CASE REPORTS

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Isolated metastasis of lung cancer to carpal bones

Izolovana metastaza karcinoma pluća u kostima ručja

Milan Stanković*†, Ivica Lalić*‡, Aleksandar Djuričin*†, Nemanja Gvozdenović*†

University of Novi Sad, *Faculty of Medicine, Novi Sad, Serbia; Clinical Center of Vojvodina, †Clinic for Orthopaedic Surgery and Traumatology, Novi Sad, Serbia; ‡Community Health Center, Novi Sad, Serbia

Abstract

Introduction. Lung cancer often gives metastases in the bone system, of which the wrist accounts for 0.1% and the bones of the wrist are primarily affected in only 17% of cases. We presented a patient with the delayed diagnosis and a rare localization of isolated metastases of lung cancer to carpal bones which ended with upper arm amputation. **Case report.** A 56-year-old, a laborer, healthy, smoker, coughing for decades with occasional expectoration, hoarseness, during the last 3 months felt pain in his right wrist. He denied trauma. Physical examination led to the diagnosis of tendovaginitis of the hand. He visited a physiatrist and began treatment. After the therapy, symptoms were partially decreased and later began to worsen with symptoms of the median nerve compression. The neurologist diagnosed it as the carpal tunnel syndrome. The patient's condition worsened and he was sent to the Emergency Center of the Clinical Center of Vojvodina, Novi Sad, Serbia with the diagnosis of arthritis of the wrist. The final diagnosis of lung adenocarcinoma with isolated metastasis to bone tissue was made with a biopsy of the tumor and examination by an oncologist. Primary tumor localization was diagnosed with a computed tomography (CT) scan and skeletal scintigraphy. The patient underwent upper arm amputation and was sent to an oncologist. **Conclusion.** Carefully taken anamnesis, detailed general and local examination, and frequent monitoring of patients could help make a correct diagnosis of this rare localization of the lung cancer, before the spreading process and the occurrence of severe complications.

Key words:
bone neoplasms; neoplasm metastasis wrist joint; carpal bones; lung neoplasms; diagnosis; treatment outcome.

Apstrakt

Uvod. Karcinom pluća obično daje metastaze u skeletni sistem, od kojih 0,1% u predeo ručnog zgloba, a od tog broja samo 17% otpada na kosti ručja. Prikazan je bolesnik sa odloženom dijagnozom izolovane metastaze karcinoma pluća retke lokalizacije u kostima ručja, sa nadlakatnom amputacijom kao krajnjim ishodom. **Prikaz bolesnika.** Bolesnik starosti 56 godina, fizički radnik, zdrav, "teški pušač", sa kašljem tokom decenija uz povremeno iskašljavanje i promuklost, poslednja tri meseca žalio se na bol u desnom ručnom zglobu. Bolesnik je negirao traumu. Na osnovu kliničkog pregleda postavljena je dijagnoza zapaljenja tetiva šake (dijagnoza fizijatra) i odmah je započeta fizikalna terapija. Nakon završetka fizikalne terapije, simptomi su se delimično smirili, ali je ubrzo došlo do pogoršanja stanja u smislu pojave simptoma kompresije medijalnog živca (*nervus medijanus*). Bolesnik je poslat na dalje lečenje neurologu, koji je postavio dijagnozu sindroma karpalnog tunela. Stanje bolesnika se pogoršavalo zbog čega je upućen u Urgentni centar Kliničkog Centra Vojvodine, Novi Sad, sa uputnom dijagnozom zapaljenja ručnog zgloba. Konačna dijagnoza izolovane metastaze adenokarcinoma pluća postavljena je biopsijom i pregledom onkologa. Primarna lokalizacija tumora pluća dijagnostikovana je kompjuterizovanom tomografijom i scintigrafijom skeleta. Načinjena je visoka amputacija ruke i bolesnik je poslat na dalje lečenje onkologu. **Zaključak.** Pažljivo uzeta anamneza, detaljan opšti i lokalni klinički pregled i učestalije kontrole bolesnika mogu pomoći u postavljanju tačne dijagnoze tumora pluća, pre širenja procesa i nastanka težih komplikacija.

