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Correlation between tru cut biopsy and final pathology in soft tissue sarcomas

Abstract

Introduction: There are 50 to 60 different subtypes of soft tissue sarcomas, with a mean age of presentation in adults between 40 and 60 years and a 5-year survival rate of 64.7%. The main symptom is the appearance of a lump or tumor of variable growth, predominantly soft tissue sarcomas affecting the extremities. The diagnostic method involves taking a sample through biopsy, which is one of the main causes of recurrence. Depending on the type of biopsy used, it can alter the disease's behavior and prognosis. Therefore, the tru-cut biopsy, being an economical, minimally invasive method with rapid recovery and minimal complications, allows for the early establishment of therapeutic strategies, making it the method of choice.

Materials and methods: Retrospective and descriptive study of patients with histological diagnosis of soft tissue sarcoma from January 2018 to December 2020 at the Institute of Cancerology and Hospital Dr. Bernardo del Valle S. INCAN Guatemala City - Guatemala. The Tru cut biopsy was compared vs. the final pathology.

Results: In 16 cases (38 %) the use of immunohistochemistry was necessary to confirm the diagnosis, the most affected age was between 49 - 68 years (40.4 %), the main histological type was pleomorphic sarcoma (23.8 %), the extremities were the most affected (38.1%) and tomography was the study that was most used (83.3%).

Keywords: sarcoma, immunohistochemistry, biopsy

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Abbreviations: NCCN, national comprehensive cancer network; IHC, immunohistochemistry; CT, computed tomography; MRI, magnetic resonance imaging

Introduction

Soft tissue sarcomas are malignant tumors that originate from the connective or supporting tissue of the body. In the embryonic process, they are formed from the mesenchyme. There are 50 to 60 different subtypes of sarcoma, depending on the type of cells that constitute them.[1–4] Sarcomas represent 1% of all neoplasms present in humans, presenting an estimated annual incidence of 1.4 per 100,000 inhabitants. Soft tissue sarcomas are rare neoplasms, with an incidence of five new cases per 100,000 inhabitants per year in Europe. Globo can in 2018 only mentions Kaposi's sarcoma worldwide, among the pathologies with the lowest incidence, a panorama that does not differ from the Globo can 2018 registry for Guatemala.[5–7]

The risk of suffering from this disease increases progressively with age, reaching between 6 - 20 cases per 100,000 inhabitants between 49 - 80 years of age; They are slightly more frequent in men than in women and are distributed in all ages, even in children and adolescents. The average age of presentation in adults is between 40 - 60 years; with a 5-year survival of around 64.7%.[7–10] 50% of patients diagnosed with sarcomas die from this disease. Soft tissue sarcomas are not among the first 10 most frequent types of neoplasms in the Hospital Registry of the Institute of Cancerology and Hospital Dr. Bernardo del Valle S. INCAN; however, between 60 - 65 new cases are reported per year.[11] Undifferentiated pleomorphic sarcomas (34%) and liposarcomas (25.6%) are the majority, located in the extremities (59.3%), trunk (17.9%), retroperitoneum (12.5%), head and neck (8.9%), and mediastinum (1.3%). Sarcomas are characterized by significant local aggressiveness and the propensity to develop metastases, preferably in the lungs (90%) and regional lymph nodes (5%).[3,4,8,10,12] The most common signs and symptoms described in the literature are: presence of a tumor (100%) and local pain (77.8%), functional impotence (63.6%), nerve compression (22.7%), weight loss (20.5%), collateral circulation (9.1%), hyperemia (25%), ulceration (15%), bleeding (6.8%).[2] Additionally, rapidly growing, ill-defined tumors are named, located at the root of the limb attached to deep planes. In more advanced cases, the presence of pathological fractures, other manifestations appear as a result of the rapid and excessive growth of the tumor, displacing structures, occupying space, causing compression thereof. and intestinal obstruction, as in the case of sarcomas located retroperitoneally, in the abdominal cavity.[13,14] The diagnosis in advanced conditions (metastatic) is made in 10 - 16% of patients, the main route of dissemination is through blood, 75 - 80% with affinity to the lung, bone, liver, or brain. Nodal metastases are present in 5%, except in synovial sarcomas, small cells, epithelioid, clear cell sarcomas, angiosarcomas, and alveolar rhabdomyosarcoma, in which they occur in up to 17% in each of these subtypes.[12,15,16] Clinical suspicion is addressed through an adequate history, physical examination, imaging tests such as: there is a possibility of vascular involvement.[1,4,17]

The indications for PET study in the National Comprehensive Cancer Network (NCCN) guidelines correspond to:

Diagnosis / Staging:

a. Auxiliary staging of Ewing sarcoma

b. Detection of extrapulmonary metastases from other sarcomas (without pulmonary involvement).

