



An analysis of cases presenting with a mass in the hand and an evaluation of treatment methods

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The aim of this study was to present and discuss our clinical experience of patients presenting with a mass in the upper extremity, in respect of demographic characteristics, localisation of the mass, clinical and pathological characteristics.

A retrospective evaluation was made of 114 cases (60 females, 54 males) who presented at our clinic with complaints of localised pain and swelling in the upper extremity between 1 June 2016 and 31 December 2018. The cases were separated into 3 groups; Group 1 with a mass determined in the carpal region, Group 2 with localisation between the wrist and the metacarpophalangeal joint, and Group 3, in the distal of the metacarpophalangeal joint.

The mass was of soft tissue origin in 90 cases, and of bone origin in 24 cases. The distribution of cases was 6 in Group 1, 20 cases in Group 2, and 88 in Group 3. The tumour was benign in 105 (92%) cases and a primary malignancy in 9 (7.8%) cases. Recurrence occurred in 4 cases, of which 2 were enchondroma, 1 was a giant cell tendon sheath tumour, and 1 was hemangioma

The majority of painful masses seen in the hand are benign and very few are malignant. In the approach to hand tumours, clinical evaluation guided by demographic data, and the evaluation of diagnostic and treatment options according to the radiological appearance and anatomic localisation will determine the ideal approach providing a full cure.

Keywords: upper extremity; hand mass; localisation; tumour.

INTRODUCTION

In addition to the complex structure of the hand, many abnormalities, variations, or mass lesions may be seen in the hand. The most frequently seen problems are masses (1). The frequency of masses seen in the hand is very different from other areas. These masses constitute 15% of soft tissue tumours, and 6% of bone tumours (2, 3). Generally these tumours are palpable and cause complaints of pain and swelling, and palpable tumours can usually be easily clinically identified (3). However, sometimes the nature of the mass may not be able to be clearly identified in the first evaluation and it may not be possible to make benign-malignant differentiation. Therefore, parameters such as a detailed anamnesis, clinical examination, localisation and size of

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the mass, changes in the skin, and translumination must be applied at the stage of diagnosis, and biopsy for a definitive diagnosis (1, 3).

The majority of masses in the hand are benign and malignant tumours are extremely rare (4). Although benign tumours of the hand have a more aggressive course than benign tumours in other parts of the body, malignant bone tumours tend to show less aggressive behaviour (5). Despite the low incidence of masses in the hand, as these masses can be locally invasive or affect hand function, early diagnosis and starting treatment are extremely important for the protection of hand function (1, 3, 4). The information in literature related to the treatment methods for mass lesions in the hands is limited to small case series, case reports, and just a few large, general case series (1, 6).

That the clinicians have good knowledge of the clinical characteristics of these masses, the frequency at which they are seen, distribution, and localisation, is one of the important factors determining treatment selection (1). Therefore, determination of the anatomic differences of masses in the hand allows the clinician to be able to be more selective in the differential diagnosis. The aim of this study was to analyze cases presenting at our clinic because of a mass in the hand, and to present the clinical experience obtained in respect of performing differential diagnosis based on age, frequency of masses seen, and anatomic localisation, and on the subject of planning appropriate treatment.

MATERIAL AND METHODS

Approval for this retrospective study was granted by the Local Ethics Committee. A total of 159 cases presented at our clinic because of a mass in the hand between 1 June 2016 and 31 December 2018. After the exclusion of 45 cases diagnosed with ganglion

cyst in the soft tissue, the majority of which were asymptomatic and did not require surgery, evaluation was made of 114 cases. The patient age, gender, clinical presentation, mass lesions, symptom duration and time from onset of symptoms to surgery, radiological appearances, histopathological diagnoses, surgical methods applied, complications, and recurrence rates were evaluated.

The 114 patients comprised 60 females and 54 males with a mean age of 42.2 years (range, 14-91 years). The mass was present in the right-side upper extremity of 62 cases and in the left-side upper extremity in 52 cases (Table I). There was no history of trauma in the site of the mass in any case. The most frequently encountered complaints were pain and swelling, irrespective of tumour type. Following clinical and radiological evaluation, the diagnosis was confirmed histopathologically for all the patients who were planned to undergo surgery. Excisional biopsy was performed in cases with a lesion of small dimensions, and incisional biopsy was applied to large lesions or those which were suspected malignancy.

