

Metastases to the Hand and Wrist: An Analysis of 221 Cases

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Purpose To identify demographic trends, survival rates, the most common metastatic locations, and the most common primary malignant tumors in the reports of hand and wrist metastases published over the past 27 years.

Methods A keyword search was performed across PubMed, Google, Science Direct, and Springer databases with a time-range restriction set between April 1986 and April 2013. A total of 193 articles were located describing 221 patients. The data were analyzed for patient age, sex, known history of malignancy, primary tumor site, histological diagnosis, metastatic location, hand involvement, and survival rates.

Results Lung, gastrointestinal tract, and kidney malignancies were the 3 leading metastatic tumors. The mean age among patients was 61 ± 13 years, and involvement among men was almost twice as common as among women. The mean survival from the time of the diagnosis was 7 ± 7 months. There were no predilections for either the right or the left hand. The distal phalanx was the most frequently involved bone, and the thumb was the most frequently involved digit.

Conclusions The frequency of published hand and wrist metastasis has increased dramatically within the last decade. Metastases have been reported for every bone of the hand and wrist as well as for the soft tissues. Compared with the previous studies, the mean age of reported patients has slightly increased even though the mean survival time has not changed. (*J Hand Surg Am.* 2014;39(5):923–932. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Acrometastasis, carpal metastasis, hand metastasis, wrist metastasis.



THE INCIDENCE OF HAND METASTASIS has been estimated to represent 0.1% of all metastases in the skeleton. Hand metastasis may present with several symptoms and signs that include pain,

tenderness, palpable masses, enlarging digits, ulcerations, mechanical dysfunctions, and pathological fractures. They may mistakenly be treated as soft tissue infections, osteomyelitis, tenosynovitis, gout, complex regional pain syndrome, arthritis, or other inflammatory processes.^{1–11} Thus, the diagnosis of a metastatic lesion is often delayed, which may affect the quality of patients' lives.³ Hand metastasis is an ominous sign among malignancies because it indicates widespread dissemination of the tumor with limited chances of patient survival.^{1–11}

Kerin^{7–9} reviewed reports of hand metastases in 1958, 1983, and 1987 and eventually published his classic summary of 163 cases based on a review of the available literature between 1907 and 1986. Flynn and colleagues in 2008³ published a review of 256

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cases of hand metastasis across English and French language sources, but included Kerin's cases in their data.^{5,11} The purpose of this study was to identify demographic trends, survival rates, the most common metastatic locations, and the most common primary malignant tumors in the reports of hand and wrist metastases published between April 1986 and April 2013.

MATERIALS AND METHODS

A literature search on metastasis to the hand and wrist was performed in April 2013 using PubMed (www.pubmed.com), Google (www.google.com), Science Direct (<http://www.sciencedirect.com>), and Springer (<http://link.springer.com>) search engines or databases. Keyword search terms included acrometastasis, carpal metastasis, hand metastasis, finger metastasis, phalangeal metastasis, and wrist metastasis. When available, the search was restricted to the category limitations of human, reviews, case reports, case series, and abstracts. A time-range limit was set between April 1986 and April 2013. Furthermore, all the articles' references and cross-references were checked and, if relevant, were included in the study. Non-English articles were considered relevant and included in our study if they mentioned metastasis to the hand or wrist in their titles or abstracts. A total of 197 articles^{3,12–208} were located, of which 4 articles^{55,62,118,185} were omitted owing to redundancies in their publications. This provided a total of 193 articles describing 221 cases that were employed for our review. The articles were written in Dutch, English, French, German, Hungarian, Italian, Portuguese, Russian, Japanese, Spanish, and Turkish. The articles were reviewed for the following data points: age at the time of diagnosis, sex, metastatic locations, handedness, primary tumor origin, known history of malignancy, presence of other metastasis, treatment options, and survival rates. The data are presented in Appendix A (available on the *Journal's* Web site at www.jhandsurg.org). Some articles presented some data in ambiguous ways.

The cases published between 1988 and 2012 were divided into 5 groups using 5-year intervals: group 1 (1988–1992), group 2 (1993–1997), group 3 (1998–2002), group 4 (2003–2007), and group 5 (2008–2012). Owing to our time-frame restrictions, the years 1986 and 2013 were not complete and therefore not included in the groups. Likewise, the year 1987 was omitted because it confounded the 5-year interval pattern. Figure 1 demonstrates the frequency of published hand and wrist metastasis patients

in each of the 5-year groups but does not necessarily mean that tumors originally occurred or were diagnosed during that 5-year time frame.

The mean of age and survival of patients were compared in the 5 groups. Binominal with test proportion 0.5, one-way analysis of variance (ANOVA) and independent sample *t*-tests were used for statistical analysis. *P* less than .05 was considered statistically significant.

RESULTS

Among the 221 collected cases, 144 (65%) were men and 74 (34%) were women. In 3 cases, sex was not specified. Men were involved twice as commonly as women (binominal test, *P* < .001). Involvement was on the right in 120 (53%) cases, left in 108 (47%) cases, bilateral in 12, and unspecified in 5 cases. The difference between right and left hand involvement was not significant. The age of 2 patients was not mentioned in 2 reports. The mean age of the 219 patients at the time of diagnosis was 61 ± 13 years, and the median age was 62 years (range, 10–91 y). The mean age was 61 ± 12 years for men and 60 ± 15 years for women, a statistically insignificant difference. Table 1 demonstrates the means of the patients' ages in the 5 groups. The survival rates for 113 patients were not mentioned in the reports. The mean survival in the remaining 108 patients from the time of the hand metastasis diagnosis was 7 ± 7 months. The median survival was 5 months (range, 2 wk to 39 mo). Table 1 demonstrates the means of survivals in the 5 groups.

A total of 153 (69%) patients had a known primary malignancy at the time of presentation. The duration of the malignancies ranged from simultaneous diagnosis to 13 years. In 66 (30%) patients, a hand metastasis was the first manifestation of an occult malignancy. In 2 patients, the history was not specified. A total of 147 (66%) patients had other metastatic lesions in addition to their hands or wrists, and 57 (26%) patients had isolated metastasis to their hands. This information was not reported in 17 (8%) patients. Overall, 164 (74%) patients had a single metastasis to their hands and 57 (26%) had concurrent multiple metastases of which 12 had bilateral hand involvement. Metastases were reported in the soft tissues as well as in every bone of the hand and wrist. The distal phalanx was the most commonly involved site, and the thumb was the most frequently involved digit.

