Int J Clin Exp Pathol 2024;17(1):22-26
www.ijcep.com /ISSN:1936-2625/IJCEP0153516

Case Report

Pulmonary squamous cell carcinoma metastatic to the proximal interphalangeal joint of the right finger: report of a rare case and review of the literature

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Received September 19, 2023; Accepted October 30, 2023; Epub January 15, 2024; Published January 30, 2024

Abstract: Synovial metastasis is a rare condition with only a few cases reported in the literature. Synovial metastasis to the finger or toe joint is different from acrometastasis, which is defined as bone metastasis located distal to the elbow and knee. The most common site of synovial metastasis is the knee joint. Conversely, synovial metastasis to the finger or toe joints has, to our knowledge, been reported in one case only so far. Herein, we report the second case of synovial metastasis to the proximal interphalangeal joint of the right third finger in a patient with metastatic pulmonary squamous cell carcinoma and review the literature on synovial metastasis.

Keywords: Proximal interphalangeal (PIP), acrometastasis, synovial metastasis, squamous cell carcinoma

Introduction

Synovial metastasis is a rare condition with few cases reported in the literature [1, 2]. The most common site of synovial metastasis is the knee joint [3]. Synovial metastasis to the finger or toe joints has, to our knowledge, been reported in only one case [3]. It is important not to confuse finger/toe joint or synovial metastasis with acrometastasis. Acrometastasis is defined as bone metastasis located distal to the elbow and knee [4] whereby the bone is the original site of metastasis, as opposed to synovial metastasis where the main metastatic focus is the finger/toe joint. Herein, we report the second case of synovial metastasis to the proximal interphalangeal (PIP) joint of the right third finger in a patient with metastatic pulmonary squamous cell carcinoma and review the literature on synovial metastasis.

Case report

An 80-year-old female with a past medical history of rheumatoid arthritis (RA) and stage Ib (pT2aN0M0) squamous cell carcinoma of the left upper lobe of the lung diagnosed 4 months prior to presentation, presented to the emergency room with right middle finger swelling and tenderness which she first noticed 3 weeks prior. X-ray of the right hand (**Figure 1**) revealed marked deformity compatible with arthritis mutilans and marked soft tissue swelling of the middle finger with extensive bony destruction centered at the third PIP joint. MRI of the right hand (**Figure 2**) revealed a solid tumor in the proximal right third finger at the level of the PIP joint, measuring approximately 3.1 × 3.6 × 4 cm, with destruction of the joint, the proximal third of the middle phalanx and distal third of the proximal phalanx. The lesion showed restricted diffusion and internal enhancement that was most suggestive of malignancy with less likely possibilities including gout and giant tumor of the tendon sheath. Microscopic examination of the synovial biopsies of the right PIP joint revealed nests and sheets of epithelioid to occasionally spindled cells with hyperchromatic pleomorphic nuclei and pale cytoplasm with rare keratinization (**Figures 3**, **4**). Foci of tumor necrosis (**Figure 5**) and mitotic figures were also identified. Immunohistochemical stains were positive in the tumor cells for cytokeratin 5/6 (**Figure 6**), p40 (**Figure 7**) and patchy positive for P903. Additionally, the morphology of the current tumor was compared to the patient's previously diagnosed left upper lobe lung squamous cell carcinoma and appeared similar (**Figure 8**). Overall findings were most compati-

https://doi.org/10.62347/VGCB2769

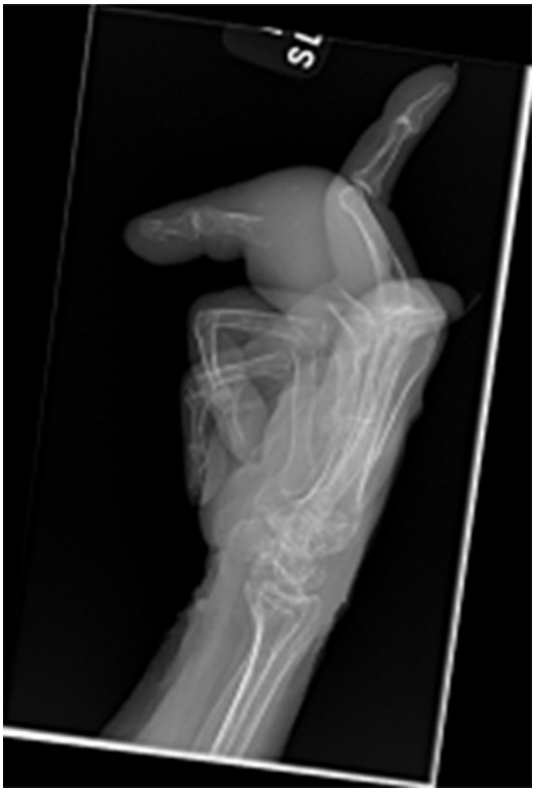

Figure 1. X-ray of the right hand demonstrates marked soft tissue swelling of the middle finger with extensive bony destruction centered at the third PIP joint.