The cases were classified as 3 different regions according to the anatomic localisation of the mass; Group 1: carpal region, Group 2: between the wrist and metacarpophalangeal joint, and Group 3: distal of the metacarpophalangeal joint. In lesions in the joint between two regions, wherever the largest part of the lesion was situated was accepted as the localisation.

Direct radiographs were taken of the upper extremity of all the cases, and the masses were differentiated according to whether they originated from bone or soft tissue. For masses originating from soft tissue, generally ultrasonographic examination was applied (except for squamous cell carcinoma).

Table I. — Distribution of the demographic characteristics and distribution of the localisations of the masses of the cases

Tumour type		Gender		Localisation		Groups			Origin of the mass	
Benign, n (%)	Malignant, n (%)	M	F	Left	Right	1) Carpal region	2) Between the wrist and the metacarpophalangeal region	1) Distal of the metacarpophalangeal region	Soft tissue	Bone
105 (92%)	9 (7.8%)	54	60	52	62	6	20	88	90	24

For lesions thought to be malignant or metastatic, detailed laboratory examinations, abdomen, thorax, pelvis computed tomography (CT), and for cases of suspected sarcoma, magnetic resonance imaging (MRI) tests were applied. In cases with planned surgery, local/regional/general anaesthesia methods were applied according to the localisation, size, and spread of the mass.

RESULTS

The masses were determined to be of soft tissue origin in 90 cases and of bone origin in 24 cases. Benign tumour was determined in 105 (92%) cases and

primary malignant tumour in 9 (7.8%) cases. Of the 90 cases determined with soft tissue tumour, the most commonly seen benign lesion was giant cell tumor of the tendon sheath (GCTTS) in 22 (24.5%) cases, all of which were in the distal of the carpometacarpal (CMC) joint and at the level of the phalanx. The other benign masses comprised 18 hemangioma, 14 epidermoid cysts (7 in the metacarpal area and tenar region), 15 enchondroma (most often in the phalangeal area), 7 glomus tumours, 6 neurofibroma, 3 angiofibroma, 3 angiofibrolipoma, 3 Dupuytren's contractures, 3 dystrophic calcifications and 3 pyogenic granuloma (Table II).

Table II. — Distribution of the benign tumoural lesions in the hand and treatment methods and complications encountered

Localization	Tumor type	Number of cases	Mean age (min-max) (year)	Treatment	Complication
Carpal region	Epidermoid Cyst	2	16.5(14-19)	Excision	-
	Hemangioma	2	46(40-52)	Excision	-
	Osteoid osteoma	1	28	Excision	-
Metacarpal region	Epidermoid Cyst	7	44(28-68)	Excision	-
	Hemangioma	4	48.6(20-82)	Excision	-
	Nörofibroma	1	40	Excision	-
	Angiofibroma	1	32	Excision	-
	Dupuytren's Contractures	3	72.3(60-90)	Excision	-
	Enchondroma	1	46	Curettage	-
Phalangeal region	Giant cell tumor of tendon sheath	22	42.4(16-88)	Excision	Recurrence (n=1), partial sensory loss(n=1)
	Epidermoid cysts	5	36.4(14-80)	Excision	-
	Hemangioma	12	46.1(16-81)	Excision	Recurrence
	Glomus tumor	7	38.6(14-76)	Excision	-
	Nörofibroma	5	40.4(20-66)	Excision	-
	Angiofibroma	2	49.5(18-81)	Excision	-
	Angio-Fibrolipoma	3	42(26-64)	Excision	-
	Dystrophic calcifications(gut top-hüs)	3	48.3(42-60)	Excision	-
	Pyogenic granülom	3	33.3(15-60)	Excision	-
	Enchondroma	14	42.1(14-88)	Curettage, Grafting	Recurrence (n=2),extension restriction(n=1)
	Osteochondroma	4	30(25-40)	Excision	-
	Chondroma	2	38(30-46)	Excision	-
Osteblastoma	1	22	Curretage, Cementing	-	



Figure 1. — Preoperative image of a case with SCC in the hand.