Forty-five patients had only soft tissue involvement, 2 of which were in the hand muscles. Table 2

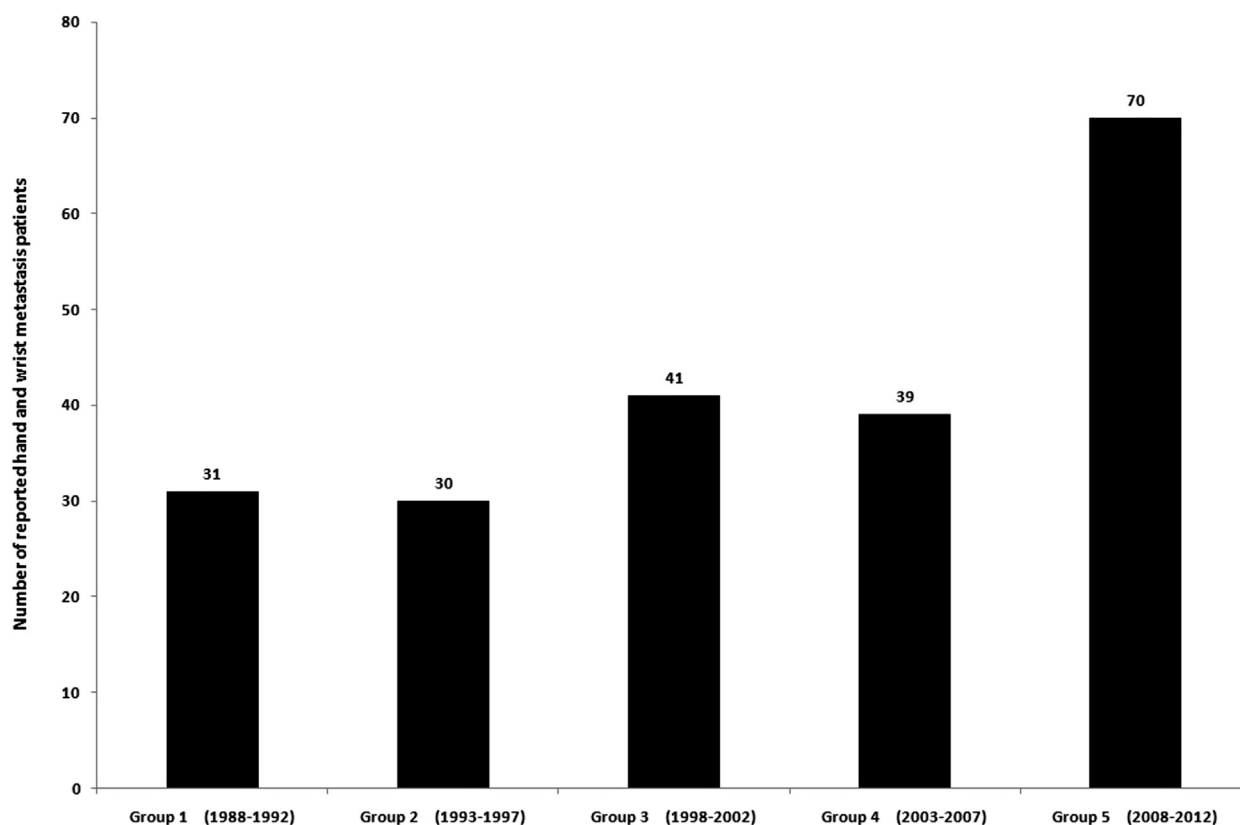


FIGURE 1: The frequency of reported hand and wrist metastasis patients in each 5-year group. It does not necessarily mean that tumors originally occurred or were diagnosed during the 5-year time frame.

demonstrates the primary sites of malignancies. Bronchogenic carcinoma, gastrointestinal tract, and kidney malignancies together constituted nearly two thirds of the primary malignancies. Treatment options were not reported in some cases. However, 91 patients were treated with amputation, 42 with radiotherapy, 33 with chemotherapy, and 15 with radiotherapy and chemotherapy. Twenty-six patients underwent excision of the lesions. Some patients received more than one type of treatment.

DISCUSSION

Metastases to the hand and wrist are less common than to the axial skeleton, most likely because the hand is the most distal part of the upper extremity and its bones do not contain a large amount of red marrow.^{3,5} Metastatic tumors are known to involve bone with large capillary networks and sluggish blood flow. The peripheral bones do not have sluggish venous flow. This may be another reason for the rarity of metastatic tumors in the hand.²⁰³ Nevertheless, metastases may still occur, with hematogenous spread by embolic malignant cells being the most common route of spread. Healey et al⁶ suggested a

source of the acrometastasis may be the secondary tumor (the pulmonary metastasis) rather than the primary malignancy.¹⁷⁵ Dar et al⁵⁹ reported a case of hematogenous seeding of esophageal squamous cell carcinoma tumor cells to all digits of both hands. Bahk et al²⁴ reported a case of hematogenous seeding of gastric adenocarcinoma tumor cells to all digits of the left hand following closed intramedullary nailing for treatment of a pathological fracture of the ipsilateral humerus. In the current study, 146 (66%) patients had other concurrent metastatic lesions to other parts of the body. Particularly, a majority of patients had concurrent lung metastases.

Similar to other studies, we found that the distal phalanx was the most frequently involved bone and the thumb was the most frequently involved digit. This may be explained by mechanical and chemotactic factors. The distal phalanx receives a profuse blood flow.⁶⁰ Repeated trauma sustained to the distal phalanx and thumb may produce prostaglandins and other chemotactic factors that contribute to cell migration and attachment.^{5,179} Mátrai et al¹³¹ reported a case of a 63-year-old woman who had colonic adenocarcinoma metastasis to her right fourth metacarpal following a dog bite. The authors theorized that

TABLE 1. Means of Ages and Survivals in the 5 Groups

Groups	Group 1 (1988–1992)	Group 2 (1993–1997)	Group 3 (1998–2002)	Group 4 (2003–2007)	Group 5 (2008–2012)	P Value
Number of patients out of 209 patients; mean age \pm SD	31; 56 y \pm 14 y	30; 61 y \pm 12 y	41; 58 y \pm 12 y	39; 62 y \pm 13 y	68; 63 y \pm 12 y	.05 (one-way ANOVA test)
Number of patients out of 104 patients; mean survival \pm SD	17; 6 mo \pm 6 mo	17; 9 mo \pm 8 mo	26; 7 mo \pm 5 mo	17; 8 mo \pm 9 mo	27; 7 mo \pm 6 mo	.67 (one-way ANOVA test)

ANOVA, analysis of variance.
P < .05 was considered statistically significant.

TABLE 2. Frequency of Primary Tumors in 221 Patients With Hand Metastasis

Primary Tumor	Number
Lung	76 (34%)
Esophagus, stomach, and colorectal	55 (25%)
Kidney	21 (10%)
Breast	10 (5%)
Larynx and nasopharynx	9 (4%)
Bladder and vesicourethral	8 (4%)
Liver	8 (4%)
Thyroid	4 (2%)
Uterus	4 (2%)
Leukemia and lymphoma	3 (1%)
Lower alveolus	2 (1%)
Palate	2 (1%)
Femur	2 (1%)
Parotid gland	2 (1%)
Skin squamous cell carcinoma	2 (1%)
Skin melanoma	2 (1%)
Foot	2 (1%)
Prostate	1 (< 1%)
Thymus	1 (< 1%)
Mediastinum	1 (< 1%)
Vagina	1 (< 1%)
Pleural mesothelioma	1 (< 1%)
Tibia osteogenic sarcoma	1 (< 1%)
Ovary	1 (< 1%)
Unknown origin	2 (1%)
Total	221 (100%)

the wound healing process created a suitable environment for tumor growth and metastatic potential. Lewin et al¹²⁵ reported a patient with metastatic squamous cell carcinoma in the pulp of left thumb following laryngectomy. The patient had lung metastases and used his left thumb to occlude his tracheostomy fistula in order to verbalize. The authors postulated a possible direct implantation of the squamous tumor cells onto the pulp of the patient's thumb.

