



# Acrometastases to the Hand and Wrist: A Series of 9 Cases and Review of the Literature

## *Acrometástasis en mano y muñeca: Serie de 9 casos y revisión de la literatura*

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### Abstract

**Introduction** Acrometastases are extremely rare in the hand, with a prevalence of around 0.1% according to the literature. They are normally associated with advanced tumor stages, especially in lung cancer. The present article shows the experience of our center in the management and treatment of these pathologies.

**Materials and Methods** We report a series of 9 cases treated between 1992 and 2020 in the hand and wrist. Data regarding the primary tumor, the target organ, and survival are analyzed. A review of the cases of acrometastasis reported in the literature is also carried out, emphasizing in how many of them the acral lesion was the first sign of an unknown tumor.

**Results** Acrometastases predominantly affect male patients aged around 60 years, and the primary tumor that is the cause in most cases is lung cancer, with a very low survival rate after the diagnosis (of approximately 8 months).

**Discussion and Conclusions** In cases of acral lesion of non-traumatic origin, acrometastases should be considered, especially in patients who have a known primary tumor. In the present series, there were three cases in which the acrometastases were the first sign of a tumor in the patient, and in one of them it was initially treated as whitlow. In the literature, in approximately 50% of the cases, acrometastases are the first sign of the presence of a tumor..

Once diagnosed, multidisciplinary medicosurgical treatment is essential to improve the patient's function and pain as much as possible.

### Keywords

- ▶ acrometastases
- ▶ hand
- ▶ acral injury
- ▶ finger
- ▶ bone metastases

### Resumen

#### Palabras clave

- ▶ acrometástasis
- ▶ mano
- ▶ lesión acra
- ▶ dedo
- ▶ metástasis ósea

**Introducción** Las acrometástasis son extremadamente raras en la mano, con una prevalencia alrededor de un 0,1% según la literatura. Normalmente se asocian a patologías tumorales en estadios evolucionados, especialmente el carcinoma de pulmón. En este trabajo se muestra la experiencia de nuestro centro en el manejo y el tratamiento de estas entidades.

**Materiales y métodos** Describimos una serie de 9 casos tratados entre 1992 y 2020 de acrometástasis en la mano y muñeca. Se analizan datos de tumor primario, órgano

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diana, tratamiento y supervivencia. Asimismo, se realiza una revisión de los casos de acrometástasis de la literatura, haciendo hincapié en cuántos de ellos la lesión acra fue el primer signo de patología tumoral desconocida.

**Resultados** Se objetiva que afectan predominantemente a varones alrededor de 60 años, y que el tumor primario causante en la mayoría de los casos es el de pulmón, con una supervivencia del paciente tras el diagnóstico muy baja (alrededor de 8 meses).

**Discusión y conclusiones** Ante una lesión acra de origen no traumático, hay que tener en cuenta las acrometástasis, especialmente en pacientes que tienen un tumor primario conocido. En esta serie hubo tres casos en los que las acrometástasis fueron el primer signo de la patología tumoral del paciente, y en uno de ellos se le trató erróneamente como un panadizo inicialmente. En la literatura, aproximadamente el 50% de las acrometástasis son el primer signo de patología tumoral.

Una vez diagnosticado, el tratamiento multidisciplinar médico-quirúrgico es fundamental para mejorar la función y el dolor del paciente en la medida de lo posible.

## Introduction

Tumor metastases in the hand are extremely rare, with a prevalence of around 0.1% of all metastatic lesions.<sup>1</sup> They are more common in the lower limbs than in the upper limbs, and do not have a predominant age of onset. It is a more common pathology in men than in women.<sup>2</sup>

They appear more habitually in patients who are in advanced stages of cancer,<sup>3</sup> and lung carcinoma is the one that most frequently generates them.<sup>4</sup> They rarely appear as the first telltale sign of the primary pathology.<sup>1</sup>

They usually show up in the terminal phases of the disease, usually due to hematogenous spread, and post-diagnosis survival is usually low (average: 7 months), although it does not mean that they worsen the prognosis.<sup>5</sup>

The treatment will depend on the primary pathology of the patient, their life expectancy and symptoms.<sup>6</sup> In the present article, we describe a series of acrometastases to the hand and wrist, their therapeutic management, and review the existing literature.

## Materials and Methods

The present is a retrospective review of a series of 9 cases of acrometastases only to the hand and wrist, collected in the same center between 1992 and 2020.