Restaging/recurrence: (not clear in sarcomas).

Prognosis: only in GIST.

Treatment planning and response monitoring: in GIST.

Controversial criteria persist and there is little information on the performance of PET in relation to the evaluation of sarcomas.[9,18] The diagnosis of soft tissue sarcomas is often a diagnostic challenge given by the histological report. Currently, immunohistochemistry (IHC) constitutes an auxiliary tool that allows determining the type of tumor differentiation (muscular, neural, vascular) through antibodies such as CD34, EMA, CD99, STAT-6, ALK, MUC-4, MDM-2, CDK-4, INI-1, TFE-3, TLE-1, and SOX-10.[2,15,19] The biopsy recommended to be performed to obtain adequate material for histopathological evaluation in soft tissue sarcomas is a core needle biopsy (CLOSED) (BAG/TRU CUT): It is performed under local anesthesia using special needles that allow cylinders of tissue to be extracted. In this technique, at least four representative cylinders with 14 - 18 G needles should be taken, which include sampling of different areas of the tumor, avoiding areas of necrosis. This allows obtaining a fragment of tissue up to a maximum of 2 cm in length. Among the benefits, we can list the low cost of the procedure, its ability to be performed on an outpatient basis with high diagnostic accuracy. The tru-cut biopsy with a representative sample allows obtaining the diagnosis of the type in 73% of cases, the histological subtype in 85% of cases, and the grade in 80 – 92% of cases. It can be guided by images (Ultrasonography, CT, MRI). Guided tru-cut biopsy can be performed in the operating room, minor surgery or procedure room with local anesthesia or with ultrasound or tomographic guidance. It is low-cost and easy to perform; Sensitivity and specificity of 97% and 99% respectively have been described.[5,8,12,20]

Advantages of Tru cut biopsy:[5,8,15,28]

I. Low traumatic technique

II. Low incidence of hematomas and complications

III. Allows the initiation of treatment with early chemotherapy or radiotherapy by having a diagnosis with minimal invasion

IV. Use of local anesthesia

V. Outpatient procedure

VI. Low cost

VII. Allows obtaining the sample in the form of cylinders

VIII. With minimal risk of contamination of structures adjacent to the biopsy

a. Limitations:[5,8,15,28]

IX. Obtaining little tumor material

X. A pathologist with extensive experience is required

XI. An interventional imaging specialist with experience in taking percutaneous biopsies is required.

Because international studies have shown that a very important criterion for recurrence is the type of biopsy performed. Initially, the types that present the most recurrence and make the final oncological treatment difficult are incisional and seasonal biopsies, which is why it is very important to know and be able to properly perform a trucut biopsy. We want to know if there is an adequate correlation between the biopsy performed either guided or blind and the final pathology after surgical intervention (wide resection) at our institution. This type of biopsy, according to the American Musculoskeletal Tumor Society, is associated with a significant risk of diagnostic errors, non-representative samples, and skin or soft tissue complications.[12] The Musculoskeletal Tumor Society and its members, including Mankin et al., evaluated 329 patients with malignant neoplasms of the musculoskeletal system in whom seasonal biopsies were performed. It was concluded that 8.2% of the cases presented diagnostic errors, such as the lack of representative material for pathological study in 10.3% and complications at the biopsy wound in 17.3%. The location of the biopsy modified the surgical approach in 18.2%, leading to definitive treatments such as limb amputation in 4.5% and poor prognosis in 8.5% of cases.[21] The 2020 meta-analysis on Core Needle Biopsy versus Incisional Biopsy for Differentiation of Soft Tissue Sarcomas included 17 studies with 2,680 patients who underwent tru-cut needle biopsy and 241 incisional biopsies. When comparing the sensitivity and specificity of the tru-cut needle biopsy and incisional biopsy, it was evident that they had a sensitivity of 97% (95% CI, 95 - 98) and 99% (95% CI, 97 - 99), respectively, and a specificity of 96% (95% CI, 92 - 99) and 100% (95% CI, 94 - 100) for each. Estimates of the sensitivity and specificity of tru-cut needle biopsy and incisional biopsy for detecting the histological subtype of soft tissue sarcoma were 88% (95% CI, 86 - 90%) and 77% (95% CI, 72 - 81%), respectively, and 93% (95% CI, 87 - 97%) and 65% (95% CI, 49 - 78%) for each. Patients who underwent tru-cut needle biopsy had a significantly lower risk of complications compared to those who underwent incisional biopsy (hazard ratio, 0.14; 95% CI, 0.03-0.56 [$P \leq 0.01$]).[22]

