

## Original Research Article

# Biopsy tract seeding in musculoskeletal sarcomas: myth or reality?

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## ABSTRACT

**Background:** It is a common practice in oncology in general and musculoskeletal oncology that the biopsy tract must be resected together with the tumor while performing limb-sparing surgery. Our study aims to assess the need for routine excision of biopsy scars in musculoskeletal malignancies by analyzing the presence of tumor in the biopsy tracts.

**Methods:** We conducted a prospective study from January 2021 to April 2023, including 48 soft tissue and bone sarcoma patients. Neoadjuvant chemotherapy was administered to all cases of Ewings sarcoma and osteosarcoma. All of them underwent surgical resection with appropriate reconstruction. Biopsy tracts were sent separately and analyzed for tumor infiltration.

**Results:** Two of the 48 patients included in the study had tumor deposits in their biopsy tracts. One patient with undifferentiated pleomorphic sarcoma and another patient with high-grade myxoid liposarcoma had tumor seeding in their biopsy tracts.

**Conclusions:** The rate of biopsy tract seeding in our study was 4.2% (2 out of 48). Even though this might seem very less, it is still significant considering the rarity of bone and soft tissue sarcomas. Despite the low risk of tumor seeding, it is advisable to continue routinely excising the biopsy tract. Whether inappropriately placed biopsy tracts warrant an amputation instead of limb salvage is a question that will be best answered in the future with large-scale prospective randomized studies.

**Keywords:** Biopsy tract, Tumor seeding, Limb salvage

## INTRODUCTION

It is a common practice in oncology in general and musculoskeletal oncology that the biopsy tract must be resected together with the tumor while performing limb-sparing surgery. There is a paucity of data regarding biopsy tract seeding with most of the studies being retrospective with limited sample sizes.<sup>1</sup>

The aim of our study is to assess the need for routine excision of biopsy tracts in bone and soft tissue sarcomas by analyzing the presence of tumor in the biopsy tracts.

## METHODS

We conducted a prospective analytical study from January 2021 to April 2023 at the Department of Surgical Oncology, Government Royapettah Hospital, Kilpauk Medical College, Chennai 10. A total of 48 patients between the ages of 10-70 with soft tissue and bone sarcoma were studied. All patients with soft tissue and bone sarcoma who were treated with curative intent were included in the study. Patients with distant metastases, including those who underwent amputation were excluded. All of them underwent biopsy with a 16-G Tru Cut needle and for bone cases with very little soft tissue

component, an 18-G Jamshedi needle was used. Image guidance was used whenever necessary. Neoadjuvant chemotherapy was administered to all cases of Ewings sarcoma and osteosarcoma. All of them underwent surgical resection with appropriate reconstruction. Biopsy tracts were sent separately and analyzed for tumor infiltration. Statistical analysis was done using statistical package for the social sciences (SPSS) version 21.

## RESULTS

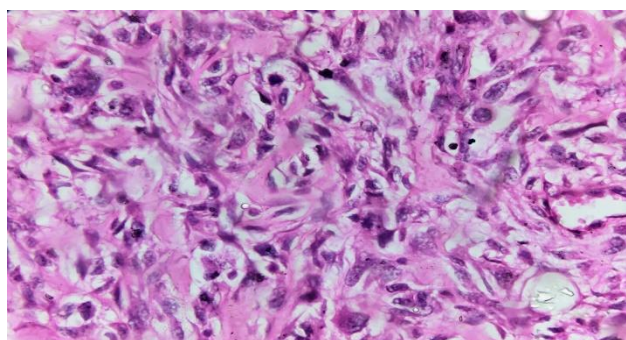
Two of the 48 patients (4.2%) included in the study had tumor deposits in their biopsy tracts. One patient with Undifferentiated pleomorphic sarcoma and another patient with high-grade myxoid liposarcoma had tumor seeding in their biopsy tracts. One of them had undergone an incisional biopsy outside.

**Table 1: Patient characteristics.**

| Characteristics  | No. of patients |
|--|-----------------|
| Soft tissue sarcoma                                      | 34              |
| Bone sarcoma   | 14              |
| Patients treated with neoadjuvant CT                     | 11              |
| Patients with positive biopsy tract                      | 2               |
| No. of patients with recurrent disease (at presentation) | 8               |

**Table 2: Histology.**

| Histology                            | No. of patients |
|--------------------------------------|-----------------|
| Fibromyxosarcoma                     | 3               |
| Undifferentiated pleomorphic sarcoma | 8               |
| Leiomyosarcoma                       | 2               |
| Chondrosarcoma                       | 2               |
| Synovial sarcoma                     | 4               |
| Epithelioid sarcoma                  | 5               |
| Liposarcoma                          | 12              |
| Osteosarcoma                         | 6               |
| Ewing sarcoma                        | 6               |



**Figure 1: High power field showing anaplastic tumor cells with intervening lace-like osteoid in a case of osteosarcoma.**

## DISCUSSION

Local recurrence adversely affects survival in extremity sarcomas. One of the important factors in determining the local recurrence is the biopsy tract. Our standard practice has been to remove the biopsy tract for the fear of local recurrence arising from tumor seeding. There is conflicting data regarding the effectiveness of excising the biopsy tract to prevent local recurrence. As neoadjuvant chemotherapy and advanced radiation techniques have emerged, the relevance of this inquiry has grown even more.