Data on the primary tumor, location of the metastasis in the hand, treatment and patient survival once diagnosed with acrometastases were collected from each of the cases.

In addition, a review of the literature of all the articles indexed in PubMed on acrometastases has been carried out, and, from each article, we have reviewed the primary tumor, the target organ, the demographic data, and if the acral lesion was the first sign of an unknown tumor pathology. To perform the search, we associated the keywords *acrometastases* and *hand*.

## Results

The main results of our series are presented in **Table 1**, in which a predominance of men (60%) with a mean age of 66 years (range: 47 to 86 years) can be observed.

In 3 of the 9 cases (case 1, 2, and 6) the metastatic lesion was the first manifestation of the disease, and in all 3 it was squamous cell carcinoma of the lung (**fig. 1a, 1b, 1c**).

As for the differential diagnosis, in case number 4 there was an initial confusion in the diagnosis of the lesion, which was treated as a case of whitlow. After verifying that the antibiotic therapy was not effective, it was decided that a biopsy of the lesion should be performed, which concluded that it was a metastasis of a breast carcinoma.

Regarding treatment, for the most part, amputation with or without adjuvant radiotherapy was the most used. However, in one of the cases (number 9), the patient presented renal carcinoma with pulmonary involvement and a single metastasis in the distal radius. The osteolytic lesion was large and very painful, so the physicians decided to excise it and use the single-bone forearm technique, with the performance of an arthrodesis of the ulna and carpus.

One of the patients, whose index finger was amputated due to acrometastases secondary to carcinoma of the sigmoid colon (case number 7), had the peculiarity that a second lesion appeared 2 months later in the thumb of the contralateral hand.

The overall survival after the diagnosis was of 8.22 months (range: 2 to 43 months).

The main results of the literature review are presented in **Table 2**, in which one can see that there is a male predominance, the patients have a mean age of 60 years, and the most frequent primary tumor is lung cancer (61% of the published cases), followed by kidney (11 %) and breast cancer (11%), although with a lower frequency. The acral lesion was the first sign of a previously-unknown tumor pathology in 48% of the patients.

**Table 1** Data on demographic characteristics, survival, primary tumor, and treatment of the study sample

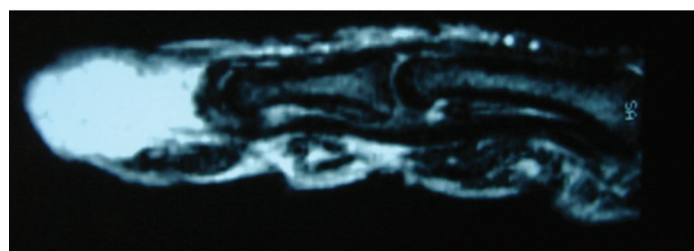
Case	Gender	Age at diagnosis (years)	Target	Primary tumor	Treatment	Survival (months)
1	Male	74	Pyramidal bone	Lung	Radiotherapy	8
2	Male	71	Second metacarpal	Lung	No	2
3	Female	47	Distal radius	Lung	Radiotherapy	2
4	Female	53	Distal phalanx of the ring finger	Breast	Amputation	3
5	Male	86	First metacarpal	Lung	No	7
6	Female	71	Distal phalanx of the index finger	Lung	Radiotherapy + amputation	2
7	Male	73	Distal phalanx of the index finger and proximal phalanx of the thumb	Sigmoid colon	Radiotherapy + amputation	3
8	Male	56	Distal phalanx of the index finger	Lung	Amputation + chemotherapy	4
9	Male	66	Distal radius	Kidney	Exeresis + ulnocarpal arthrodesis	43

## Discussion

Acrometastases are uncommon in general, but more frequent in the lower extremities. In the hand, they have been described with a prevalence of around 0.1% of all bone metastases,<sup>1</sup> although it is probably higher due to subclinical cases and those that are not reported. The reason for this phenomenon could be the lower amount of bone marrow in the bones of the hand, as well as the lower amount of slow venous flow in these locations.<sup>7</sup> Afshar et al.<sup>5</sup> determined in their review that bone metastases distal to the elbow are

more frequently caused by supradiaphragmatic tumors. In the series of the present study, 6 out of 9 cases originated from lung carcinoma. This is the primary tumor that most generates acrometastases in the hand. Although there is no proven theory, the explanation could be that the spread of these tumors is mainly hematogenous<sup>8</sup> and the lung has great access to arterial blood. Kidney and breast tumors are the next in terms of prevalence.<sup>3</sup>

It has also been seen that it affects men more than women, which could be explained by the higher frequency of lung cancer among men.<sup>9</sup>

**A****B****C**

**Fig 1** (A) T2-weighted MRI scan showing a metastatic lesion in the distal phalanx. (B) Radiographic image of a case of lung carcinoma in anteroposterior view of the chest. (C) Image of the complete amputation of the second finger.