Ključne reči:
kosti, neoplazme; neoplasme, metastaze ručje, zglob; karpusne kosti; pluća, neoplazme; dijagnoza; lečenje, ishod.

Introduction

Lung cancer gives metastases in the bone system, of which the wrist accounts for 0.1% [1]. In only a few cases metastasis of lung cancer in the bones of the wrist was presented as the first sign of the disease and the only metastasis [2–5]. Initial infiltration of semilunar bone was shown in only one case [6]. First signs are related to other more common pathologies of the hands [7]. Lost time until the diagnosis is made is significant [2–6]. We reported a patient with an undiagnosed,

Correspondence to: Nemanja Gvozdenović, Clinical Center of Vojvodina, Clinic for Orthopaedic Surgery and Traumatology, Hajduk Veljkova 1-7, 21 000 Novi Sad, Serbia. E-mail: nemanja.gvozdenovic@mf.uns.ac.rs

rare localization of isolated metastases of lung cancer to carpal bones which ended with upper arm amputation.

Case report

A 56-year-old man, a laborer, heavy smoker, last 3 months felt pain in his right wrist. Firstly, he visited a physiatrist who began treatment, with the diagnosis tendovaginitis of hand and fingers. Symptoms were initially decreased and then began to worsen. Radicular symptomatology of the median nerve appeared and then a neurologist was included. The pain became stronger, redness and swelling of the wrist appeared. After re-examining, the bacterial arthritis of the wrist was suspected, and the patient was sent to the Emergency Center of the Clinical Center of Vojvodina, Novi Sad, Serbia.

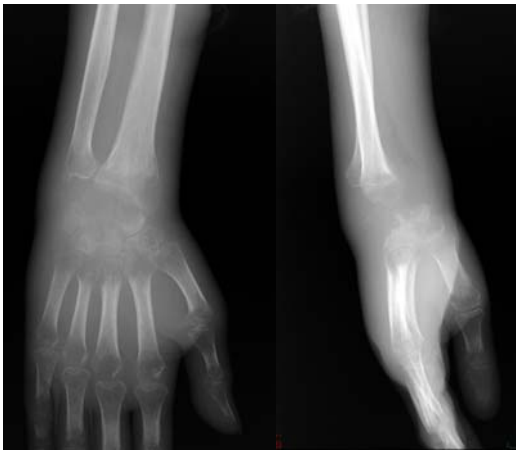
Clinical examination of the patient showed a local swelling and hyperemia of the wrist. On neurological examination, there was a partial loss of motor functions of the median nerve.

Native X-ray of the wrist (Figure 1), showed a marked osteoporosis of carpal and metacarpal bones with almost complete destruction of the upper row of carpal bones (most prominent in semilunar and navicular bone) and with a volar subluxation of the wrist. X-ray of lungs was in the referent range. Computed tomography (CT) scan of the wrist was not made initially.

The laboratory findings showed hyperkalemia [5.6 mmol/L normal range (NR) 3.5–5.5 mmol/L], hyperglycemia [7.6 mmol/L (NR 3.3–5.5 mmol/L)] and increased values of C-reactive protein (CRP) – 59.6 mg/L (NR < 8 mg/L). Kidney and liver function were preserved, as well as the hemostatic mechanism of the blood.

After a short preparation of the patient, the wrist incision was done. Expected pus was not obtained but there was gray-lardy tissue that permeated the wrist and carpal bones with their destruction. A biopsy of the tumor was done with external fixation of hand and forearm (Figure 2).

The CT scan of the chest demonstrated irregular nodular lesions in the right lung (Figure 3A and B) and a subpleural nodule in the S6 segment of the left lung, (Figure 3C and D). Isolated lymph nodes were seen in mediastinum enlarged to 20 mm. Skeletal scintigraphy of the whole body showed



A) B)

Fig. 1 – X-ray the right wrist and forearm: A) Anteroposterior view – diffuse osteoporosis bones of the hand and distal forearm. Bones of the wrist infiltrated, almost completaly destruction of the navicular and semilunar bone. Capitate bone partially destructed; B) Lateral view – volar subluxation of the wrist.

