Fibromatosis (All Types)

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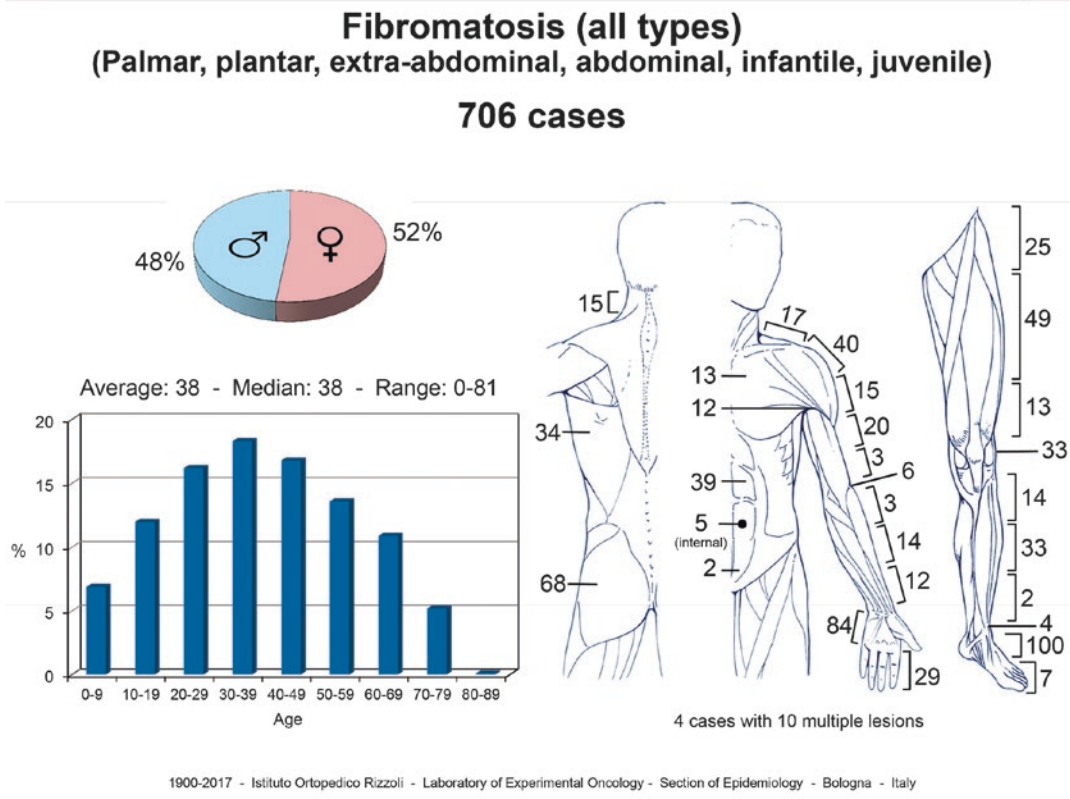
Davide Maria Donati and Tommaso Frisoni

Fibromatosis consists in a wide group of benign mesenchymal proliferation. In WHO 2013 it belongs to the group of fibroblastic/miofibroblastic neoplasms not metastasizing but with a potential locally aggressive behavior. They can arise either from fasciae (superficial type) or from deep tissue:

(a) Superficial: (1) palmar f. (Dupuytren's contracture); (2) plantar f. (Ledderhose's disease); (3) penile f. (Peyronie's disease); (4) knuckle pads.
(b) Deep (desmoid-type fibromatosis): (1) extra-abdominal f.; (2) abdominal f.