In the previous reviews, lung, kidney, and breast were the 3 most frequent primary malignancies leading metastatic tumors of the hand.^{1,3–5,7–9} However, in our review, the lung, gastrointestinal tract, and kidney were the 3 most frequent primary sources. Malignant lung cells have unlimited access to the systemic arterial circulation, and this may explain why bronchogenic carcinoma is one of the most common hand metastasis across all reviews.⁷⁹ Hand metastases from primary tumors of the lower

teeth alveoli,^{176,203} foot,^{156,159} thymus,¹⁷⁵ mediastinum,⁵¹ and vagina¹⁰⁹ were not reported in previous reviews on the subject.^{1–11} In the current study, we could not calculate the relative incidence rates of hand metastasis because we did not have data from the whole population.

Radiography of the hand metastasis classically demonstrates osteolytic lesions, but sclerotic and mixed patterns may be seen in breast metastasis.^{11,12,149} Prostatic metastasis frequently shows osteoblastic lesions.^{182,191} Isotope bone scans are helpful in detecting occult malignancies and defining areas of involvement. However, acrometastases may be missed on standard whole body scans.¹⁸⁴ For example, Hsieh et al⁹⁸ failed to identify a metastatic lesion in the left thumb of a patient using standard whole body bone scan because they interpreted the minimal uptake to the left thumb as artifact. For this reason, Sonoda et al¹⁸⁰ emphasized the need to obtain local views of extremities on standard whole body scans.

The use of positron emission tomography (PET) scan may disclose the primary site earlier than the other techniques.²⁸ With a sensitivity of more than 90% and a specificity of 78%, PET scans are highly accurate in differentiating malignant from benign lesions.²⁸ Furthermore, PET scans demonstrate distant metastasis earlier than the other conventional techniques.^{28,159} For example, Khosla et al¹⁰⁹ discovered a metastatic lesion to the fourth metacarpal bone by PET scan during a work-up in a patient with vaginal squamous cell carcinoma. The patient had no hand symptoms at the time the lesion was identified. Conversely, computed tomography scan has limited value because it lacks adequate resolution within the constrained spaces of the hand. However, magnetic resonance imaging (MRI) is useful to identify and delineate bone and soft tissue extensions of metastasis.¹⁸²

Among previous reviews of the topic, the mean age of patients was reported to be 58 years by Healey et al,⁶ 52 years by Kerin,⁹ and 55 years by Amadio and Lombardi.¹ According to the data collected in the present study, the mean age of patients with hand metastasis has slightly increased in the recent decade, but the survival rates have not changed. This increase in age may be due to selection bias. However, relative success of treatment of the various primary tumors may account for the changes in age occurrence of metastatic lesions in the hand.

Similar to the previous reviews, the current review identified hand metastasis to occur significantly more often in men than in women. This discrepancy is most likely related to the origin of the primary cancer because most hand metastases stem from lung cancers,

which are more prevalent in men.^{3,5,6,182} Likewise, some authors have indicated that hand and wrist metastases are more common in the dominant hand because it receives more blood flow than the nondominant hand.^{3,6,182} However, similar to other reviews, our review was not able to identify any apparent relationship between hand dominance and hand metastasis.^{5,9,11}

Currently, there is no standard treatment for hand metastasis.⁸⁵ Treatment strategies include pain relief and preservation of hand function.^{3,5,6} The prognosis depends on the behavior of the primary tumor.⁵ De Smet⁶⁵ described a case of metastatic breast carcinoma to the second metacarpal in a patient 13 years after her mastectomy. Four years later, she had good hand function, and there was no evidence of secondary localizations of the tumor.

Because patients with hand metastasis may have limited survival rates, in the current review as well as other reviews, amputation was the most common treatment.^{3,5,182} When dealing with a hand tumor, any history of present or prior malignancy should always raise suspicion of metastasis to the hand versus a primary tumor, especially when considering that, in many cases, the hand tumor may be the first presenting finding of an occult malignancy.^{1,5,9} In the current review, 30% of hand metastases were the first manifestation of an occult malignancy. Over the last few years, there has been a surge in reports of hand metastasis, and several new metastatic tumors of the hand have been reported. Metastasis incidence may be underreported or underestimated for several reasons, which include subclinical presentations, selection and reporting bias among cases, missed cases in severely debilitated patients, and lack of post mortem investigations.⁵ Therefore, hand metastasis should no longer be considered a rare finding in malignancies. As advances in the management of cancer patients have increased their survival rates, we can expect to find more hand metastases across an older average age group of patients.

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis*

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
1	Abrahams et al ¹²	1995	62/M	Right thumb, proximal phalanx	Bronchogenic adenocarcinoma	Negative		Radiotherapy, chemotherapy	
2	Abrahams et al ¹²	1995	63/M	Right fourth metacarpal	Renal cell carcinoma	Negative	No		
3	Abrahams et al ¹²	1995	59/F	Left lunate	Bronchogenic squamous cell carcinoma	Negative			
4	Adegboyega et al ¹³	1999	60/M	Right middle finger, middle phalanx	Renal cell carcinoma	Negative	Yes	Amputation of the middle finger	11
5	Ahlmann et al ¹⁴	2008	65/M	Right hamate	Bronchogenic adenocarcinoma	Negative	Yes	Excision of the hamate	12
6	Ahlmann et al ¹⁴	2008	73/M	Left ring finger, proximal phalanx	Bronchogenic non-small cell carcinoma	Negative	No	Ray amputation	3
7	Ahlmann et al ¹⁴	2008	62/F	Left thumb, distal and proximal phalanges	Bronchogenic adenocarcinoma	1 y		MCP joint disarticulation	
8	Afshar et al ¹⁵	2007	33/F	Right little finger, pulp	Uterine choriocarcinoma	Positive	Yes	DIP joint disarticulation	11
9	Afshar and Ilkhanizadeh ¹⁶	2010	72/M	Right thumb, pulp	Leukemia cutis, chronic lymphocytic leukemia	Positive	No	IP joint disarticulation	
10	Aguiar Bujanda et al ¹⁷	2003	65/M	Left thumb, distal phalanx	Esophageal squamous cell carcinoma	3 mo	Yes	Pain control with analgesics	
11	Akjouj et al ¹⁸	2006	57/M	Left thumb, distal phalanx	Bronchogenic adenocarcinoma	Negative	No	DIP joint disarticulation	
12	Amar et al ¹⁹	2011	46/F	Left thumb, distal phalanx	Bronchogenic adenocarcinoma	Negative	Yes	MCP joint disarticulation	11
13	Anoop et al ²⁰	2010	76/M	Right little finger, distal phalanx	Colon well-differentiated adenocarcinoma	Negative	Yes	Radiotherapy, chemotherapy	1
14	Anandan et al ²¹	2010	64/M	Left middle finger, proximal phalanx	Bronchogenic small cell carcinoma	6 mo	Yes	Radiotherapy	3

(Continued)

APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
15	Anglada-Curado et al ²²	2010	75/F	Left hypothenar (soft tissue)	Renal clear cell carcinoma	1 y	No	Marginal excision	9
16	Asthana et al ²³	2001	40/F	Left thumb, proximal phalanx	Breast carcinoma	Positive	Yes	Radiotherapy	6
17	Bahk et al ²⁴	2006	67/F	Left hand, all distal phalanges	Gastric adenocarcinoma	42 mo	Yes	Shoulder disarticulation	4
18	Baran et al ²⁵	1998	70/F	Left middle finger, distal phalanx	Bronchogenic squamous cell carcinoma	2 mo	Yes		
19	Baron et al ²⁶	1988	59/F	Left index finger, distal phalanx	Colon adenocarcinoma	10 y	Yes	Radiotherapy	
20	Bauer et al ²⁷	1997	66/F	Right pisiform	Bladder carcinoma	18 mo	Yes		
21	Bhandari and Brown ²⁸	2011	52/M	Left index finger, proximal phalanx	Bronchogenic adenocarcinoma	Negative	Yes	Ray resection	
22	Bibi et al ²⁹	1993	60/M	Right little finger, distal phalanx	Renal cell carcinoma	3 y	No	PIP joint disarticulation	
23	Bigot et al ³⁰	2007	64/M	Right third metacarpal	Gastric adenocarcinoma	1 y		Excision	5
24	Biyi et al ³¹	2010	37/F	Left thumb, proximal phalanx	Breast adenocarcinoma	4 y	Yes	Chemotherapy	18
25	Blanes et al ³²	2003	67/F	Left index finger, distal phalanx	Renal cell carcinoma	Positive	Yes		
26	Bloom et al ³³	1992	51/F	Both hands (not specified)	Breast carcinoma	Positive	Yes		
27	Borgohain et al ³⁴	2012	70/M	Right second metacarpal, trapezium and trapezoid	Renal cell carcinoma	Negative	Yes	No treatment	
28	Borobio León et al ³⁵	2010	81/F	Left third metacarpal	Rectal adenocarcinoma	1 y	Yes	Radiotherapy, chemotherapy	7
29	Bourne et al ³⁶	1988	74/F	Right second, third, and fourth metacarpals	Colon adenocarcinoma	Positive	Yes	Radiotherapy	2

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
30	Bowles and Wells ³⁷	2011	63/M	Right ring finger, distal phalanx	Bronchogenic carcinoma	Negative	No		
31	Buckley and Peebles Brown ³⁸	1987	78/F	Left trapezium and trapezoid	Sigmoid colon adenocarcinoma	4 y	Yes	Chemotherapy	
32	Buckley and Brown(38) ³⁸	1987	61/F	Left little finger, proximal phalanx	Transverse colon adenocarcinoma	2 y		Radiotherapy, amputation	2
33	Bülbül et al ³⁹	2006	67/M	Right little finger, middle phalanx	Bronchogenic non-small cell carcinoma	Positive	Yes	Chemotherapy	
34	Caglar and Ceylan ⁴⁰	2001	51/M	Right capitate	Bronchogenic squamous cell carcinoma	Negative	No		
35	Campa et al ⁴¹	2004	72/F	Right ring finger, distal phalanx	Bronchogenic adenocarcinoma	Positive	Yes	DIP joint disarticulation	6
36	Carty et al ⁴²	2006	68/F	Left middle finger, proximal phalanx	breast carcinoma	4 y	No	Ray amputation	
37	Carvalho Hde et al ⁴³	2002	51/F	Right thumb, distal phalanx	Bronchogenic small cell carcinoma	2 mo	Yes	Radiotherapy	12
38	Castello et al ⁴⁴	1996	68/M	Right thumb, distal phalanx	Hard palate squamous cell carcinoma	Negative	Yes	Amputation through proximal phalanx	10
39	Castello et al ⁴⁴	1996	65/M	Left ring finger, proximal phalanx + third metacarpal	Renal cell carcinoma	Negative	Yes	Chemotherapy	
40	Castello et al ⁴⁴	1996	67/M	Right wrist, ulceration of the ulnar side	Nasopharynx squamous cell carcinoma	15 mo	Yes	Excision of the ulcer, skin graft	8
41	Castello et al ⁴⁴	1996	65/M	Right index finger, distal phalanx	Laryngeal squamous cell carcinoma	11 mo	Yes	Distal phalanx amputation	6
42	Castello et al ⁴⁴	1996	74/M	Right thumb, distal phalanx	Bronchogenic squamous cell carcinoma	2 y		Amputation through proximal phalanx	3

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
43	Castello et al ⁴⁴	1996	68/F	Right middle finger, distal phalanx	Bronchogenic carcinoma	4 y	Yes	Amputation	7
44	Celik et al ⁴⁵	1998	36/M	Left index and middle fingers, distal phalanges	Bronchogenic mixed squamous and small cell carcinoma	Negative	Yes	Radiotherapy	3
45	Çetin et al ⁴⁶	2011	53/M	Right thenar muscles eminence	Rectal adenocarcinoma	2 y		Partial resection	
46	Chakravarthy et al ⁴⁷	2010	32/F	Right hand, metacarpal	Thyroid papillary carcinoma		Yes		
47	Chang et al ⁴⁸	2001	66/M	Right fourth metacarpal	Gastric adenocarcinoma	Negative	No	Radiotherapy	3
48	Chang et al ⁴⁹	1999	57/M	Right thumb, subungual	Bronchogenic squamous cell carcinoma	Negative	Yes		
49	Chao et al ⁵⁰	2011	62/F	Left middle finger, proximal phalanx	Bronchogenic squamous cell carcinoma	Positive	Yes	Radiotherapy	
50	Chen et al ⁵¹	2008	41/F	Left middle finger, pulp	Mediastinal epitheloid angiosarcoma	Positive	Yes	Chemotherapy, radiotherapy	2
51	Chin et al ⁵²	1998	66/F	Right middle finger PIP joint	Chronic lymphocytic leukemia	4 y	Yes	Chemotherapy	
52	Chirodian et al ⁵³	1998	72/M	Left ring finger, distal phalanx	Adenocarcinoma, unknown origin	Negative	Yes	DIP joint disarticulation	1
53	Chou et al ⁵⁴	2004	63/M	Right thumb and both ring fingers pulps	Esophageal squamous cell carcinoma	1 y	No		2 wk
54	Corrales Pinzón et al ⁵⁶	2012	59/M	Right wrist, all carpals	Hepatocellular carcinoma	Negative	No	Splint, pain control	
55	Craigien and Chesney ⁵⁷	1988	37/M	Right hamate	Gastric adenocarcinoma	3 y	Yes		
56	Dalicho et al ⁵⁸	1988	64/F	Right little finger, distal phalanx	Uterine cervixes squamous cell carcinoma	3 wk	Yes	Amputation of distal phalanx	4 wk