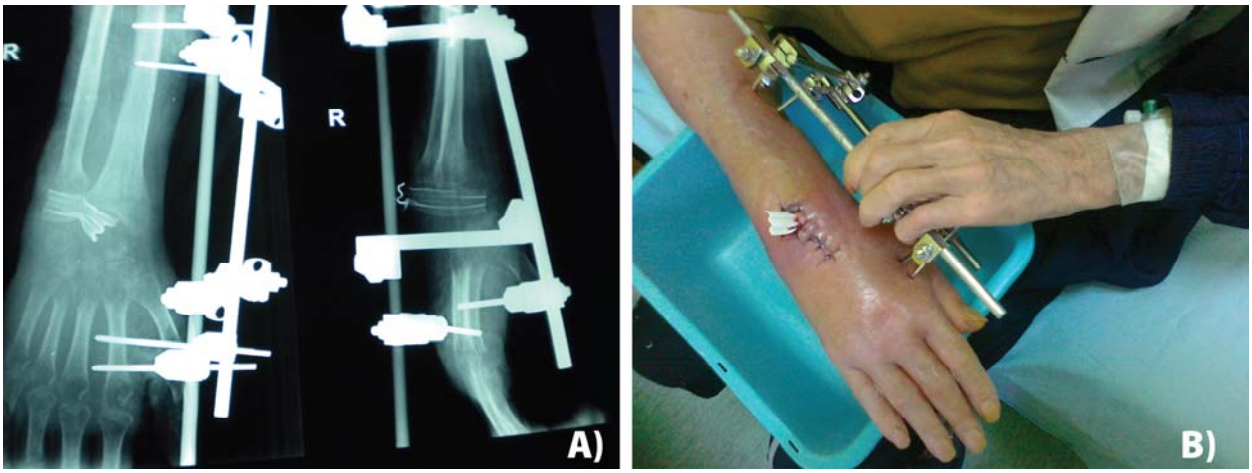


Fig. 2 – A) Postoperative anteroposterior and lateral radiographies of the right wrist show devastated wrist, passive rubber drain is situated in the tumor tissue. Wrist is stabilased with external fixation; B) Postoperative local clinical picture shows swelling of the hand and wrist with hyperemia, minimal bleeding around the drainage.

