Soft tissue tumors are rare, although their overall incidence is nearly impossible to determine. Most lesions are located superficially, near the skin, and do not undergo further investigation. They are usually either excised without prior radiological assessment or remain unbiopsied. Most of the remaining lesions, located deeply and without cutaneous changes, are benign. It is estimated that benign soft tissue tumors outnumber their malignant counterparts by a ratio of about 100:1. Their annual incidence is approximately 300 per 100,000. In certain age groups (e.g., the elderly) and anatomical locations (e.g., the thigh), the frequency of malignant soft tissue sarcomas is much higher.

Histological examination remains the gold standard for differentiating benign and malignant lesions. The reasons for preoperative imaging include the determination of the exact localization and extent of the lesion, characterization (grading and tissue specific diagnosis) of the tumor, and indication of biopsy site and trajectory. However, to avoid unnecessary examinations and to obtain a cost-effective investigation, we propose an imaging pathway which considers the most common presentations of a soft tissue tumor. The reader should be aware that this pathway is not tailored to individual cases and does not take into account the availability of diagnostic imaging techniques or the individual experience of the investigator (Fig. 9.1).

Whenever a soft tissue tumor is suspected, a detailed anamnesis and thorough clinical examination should be performed. The history of the patient sometimes reveals important information about the pathogenesis of a soft tissue tumor. Trauma or past injury, exposure to environmental carcinogens, or prior irradiation can be related to the development of soft tissue sarcoma. Some congenital syndromes are also associated with an increased incidence of soft tissue tumors. The rate of growth of a soft tissue mass may also indicate its aggressiveness, since malignant lesions tend to grow faster than benign ones (Table 3.1). However, the clinical history is generally nonspecific. Patients may complain of numbness, paresthesia, or local space occupying or irradiating pain due to local effects of the mass, or they may have no complaints at all. Metastasized sarcomas can cause weight loss, hypoglycemia, and emaciation, but this normally occurs late in the course of disease.

Superficially located soft tissue masses are usually easily detected during clinical examination. More deeply seated lesions, however, especially those in the thigh, must attain considerable size before they are palpable. The detectability of a soft tissue mass also depends on its consistency.

Choice of the initial imaging technique is determined by whether the soft tissue mass is palpable. If it is, we suggest beginning the examination with ultrasound or plain radiography.

Ultrasound is widely available and provides a quick impression of the localization of a soft tissue mass. Superficial lesions without extension do not require further investigation by medical imaging. If biopsy is performed, this can be easily carried out under ultrasound guidance. High-frequency transducers are optimal for superficial imaging. Soft tissue tumors that are deep seated are not as readily appreciated on ultrasound. However, a number of nontumoral or pseudotumoral conditions (e.g., hematomas, fluid collections, sebaceous cysts) can be ruled out by their clinical presentation and ultrasound features. On the other hand, a number of benign lesions also can be diagnosed with a high degree of certainty. Homogeneous echotexture and sharp margins without invasion of the surroundings are features suggesting a benign character. Such lesions can be managed conservatively. A follow-up ultrasound examination is scheduled after 6 weeks to 3 months. If the aspect has not changed, further investigation is not necessary. However, if ultrasound shows that the lesion has grown, or if the echotexture has changed considerably, magnetic resonance imaging (MRI) should be performed. There is an overlap between benign and malignant
Fig. 9.1. Diagnostic algorithm for soft tissue tumors