**Table 2** Cases of acrometastasis described in the literature

	Gender (male/female)	Age (years)	Acrometastasis as first sign (cases)	Target	Primary tumor	Treatment	Survival
Muñoz-Mahamud et al. <sup>8</sup> (2017)	2/3	63	1/5	First metacarpal bone	Lung	No	6 months
Flynn et al. <sup>9</sup> (2008)	0/2	78 69	1/2	Second metacarpal bone; third metacarpal bone	Lung; breast	Radiotherapy; radiotherapy	Alive
Kumar et al. <sup>11</sup> (2011)	3/0	52; 60	2/3	Distal phalanx of the fifth finger; middle phalanx of the thumb	Squamous cell carcinoma of the esophagus; squamous cell carcinoma of the skin	Radiotherapy; radiotherapy	
Biji et al. <sup>12</sup> (2010)	0/1	37	0/1	Middle phalanx of the left thumb	Breast	Chemotherapy	18 months
Xie <sup>13</sup> (2017)	1/0	45	0/1	Proximal phalanx of the left thumb	Lung	Amputation	
Gilardi et al. <sup>14</sup> (2013)	1/0	55	1/1	Trapezium	Lung	Radiotherapy	Alive
Sahoo et al. <sup>6</sup> (2016)	1/0	53	1/1	Distal phalanx of the left index finger	Lung	Amputation	
Liu et al. <sup>15</sup> (2014)	0/1	53	1/1	Second metacarpal bone	Lung		
Asirvatham Gjorup et al. <sup>16</sup> (2017)	0/1	55	1/1	Middle phalanx of the third finger	Lung		2 months
Troncoso et al. <sup>17</sup> (1991)			1/1	Distal phalanx of the finger	Kidney carcinoma		7 months
Taleb et al. <sup>4</sup> (2011)	0/1	46	1/1	Fourth left metacarpal bone	Urothelial carcinoma	Amputation	
Lucilli et al. <sup>18</sup> (2010)	1/0	63	0/1	Middle phalanx of the left thumb	Lung	Amputation	
Akjouj et al. <sup>19</sup> (2006)	1/0	57	1/1	Thumb	Lung		
Bigot et al. <sup>20</sup> (2007)	1/0	64	0/1	Third metacarpal bone	Gastric carcinoma		5 years
Khosla et al. <sup>21</sup> (2012)	0/1	65	0/1	Fourth metacarpal bone	Vaginal carcinoma		
Adegboyega et al. <sup>22</sup> (1999)	0/1	60	1/1	Middle phalanx of the third finger	Kidney carcinoma	Amputation	11 months
Rommer et al. <sup>23</sup> (2014)	1/1	30; 66	0/2	Distal phalanges of the fourth and fifth fingers; distal phalanx of the third finger	Hepatocarcinoma; kidney carcinoma	Amputation; amputation	;- 4 months
Hernández-Cortés et al. <sup>24</sup> (2015)	1/0	53	0/1	Distal phalanx of the fifth finger	Kidney carcinoma		3 months
Madjidi et al. <sup>25</sup> (2009)	1/0	55	1/1	Distal phalanx of the second finger	Lung		
Borgohain et al. <sup>26</sup> (2012)	1/0	70	1/1	Second metacarpal bone, distal femur	Kidney carcinoma	No	

Table 2 (Continued)