The malignant soft tissue tumours comprised squamous cell carcinoma (SCC) (Figure 1) in 6 cases, synovial sarcoma in 1 case, and neurofibrosarcoma in 1 case.

Of the benign tumours of bone origin, enchondroma was most frequently seen (n:15) followed by osteochondroma in 4 cases, one of which had multiple hereditary exostoses, chondroma in 2 cases, symptomatic osteoid osteoma in 1 case (in the capitatum bone), and osteoblastoma in 1 case.

Malignant tumour of bone origin was determined in 1 case as chondrosarcoma.

In respect of localisation, the majority of the soft tissue tumours were in the distal of the metacarpophalangeal joint and in the phalanges (73%). The majority (90%) of the bone tumours were also in this region. When all the masses were evaluated together, the second most common localisation was the metacarpal region (17.5%). As ganglions were excluded from the study, the radiocarpal region was the area where fewest lesions were seen (5.3%) (Table II).

The time from onset of clinical symptoms to surgery was determined as mean 46.2 weeks (range, 6-214 weeks). Medical treatment was not preferred for any cases and all were applied with surgical treatment methods. Marginal resection was applied to benign soft tissue lesions.

In malignant soft tissue lesions, generally the en-bloc resection method or amputation was applied (Table III). In cases with SCC, wide resection or amputation was preferred. In 2 cases applied with wide resection, skin graft of the thickness of the defect was applied, and in 1 case, treatment was with a radial forearm flap.

The treatment options applied to the benign bone lesions were observed to be excision to chondroma and osteochondroma, and in enchondroma, residual tissue was checked under fluoroscopy following intralesionary curettage and bone defects were filled with allograft. In the case with osteoblastoma, cement was applied to the defect area after curettage (Fig. 2, 3). In the case with osteoid osteoma, the nidus was excised with curettage. Finger amputation was performed in the case with chondrosarcoma (Table III).

When the cases were examined in respect of complications, following GCTTS excision, there was partial sensory loss on the ulnar side in 1 case, and recurrence was observed in 1 case. Recurrence

Table III. — Distribution of the localisations of the malignant tumoural lesions

Type	Phalanks	Methacarpal	Carpal Bones	Mean age (year)	Treatment
Synovial sarcoma		1		32	Amputation
Squamous cell carcinoma	3	2	1	67	Resection, Amputation
Norofibrosarcoma	1			62	Amputation
Chondrosarcoma	1			44	Amputation



Figure 2. — Preoperative x-ray image of a case with enchondroma in the phalanx.

developed in 2 cases operated on because of enchondroma, both of which underwent surgery again, and minimal extension restriction was observed in one. Following hemangioma excision in 1 case, recurrence was observed, which was followed up conservatively.

DISCUSSION

Masses seen in the hand are a cause of concern to patients both because of the impaired cosmetic appearance and the potential of conversion to malignancy (3). These masses are often encountered by clinicians. It must be kept in mind that those with a tendency for growth or when a rapid change in character of the mass is observed, this could be a sign of malignancy and detailed examinations must be made (1).

Soft tissues of the hand constitute 15% of all soft tissue tumours, and bone tumours of the hand



Figure 3. — . Month x-ray image after excision of enchondroma in the phalanx and allograft applied.

constitute 6% of all bone tumours (1). There are few detailed studies in literature related to the anatomic distribution of the masses observed in this region, histological evaluations, and complications after treatment (3, 4). Campanacci et al. investigated 19,673 bone and soft tissue tumours, and reported that only 4.7% of the masses were localized in the hand. Of these, approximately 89.8% were benign and 10.2% were malignant (7). In a series of 11,087 bone tumours, Dahlin reported that 194 (1.7%) were tumours in the hand region, of which were 86.6% were benign (9). Campbell et al reported that 80 (3.9%) of 2069 bone tumours were tumours in the hand (8). In the current study, benign tumours were more predominant than malignant tumours (92% vs. 7.8%) and the data obtained were in parallel with the findings in literature.

