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Authors
Chang, Le
Rao, Nagesh
Bernthal, Nicholas
et al.

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Case Report

An unusual karyotype in leiomyoma: Case report and literature review

Le Chang [a], *Nagesh Rao* [a], *Nicholas Bernthal* [b], *Sarah M. Dry* [a], *Aaron W. James* [a,*]

[a] *Department of Pathology and Laboratory Medicine, David Geffen School of Medicine, University of California, Los Angeles, CA, USA*

[b] *Department of Surgery, University of California, Los Angeles, Los Angeles, CA, USA*

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ABSTRACT

Vascular leiomyoma are uncommon, clinically benign smooth muscle tumors. Here we report a case of an otherwise typical leiomyoma with unusual cytogenetic changes including t(1;10). Reports from the existing literature suggest that approximately 40–50% of leiomyomas contain nonrandom chromosomal abnormalities of which a subset is tumor specific. t(12;14)(q15;q24) is one of the most common translocations, which occur in approximately 20% of karyotypes. Additional aberrations include del(7)(q22-q32), trisomy 12, and 6p21 rearrangements. Other recurrent abnormalities include monosomy 22, monosomy 10, del (10q), and structural rearrangements of chromosome 3.

1. Introduction

Leiomyomas of the subcutaneous tissue are commonly referred to as vascular leiomyoma or angiomyoma. These lesions represent an estimated 5% of all benign soft tissue tumors and up to one-half of superficial leiomyomas.[1,2] They occur more frequently in women and usually develop later in life, with an average age of 47 years.[1] The most common site of these tumors was in the lower extremity.[1] These tumors often cause pain, which can be worsened with pressure, change in temperature, pregnancy, or menses.[2] These tumors consist of both smooth muscle cells, as well as components of the extracellular matrix, including collagen, fibronectin, and proteoglycan.[3,4] Histologically, these tumors usually have a well-demarcated nodule of smooth muscle along with thick-walled vessels. Focal areas of myxoid change, hyalinization, calcification, and adipose tissue may also be seen.[5] Stringent histologic criteria to distinguish leiomyomas from leiomyosarcomas include absence of nuclear atypia, cell necrosis, and low mitotic activity.[5,6] Although the cause of leiomyomas are unknown, current investigation into initiation of tumorigenesis has theorized that hormonal and genetic features may affect pathogenesis of vascular leiomyomas.

Here we report a case of an otherwise typical soft tissue leiomyoma with unusual cytogenetic changes including t(1;10). This unusual translocation is more typical of

* *Corresponding author.*
E-mail address: Awjames@mednet.ucla.edu (A.W. James).

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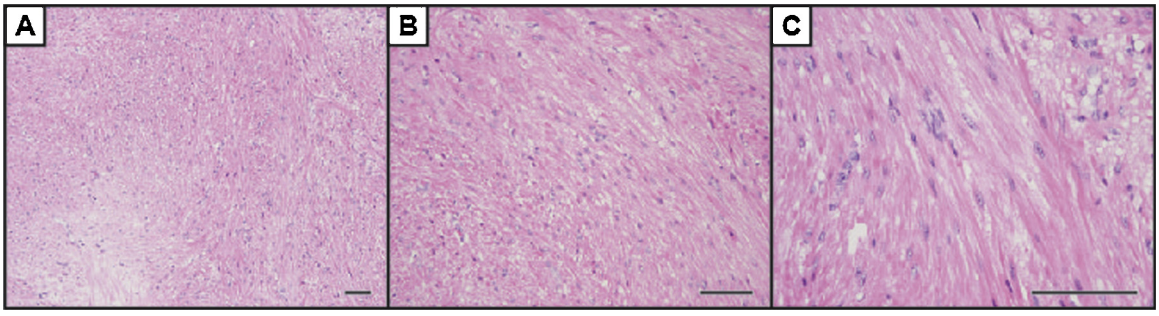

Fig. 1 – Histologic appearance of tumor. (A–C) Tight intersecting fascicles of bland-appearing tumor cells with smooth muscle differentiation. No significant nuclear atypia/pleomorphism, no mitoses, nor necrosis were seen. Scale bar: 50 μm.

myxoinflammatory fibroblastic sarcomas (MIFS) and hemosiderotic fibrolipomatous tumor (HFLT).

2. Case presentation

A 60-year-old female presented with a painful superficial mass at her anterior mid-lower right leg for the past 2 years. Magnetic resonance imaging revealed a T1 isointense and T2/STIR hyperintense nodule measuring 7 mm × 5 mm × 5 mm. The specimen was well-circumscribed and pathologic analysis found tight intersecting fascicles of cytologically bland smooth muscle cells. There was no significant nuclear pleomorphism. No mitoses or necrosis was seen (Fig. 1).

3. Cytogenetic study

Chromosomal analysis revealed a female karyotype with two independent abnormal clones, each showing a different aberration. The first clone showed a T(1;15) in 3 of 20 cells while the second one had a T(1;10) seen in 2 of 20 cells. The remaining 15 cells were cytogenetically normal. The composite karyotype 46,XX,t(1;15)(p36.3;q21.2)[3]/46,XX,t(1;10)(p22;q24)[2]/46,XX[15] was identified in cultured cells (Fig. 2).