Material and methods

A retrospective descriptive study was carried out in patients with a histological diagnosis of soft tissue sarcoma who underwent Tru cut biopsy at the Institute of Cancerology and Hospital Dr. Bernardo del Valle S. INCAN Guatemala City - Guatemala from January 2018 to December 2020. The AJCC 8th edition classification for soft tissue sarcomas was used for staging.

General objective

Correlate the Tru cut biopsy vs the final pathology in soft tissue sarcomas.

Study population

Patients with a histological diagnosis of soft tissue sarcoma obtained through Tru-cut biopsy from January 2018 to December 2020 were included in the study. All patients with a confirmed diagnosis of soft tissue sarcomas by Tru-cut biopsy, performed at the institution by doctors in training or specialists either obtained directly or guided by some imaging method, were included. Histopathological samples taken by Tru-cut biopsy must include a minimum of 6 cores, and patients who have received surgical treatment at this institution were eligible for inclusion in the study.

Results

A total of 42 patients who met the inclusion and exclusion criteria of the study were analyzed and divided into the Tru-cut biopsy group, with 33 cases (79%) performed blindly and 9 cases (21%) guided by imaging. There were 23 cases (55%) in females and 19 cases (45%) in males Tabel 1–Table 5.

Table 1 Distribution according to age in patients with soft tissue sarcoma

Age	Number of cases	Percentage
19 - 28	5	11.9
29 - 38	4	9.5
39 - 48	7	16.7
49 - 58	9	21.4
59 - 68	8	19
69 - 78	6	14.3
79 - 88	3	7.1
Total	42	100

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Table 2 Distribution according to anatomical location in patients with soft tissue sarcoma

Anatomical location	Number of cases	Percentage
Inferior extremities	12	28.6
Chest	10	23.8
Abdomen	7	16.7
Head and neck	7	16.7
Superior extremities	6	14.3
Total	42	100

Table 3 Distribution according to diagnostic studies in patients with soft tissue sarcoma

Diagnostic studies	Number of cases	Percentage
Tomography	35	83.3
Mammography	3	7.1
Ultrasound	2	4.8
X-rays	1	2.4
Magnetic resonance	1	2.4
Total	42	100

Table 4 Distribution according to the final pathology with immunohistochemistry in patients with soft tissue sarcoma

Final pathology	Number of cases	Percentage
Pleomorphic Sarcoma	10	23.8
Spindle cell and epitheloid sarcoma	7	16.7
spindle cell sarcoma	6	14.3
Fibrosarcoma	5	11.9
High grade sarcoma	3	7.1
Synovial sarcoma	2	4.8
Epitheloid sarcoma	2	4.8
Rhabdomyosarcoma	2	4.8
Metaplastic carcinoma	1	2.4
Leiomyosarcoma	1	2.4
Myxoid liposarcoma	1	2.4
Low grade sarcoma	1	2.4
Breast stromal sarcoma	1	2.4
Total	42	100

Table 5 Distribution according to the type of biopsy, the initial pathology and the final pathology confirmed by immunohistochemistry in patients with soft tissue sarcoma

Initial pathology	Final pathology	Biopsy type		Total
		Blind biopsy	Guided by image	
Malignant (Sarcoma)	Malignant (Sarcoma)	18 (43)	8 (19)	26 (62)
	Malignant neoplasm	0 (0)	0 (0)	0 (0)
Malignant neoplasm	Malignant (Sarcoma)	15 (36)	1 (2)	16 (38)
	Malignant neoplasm	0 (0)	0 (0)	0 (0)
Total		33 (79)	9 (21)	42 (100)

The type of biopsy performed, the initial pathology, and the final pathology revealed that out of 42 cases, 16 (38%) initially described as malignant neoplasms were confirmed as sarcomas upon performing the immunohistochemistry study in the final pathology. This breakdown includes 15 (36%) from blind biopsies and 1 (2%) from image-guided biopsies.