Tumor seeding of the biopsy tract has been described in various cancers; however, literature on extremity sarcomas is scarce. The potential risk of tumor seeding has led to the authors advising resection of the core needle biopsy (CNB) tract during definitive surgery for STS. Guidelines for performing a correct core needle biopsy have been described in the literature with special emphasis on bone and soft tissue sarcomas.<sup>2</sup> Open biopsy has a higher incidence of tract seeding when compared to closed biopsy and hence should be avoided whenever a closed biopsy is feasible.<sup>3</sup>

Upon extensive review of the literature, we narrowed down a few studies that showed tumor deposits in the biopsy tract. Davies et al in 1993 were the first ones to report a case of local recurrence occurring along the biopsy tract in a case of osteosarcoma.<sup>4</sup> Cannon and Dyson reported a statistically significant lower occurrence of local tumor recurrence where the biopsy tract was resected, compared with cases in which it was not resected.<sup>5</sup> Mohana et al described 26 cases of osteosarcoma, where 5 patients (19.2%) had histological proof of tumor seeding in the resected biopsy tracts.<sup>6</sup> Ribiero et al demonstrated 32% of biopsy tract seeding in their study.<sup>7</sup> Barrientos-Ruiz et al studied 180 patients with bone and soft tissue sarcomas and reported a contamination rate of 12% and showed that open biopsies had a higher percentage of contamination and those patients without contamination/tract seeding had higher local free recurrence when compared to the contrary.<sup>8</sup>

The evidence overwhelmingly indicates that biopsy tracts are seldom contaminated with tumors, far outweighing any evidence indicating the opposite. Binitie et al reviewed 59 extremity STS patients who underwent wide local resection without excision of the needle tract and found no increase in LR rates or rates of metastatic disease compared with published studies.<sup>9</sup> Ather Siddiqi et al retrospectively studied 116 patients and after control matching reported that two patients had local recurrence in the biopsy tract resected group compared to three patients in the biopsy tract non-resected group. They concluded that although it would be prudent to resect the CNB tract in most cases, not resecting the CNB tract is a feasible option if identification or removal of the CNB tract proves difficult.<sup>10</sup>

Said Saghie et al studied patients with pediatric bone sarcomas and found no recurrences even after not resecting the biopsy tract.<sup>11</sup>

A systematic review pertaining to this question that we attempt to address was done by Oliveira et al and deserves a special mention for its clarity.<sup>1</sup> They finally conclude that in the absence of resection in the biopsy tract, the possibility of local recurrence is quite real and chemotherapy has likely, a protective effect against tumor contamination in the biopsy tract. They also added that those patients with tumor seeding in their biopsy tracts indeed have an unfavorable prognosis. In an excellent review of needle tract seeding in STS, Berger-Richardson and Swallow conclude that “routine excision of the needle biopsy tract would appear sound based on intuition and oncologic principles, but not grounded in clinical evidence, other than a few published case reports”.<sup>12</sup>

From the pathologist's perspective, the study conducted by Cates throws light on this difficult yet important question regarding the routine excision of biopsy tracts.<sup>13</sup> This study showed that biopsy tract recurrences are negligible and this could be attributed to various reasons such as an acute inflammatory response that follows an invasive procedure such as core or incisional biopsy, the prolonged delay between biopsy and surgical resection, and administration of cytotoxic neoadjuvant chemotherapy.

There are several inherent difficulties in excising the biopsy tracts. Resecting the biopsy tract completely is difficult owing to its tri-dimensional shape. The biopsy site might not be identifiable in cases with a long interval from biopsy to surgery, such as administration of neoadjuvant therapy, which results in healing of the biopsy site. In addition, if the biopsy has been performed at a different center and the needle site is not properly marked, there would be difficulty in localizing the site of the biopsy tract. Also, improper communication between the surgeon and the radiologist might result in an inappropriately placed biopsy tract which will be difficult to remove during the definitive surgery.

In our study, the percentage of biopsy tract seeding is 4.2%. Amongst the two patients, one had an incisional biopsy done elsewhere. One of them had Undifferentiated pleomorphic sarcoma while the other had high-grade myxoid liposarcoma. Previous studies have shown no correlation between histology and biopsy tract seeding. Among the 48 patients, three had local recurrences with a median follow-up of 16 months, and these three did not have biopsy tract seeding.

With the advent of effective chemotherapy and radiation techniques, limb salvage is the ideal management for most cases of bone and soft tissue sarcomas. With this low percentage of biopsy tract seeding, an inappropriately placed biopsy tract might not necessarily dictate the need for radical procedures.

One of the limitations of our study is that the sample size is limited and the follow-up duration was relatively short, lasting only 16 months.

## CONCLUSION

Our study's rate of biopsy tract seeding was 4.2% (2 out of 48). Even though this might seem very less, it is still significant considering the rarity of bone and soft tissue sarcomas. Despite the low risk of tumor seeding, it is advisable to continue routinely excising the biopsy tract. Whether inappropriately placed biopsy tracts warrant an amputation instead of limb salvage is a question that will be best answered in the future with large-scale prospective randomized studies.

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