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
57	Dar et al ⁵⁹	2011	75/M	Both hands, distal phalanges of all the digits	Esophageal squamous cell carcinoma	3 y	Yes	Amputation of the fifth finger, chemotherapy	
58	De Abaffy et al ⁶⁰	1998	54/M	Right little finger, proximal phalanx	Bronchogenic large cell carcinoma	4 mo	No	Transmetacarpal amputation	
59	Delsmann & Caselmann ⁶¹	1997	62/M	Right thumb metacarpal and thenar area	Hepatocellular carcinoma	Negative	Yes	Ray amputation, chemotherapy	15
60	De Maeseneer et al ⁶³	1995	60/M	Right and left thumbs, distal phalanges	Bronchogenic squamous cell carcinoma	3 mo	Yes		
61	Desmanet et al ⁶⁴	1991	48/M	Right middle finger, distal phalanx	Esophageal cancer	1 y	Yes	Amputation	2
62	Desmanet et al ⁶⁴	1991	62/M	Right hamate	Bronchogenic cancer	Positive	Yes	Radiotherapy	10
63	De Smet ⁶⁵	2004	71/F	Right second metacarpal	Breast carcinoma	13 y	No	Radiotherapy	
64	Dimri et al ⁶⁶	2003	60/M	Right little finger, distal phalanx	Esophageal squamous cell carcinoma	Positive	Yes	No treatment	1
65	DiSpaltro et al ⁶⁷	1992	41/M	Right little finger, pulp	Gastric adenocarcinoma	5 mo	Yes	Amputation of distal phalanx	
66	Elhassan and Fakhouri ⁶⁸	2007	68/M	Left first metacarpal	Bronchogenic squamous cell carcinoma	Negative	No	Wide amputation	
67	Elvey et al ⁶⁹	2011	67/M	Left second, third, fourth, and fifth metacarpals	Parotid basal cell adenocarcinoma	2 y	No	Below elbow amputation	
68	Esther and Bos ⁷⁰	2000	58/F	Right capitate	Parotid mucoepidermoid carcinoma	5 y	Yes	Radiotherapy	
69	Fadli et al ⁷¹	2012	67/F	Left first metacarpal	Rectosigmoid adenocarcinoma	2 y	Yes		

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
70	Fang et al ⁷²	2001	49/M	Right hand, soft tissue (multiple cutaneous nodules over the fingers' pulps and palm)	Hepatocellular carcinoma	1 y	Yes		2
71	Farouk et al ⁷³	1990	66/M	Right ring finger, distal phalanx	Bronchogenic squamous cell carcinoma	Negative	No	PIP joint disarticulation	
72	Ferraro and Lucero ⁷⁴	2012	52/F	Left thumb, proximal phalanx	Bronchogenic adenocarcinoma	Negative	Yes		
73	Filloux and Fontaine ⁷⁵	2000	57/M	Right index finger, pulp	Bronchogenic carcinoma	5 mo		DIP joint disarticulation	1
74	Filloux and Fontaine ⁷⁵	2000	76/M	Right carpals, metacarpals, pulp of the index and middle fingers	Renal cell carcinoma	Positive	Yes	Upper limb amputation	15
75	Filloux and Fontaine ⁷⁵	2000	54/M	Right little finger, pulp	Pharynx cancer	Positive			1
76	Filloux and Fontaine ⁷⁵	2000	58/M	Left middle finger, soft tissue of the middle phalanx	Laryngeal squamous cell carcinoma	2 y	Yes		14
77	Filloux and Fontaine ⁷⁵	2000	62/M	Left index finger, pulp	Sigmoid adenocarcinoma	9 mo	No		15
78	Filloux and Fontaine ⁷⁵	2000	72/M	Ring finger, pulp	Bronchogenic carcinoma	Negative		DIP joint disarticulation	6
79	Flynn et al ³	2008	78/F	Left second metacarpal	Bronchogenic non-small cell carcinoma	Negative	Yes	Radiotherapy	
80	Flynn et al ³	2008	65/F	Right third and fifth metacarpals	Breast carcinoma	Positive	Yes	Radiotherapy	
81	Fontana et al ⁷⁶	2004	62/M	Right index and middle fingers, middle phalanges	Hepatocellular carcinoma	Positive	No	Amputation	4