Tumours and tumour-like lesions can be confused with several benign and malignant tumours found in the upper extremity, and great care must be taken in the differential diagnosis of masses in these localisations. Therefore, imaging methods are important in masses

observed in the hand (4). With imaging, it is possible to determine the accurate localisation of the mass, to evaluate the relationships of the vessels, nerves, and tendons, and to apply grading (10). Standard radiographs are widely used, and CT in bone masses, and MRI in soft tissue masses (1, 4). Differentiation of soft tissue and bone masses can be made at the first stage with standard radiographs (1).

While a sclerotic margin around the bone defines benign lesion, defects in the cortex can indicate malignancy. Determination of intramedullary spread in the bone on CT indicates the need to expand surgical resection (4). As the majority of masses in the hand originate from soft tissue, MRI is used extremely often in the preoperative evaluation. Especially in masses located in close proximity to deep neurovascular structures, MRI can provide extremely detailed information and can show tissue invasion and satellite lesions in detail. MRI is also extremely useful in the differentiation of benign and malignant lesions (1). In the current study, ultrasonography was applied to most patients with a soft tissue lesion and MRI was applied to cases related to the neurovascular region or seen to have suspicious findings.

Differences can be seen according to the anatomic localisation of masses observed in the hand. Simon et al reported that bone tumours seen in the hand were most often located in the phalangeal region. Skeletal tumors were reported to be observed more frequently than tumors of cartilage origin in the hand, but that study did not include soft tissue tumours (11).

The soft tissue masses seen most often in the wrist section of the hand are ganglions, and GCTTS is the most frequently observed, especially in the phalangeal region (1, 3, 12-14). Sağlık et al reported that GCTTS was the most frequent soft tissue tumour in the hand (1, 3, 4, 6, 7). Typical localisation of GCTTS is the volar surface of the radial first 3 fingers (1). Tang et al reported that GCTTS was seen most often in the 2nd phalanx (3) and Darwish et al stated that it was observed most often in the thumb (14). In the current study, GCTTS was the most common tumour and it was observed most often in the 3rd phalanx and less often in the 4th phalanx.

In literature, the recurrence rate of GCTTS has been reported to range from 0- 44% (1, 3, 4, 14-16). In

a series of 84 cases by Lautenbach et al, recurrence was reported at 2.4% in a 31.5-month follow-up period (17). Darwish and Haddad reported a 24% recurrence rate in a series of 52 cases (14). In a 12-year follow-up period of 96 cases, Lancigu et al observed recurrence generally within 36 months, and stated that the Ki67 index is an important marker of recurrence (18). In the current study, recurrence was observed in 1 (4.5%) of 22 GCTTS cases. Knowledge of recurrence rates is a significant parameter for clinicians deciding resection margins at the stage of surgery planning (3).

Hemangioma is the third most commonly seen soft tissue tumour in the hand, observed at the rate of 15% (1, 19). In the current study, hemangioma was the second most common soft tissue tumour after GCTTS. Surgical treatment is applied, especially when the lesion is of a size that will affect hand functions, when there is no involution, and in conditions which cause symptoms such as ulceration, bleeding, and recurrent infections. Surgical treatment includes complete excision of the lesion (1). Recurrence rates at 5 years after excision have been reported as 19% (1, 20, 21). In the one case of the current study applied with excision of hemangioma, recurrence was seen in the late period and the case was followed up.

Enchondroma constitute the majority of all primary bone tumours seen in the hand (1, 6, 22). Of all the cases of enchondroma in the body, 30%-35% are seen in the hand (1, 23). In a study by Sağlık et al, enchondroma were reported to form 52.3% of bone tumours in the hand (4). Cavit et al reported that >60% of 41 osseous origin tumours seen in the hand were enchondroma (1). In a series of 99 cases with osseous hand tumour, Farzan et al determined 31 (31.3%) cases of enchondroma (23). Simon et al examined 631 cases of primary bone tumour and determined that 297 (47.1%) were enchondroma (11). In the current study, 62% of the 24 cases with bone-origin tumour were observed to be enchondroma.

The clinical and radiological findings are extremely important in enchondroma. Close follow-up is necessary keeping in mind that enchondroma can transform to secondary chondrosarcoma. Sağlık et al reported that chondrosarcoma was the

most frequently observed malignant bone tumour (4). It must also be kept in mind that there could be pathological fracture in enchondroma and chondrosarcoma (4).