D. M. Donati · T. Frisoni (✉)
Orthopedic Oncology Department, IRCCS Istituto Ortopedico Rizzoli, University of Bologna, Bologna, Italy
e-mail: davide.donati@ior.it; Tommaso.frisoni@ior.it

P. Picci et al. (eds.), *Diagnosis of Musculoskeletal Tumors and Tumor-like Conditions*,
https://doi.org/10.1007/978-3-030-29676-6_29

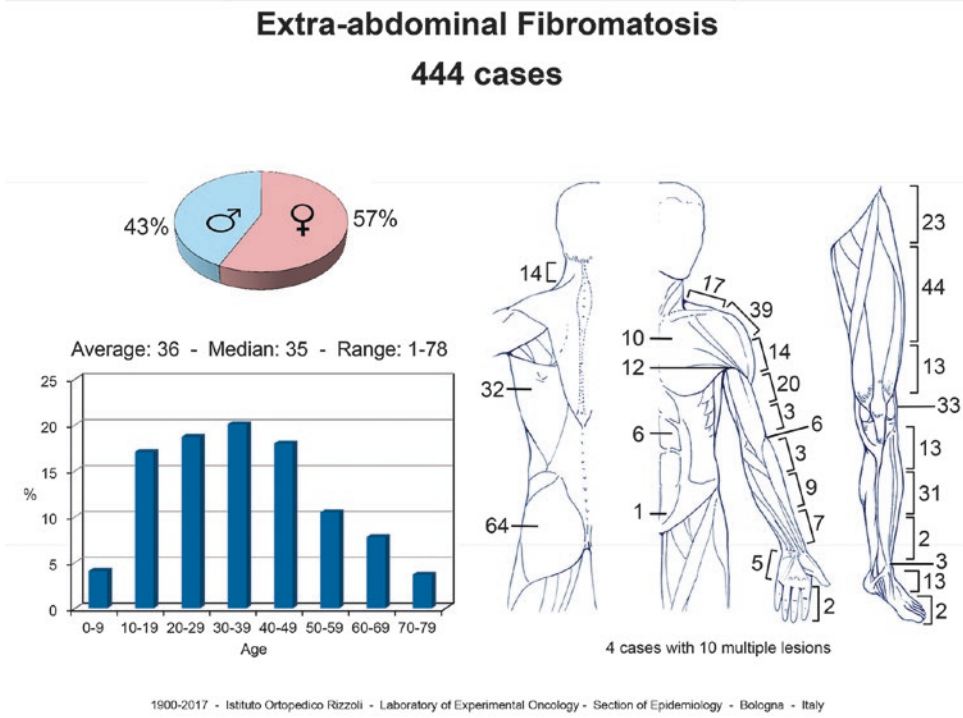


29.1 Desmoid Type: Fibromatosis

Definition: This tumor consists in a locally aggressive proliferation of small bundles of spindle cells (monoclonal fibroblasts) in an abundant fibrous stroma with an infiltrative growth. Not metastasizing but with an high local recurrence rate after surgical excision.

Epidemiology: Young adults and women are mostly involved. Occurs more often in patients with FAP. In women tumor growth may be related to pregnancy. Peak incidence 25–35 years. Three percent of all soft tissue tumors rising to 13% in FAP.

Localization: Ubiquitous. Scapular girdle, pelvic girdle, lower limbs, and upper limbs. Usually deep. Skin invasion is rare.



Clinical: Clinical features depend on localization. Symptoms are mainly related to the structures involved. Tumor is usually a slowly growing, painless, hard mass, often very adherent to surrounding tissues. The infiltrative pattern leads the tumor grow into the muscles and along fasciae with multiple nodules (multifocality) that can arise proximally and distally even in different compartment of the same limb configuring an high morbidity evolution although the lack of metastasizing potential with an tendency to recur. When it develops close to a joint, a functional impairment may occur due to stiffness and muscular/tendon/capsular retraction. Neurological symptoms are rare but possible when nerves are involved.

Imaging: On standard X-ray, it may be not detectable even if sometimes a calcific mass in soft tissue or a bony erosion when the tumor is seated on cortical bone can be revealed. US scan appearance is variable, usually hypoechoic and inhomogeneus; if performed with contrast medium, it shows an early enhancement of the contrast agent and a long washout, typical aspect of benign lesions probably due to the presence of fibrotic tissue.