	Gender (male/female)	Age (years)	Acrometastasis as first sign (cases)	Target	Primary tumor	Treatment	Survival
Koyama and Koizumi <sup>27</sup> (2014)	1/0	62	0/1	Hamate	Lung		
Kumar et al. <sup>28</sup> (2011)	1/0	55	0/1	Distal phalanges of all fingers	Laryngeal carcinoma		2 years
Gallardo-Alvarado et al. <sup>29</sup> (2020)	0/1	58	0/1	Right thumb	Cervical cancer		4 months
Voskuil et al. <sup>30</sup> (2019)	1/0	81	0/1	Scaphoid	Colon adenocarcinoma	Resection of the first row	1 year
Van Veenendaal et al. <sup>31</sup> (2014)	0/1	83	1/1	Proximal phalanx of the third right finger	Lung	Amputation	
Miyamoto et al. <sup>32</sup> (2008)	0/1	72 <sup>a</sup>	0/1	Fifth metacarpal bone	Gastric carcinoma	Amputation	
Ghert et al. <sup>33</sup> (2001)	0/1	56	0/1	Middle phalanx of the second left finger	Kidney carcinoma	Amputation	Alive
Rinonapoli et al. <sup>34</sup> (2012)	1/0	72	1/1	Carpus	Lung	Amputation	
Tabrizi et al. <sup>35</sup> (2019)	1/0	60	1/1	Hamate	Lung		20 months
Salesi et al. <sup>36</sup> (2007)			0/1	Second left finger	Kidney carcinoma		
Riter and Ghobrial <sup>37</sup> (2004)	0/1	53	0/1	Distal phalanx of the second right finger	Kidney carcinoma	Amputation	
Lambe et al. <sup>38</sup> (2014)	1/0	72	0/1	Distal phalanx of the fifth finger	Lung	Radiotherapy	2 weeks
Cruz <sup>39</sup> (2021)	1/0	62	0/1	Third metacarpal bone	Chronic lymphocytic leukemia		
Sumodhee et al. <sup>40</sup> (2014)	1/0	61	1/1	Middle phalanx of the fourth left finger L	Lung	Radiotherapy	Alive
Knapp and Abdul-Karim <sup>41</sup> (1994)			1/2		Lung; dastric carcinoma		
Lee et al. <sup>42</sup> (1999)	1/0	47	0/1	Middle phalanx of the thumb	Hepatocellular carcinoma	Amputation	5 months
Spiteri et al. <sup>43</sup> (2008)	1/0	82	1/1	Distal phalanx of the fourth right finger	Gastric carcinoma	Amputation	
Ornetti et al. <sup>44</sup> (2012)	0/1	68	1/1	Distal phalanx of the second right finger	Endometrial carcinoma	No	6 months

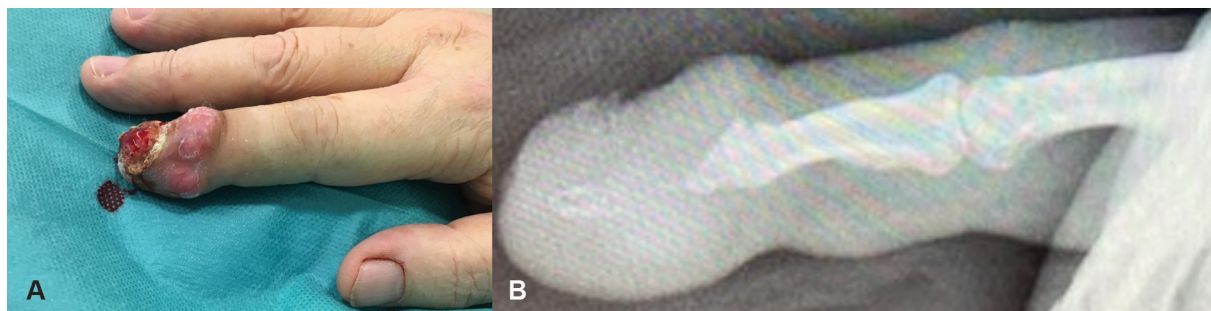


Fig 2 (A) Clinical signs of acrometastases in the distal phalanx of a second finger. (B) Radiological signs.

In the present series, the most patients were men: 6 out of 9. In addition, except for one case, all those caused by pulmonary neoplasia occurred in men.

All the bones of the hand have been reported as metastatic targets in the literature, but the location where they most frequently settle is the distal phalanx of the dominant limb. Microtraumas produced by daily activities (typing, using the mobile phone...) are very common in the distal phalanx, it could be the cause of small inflammatory reactions. The chemotherapeutic factors (prostaglandins...) produced would favor the settlement of tumor cells that arrive through the bloodstream.<sup>10</sup> The proximal and middle phalanges, followed by the metacarpus, are next in frequency, while it is rarer that they involve the carpal bones. The most commonly-affected finger is the third,<sup>10</sup> which is far from the results obtained in the present review, in that there were no cases in which this finger was affected (► Fig. 2a, 2b).

