Cytogenetic Characterization of Tenosynovial Giant Cell Tumors (Nodular Tenosynovitis)\(^1\)

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Abstract

Chromosome investigation in six localized forms of tenosynovial giant cell tumors, also known as nodular tenosynovitis, revealed an identical translocation between chromosomes 1 and 2, t(1;2)(p11;q35-36) in three tumors, a variant translocation t(1;5)(p11;q22) in a fourth case, and a t(2;16)(q33;q24) in a fifth case. One case showed a normal karyotype. Although morphologically rather uniform, these benign tumors appear to be cytogenetically heterogeneous, but the chromosome changes seem to cluster in 2 regions, 1p11 and 16q24.

Introduction

TGCF\(^3\) are the most common tumors of synovial tissue and have been divided into localized and diffuse forms, depending on their growth characteristics (1). The localized type, often referred to as nodular tenosynovitis, primarily affects the fingers and arises from the synovium of the tendon sheath or interphalangeal joint. It is a common lesion that may occur at any age but usually appears in young and middle-aged persons, more frequently in women than in men. The lesion develops gradually over a long period, often retains the same size for several years and has a preferential location on the flexor surface. TGCTs are benign lesions that, nonetheless, possess a capacity for local recurrence. Their etiology is still controversial (1).

Cytogenetic investigations in TGCTs are scarce. Abnormal karyotypes have been reported in two cases of the localized type TGCT (2). The same investigators also reported cytogenetic findings in pigmented villonodular synovitis, the diffuse form of TGCT (3, 4). Albeit histologically similar to the localized form, pigmented villonodular synovitis is rather uncommon and usually appears as a poorly confined soft tissue mass in areas adjacent to large weight-bearing joints (1).

In this report, we describe the finding of a consistently occurring chromosome abnormality, t(1;2)(p11;q35-36), in three nodular tenosynovitis tumors and a variant translocation, t(1;5)(p11;q22), in a fourth tumor. Our findings and the data from the literature strongly suggest the involvement of region 1p11-p13 in the localized and diffuse forms of TGCT.

Materials and Methods

For each tumor, a sample was obtained at the time of surgery and processed for short-term culturing and cytogenetic analysis, according to procedures described previously (5, 6). Part of the same sample was fixed

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\(^3\) The abbreviation used is: TGCF, tenosynovial giant cell tumors.
Table 1 Clinical, pathological, and cytogenetic findings in TGCT

<table>
<thead>
<tr>
<th>Case</th>
<th>Age/Sex</th>
<th>Location</th>
<th>Diagnosis*</th>
<th>Karyotype [no. of cells]</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54/F</td>
<td>Left hand, 1st finger</td>
<td>NTS</td>
<td>46, XX, t(1;2)(p11;q35—36) [15]/46, XX, [5]</td>
<td>Present report</td>
</tr>
<tr>
<td>2</td>
<td>90/F</td>
<td>Right hand, 3rd finger</td>
<td>NTS</td>
<td>46, XX, t(1;2)(p11;q35—56) [7]/46, XX [10]</td>
<td>Present report</td>
</tr>
<tr>
<td>3</td>
<td>60/M</td>
<td>Right hand, 4th finger</td>
<td>NTS</td>
<td>46, XY t(1;2)(p11;q35—36) [4]/46, XY [10]</td>
<td>Present report</td>
</tr>
<tr>
<td>4</td>
<td>32/M</td>
<td>Left foot, 4th toe</td>
<td>NTS</td>
<td>46, XY, t(1;5)p11q22</td>
<td>Present report</td>
</tr>
<tr>
<td>5</td>
<td>49/M</td>
<td>Hand, 3rd finger</td>
<td>NTS</td>
<td>46, XY, t(2;16)(q32;q24) [14]/46, XY [1]</td>
<td>Present report</td>
</tr>
<tr>
<td>6</td>
<td>46/F</td>
<td>Right index finger</td>
<td>NTS</td>
<td>45, XX, t(1;5;13)(p11;q35;4), del(2)(q33), der(2)(pter-q31::?), t(5;14)(q13q24), del(9)(p12), t(15;22)(q6;46, XX [8]</td>
<td>Present report</td>
</tr>
<tr>
<td>9</td>
<td>36/F</td>
<td>Footsole</td>
<td>PVNS</td>
<td>46, XX, t(7;16)(q22;q24) [4]/46, XX [21]</td>
<td>Mertens et al., 1993</td>
</tr>
<tr>
<td>10</td>
<td>45/F</td>
<td>Talcalcaneal joint</td>
<td>PVNS</td>
<td>46, XX, t(1;9)(p11;p12) [7]/47, idem, +12 [9]/46, XX [3]</td>
<td>Mertens et al., 1993</td>
</tr>
<tr>
<td>11</td>
<td>68/M</td>
<td>Distal part, 4th finger</td>
<td>NTS</td>
<td>46, XY, ins(5;1)(q31;p13p34) [6]/46, idem, t(2;4)(q23;q21) [2]/46, X, – Y, [4]/46, XY [12]</td>
<td>Mertens et al., 1993</td>
</tr>
</tbody>
</table>

* NTS, nodular tenosynovitis; PVNS, pigmented villonodular synovitis.

in formalin, processed to paraffin, and examined on hematoxylin and eosin-stained sections.

Results and Discussion

All five tumors appeared as circumscribed, lobulated, and more or less encapsulated lesions consisting of rounded, mononuclear, synovial-like cells accompanied by multinucleated giant cells, inflammatory cells, siderophages, and rare foamy macrophages (Fig. 1). Table 1 summarizes the clinical, pathological, and cytogenetic findings of our five cases (nos. 1, 2, 3, 4, and 5) as well as the other tenosynovial giant cell tumors with abnormal karyotype reported in the literature. A seemingly identical translocation between chromosomes 1 and 2, t(1;2)(p11;q35—36), was found in three tumors. In addition, a variant translocation, t(1;5)(p11;q22), was present in a fourth case (Fig. 2).

Involvement of 1p11–p13 has been described previously in two nodular tenosynovitis tumors (cases 6 and 11) and in one case of pigmented villonodular synovitis (case 10). Interestingly, the long arm of chromosome 5 was also involved in nodular tenosynovitis cases 6 and 11. Cytogenetic aberrations in tenosynovial giant cell tumors appear to be similar in both the localized and the diffuse form, and at least two cytogenetic groups can be distinguished: tumors with rearrangements of the 1p11–p13 region with either 2q35–36 and 5q22–5q35 involvement (7 of 11); and those with an abnormality involving the 16q24 band (2 of 11).

From a morphological point of view, the localized and diffuse form of TGCT are virtually identical. Both lesions consist of a similar polymorphic population of cells, albeit that giant cells are somewhat less numerous in the diffuse form.

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References

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