Did you know?
Sarcoma of Soft Tissues

Abstract

There are more than 50 different types of soft tissue sarcomas (Figure 1).
The number of new cases is 3.4 per 100,000 people per year and the number of deaths is 1.3 per 100,000 people per year.
The relative survival after 5 years for all soft tissue sarcomas is 65%.

Soft tissue sarcomas are rare cancers, which represent between 1 to 2% of all cancers. These are malignant tumors developed within connective tissue or supporting cells.

They are named after the type of normal tissue cells that cancer cells look like when observed under a microscope. More than 50% of soft tissue sarcomas originate in limbs. They develop more often in lower limbs than in upper limbs, especially in the thigh.

Biopsy is essential before any treatment to ensure proper patient management according to the type of tumor. Several histological, immunohistochemical and molecular analyzes are then carried out in accordance with the two major complementary classifications in force, coming from the World Health Organization (WHO) and the National Federation of Centers for the Fight Against Cancer (FNCLCC).

The origin of soft tissue sarcomas is still relatively unknown, the majority of them are said to be idiopathic that is to say that no cause can be found. However, we know that it exists some predisposing factors responsible for the occurrence of these tumors, such as rare genetic diseases (retinoblastoma, Werner syndrome), exposure to ionizing radiation or viruses such as herpes or HIV.

Complications

- The signs and symptoms of soft tissue sarcoma may vary depending on the type of tumor and its location.
- They are often linked to a painless mass magnifying in a few weeks or months, compressing the surrounding tissues, thus becoming painful and annoying movements.
- When sarcoma affects the retroperitoneum, abdominal pain may occur, accompanied by vomiting.

Possible treatments

- Surgical: lumpectomy with a healthy tissue margin around, wide enough to minimize the risk of local recurrence.
- Chemotherapy: either pre-surgically to reduce the tumor or as a complementary treatment. A special technique called "isolated limb perfusion" can isolate an arm or leg from the bloodstream with a tourniquet or extracorporeal circulation. Thus, the doses of chemotherapy delivered are much higher than by the general stream.
- Radiotherapy that can be pre-surgical, adjuvant on the surgical cavity, or exclusive on inoperable tumors.
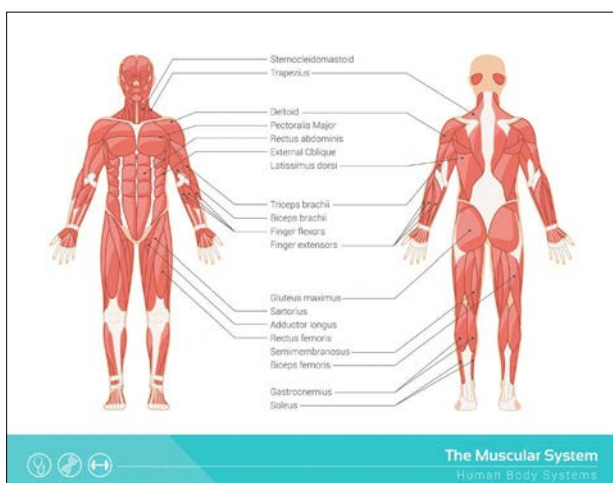

Figure 1

In Olea Sphere®

Olea Vision™ makes morphological review easier (Figure 2), which is a major step in the evaluation of soft tissue sarcomas. Measurement or volumetric tools are available for monitoring these tumors, in particular using tumor response criteria "RECIST 1.1".

The multiparametric analysis provides additional information about the architecture, the vascularization and their changes during treatment. In this case of Myxoid Liposarcoma (a rare soft-tissue tumor with a misleading benign appearance) (Figure 3), comparison between the tumor and healthy muscle can be achieved based on contrast agent uptake and kinetics analysis. We note here a rapid contrast enhancement, followed by continuous enhancement without wash-out, which is well-known for tumors with large range of interstitial tissue. These findings are characteristics of such tumors.

The diffusion and ADC computation (Figure 4) are also suitable tools to differentiate Myxoid tumors from another type of sarcoma, with fairly high values (2.08 +/- 0.51.10-3 mm2/s), relative to the high proportion of mucin and the low presence of collagen.