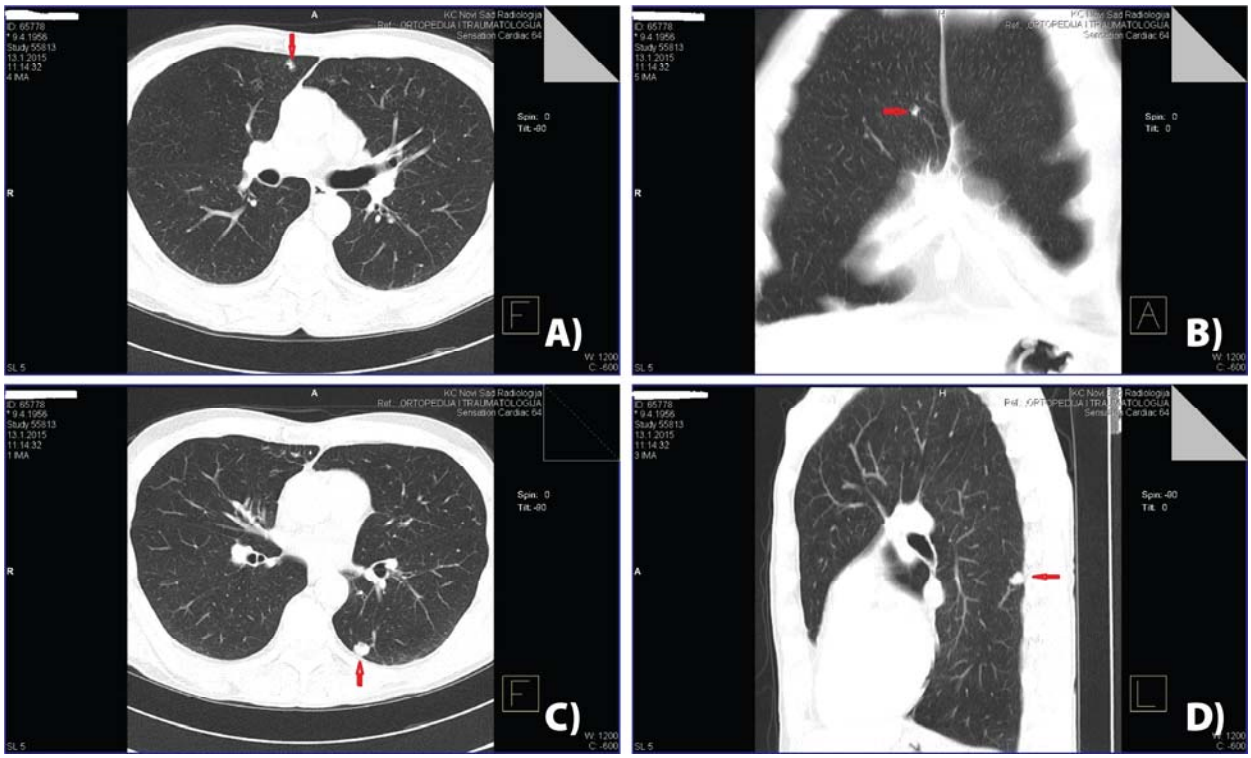


Fig. 3 – Computed tomography (CT) appearance of tumors in the lungs. No invasion of the bronchi, main blood vessels nor bone structures. No effusion in the pleural space.
A) and B) – Axial and frontal appearance of the tumor in the S3 segment of the right lung, dimensions 8 mm, partialy calcificated (see the arrow under A).
C) and D) – Axial and frontal appearance of the tumor in the S6 segment of the left lung, subpleural situated, dimensions 13 × 12 mm (arrow).

diffusely increased bone metabolic activity in the region of the right wrist. Other scintigraphy was normal. After diagnostic procedures, the patient was sent to an oncologist.

Histopathological findings of the tumor mass from the wrist (Figure 4) showed fragments of bone tissue with the tumor. The tumor cells were cylindrical, with moderately vesicular nuclei and many visible mitoses. The diagnosis of adenocarcinoma with metastasis to bone tissue was initially made by the pathologist and a definitive diagnosis of primary lung carcinoma was set up by the oncologist, based on the anamnesis, clinical examination, radiological and histopathological findings.

Before the treatment of cancer, there was an acceleration of tumor growth in the carpal region with the deteriorati-

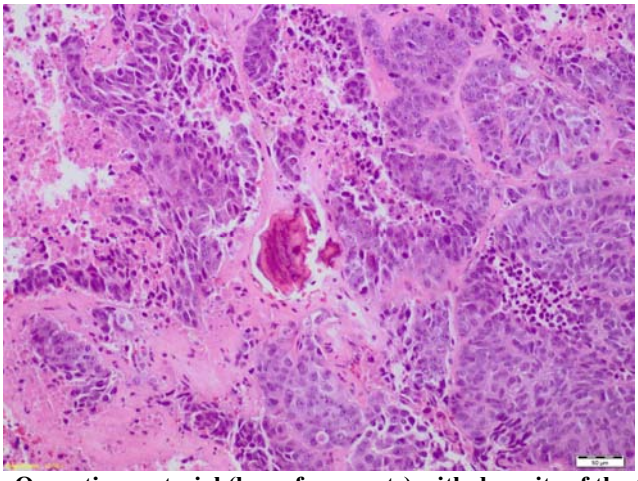


Fig. 4 – Operative material (bone fragments) with deposits of the tumor.
Tumor tissue is arranged into solid groups and small adenoid structures. Tumor cells have polygonal and cylindrical shape, with large nuclei with visible abundant mitotic figures. On immunohistochemical analysis tumor cells are cytokeratin AE1/AE3 (CKAE1/AE3) positive and thyroid transcription factor-1 (TTF1) positive. The diagnosis of metastatic adenocarcinoma was made, with most probable primary lung tumor.

on of the general condition of the patient (Figure 5). After removal of the external fixation and partial healing of wounds from the biopsy, an attempt to perform magnetic resonance imaging (MRI) of the hand and forearm was made to evaluate the extent of changes, but the patient could not withstand the procedure. The patient underwent upper arm amputation (Figure 6A and B) and his further treatment was continued by the oncologist.