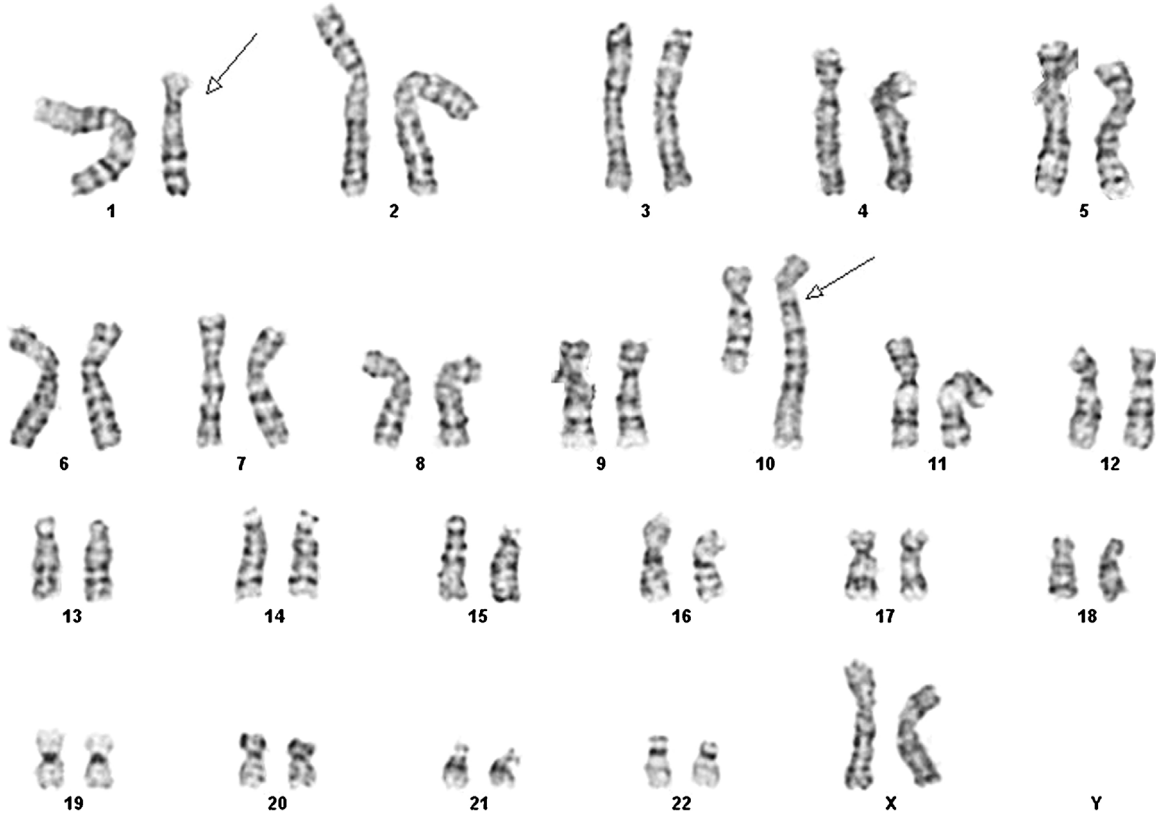

Fig. 2 – Cytogenetic findings. Chromosome analysis reveals a female karyotype with two independent abnormal clones each showing a different aberration. The first clone shows a t(1;15)(p36.3;q21.2) in 3 of 20 cells while the second one has a T(1;10)(p22;q24) seen in 2 of 20 cells. The T(1;10) clone is shown.

4. Discussion

Due to the rare nature of vascular leiomyomas, full cytogenetic analyses of such tumors are not available and the common mutations have not been described. However, approximately 40–50% of uterine leiomyomas contain nonrandom chromosomal abnormalities, of which a subset is tumor specific. t(12;14)(q15;q24) is one of the most common translocations, which occur in approximately 20% of karyotypes.[7] Additional aberrations include del(7)(q22-q32), in 17% of karyotypes,[8] trisomy 12, in 12% of karyotypes,[7,9] and 6p21 rearrangements, in <5% karyotypes.[7] Other recurrent abnormalities include monosomy 22, monosomy 10, del(10q), and structural rearrangements of chromosome 3 and chromosome 1, especially ring chromosomes.[8,10–16] Notably, intravenous leiomyoma, a quasimalignant lesion that also arises in the uterus, has a similar t(12;14)(q15;q24) karyotype as uterine leiomyoma, as reported in two case studies.[17,18] The similarities in cytogenetic characterization indicate that the pathogenesis of these two lesions may have originated from a similar breakpoint translocation event. For a full review of cytogenetic abnormalities in leiomyomas see 10.

Structural rearrangements of chromosome 1, such as the one found in this leiomyoma (1p36), have been reported previously.[14] However, in comparison with recurrent cytogenetic changes in leiomyomas, the changes in this leiomyoma are unusual as the translocation t(1;10), more specifically t(1;10)(p22;q24), has been reported in MIFS HFLT.[19–21] The breakpoints of this translocation have been mapped to transforming growth factor-beta 3 receptor (*TGFBR3*) in 1p22 and meningioma expressed antigen 5 (*MGEA5*) in 10q24.[20] Additionally, the gene coding for transforming growth factor-beta 3 (*TGFB3*) is mapped to 14q23-24, one of the most common fibroid translocation sites.[22] Interestingly, previous studies found that expression of TGFB3 mRNA levels in leiomyomas was elevated compared to matched myometrium.[23,24] These data suggest that TGFB3 may be important in uterine leiomyoma growth; however, there have been conflicting views on its effects, as high concentrations of TFGB3 did not simulate significant smooth muscle cell proliferation.[23]

Conflicts of interest

The authors have none to declare.

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