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
82	French et al ⁷⁷	2007	39/F	Right hand, extensive cutaneous necrosis	Breast ductal adenocarcinoma	1 y	Yes	Right shoulder disarticulation	18
83	Fusetti et al ⁷⁸	2003	69/M	Left middle finger, middle phalanx	Renal cell carcinoma	4 y	No	PIP joint disarticulation	15
84	Galmarini et al ⁷⁹	1998	53/M	Left thumb, distal phalanx	Bronchogenic adenocarcinoma	Positive	Yes	Thumb amputation	5
85	Gallagher et al ⁸⁰	2006	72/M	Left thumb, subungual	Rectal adenocarcinoma	5 y	Yes	MCP joint disarticulation	6
86	Gamblin et al ⁸¹	2006	72/M	Index finger, distal phalanx	Sigmoid colon adenocarcinoma	Positive	Yes	Ray amputation	
87	Gaston et al ⁸²	2008	Mid-40s/F	Right trapezium	Bronchogenic non-small cell carcinoma	Positive	No	Excision of the trapezium	
88	Gawley et al ⁸³	2006	65/M	Left little finger, distal phalanx	Bronchogenic squamous cell carcinoma	Negative	Yes	Digital amputation	3
89	Gharwan et al ⁸⁴	2012	54/M	Right third metacarpal	Colon adenocarcinoma	Negative	Yes	Ray amputation	
90	Ghert et al ⁸⁵	2001	56/F	Left index finger, middle phalanx	Renal cell carcinoma	1 y	No	PIP joint disarticulation	
91	Giberti et al ⁸⁶	1999	52/M	Right first metacarpal	Renal cell carcinoma	8 mo	No	Thumb amputation	
92	Haas et al ⁸⁷	1988	51/F	Right little finger, proximal phalanx	Esophageal squamous cell carcinoma	Positive	No	Radiotherapy	6
93	Hatakeyama et al ⁸⁸	1997	72/M	Right first metacarpal	Bronchogenic squamous cell carcinoma				
94	Hayes et al ⁸⁹	1992	76/M	Right first metacarpal	Transitional cell carcinoma, right renal pelvis	Negative	No	Transmetacarpal amputation	1
95	Heidarpour et al ⁹⁰	2006	78/F	Left index finger, distal phalanx	Bronchogenic carcinoma	Negative	Yes	Treatment refused	2
96	Henderson ⁹¹	1987	63/M	Left thumb, distal phalanx	Bronchogenic squamous cell carcinoma	Negative	No	Amputation of distal phalanx	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
97	Henderson and Jehangir ⁹²	2001	52/M	Right ring finger, distal phalanx	Sigmoid colon adenocarcinoma	Negative	Yes	Finger amputation	11
98	Henkert and Berge ⁹³	1991	53/M	Left little finger, distal phalanx	Sigmoid colon adenocarcinoma	Positive	Yes	Amputation	12
99	Henkert and Berge ⁹³	1991	52/M	Right little finger, proximal phalanx	Unknown origin	Negative	Yes	No treatment	4
100	Hetzel et al ⁹⁴	1996	31/F	Left little finger, distal phalanx	Uterine choriocarcinoma	Negative	Yes	Chemotherapy	
101	Heymans et al ⁹⁵	1990	65/M	Right hand, dorsal soft tissue	Vesicourethral junction transitional cell carcinoma	Negative	No	Wide excision and skin graft	4
102	Hindley and Metcalfe ⁹⁶	1987	44/M	Right little finger, middle phalanx	Colon adenocarcinoma	2 y	Yes	Ray amputation	
103	Houston and Telepak ⁹⁷	2000	56/M	Left ring finger, distal phalanx	Esophageal basaloid squamous cell carcinoma	8 mo	No	Excision	
104	Hsieh et al ⁹⁸	2008	56/M	Left thumb (bone not specified)	Esophageal squamous cell carcinoma	3 mo	No	Chemotherapy	
105	Huri ⁹⁹	2011	84/M	Right thumb, distal phalanx	Thyroid follicular-type adenocarcinoma	Positive	No	Amputation through the proximal phalanx	
106	Jakhar et al ¹⁰⁰	2009	70/M	Right ring finger, proximal phalanx	Bronchogenic adenocarcinoma	Negative	No	Radiotherapy, chemotherapy	
107	Javed et al ¹⁰¹	1997	72/F	Right index finger, distal phalanx	Bronchogenic adenocarcinoma	Negative	No		
108	Jebson et al ¹⁰²	1992	77/M	Left middle finger, pulp	Renal cell adenocarcinoma	Negative	Yes	PIP joint disarticulation	4
109	Jenzer et al ¹⁰³	2011	85/M	Right ring finger, proximal phalanx	Gastroesophageal adenocarcinoma	Positive	No	Ray amputation	2
110	Kamolz et al ¹⁰⁴	2012	69/M	Left palm	Esophagogastric junction adenocarcinoma	1 y	Yes	Chemotherapy	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
111	Kanbay et al ¹⁰⁵	2007	47/M	Left index finger, soft tissue nodule	Pleural malignant mesothelioma	Positive	Yes	-	6
112	Kanatani et al ¹⁰⁶	2008	57/M	Left little finger, distal phalanx	Esophageal carcinoma	2 y	Yes	PIP joint disarticulation	2
113	Keramidas and Brotherston ¹⁰⁷	2005	66/F	Right middle, ring, little metacarpals, capitates, and hamate	Bronchogenic adenocarcinoma	Negative	No	Biopsy	3
114	Khmamouche et al ¹⁰⁸	2013	72/M	Left thumb, distal phalanx	Bronchogenic adenocarcinoma	Negative	Yes	Thumb amputation	1
115	Khosla et al ¹⁰⁹	2012	65/F	Left fourth metacarpal	Vaginal squamous cell carcinoma	11 mo	Yes	Radiotherapy, chemotherapy	
116	Kim et al ¹¹⁰	2012	55/M	Left thumb, skin of the distal phalanx	Hepatocellular carcinoma	3 y	Yes	PIP joint disarticulation	6
117	Knapp and Abdul-Karim ¹¹¹	1994	89/F	Right index finger, middle phalanx	Bronchogenic adenocarcinoma	Negative	Yes	Radiotherapy	4
118	Knapp and Abdul-Karim ¹¹¹	1994	38/M	Left ring finger, middle phalanx	Gastroesophageal junction adenocarcinoma	Positive	Yes	Radiotherapy, chemotherapy	3
119	Kobos et al ¹¹²	1992	65/F	Left third metacarpal	Renal cell carcinoma	2 y	No	Ray amputation	
120	Kodama et al ¹¹³	2009	78/M	Left hamate	Bronchogenic adenocarcinoma	2 mo	No	Radiotherapy, chemotherapy	22
121	Kolomiets and Lytkin ¹¹⁴	1991	50/M	Left index finger, proximal phalanx	Bronchogenic small cell carcinoma	Negative	No		
122	Königsberger and Goth ¹¹⁵	1996	54/M	Right hamate	Bronchogenic small cell carcinoma	Negative	No	Chemotherapy	16
123	Kontogeorgakos et al ¹¹⁶	2011	75/F	Right middle finger, distal phalanx	Bronchogenic non-small cell carcinoma	6 y	No	Ray amputation	15
124	Kosuda et al ¹¹⁷	1986	61/M	Left ring finger, distal phalanx	Esophageal squamous cell carcinoma	Positive	Yes	-	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
125	Kosuda et al ¹¹⁷	1986	47/F	Left middle finger, distal phalanx	Bronchogenic squamous cell carcinoma	Positive	Yes	-	
126	Krishnamurthy and Ramshankar ¹¹⁹	2013	45/M	Left third metacarpal	Thyroid follicular carcinoma	At presentation	Yes	Idodine-131 ablation + radiotherapy	
127	Kumar et al ¹²⁰	2011	60/M	Right thumb, distal phalanx, onycholysis	Skin squamous cell carcinoma (right inguinal)	8 y	No	Radiotherapy	
128	Kumar et al ¹²⁰	2011	55/M	Left hand, all 5 distal phalanges	Laryngeal supraglottic squamous cell carcinoma	2 y	Yes	Supportive	
129	Kumar et al ¹²⁰	2011	52/M	Left little finger, distal phalanx	Esophageal squamous cell carcinoma	At presentation	No	Radiotherapy	
130	Lambert et al ¹²¹	1992	36/M	Right and left ring fingers, subungual	Femur chondrosarcoma	2 y	Yes	Surgical excision	3
131	Lederer et al ¹²²	1990	51/M	Right trapezium	Bronchogenic carcinoma	3 mo	No	Excision of trapezium and trapezoid	
132	Lee et al ¹²³	1999	47/M	Right thumb, distal phalanx	Hepatocellular carcinoma	10 mo	Yes	CMC joint disarticulation	5
133	Letanche et al ¹²⁴	1990	53/M	Fifth metacarpal	Bronchial large cell carcinoma	Positive	Yes	Chemotherapy	2
134	Letanche et al ¹²⁴	1990	59/M	Right middle finger, middle phalanx	Bronchogenic squamous cell carcinoma	Positive		Amputation	11
135	Lewin et al ¹²⁵	1997	70/M	Left thumb, pulp	Laryngeal squamous cell carcinoma	9 mo	Yes		6 wk
136	Long et al ¹²⁶	2010	53/M	Left middle finger, distal phalanx	Bronchogenic adenosquamous cell carcinoma	Negative	No	Treatment refused	1

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
137	Lozić et al ¹²⁷	2010	68/M	Right thumb, distal phalanx	Bronchogenic squamous cell carcinoma	Negative	Yes	Chemotherapy	4
138	Lucilli et al ¹²⁸	2010	63/M	Left thumb distal phalanx	Bronchogenic squamous cell carcinoma	2 y	Yes	IP joint disarticulation	6
139	Majidi et al ¹²⁹	2009	55/M	Right index finger, distal phalanx	Bronchogenic squamous cell carcinoma	Negative	Yes	DIP joint disarticulation	2
140	Marya et al ¹³⁰	1993	62/M	Left thumb, distal phalanx	Bladder transitional cell carcinoma	6 mo	Yes	No treatment	8
141	Mátrai et al ¹³¹	2005	63/F	Right hand, fourth metacarpal	Colon adenocarcinoma	3 y	Yes	Ray amputation	
142	Massraf and Wand ¹³²	1998	62/M	Left thumb, distal phalanx	Prostatic carcinoma	Positive	Yes	Amputation through the proximal phalanx	—
143	Mehta et al ¹³³	2001	61/F	Right thumb, subungual	Bronchogenic small cell carcinoma	2 mo	Yes	Excision	4
144	Mendez Lopez et al ¹³⁴	1997	54/M	Right first metacarpal	Colon adenocarcinoma	4 y	Yes	No treatment	1
145	Mitrovic et al ¹³⁵	2009	67/M	Left ring finger, proximal phalanx	Renal cell carcinoma	Negative	No	Ring finger amputation	
146	Miyamoto et al ¹³⁶	2008	72/F	Left fifth metacarpal	Gastric adenocarcinoma	2 y	Yes	Wide excision	12
147	Moens et al ¹³⁷	1993	65/M	Right little finger, distal phalanx	Bronchogenic squamous cell carcinoma	4 mo	No	PIP joint disarticulation	5
148	Mousavi et al ¹³⁸	2005	80/F	Right thumb, distal phalanx	Esophageal papillary adenocarcinoma	Positive	Yes	Amputation	
149	Moutet et al ¹³⁹	1991	56/M	Right capitate	Esophageal squamous cell carcinoma	9 mo	Yes	Excision of the capitate	2 y