Fig. 5 – Local finding after removal of the external fixation, two weeks after the biopsy, shows accelerated growth of tumor, skin necrosis, and exulceration to place the incision.

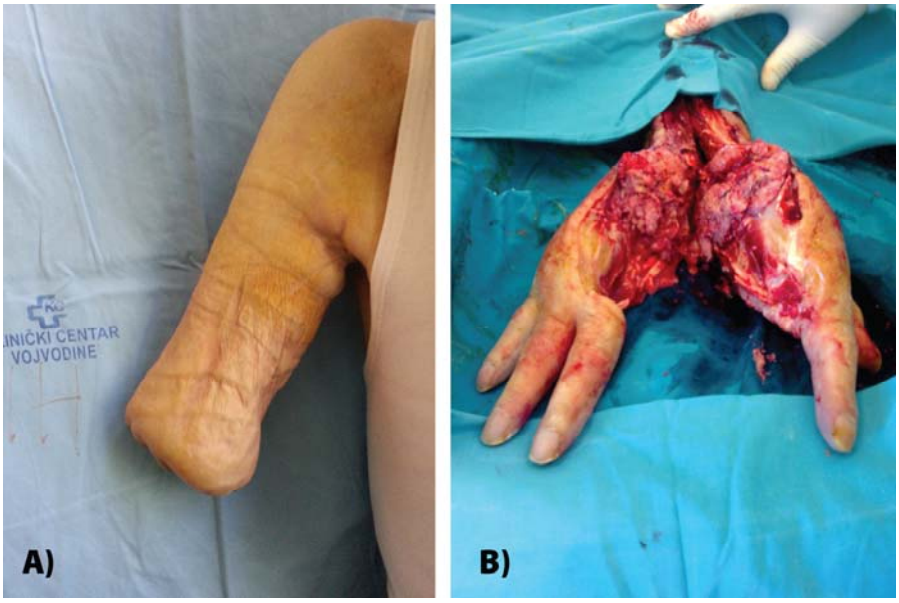


Fig. 6 – A) Upper arm amputation; B) Sagital section through an amputated hand shows completelly destruction of the carpal bones and distal radius and ulna. The tumor penetrates skin on the dorsum of the wrist.

Discussion

The primary metastases to the hand are extremely rare and include 0.1% of all bone metastases [2]. They are most frequently produced by carcinomas of the lung, breast, and kidney from which the metastasis of lung cancer is present in about half of the cases [8]. Handley [9] first described metastasis of the breast cancer in the metacarpal bone. Flynn et al. [10] showed at 257 cases that the most commonly affected was the third finger of the dominant hand, then thumb and other fingers. Hsu et al. [7] state that the carpal bones metastases are present in 17% of all cases of bone metastases in the hand.

Cancer metastasis to trapezium was described by Asencio et al. [2], Rinonapoli et al. [3], Lederer et al. [4], Song and Yao [5] and Gaston et al. [11]. Nissenbaum et al. [12] showed metastasis of the lung cancer in the hamate bone. Metastasis of the lung cancer in the scaphoid bone was shown earlier by Ioia et al. [13]. According to available literature, isolated metastatic bronchial carcinoma invading the lunate bone was described only by Abrahams [6]. He described the lytic changes of the ulnar part of semilunar bone and loss of bone mass in a 59-year-old female patient with a quarterly pain wrist. A biopsy of

the bone confirmed that this was a metastatic squamous cell carcinoma of the lung.

The time from the onset of symptoms and signs, and the diagnosis can be a few weeks, months to a year or longer [3, 4, 7]. In our case, time lost was about three months.