CT scan reveals a isodense lesion, thus is recommended to conduct the exam with contrast medium, in order to distinguish the mass from surrounding tissue and recognize its multinodular shape. It's very useful in studying the bony erosion.

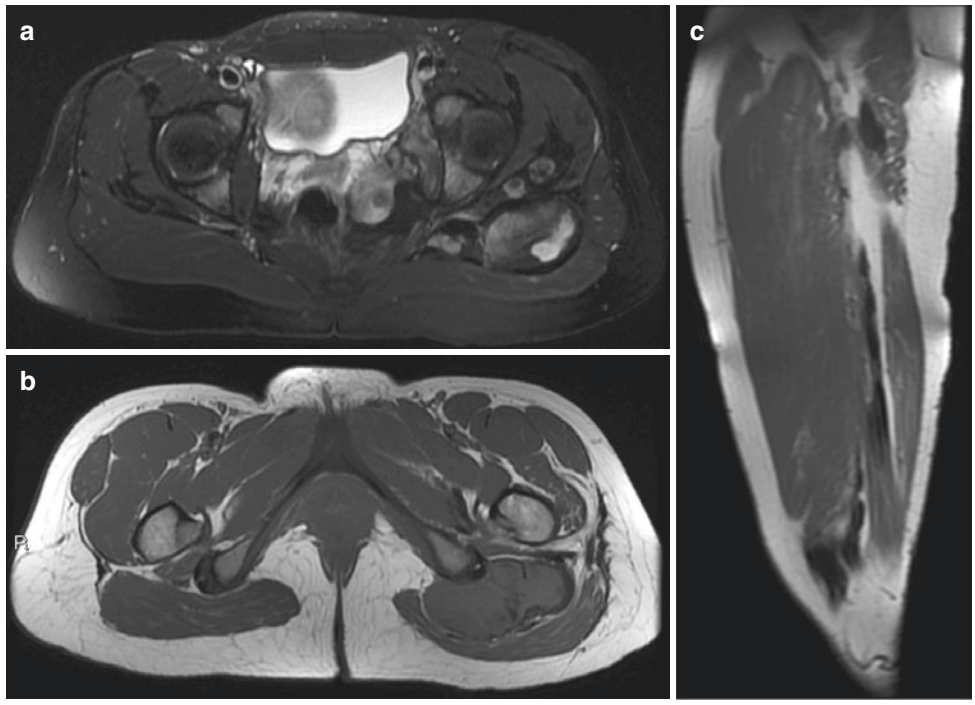
The gold standard is MRI in which active desmoid fibromatosis is often heterogeneously isointense on T1-weighted images and heterogeneously hyperintense on T2-weighted images. An inhomogeneus contrast enhancement is present. Bands of low signal on all sequences are due to the presence of hypocellularity and abundant collagen areas, within high T2 signal and enhancement reflecting the cellularity and active disease, whereas low T2 signal denotes collagenization and maturation.

Changes in MRI imaging features are used as evaluation for treatment response; however, a large consensus for what can be considered a good response is necessary. RECIST criteria are not applicable as assessment because usually they do not reduce in volume but they change becoming "biologically inactive" with an increased hypointensity in T2 and a decreased contrast enhancement.