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
150	Müller et al ¹⁴⁰	1988	77/M	Left hand, soft tissue	Rectal adenocarcinoma	2 y	Yes	Radiotherapy	
151	Myrehaug and Bezjak ¹⁴¹	2010	Not given	Right index finger, proximal phalanx	Bronchogenic adenocarcinoma	Positive	Yes	Radiotherapy	
152	Nakamura et al ¹⁴²	2005	73/M	Left thumb, pulp	Bronchogenic squamous cell carcinoma	Negative	Yes	Radiotherapy, chemotherapy	6
153	Nakamura et al ¹⁴²	2005	71/M	Left ring finger, pulp	Bronchogenic squamous cell carcinoma	1 mo	No		
154	Nikolić et al ¹⁴³	2007	67/M	Right thumb, proximal phalanx	Colorectal adenocarcinoma	2.5 y	Yes	Transmetacarpal amputation	39
155	Okada et al ¹⁴⁴	1999	84/F	Left ring finger, pulp	Gastric adenocarcinoma	2 mo		Incisional biopsy	1 y
156	Ornetti et al ¹⁴⁵	2012	68/F	Right index finger, soft tissue	Uterine endometrial adenocarcinoma	Positive	Yes	Treatment refused	6
157	Oron et al ¹⁴⁶	2003	77/F	Left index finger, proximal phalanx	Colon adenocarcinoma	6 wk	Yes	Ray amputation	
158	Otsuji et al ¹⁴⁷	2009	49/F	Left little finger distal phalanx	Hepatocellular carcinoma	5 y	Yes	CMC joint disarticulation	
159	Ottomani et al ¹⁴⁸	2008	52/M	Left index and right middle fingers' pulps	Laryngeal squamous cell carcinoma	9 mo	Yes	Amputation of left, excision of right middle finger, pulp	
160	Ozcanli et al ¹⁴⁹	2005	58/M	Left thumb, distal phalanx	Bladder transitional cell carcinoma	8 y	Yes	Thumb amputation	
161	Ozcanli et al ¹⁴⁹	2005	42/F	Right third metacarpal	Colon adenocarcinoma	5 mo	No	Ray amputation	
162	Ozcanli et al ¹⁴⁹	2005	40/M	Right ring finger, subungual	Femur chondrosarcoma	4 y	Yes	Biopsy	
163	Park et al ¹⁵⁰	2006	39/F	Right trapezium; left capitates	Gastric adenocarcinoma	Positive	Yes	Radiotherapy, chemotherapy	
164	Parungao and Milner ¹⁵¹	2002	65/M	Right thumb, distal phalanx	Bronchogenic non- small cell carcinoma	Negative	Yes	Thumb amputation	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
165	Plotkine et al ¹⁵²	2008	80/M	Right middle finger, distal phalanx	Nasopharynx carcinoma	5 y	Yes	Amputation through the proximal phalanx	
166	Preto et al ¹⁵³	2007	61/M	Right trapezoid + base of the first and second metacarpals	Bronchogenic adenocarcinoma	Negative	Yes		6
167	Ragois et al ¹⁵⁴	2012	72/M	Left hypothenar (soft tissue)	Bronchogenic small cell carcinoma	4 y	Yes	Excision, skin graft	2
168	Raissouni et al ¹⁵⁵	2002	36/F	Right third metacarpal	Bronchogenic adenocarcinoma	Negative	Yes		21 d
169	Ramseier et al ¹⁵⁶	2007	76/M	Right thumb and left ring finger subunguals	Foot chondrosarcoma	5 y	Yes	Ring finger: marginal excision; thumb: en-bloc resection	
170	Rauf et al ¹⁵⁷	2012	66/M	Left little finger, distal phalanx	Hepatocellular carcinoma	Negative		Excision	
171	Rauh et al ¹⁵⁸	2009	69/M	Right little finger, distal phalanx	Skin squamous cell carcinoma (right thumb, distal phalanx)	Positive		Ray amputation	6
172	Reichert et al ¹⁵⁹	2001	29/M	Left capitate	Foot clear cell sarcoma	2 mo	Yes	Partial excision of the carpus	10
173	Reparaz Padros et al ¹⁶⁰	2006	61/F	Left ring finger, distal phalanx	Thyroid follicular carcinoma	7 y	Yes	Amputation through the milled phalanx	
174	Riter and Ghobrial ¹⁶¹	2004	53/F	Both index fingers, distal phalanges	Renal cell carcinoma	Positive	Yes	Right index DIP joint disarticulation	
175	Rinonapoli et al ¹⁶²	2012	74/M	Left trapezium, trapezoid and scaphoid	Bronchogenic undifferentiated large cell carcinoma	Negative	No	Below-elbow amputation	
176	Rochet et al ¹⁶³	1991	62/M	Left thumb, distal phalanx	Bronchogenic adenocarcinoma	Negative	No	Amputation	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
177	Roncaglio and Arena ¹⁶⁴	1993	44/M	Left lunate	Bronchogenic carcinoma	Negative	Yes		
178	Roncaglio and Arena ¹⁶⁴	1993	55/M	Right ring finger, distal phalanx	Bronchogenic squamous cell carcinoma	Positive	Yes	Amputation	26
179	Roohi et al ¹⁶⁵	2011	57/F	Most bones of the right hand except scaphoid, trapezium, thumb phalanges, and second metacarpal	Rectal adenocarcinoma	5 y	Yes	Below-elbow amputation	
180	Roushdi et al ¹⁶⁶	2012	66/F	Left hamate	B-cell lymphoma	Negative	Yes	Chemotherapy	
181	Rousseau et al ¹⁶⁷	1992	72/M	Left little finger, soft tissue of the proximal phalanx	Bronchogenic adenocarcinoma	5 mo	Yes	Excision	
182	Rümenapf et al ¹⁶⁸	1997	69/M	Left index finger, distal phalanx	Colon adenocarcinoma	1.5 y	Yes	Amputation	2 y
183	Ryu et al ¹⁶⁹	2000	63/M	Ring finger, subungual (side not specified)	Bronchogenic squamous cell carcinoma	3 mo	Yes	Radiotherapy, chemotherapy	6
184	Saglike et al ¹⁷⁰	1996	36/M	Left index and ring fingers, distal phalanges	Bronchogenic squamous cell carcinoma	Negative	Yes	Amputation of the index finger, chemotherapy and radiotherapy	12
185	Sahbaz et al ¹⁷¹	2004	54/M	Right middle finger, distal phalanx	Bronchogenic squamous cell carcinoma	4 mo	Yes	Radiotherapy	
186	Salesi et al ¹⁷²	2007	74/M	Left index finger, proximal phalanx and right first metacarpal	Renal cell carcinoma	3 y	Yes	Amputation of the index finger	
187	Sanjay et al ¹⁷³	1988	10/M	Left third metacarpal	Tibia, small cell osteogenic sarcoma	Positive	Yes	No treatment	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
188	Seth et al ¹⁷⁴	2008	46/M	Right ring finger, subungual	Bronchogenic adenocarcinoma	Negative	No	Marginal excision	4
189	Shannon et al ¹⁷⁵	2000	54/M	Right ring finger, distal phalanx	Thymic undifferentiated carcinoma	7 y	Yes	PIP joint disarticulation	2
190	Shrivastava et al ¹⁷⁶	2009	66/M	Left middle finger, middle phalanx	Lower alveolus squamous cell carcinoma	1 y	No	Radiotherapy, chemotherapy	3
191	Silfen et al ¹⁷⁷	2001	73/M	Right ring finger, pulp	Esophageal squamous cell carcinoma	Negative	Yes	Chemotherapy	5
192	Sim ¹⁷⁸	1989	49/F	Right wrist	Bronchogenic squamous cell carcinoma	Negative	No	Amputation	7
193	Sipahioglu et al ¹⁷⁹	2012	60/M	Middle finger, distal phalanx, pulp (side not specified)	Nasopharynx epidermoid carcinoma	3 y	Yes	MCP joint disarticulation	< 2 y
194	Sonoda et al ¹⁸⁰	2011	70/F	Right index finger, middle phalanx	Renal cell carcinoma	Positive	No		
195	Song and Yao ¹⁸¹	2012	70/M	Right trapezium	Bronchogenic non-small cell carcinoma	Negative	No	Trapeziectomy	
196	Spiteri et al ¹⁸²	2008	82/M	Right ring finger, distal phalanx	Gastric adenocarcinoma	Negative	No	Ray amputation	
197	Stahl et al ¹⁸³	2012	46/F	Left scaphoid	Lower leg melanoma	8 y	Yes	Excision	13
198	Stone and Davies ¹⁸⁴	1990	51/F	Left little finger, distal and middle phalanges	Bronchogenic squamous cell carcinoma	Positive	Yes	Finger amputation	Several wk
199	Taleb et al ¹⁸⁶	2011	46/F	Left fourth metacarpal	Bladder urothelial carcinoma	2 y	No	Radiotherapy, excision of the metacarpal	
200	Tan et al ¹⁸⁷	2012	71/M	Right fourth metacarpal	Renal cell carcinoma	Negative	Yes	Radiotherapy, chemotherapy	13
201	Tenenbaum et al ¹⁸⁸	1988	65/M	Right capitate and hamates	Esophageal squamous cell carcinoma	Positive	No	Radiotherapy	