Craigen et al. [14] describe the metastasis of gastric cancer in the hamate bone of dominant right hand, while Flynn et al. [10] showed at 257 cases that metastases most commonly affected the third finger of the dominant hand, then the thumb and other fingers. The unilateral lesion in their study was present in 74% of cases. In our case the right, dominant hand was also involved.

Smoking and alcohol abuse, as bad predictor factors, was pointed out in earlier studies [3, 4]. Our patient was a decades-long heavy smoker.

After the X-ray confirmation of the destruction or loss of subchondral bone mass of the carpal bones, open, or CT-guided aspiration biopsy with pathohistological verification has been done in many studies [4, 10, 13]. In our case, neither a physician nor a neurologist did a radiography of the hand, which was a diagnostic failure. We suppose that some radiographic changes of carpal bones could be observed earlier if the X-rays were done in a timely manner. Our patient did not lose weight, unlike the Rinonapoli et al. [3] case, so we did not suspect a tumor growth. The general state of the patient's health, laboratory findings and clinal examination pointed to the inflammatory process in the wrist. We assumed that neurological symptoms were the consequence of the local spread of infection and joint capsule stretching. Local, general and laboratory signs of inflammation with strong pain and carpal instability indicated decompression, toilette, and stabilization of the wrist [15]. X-ray of the wrist showed most prominent destruction in semilunar and navicular bone and because of that, we assumed that primary affection of tumor cells was there.

Changes in both lungs were observed by CT examinations of the chest and abdomen. CT scan of the brain was not done because the patient showed no neurological deficits. Although expecting a larger number of bone metastases, bone scintigraphy showed changes only in the region of the right wrist, indicating that it was a single metastasis of lung cancer. Involvement of carpal bones as the primary sign of malignant disease, except in Rinonapoli et al. [3] report, was described by Lederer et al. [4] and Song and Jao [5]. The most recent, metastasis of lung cancer in the hand, but in the distal phalanx of the finger before the diagnosis of lung cancer, was described by Unsal et al. [16].

Radiation therapy, as the only treatment method, is described in the work of Flynn et al. [13]. They showed metastasis of lung cancer in the wrist as a part of multiple skeletal metastases in the 78-year-old female patient. Bone resection with capsule interposition in place of excision as a way of treating the initial trapezium destruction by lung cancer without metastases spread into surrounding soft tissue of the joint was described by Gaston at al. [11]. Amputation of the hand in the 37-year-old patient to reduce pain due to metastases in hamate and capitate bone was described by Craigen and Chesney [14], while forearm amputation due to isolated metastasis of lung cancer in trapezoidal, trapezium and scaphoid bone, in the 74-years-old male patient described Rinonapoli et al. [3]. They conclud that earlier diagnosis would allow more therapeutic choices. In our case, there was a massive extension of the tumor outside the carpal bones into the subcutaneous tissue where tumor exulceration occurred, so we could not consider the reconstructive surgery. Amputation remained the only surgical option. As the local findings in our patient rapidly deteriorated in terms of rapid acceleration of tumor growth, bearing in mind the good general condition, we decided to take the upper arm amputation. Survival in patients with metastatic carcinoma of the carpus is between four months and one year [3, 4, 13, 14]. As the wrist represents a rare place of primary tumor manifestations, pain is often attributed to benign changes such as tenosynovitis and entensitis, especially when there are nonspecific laboratory findings, and initial radiography shows no osteolytic changes. The patient is often treated by a physiatrist, thus losing precious time for the diagnosis and therapy. After a certain time of unsuccessful therapy, the attention is turned to more detailed diagnostics.

The described case was not easy to diagnose because all signs of the disease were general as well as the rarity of the carpal bone metastasis.

Conclusion

Every long-lasting pain and swelling in the hand require a special attention of the physician. Setting up an early accurate diagnosis, before the spreading of the possible malignant tumor process in the wrist gives time for the adequate surgical intervention and allows the efficient total treatment of the patients avoiding serious complications such as upper arm amputation, which was shown in this case report.

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