Regarding the diagnosis, considering the results of the literature review (► Table 2), one can observe that in 48% of the cases it was the first symptom of the primary tumor. In the present series, in 3 out of the 9 cases, it was the first symptom of the tumor, and these 3 cases were all of lung neoplasms. The initial diagnostic orientation may be erroneous, as in one of the cases, in which a whitlow was treated, which did not improve with antibiotic therapy, and the physicians decided to perform a biopsy, which concluded that it was a metastasis of an already-known breast tumor. Therefore, a good differential diagnosis is important when facing an acral lesion of this type, since it may be confused with other entities such as: infections (case number 4), inflammatory pathologies, gout, essential cysts, and primary skin tumors.<sup>9</sup> Clinically, these lesions usually start with inflammation, erythema, pain, and fluctuation,<sup>1</sup> so they can be difficult to differentiate from other pathologies. It is important, therefore, to review the patient's clinical history, since in most cases there is a history of tumor pathology.

In the event of a suspicious lesion, apart from a good examination, imaging tests should be performed, which should include X-rays to assess bone damage. Metastatic or tumoral lesions in the hand are usually observed as lytic lesions in the bone, without periosteal reaction or joint involvement, characteristics that differentiate them from osteomyelitis<sup>16</sup> (► Fig. 2a, fig. 2b). A computed tomography (CT) scan can help expand this information. A magnetic resonance imaging (MRI) scan should be performed to assess

soft-tissue involvement and adjacent neurovascular structures.

A positron-emission tomography (PET) scan can detect lesions in other locations of the body and is the test that best detects these lesions before they are symptomatic.<sup>45</sup> Finally, an incisional or excisional biopsy is essential to determine the anatomicopathological diagnosis.

In those patients in whom the primary pathology is unknown, coordination with the oncology unit is essential to perform the extension study and provide the best possible treatment. The overall survival of these patients with acrometastases is low, the average from diagnosis is of 7 months.<sup>5</sup> The appearance of acrometastases in a patient affected by a tumor indicates that said pathology is very widespread, so it is considered a bad prognostic factor.<sup>3</sup>

The treatment must be individualized and has two primary objectives: to reduce pain and preserve hand function, since it has not been shown in the literature that treatment improves the patient's prognosis.<sup>5</sup> Before performing it, it is imperative to find the primary tumor (if it is not known) and stage it, to determine the patient's survival and thus be able to offer a better treatment. The most used treatment in the literature is amputation,<sup>5,7,9</sup> mainly because the cases mostly involve the distal phalanges or metacarpals.<sup>6</sup> But when it affects bones such as the distal radius, exeresis is an option to consider, as long as the patient tolerates it. In the present series, in case 9, the technique of ulnocarpal or forearm arthrodesis of a single bone was performed in order to fulfill the two premises (pain control and preservation of function). This patient has undergone cancer treatment with chemotherapy, with good response. Two years after surgery, he required another intervention, in this case, to excise a new metastatic lesion at the level of the right elbow (fig 3a, 3b, 3c). After 43 months of the surgery, the patient has good pain control and no signs of local recurrence. This long survival is not uncommon, since the causal primary tumor was a renal carcinoma that was treated with nephrectomy. Jung et al.<sup>46</sup> have already reported a series of 8 cases of solitary metastases from primary renal tumors that were treated in the same way, and they obtained a survival of 69 months (range: 24 to 76 months).

In order to control pain, the use of radiotherapy alone or associated with surgery is also very widespread,<sup>45</sup> although, depending on the degree of weakness of the patient, a comfort splint associated with analgesic medication may be definitive.



**Fig 3** (A) Radiological image of an osteolytic lesion in the distal radius. (B) Single-bone forearm technique. (C) En bloc resection of the distal radial epiphysis.

In conclusion, acrometastases in the hand are rare, but they must be considered in any rapidly-progressive lesion that does not respond to the usual treatments. We must be careful not to confuse these lesions with some more banal pathology, since sometimes they are the first symptom of an occult primary tumor. In cases in which the patient has already been diagnosed with a primary tumor, especially of the lung, they must be taken into consideration and treated accordingly. The type of treatment used will be more or less radical depending on the patient's condition and their life expectancy, with the sole mission of improving their quality of life. Therefore, it is important to study each case carefully and treat each patient individually.

#### Conflict of Interests

The authors have no conflict of interests to declare.

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