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Short communication

Cytogenetic relationship between uterine lipoleiomyomas and typical leiomyomas

Guillaume Havel, Barbro Wedell, Rigmor Dahlenfors, and Joachim Mark
Department of Pathology and Cytogenetics, Central Hospital, S-541 85 Skövde, Sweden

Summary. The chromosomes from two human uterine lipoleiomyomas, L25 and L26, from the same patient, were studied by a banding technique applied to preparations from short-term cultures. Both tumors displayed the same pseudodiploid stemline characterized by the reciprocal translocation *t* (5;12) (q12;q24). These observations coincide with the previous finding that the largest subgroup of typical leiomyomas with an abnormal stemline are characterized by a long-arm change of one chromosome No. 12. The combined results support the previously advanced hypothesis that different histologic subtypes of uterine leiomyomas are derived from a common totipotential stem cell. This interpretation also fits with a proposed theory about the derivation of malignant leiomyomatous uterine neoplasms.

Key words: Uterine lipoleiomyomas – Cytogenetical analyses – Histogenesis.

Introduction

Benign lipomatous tumors of the human uterus are rare with less than 150 cases on record (references in Willén et al. 1978). These tumors have usually originated in the uterine corpus and have been mixed lipoleiomyomas or fibrolipoleiomyomas. They are never diagnosed preoperatively because their clinical presentation is indistinguishable from that of typical leiomyomas. The histogenesis of lipoleiomyomas continues to be debated and of the many theories advanced to account for their origin, the following are mentioned: (1) displaced embryonic mesenchymal cells, (2) lipoblasts occurring along uterine vessels and nerves, (3) multipotent persisting stem cells, and (4) direct metaplasia from smooth muscle cells (Honoré 1978; Willén et al. 1978). This question will be further amplified below, by comparing recently published chromosomal observations in typical leiomyomas with those in the two lipoleiomyomas to be presented here.

Offprint requests to: J. Mark

Case report

A 49-year-old, previously healthy female underwent hysterectomy for recurrent menorrhagia and progressive uterine enlargment. The uterus was macroscopically and histologically normal except for two closely adjacent, subserosal, rounded tumors projecting from the fundic region. The well-demarcated tumors measured up to 10 cm (L25) and 7 cm (L26) in diameter respectively (the designations are a continuation of those used in previous reports; cf. references in Havel et al. 1989). Both neoplasms showed yellow-white, solid, cut surfaces. Microscopical examination revealed a similar picture in both consistent with that of a lipoleiomyoma, i.e. a mixture of monomorphous bundles of smooth muscle cells with more or less extensive areas containing sheets of mature fat cells (Fig. 1a). There were no particularly cellular areas or any other indications of malignancy. The postoperative course was uneventful.

Methods

Central and peripheral pieces of both uterine tumors were taken for histopathology. Fresh material was in part deep-frozen for future molecular analysis and in part processed for short-term tissue cultures as described earlier (Mark et al. 1988a). Two chromosome preparations were performed from both L25 and L26. The methods for these preparations, as well as for G-banding, have been described elsewhere (Mark et al. 1988b). The nomenclature follows that of ISCN (1985).

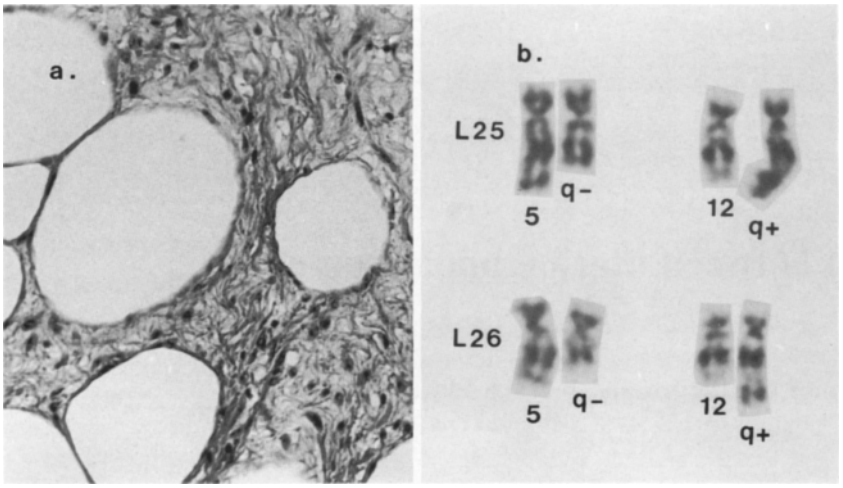

Fig. 1a. A microscopical picture typical for both lipoleiomyomas L25 and L26, i.e. an intermixture of bundles of smooth muscle cells and areas of mature fat cells. H and E × 200. **b** Partial stemline karyotypes from L25 and L26, respectively, showing the identical translocation *t* (5; 12) (q22; q24)

Table 1. Cytogenetical observations in lipoleiomyomas L25 and L26 (figures in parentheses indicate number of cells karyotyped)

Tumor L no	Days in vitro	Chromosome numbers				Total cells	Stemline karyotype	Deviations in variant cells in relation to stemline cells
		44	45	46	92			
L25	9	2 (2)	2 (2)	16 (15)	–	20 (19)	46, XX, *t*(5; 12) (q22; q24)	−2, −4/−15, −21/−1/−14
L26	14	–	2 (2)	28 (25)	–	30 (27)	46, XX, *t*(5; 12) (q22; q24)	−14/−21

Results

Since the cytogenetical observations in the two preparations from each tumor L24 and L25, respectively, agreed they were pooled in Table 1.

Both tumors had the same pseudodiploid stem line showing the *t* (5; 12) (q22; q24) as the only karyotypic change (Fig. 1 b). No cell with a normal karyotype was seen in either tumor. The hypomodal cells analyzed all contained both the 5q− and the 12q+-markers and showed, in addition, random losses, possibly changes caused by broken cells.

The constitutional karyotype of the patient, as checked by analysis of routine lymphocyte cultures, was normal.

Discussion

So far, a total of some 80 typical uterine leiomyomas have been studied cytogenetically (references in Mark et al. 1989). About half of these cases belonged to our series (Mark et al. 1988b; Havel et al. 1988). About 50 of the published cases had normal stem lines but they often contained variant cells with various, probably partly artificial, sporadic numerical deviations. Of the cases with one or more abnormal stem lines, structural deviations predominated. These affected in particular the chromosome types 1, 2, 7, 12 and 14. The recurrent aberrations, mostly reciprocal translocations, made it possible to distinguish at least three subgroups among typical leiomyomas: (I) those showing an involvement of the long arm of No. 12 and usually characterized by a translocation *t* (12; 14) (q13–15) (q23–26), (II) those showing the reciprocal translocation *t* (1; 2) (p36; p24), and finally (III) those characterized by a 7q-involvement, usually an interstitial deletion, either del(7) (q22q31) or del(7) (q11q22).

The present two lipoleiomyomas, both distinguished by the same reciprocal translocation, *t* (5; 12) (q22; q24) fit well into the above group I. Furthermore, present and previous observations suggest that the involvement of No. 12 is the critical event in this subgroup. This interpretation is also supported by our observation that in some abnormal stem lines trisomy 12 could substitute for a structural change of the long arm of one No. 12.

The above discussion demonstrates that lipoleiomyomas show clonal cytogenetical deviations closely related to those most frequently observed in typical leiomyomas and possibly also in leiomyosarcomatous neoplasms. These results indicate a similar histogenesis for typical leiomyomas and

lipoleiomyomas, probably from a common totipotential stem cell (references in Scully 1981).

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