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
202	Theunissen et al ¹⁸⁹	2002	63/M	Right thumb and index finger, pulps	Bronchogenic squamous cell carcinoma	Negative	Yes		
203	Tochigi et al ¹⁹⁰	2000	56/F	Left first dorsal interosseous muscle	Palate malignant melanoma	30 mo	Yes	Wide excision, chemotherapy	
204	Tolo et al ¹⁹¹	2002	63/M	Left triquetrum	Renal cell carcinoma	13 y	Yes	En-bloc resection of the ulnar side of the wrist	13
205	Tomas et al ¹⁹²	2005	25/F	Right capitate	Skin malignant melanoma (interscapular)	20 mo	Yes	Chemotherapy	
206	Troncoso et al ¹⁹³	1991	53/M	Left index finger, distal phalanx	Renal cell carcinoma	2 y	No	DIP joint disarticulation	7
207	Turan et al ¹⁹⁴	1990	43/F	Right little finger, proximal, middle, and distal phalanges	Ovarian endometrioid carcinoma	Negative	Yes	MCP joint disarticulation	7 wk
208	Tzaveas et al ¹⁹⁵	2008	68/M	Right fifth metacarpal	Bronchogenic carcinoma	5 mo	No	Referred to oncologist	
209	Umebayashi ¹⁹⁶	1998	81/M	Right index finger, distal phalanx	Esophageal squamous cell carcinoma	2 mo	Yes	No treatment	45 d
210	Vanhooteghem et al ¹⁹⁷	1999	61/M	Right and left little fingers nail unite	Bronchogenic squamous cell carcinoma	Negative	No	Amputation	5
211	Vadivelu and Drew ¹⁹⁸	2002	46/F	Right ring finger, middle phalanx	Breast ductal carcinoma	Negative	Yes	Radiotherapy, chemotherapy	
212	Vasić ¹⁹⁹	2010	52	Right thumb, proximal and distal phalanges	Sigmoid colon adenocarcinoma	Positive	No	Radiotherapy	
213	Verardino et al ²⁰⁰	2011	59/F	Right and left ring fingers, distal phalanges	Anal canal basaloid carcinoma	3 y	Yes	Radiotherapy	
214	Vine and Cohen ²⁰²	1996	57/F	Left thumb, subungual	Renal cell carcinoma	10 y	Yes	Radiotherapy	3
215	Vijayakumar and Creditor ²⁰¹	1986	91/F	Right thumb distal phalanx	Breast carcinoma	1 y	Yes	Radiotherapy	3

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APPENDIX A. Characteristics of 221 Reported Patients With Hand and Wrist Metastasis* (Continued)

Patient Number	Reference	Year	Age (y)/ Sex	Metastasis Location	Primary Tumor	Known History of Malignancy	Presence of Other Metastasis	Metastatic Treatment	Survival (mo, unless specified)
216	Viswanathan et al ²⁰³	1996	70/M	Right middle finger: distal phalanx + index finger: all the phalanges	Lower alveolus squamous cell carcinoma	2 y	Yes	Radiotherapy, chemotherapy	
217	Walsh et al ²⁰⁴	1994	46/M	Right index finger, distal phalanx	Bladder transitional cell carcinoma	2 y	No	Amputation through the proximal phalanx	
218	Wavreille et al ²⁰⁵	2009	48/F	Right little finger, distal phalanx	Breast carcinoma	9 y	Yes	DIP joint disarticulation	
219	Wurapa et al ²⁰⁶	2010	80/F	Left scaphoid, trapezium and trapezoid	Esophageal adenocarcinoma	3 y	Yes	Below-elbow amputation	7
220	Yasaka et al ²⁰⁷	1999	64/M	Left little finger, pulp	Esophageal squamous cell carcinoma	2 mo	Yes		2
221	Yoneda et al ²⁰⁸	2013	64/M	Left ring finger, distal phalanx	Bladder cancer	Positive	Yes	Finger amputation	3

CMC, carpometacarpal; DIP, distal interphalangeal; IP, interphalangeal; MCP, metacarpophalangeal; PIP, proximal interphalangeal.
 *Blank cell, data are not provided.