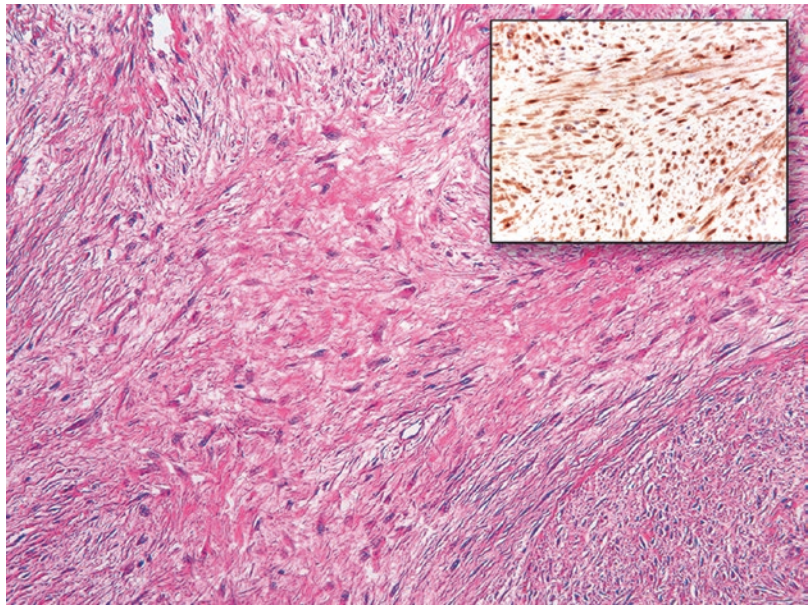
Histopathology: Grossly a solid and hard mass with infiltrative pattern can be appreciated; difficult to recognize well-defined margins and separate from the surrounding tissues even if they usually are not invaded. It's a spindle cell proliferation in a very dense and mature fibrous connective tissue. Cellularity is quite low as well as mitoses. Spindle cells are bland in appearance and grow in intersecting fascicles. Open vascular clefts are characteristics. Abnormal expression of β-catenin is due to *CNTTB1* gene mutations. In FAP, APC gene pathway is involved in pathogenesis.

Course and Staging: Locally aggressive tumor not metastasizing. Clinical behavior is unpredictable. Usually slowly growing; sometimes a rapid growth is observed but it can also tend to self limit with a spontaneous involution or regression associated to MRI changes. Local recurrence is frequent even if removed with adequate margins. Malignant transformation has never been observed.

Treatment: DT fibromatosis treatment is controversial and under debate. The standard of care has been surgical treatment with wide or radical excision (including amputation). This approach has been associated with adjuvant radiation therapy in particular when inadequate margins were obtained. During the last decades, a "wait and see" approach has become more indicated as first line regardless to symptoms. According to localization or symptoms, if resistant to painkiller treatment, systemic or adjuvant therapies such as chemotherapy or radiotherapy can be suggested. Nevertheless surgery and adjuvant therapies should be considered only in case of progression after an observational period or for not responsive tumors. The most used chemotherapy regimen have been low-dose MTX-VBL, tamoxifen, and more recently pazopanib. Prognosis is good.



(**a**, **b**) T1 and T2 FAT SAT MRI sequences show a heterogeneously isointense on T1-weighted images, heterogeneously hyperintense on T2-weighted images. In (**c**) the multifocal pattern that involves the whole extension of the thigh in the same patient



Heavily collagenized tissue with low cellularity, spindle cells with bland appearance, intersected fascicles, and ectatic vascular clefts. Immunohistochemical nuclear positivity for β-catenin in the neoplastic cells (*inset*)

Immunohistochemical panel	
• β-betenin	Smooth M Act +
• β-catenin	+ (80% of cases)

Selected Bibliography

Bates JE, et al. Radiation therapy for aggressive fibromatosis: the association between local control and age. Int J Radiat Oncol Biol Phys. 2018;100(4):997–1003.

Gronchi A, et al. Sporadic desmoid-type fibromatosis: a stepwise approach to a non-metastasising neoplasm—a position paper from the Italian and the French sarcoma group. Ann Oncol. 2014;25(3):578–83.

Scarborough MT, et al. Aggressive fibromatosis. Am J Clin Oncol. 2005;28(2):211–5. Review.

Sheth PJ, et al. Desmoid fibromatosis: MRI features of response to systemic therapy. Skelet Radiol. 2016;45(10):1365–73.

Smith K. Systematic review of clinical outcomes following various treatment options for patients with extraabdominal desmoid tumors. Ann Surg Oncol. 2018;25(6):1544.