The T1 perfusion quantitative analysis (DCE) is based on the application of a pharmacokinetic model between intra- and extra-vascular extracellular spaces (EES). The monitoring of Ktrans parameter (plasma transfer constant towards the extracellular space) makes it possible to depict the good response to the chemotherapy treatment.

Addition

Radiomics and texture analysis also allow quantifying the heterogeneity of a tissue; with the promise of great progress on the prediction and evolution of these tumors. Texture analysis* in Olea Sphere® makes it possible to derive more than a hundred of texture parameters from region or volume of interest (Figure 5).
These potential new biomarkers, consolidated by the use of artificial intelligence, make possible to automatically segment the different portions of these tumors. Thus, the radiologist could easily quantify the areas of enhancement or necrosis and compare the evolution of these ones during the various phases of treatment.
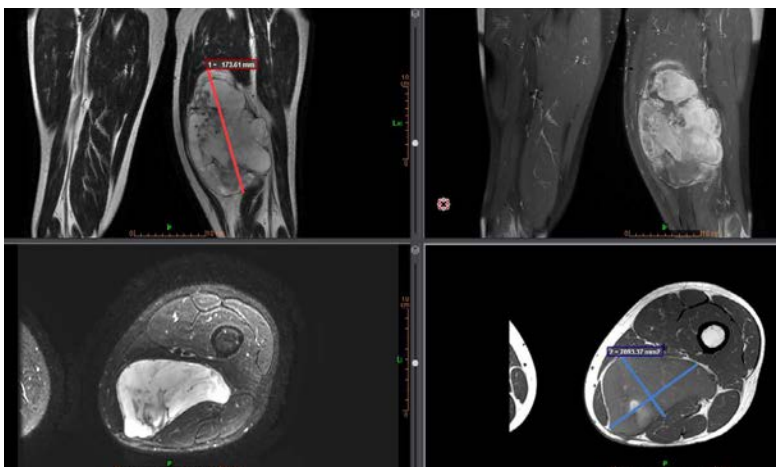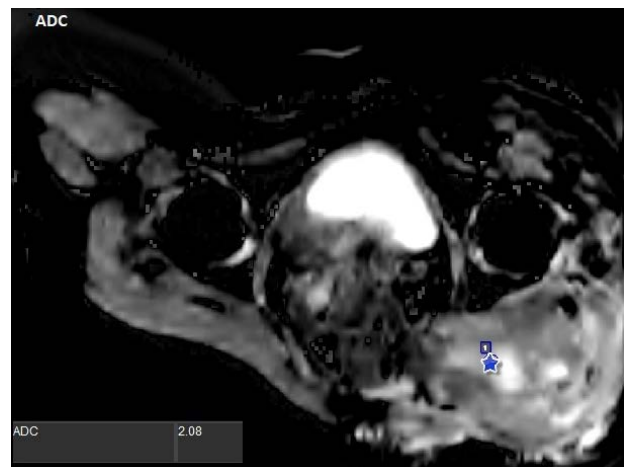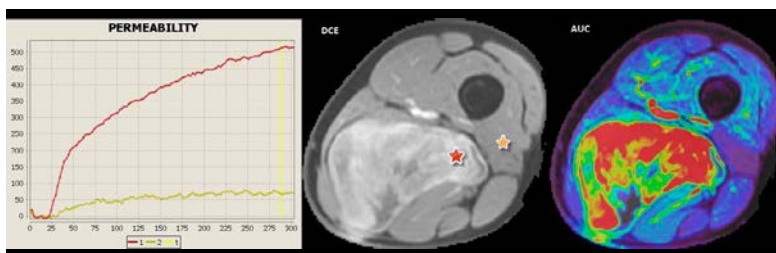

Figure 2

Figure 4
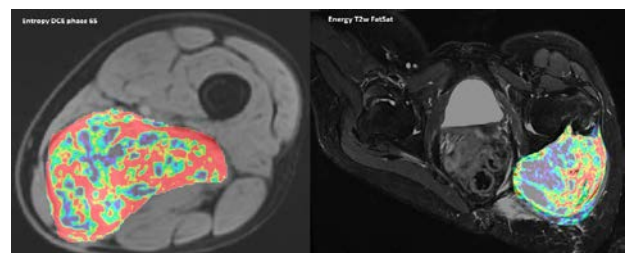

Figure 3

Figure 5

References

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