Discussion

The patients diagnosed with soft tissue sarcomas were most affected in the age range of 49 - 68 years, comprising 17 cases (40.4%), while only 3 cases were observed in the range of 79 - 88 years (7.1%). According to literature, the risk of developing this disease increases progressively with age, reaching between 6 - 20 cases per 100,000 inhabitants between 49 - 80 years old. The average age of presentation is 40 – 60 years, slightly more frequent in men than in women, which is consistent with our analysis where the female sex was slightly higher at 23 cases (55%) compared to 19 cases (45%) in males.[7–10] Regarding the histological types of soft tissue sarcomas, the breakdown is as follows: 10 cases (23.8%) were diagnosed as pleomorphic sarcoma, 7 cases (16.7%) as spindle cell and epithelioid sarcoma, 6 cases (14.3%) as spindle cell sarcoma, 5 cases (11.9%) as fibrosarcoma, 3 cases (7.1%) as high-grade sarcoma, and 2 cases (4.8%) each for synovial sarcoma, epithelioid sarcoma, rhabdomyosarcoma, and liposarcoma. Worldwide, undifferentiated pleomorphic sarcoma accounts for 28% of cases, followed by liposarcomas at 15%, leiomyosarcoma at 12%, and synovial sarcoma at 10%. This distribution differs somewhat

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from our study where the most frequently diagnosed types are spindle cell and epithelioid sarcoma followed by spindle cell sarcoma. The reasons for this histological predisposition remain unknown, but our research provides insight into our population's realities and suggests potential avenues for future studies to address this question.

Soft tissue sarcomas exhibit a predilection for anatomical locations in the extremities. In our study, this trend is evident with 12 cases (28.6%) in the lower limb, followed by 10 cases (23.8%) in the thorax; the abdomen, head and neck each accounted for 16.7%, and the upper limb for 14.3%. In contrast to the literature indicating that 50% of soft tissue sarcomas affect the extremities, we found that only 38.1% of cases were located there. The thorax accounted for 19%, differing from the literature's reported percentage, while the rest of the locations aligned closely with our findings; 13% were in the retroperitoneum and 9% in the head and neck.[23–25] Computed tomography (CT) and magnetic resonance imaging (MRI) are both recommended for pre-surgical assessment and post-treatment control of lesions. While both techniques are useful, some studies suggest that MRI allows better differentiation of muscles and vessels, often providing more reliable information on neighboring plane invasion. In our study, CT was the main imaging study used in 35 cases (83.3%), while radiography and MRI were less frequently utilized with only 1 case each (2.4%).[25,26] The number of cylinders obtained for Tru-cut biopsies, whether blind or guided, was a minimum of 6 cylinders in 41 cases, accounting for 97.6%. Biopsies performed under guidance were carried out by experienced interventional imaging doctors, and the pathology reports were conducted by skilled pathologists. However, it's possible that blindly performed biopsies had a higher diagnostic error rate due to operator dependence, tumor location, size, neurovascular compromise, inflammation degree, edema, and necrosis, evident in 9 cases (21%) where a repeat Tru-cut biopsy was necessary to obtain sufficient material for accurate histopathological study and initial pathology report.[19,22,27,28] The limitations in this work are a small number of cases. Because our many patients are previous manipulations in other health centers.

Conclusion

The Tru-cut biopsy is indeed an appropriate diagnostic method for soft tissue sarcoma. It offers the benefit of not delaying the early initiation of oncological treatment.

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Conflicts of interest

Los autores, la Dra. Maria Augusta Velasco, Dr. Juan Carlos Merida y el Dr. Alvaro Forno Noriega have no real perceived financial conflict of interest in the publication of this manuscrip.

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