgery may serve as an adjunct during limb-salvage procedures, including bone recycling. **Objective.** To report a juxta-articular EMC of the knee treated with wide excision, liquid-nitrogen cryosurgery of resected bone segments, and reconstruction with total knee replacement (TKR), and to present functional follow-up outcomes. **Methods.** A wide excision was performed via a medial parapatellar approach with osteotomy of the patella and proximal tibia. Resected bone was treated with liquid nitrogen (15 minutes) followed by stepwise thawing, then reattached; reconstruction included TKR and internal fixation. Follow-up assessed union, recurrence/metastasis (MRI/CT), and function (MSTS). **Results.** Surgical margins were negative. Union was achieved within 1 year. No local recurrence or progression of lung lesions was detected during 1–3 years of follow-up. Function was preserved (ROM 0–90°) with MSTS 90 % (1 year), 97 % (2 years), and 93 % (3 years), without reported complications. **Conclusions.** Cryosurgery with bone recycling can be a useful adjunct for limb-salvage surgery in knee EMC, enabling reconstruction with favorable functional outcomes in early to mid-term follow-up.

Позаскелетна міксоїдна хондросаркома (extraskeletal myxoid chondrosarcoma, EMC) є рідкісною саркомою м'яких тканин, для якої характерні часті місцеві рецидиви та метастазування. Кріохірургія з використанням рідкого азоту потенційно може бути корисним ад'ювантом під час органозбережних втручань. **Мета.** Описати клінічний випадок EMC колінного суглоба з ураженням кісткових структур, пролікований широким висіченням, кріообробкою резектованих сегментів і реконструкцією з ендопротезуванням, і навести функціональні результати спостереження. **Методи.** Проведено широке видалення пухлини через медіальний парapatеллярний доступ з остеотомією проксимальної великогомілкової кістки та наколінка. Резектовані кісткові фрагменти обробляли рідким азотом (15 хв) із послідовним відтаванням; виконано реімплантацію фрагментів, тотальне ендопротезування коліна та внутрішню фіксацію. Оцінювали зрощення, рецидив/метастази (МРТ, КТ) та функцію (MSTS). **Результати.** Резекційні краї були негативні. Зрощення досягнуто протягом року. Ознак місцевого рецидиву чи прогресування метастатичних легневих вогнищ упродовж 1–3 років не виявлено. Функція збережена: ROM 0–90°, MSTS 90 % (1 рік), 97 % (2 роки), 93 % (3 роки). Ускладнень не відзначено. **Висновки.** Кріохірургія з реконструкцією кістки може бути ефективним ад'ювантом під час органозбережної хірургії за EMC навколо коліна з добрими ранніми та середньостроковими функціональними результатами. **Ключові слова.** Кріохірургія; позаскелетна міксоїдна хондросаркома; клінічний випадок; рідкий азот; рециклінг кістки; тотальне ендопротезування колінного суглоба; функціональний результат.

Keywords. Cryosurgery; extraskeletal myxoid chondrosarcoma; case report; liquid nitrogen; bone recycling; total knee replacement; functional outcome

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Introduction

Extraskeletal myxoid chondrosarcoma (EMC) is a rare and generally indolent soft-tissue sarcoma that nevertheless demonstrates a substantial risk of local recurrence and distant metastasis [1]. Although historically grouped with cartilaginous neoplasms because of its chondroid-like morphology, EMC lacks true cartilaginous differentiation and is classified by the World Health Organization as a tumor of uncertain differentiation [4]. Clinically, EMC may behave as a low-grade malignancy but is associated with reported local recurrence rates of approximately 30–50 % and distant metastasis rates up to 50 %, most commonly to the lungs [3, 4]. Wide local excision with negative margins remains the cornerstone of treatment; adjuvant radiotherapy may be considered for large tumors, although EMC is often described as relatively radioresistant [5]. Cryosurgery using liquid nitrogen has been proposed as an adjunctive method for local tumor control and for recycling resected bone segments during limb-salvage reconstruction [6, 7].

Purpose. To report a juxta-articular EMC of the knee treated with wide excision, liquid-nitrogen cryosurgery of resected bone segments (bone recycling), and reconstruction with total knee replace-

ment, and to describe early to mid-term oncologic and functional outcomes.

Materials and methods

Expert opinion for regarding the possibility of publishing the material of 01.26.2026.

Study design: Case report.

Patient and setting: A 37-year-old woman presented with a slowly enlarging anterior mass of the left knee for approximately five years, with intermittent pain and activity-related worsening.

Diagnostic work-up: Plain radiographs demonstrated a soft-tissue mass. Contrast-enhanced MRI showed a large septated solid–cystic intra-articular lesion ($82.1 \times 47.5 \times 103.1$ mm) involving the femoro-tibial and patellofemoral compartments, extending to subcutaneous fat and invading the patella and proximal tibia, while major neurovascular structures were spared. High-resolution thoracic CT demonstrated multiple bilateral pulmonary nodules suspicious for metastasis. Core needle biopsy with immunohistochemistry supported the diagnosis of extraskeletal myxoid chondrosarcoma.