Soft tissue sarcomas are extremely rare (1). Epithelioid sarcoma and synovial sarcoma are the most frequently seen malignant soft tissue tumours in the hand (1, 4). In the series of Saglik et al, alveolar rhabdomyosarcoma was reported to be the most common soft tissue malignancy (4). In the current series, SCC was determined in 6 cases, neurofibrosarcoma in 1 and synovial sarcoma in 1.

Although chondrosarcoma is seen as the 4th most common malignant bone tumour in the whole body, it is the most common in the hand (1, 4, 6, 7, 24). These tumours can emerge de novo or may develop secondary to enchondroma or osteochondroma. Pain in the site of the lesion, advanced age, defect in the bone cortex, soft tissue mass associated with the lesion, and the observation of a lytic pattern on x-ray should suggest malignancy (1). In the series by Campanacci et al, osteosarcoma was reported in only one of the masses in the hand (7). In the current study, chondrosarcoma was determined in 1 case. In patients of advanced age with pain at rest, defect in the bone cortex, an associated soft tissue mass, and a lytic pattern on radiography, malignancy must be kept in mind (25).

Metastatic tumours of the hand are extremely rare and account for up to 0.1% of all skeletal metastases. The most frequently seen metastases in this group are of lung, breast, kidney and prostate cancers (1,4,26). Generally, they are seen in the distal phalanx (1). In a 20-year study between 1980 and 2000, Özcanli et al reported 3 cases in this group. These cases were transitional cell carcinoma, chondrosarcoma, and colonic adenocarcinoma (27). In a large series by Campanacci et al, only 0.5% of all bone metastases were seen to be a mass localised in the hand (7). Saglik et al reported a metastatic mass rate of 1.4% in a series of 191 cases (4) and in a series of 402 cases, Cavit et al reported 2 cases with lung and chondrosarcoma metastasis (1). In the current study, no mass in the hand was found to be associated with metastatic tumour.

Simple surgical excision is generally curative in non-aggressive benign neoplasms (1). Benign soft tissue masses in the hand may be locally aggressive

and may affect hand functions. Surgical resection is recommended in these types of masses, and high recurrence rates have been reported when resection is insufficient (4).

In benign lesions located in the bone, pain is the primary indication for surgery. The most basic treatment applied to these lesions is curettage. During the operation, whether or not there is residual tumour after curettage is checked with radiographs, then the defect formed is closed with autograft or allograft (4). In the current cases, when the defect formed was >50% of the bone diameter, allograft was applied. It is recommended that in benign aggressive bone tumours (eg, giant cell bone tumour), local adjuvant treatment is applied in addition to curettage (4, 6).

In suspected malignant lesions, biopsy must be performed before definitive surgery. When performing en-bloc resection in malignant lesions, healthy tissue must be included in the resection or if necessary, amputation must be performed. When malignant lesions are close to the distal of the finger, sufficient treatment can be obtained with ray amputation (4). When the lesion is in the palm or the wrist, just as for tumours in other parts of the body, removal with 2-3cm of healthy tissue renders functional tissues irreparable. In the current study, en-bloc resection or amputation was applied to 7 cases. In 2 cases diagnosed with SCC, skin grafting was applied after wide resection.

Limitations of this study were that it was retrospective and that only surgical cases were included. Another disadvantage was the limited number of cases. More comprehensive cross-sectional studies with longer follow up could enrich the data obtained in this study. Prevalence studies could be performed by screening larger populations of all types of masses in the hand. Thus, literature would benefit from more detailed data on this subject.

CONCLUSION

In conclusion, the most common benign tumour observed in the hand was GCTTS and it was seen to often occur in the phalangeal region. SCC was the most common malignant hand tumour observed, for which aggressive surgery is required. Evaluation

of the frequencies of the masses in the hand in this study according to localisation and histopathological diagnosis will facilitate a more decisive follow-up path in diagnosis and treatment. Determination of the localisations of masses because they are in a small area of complex structures of the hand, identification according to the clinical and radiological character and determination of the most appropriate treatment are extremely important in respect of hand functions and quality of life of the patient.

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