Clinical outcomes of patients who undergo additional excision after unplanned excision surgery for soft tissue sarcoma.

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Abstract
Surgeons who operate on benign soft tissue masses that are presumed to be benign often encounter malignancies that require wider excision, a procedure referred to as an ‘unplanned excision’. These patients then undergo additional excision after being diagnosed with malignancies. We aimed to investigate the outcomes of patients with soft tissue sarcomas who underwent unplanned excisions of their tumors followed by additional excisions at our institution.

We examined 6 patients with soft tissue sarcomas, 3 men and 3 women, who underwent additional excisions after an unplanned excision between 2004 and 2015 at our hospital. Their mean age was 59.5 y, their mean primary tumor size was 9.0 cm, and 3 each had superficial and deep tumors, respectively. No residual tumor cells were observed in patient specimens following additional excision. None of the patients required plastic reconstructions. The 5-y survival rate was 100%, while the 5-y local recurrence-free rate was 83% after 1 patient experienced local recurrence and underwent a second additional resection.

Our data suggest that patients who undergo unplanned excisions should also undergo additional excisions to avoid tumor recurrence.

Keywords: Unplanned resection, Additional resection, Soft tissue sarcoma, Prognosis.
patients and grade II in the remaining 3 [8]. The follow-up period (from initial surgery to the last follow-up) ranged from 6 months to 28 months (mean ± SD, 19.7 ± 6.95 months). In terms of adjuvant therapy; chemotherapy was administered to 2 patients (33%) and radiation therapy (a total dose was 60 Gy) to 1 (17%). The chemotherapy regimen was adriamycin and ifosfamide based on conventional protocols [9,10].

One patient (17%) had residual tumor cells after initial surgery, and 1 (17%) experienced functional impairment in the form of femoral lateral nerve area perception disorder after undergoing additional resection. 5 of the 6 patients were disease-free at 5 y post additional resection, while 1 (17%) experienced recurrence. None of the patients experienced metastases and no disease-related deaths occurred. The patient who experienced recurrence after undergoing additional resection was admitted to our hospital after the first recurrence. The patient who had residual tumor tissue after the original unplanned excision did not experience recurrence after additional excision. Moreover, tumor size, depth, and histology did not appear to be associated with tumor recurrence. The 5-y overall survival rate was 100%.

Table 1. Patient characteristics and findings.

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Age (y)</th>
<th>Histology (FNCLCC)</th>
<th>Malignancy</th>
<th>Time to additional resection</th>
<th>Size (cm)</th>
<th>Residual tumor post-initial surgery</th>
<th>Recurrence post-additional excision</th>
<th>Metastasis</th>
<th>Chemotherapy</th>
<th>Radiation</th>
<th>Outcome follow-up period and recent status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>63</td>
<td>LS</td>
<td>1</td>
<td>1 y</td>
<td>5 × 2</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Recurrence (at 6 months after surgery) CDF</td>
</tr>
<tr>
<td>2</td>
<td>47</td>
<td>UPS</td>
<td>2</td>
<td>2 months</td>
<td>15 × 10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>5-y CDF</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>UPS</td>
<td>2</td>
<td>1 month</td>
<td>16 × 10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>5-y CDF</td>
</tr>
<tr>
<td>4</td>
<td>72</td>
<td>SS</td>
<td>1</td>
<td>2 months</td>
<td>6 × 5</td>
<td>*(recurrent tumor)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5-y CDF</td>
</tr>
<tr>
<td>5</td>
<td>71</td>
<td>SS</td>
<td>2</td>
<td>1 month</td>
<td>12 × 12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>5-y CDF</td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>AFH</td>
<td>1</td>
<td>2 months</td>
<td>4 × 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5-y CDF</td>
</tr>
</tbody>
</table>

Mean: 59.5

AFH: Angiomatoid Fibrous Histiocytoma; CDF: Continuously Disease-Free; FNCLCC: Fédération Nationale des Centers de Lutte Contre le Cancer (grading system); LS: Liposarcoma; SS: Synovial Sarcoma; UPS: Undifferentiated Pleomorphic Sarcoma.

Discussion

It remains unclear whether additional resection following an unplanned excision produces a poor prognosis or functional disorders [2,5]. Our results suggest that unplanned excisions do not produce such negative outcomes.

In general, achieving a good prognosis in patients with sarcoma requires an adequate wide margin resection [11]. If adequate margins are unachievable, additional resection usually becomes necessary [12]. A previous study suggested that unplanned excisions did not worsen patients’ prognoses when additional resections were conducted subsequently [5]. Our results, that showed good patient outcomes, were consistent with those of previous investigations [5,13]. It was also reported that a high histological tumor grade can negatively affect the prognosis [14]. However, the only patient who experienced recurrence in our study had a low-grade tumor; hence, a histological grade did not appear to negatively affect prognosis. Taken together, unplanned excisions do not appear to contribute to poorer prognoses in patients with soft tissue sarcomas.

The influence of adjuvant therapy on patients who undergo unplanned resections of soft tissue sarcomas is not clear [2,15,16]. In our study, patients who received adjuvant therapy achieved good outcomes, as they maintained continuous disease-free status. Therefore, adjuvant therapy for such patients may be useful.

Functional disorders often occur following unplanned resections because of the wide margins required [3,5]; this was experienced by only 1 patient in our study. Hence, the site of the tumor may play a role in whether functional disorders develop after additional resection.

Residual tumors after unplanned resections were previously described as being poor prognostic factors [4]. None of the patients had residual tumors following additional excision. Only 1 of our patients underwent repeat resection owing to recurrence; the remainder of the patients achieved good prognoses. Based on these results, it is not clear whether residual tumors worsen prognoses. However, pre-emptively performing additional resection before any recurrence occurs is warranted.

A limitation of our study was the small sample size; hence, a larger number of patients ought to be investigated. The other limitation of the current study is that the histological types were wide-ranging. Further study restricting the histological types will be necessary.
In conclusion, our data suggest that pre-emptive additional resections ought to be considered in patients who undergo unplanned excisions for soft tissue sarcomas in order to prevent any potential recurrences. We also believe that in case of recurrence, wide additional resections should be promptly added.

**Declaration**

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**Availability of data and material**

All data and material are available upon request.

**Consent for publication**

The patient provided informed consent for publication of this report.

**Competing interests**

None.

**Authors’ contributions**

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**Data analysis:** Kazuhiko Hashimoto, Shunji Nishimura, Naohiro Oka Hiroki Tanaka, Yukiko Hara.

**Manuscript preparation:** Kazuhiko Hashimoto and Masao Akagi.

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