Laboratory tests showed mildly elevated erythrocyte sedimentation rate and C-reactive protein; hepatitis B and HIV serologies were non-reactive.



Fig. 1. Clinical Picture of both lower leg and Right Knee from anterior (a), and X-Ray findings of the left knee lateral (b)



Fig. 2. MRI of The Left Knee With Contrast

Surgical technique: Through a medial parapatellar approach, wide local excision was performed with osteotomy of the proximal tibia and patella. Resected bone segments were treated with liquid nitrogen for 15 minutes, followed by sequential thawing in 0.9 % NaCl solution and at room temperature. Reconstruction included reattachment of the recycled bone segments, total knee replacement, and internal fixation of the proximal tibia and patella. Perioperative prophylactic antibiotics were administered.

Follow-up and outcomes: Follow-up occurred every 6 months during the first year and annually thereafter. Outcomes included margin status, radiologic union, evidence of recurrence/metastasis (contrast MRI of the extremity and thoracic CT), knee range of motion, extensor mechanism function, and Musculoskeletal Tumor Society (MSTS) score.

Ethics and consent: Written informed consent for publication and images was obtained from the patient.

Results

Postoperative histopathology demonstrated negative resection margins. During follow-up at 1, 2, and 3 years, contrast MRI of the operated extremity showed no local recurrence, and thoracic CT showed no progression of pulmonary lesions. Radiographic union of the recycled bone segments was achieved at 1 year. Functional outcomes were favorable: knee range of motion was 0–90 degrees without extension lag, and MSTS scores were 90 % (1 year), 97 % (2 years), and 93 % (3 years). No perioperative or late complications were recorded.

Discussion

EMC is an ultra-rare soft-tissue sarcoma with an indolent course but a meaningful propensity for local recurrence and pulmonary metastasis [1, 3, 4]. In cases

where the tumor is juxta-articular and involves critical bony and soft-tissue structures, achieving local control while preserving function can be challenging. Liquid-nitrogen cryosurgery is an adjunctive technique that may enhance local tumor control and enable recycling of resected bone segments for reconstruction [6, 7]. Cryoablation causes cell death through direct cellular injury, osmotic shifts during freezing-thawing, and intracellular ice crystal formation, which togeth-

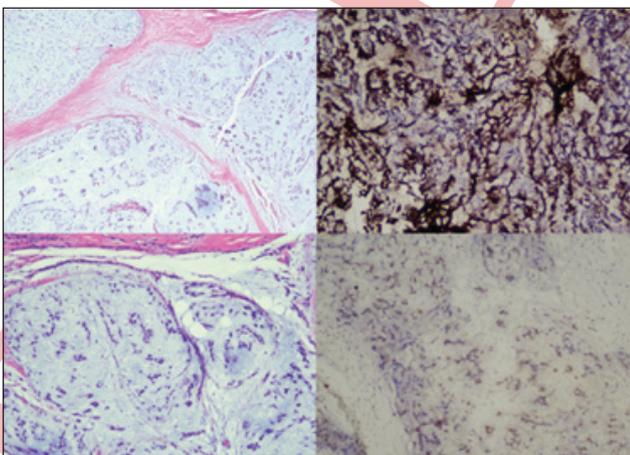


Fig. 3. Immunohistology Examination of The Core Biopsy

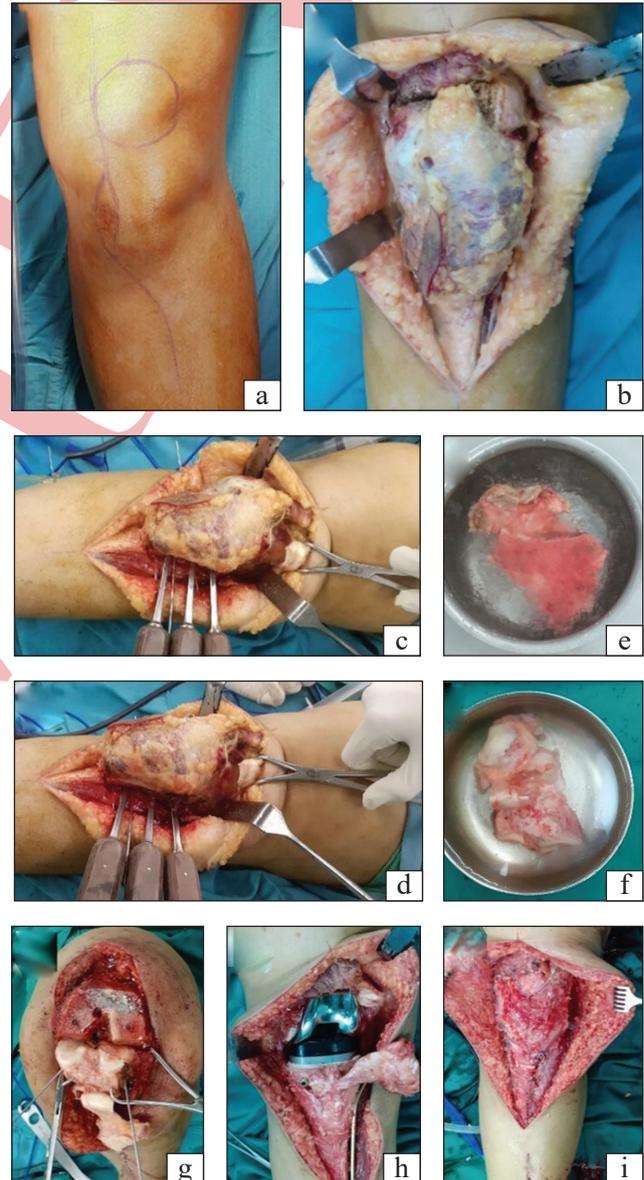


Fig. 4. Surgical Procedure. Incision according to the medial parapatellar approach (a); Tissue dissection and tumor margins identification (b); Tumor tissue resection as far as proximal osteotomy of the tibia and patella (c, d); The resected tibia and patella immersed in liquid nitrogen (e) for 15 minutes and thawing process in 0.9 % NaCl solution for 10 minutes (f); Reattachment of tissue after cryosurgery resection (g), total knee replacement and internal fixation of the proximal tibia and patella (h), and soft tissue closure (i)

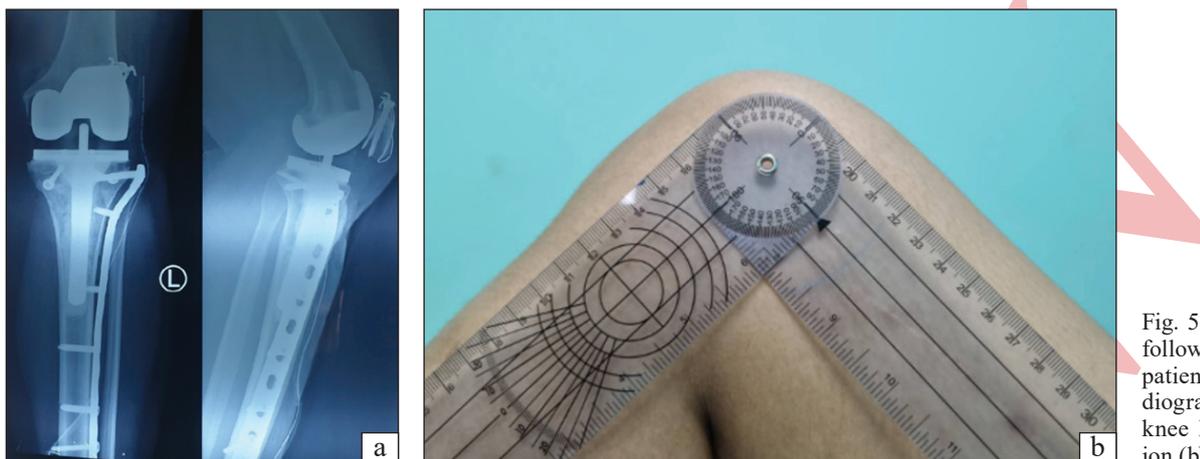


Fig. 5. Two-year follow-up of the patient. Knee radiograph (a) and knee ROM flexion (b)

Patient timeline

Date	Event
05/01/2022	Initial presentation with knee mass
12/01/2022	Imaging (MRI, CT) supporting EMC
15/01/2022	Wide excision, cryosurgery (liquid nitrogen), and TKR
15/01/2023	1-year follow-up (MSTS 90 %)
17/01/2024	2-year follow-up (MSTS 97 %)
10/01/2025	3-year follow-up (MSTS 93 %)

er can disrupt membranes and organelles [6]. In our case, cryosurgery facilitated limb salvage combined with total knee replacement and internal fixation, with negative margins, radiographic union at 1 year, and favorable functional outcomes up to 3 years. The absence of local recurrence on serial MRI and stable pulmonary findings on thoracic CT are encouraging, although oncologic conclusions are limited by the single-case design and the inherent variability in the natural history of EMC. Limitations include the single-patient nature of the report and limited generalizability; longer follow-up and larger series are required to better define indications, oncologic safety, complication profiles, and functional outcomes of cryosurgery-assisted reconstruction in EMC.

Conclusions

Cryosurgery with bone recycling may be a useful adjunct for limb-salvage management of juxta-artic-

Table 1

ular EMC of the knee, enabling reconstruction with favorable functional outcomes and no observed local recurrence during early to mid-term follow-up.

Conflict of interest. The authors declare no conflicts of interest related to this work.

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Стаття надійшла до редакції 26.01.2026	Отримано після рецензування 10.02.2026	Прийнято до друку 12.02.2026
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PREVIEW