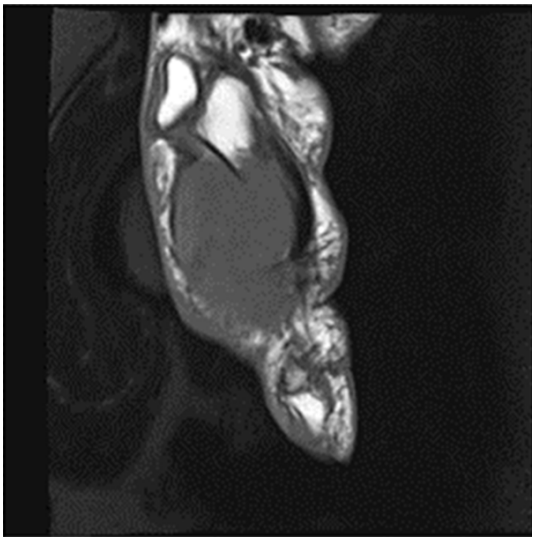

Figure 2. MRI of the right hand shows a solid tumor at the level of the proximal interphalangeal (PIP) joint with destruction of the PIP joint, including the proximal third of the middle phalanx and distal third of the proximal phalanx.

ble with metastatic squamous cell carcinoma of lung origin.

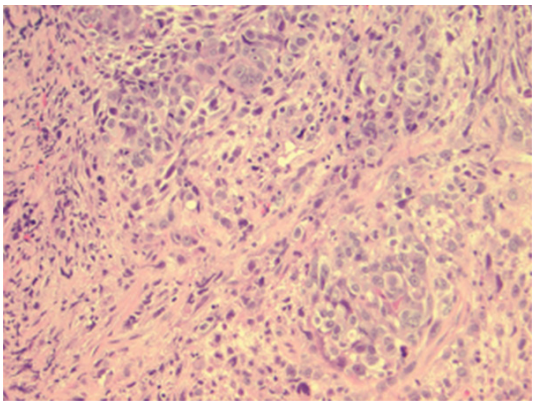

Figure 3. Biopsy of the right PIP joint shows nests and sheets of epithelioid to focally spindled tumor cells with hyperchromatic pleomorphic nuclei and pale cytoplasm (H&E, 20 ×).

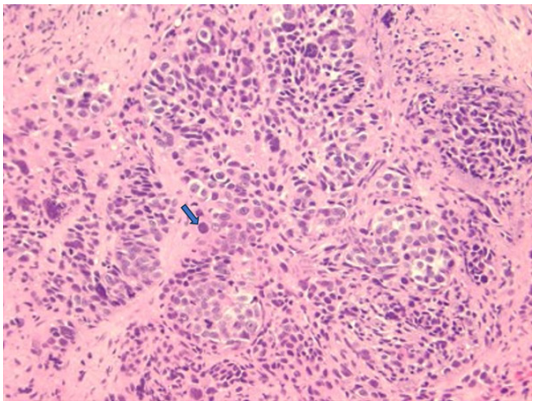

Figure 4. Nests and sheets of tumor cells with rare foci of keratinization (arrow) (H&E, 20 ×).

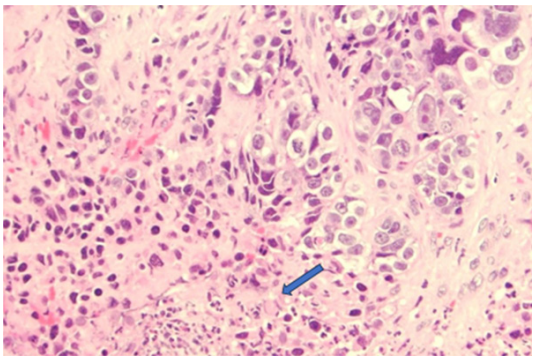

Figure 5. Foci of tumor necrosis (arrow) and pleomorphism (H&E, 40 ×).

Discussion

Joint or synovial metastasis, as opposed to bone metastasis, is a rare phenomenon with only a few cases being reported in the literature

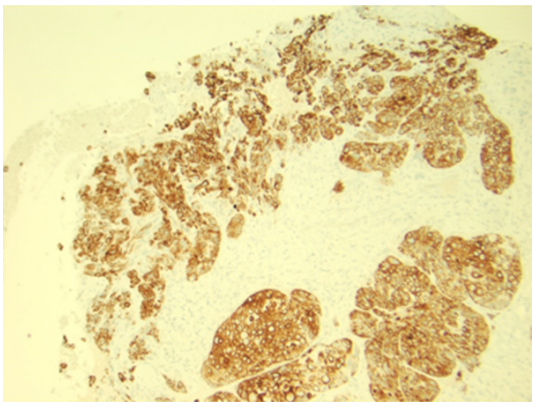

Figure 6. Immunohistochemical stain for cytokeratin 5/6 (CK 5/6) is strongly positive in the tumor cells.

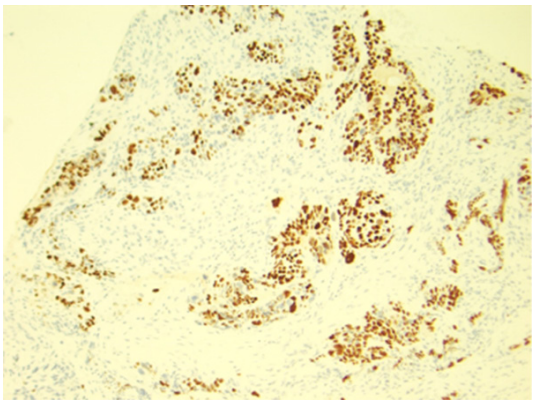

Figure 7. P40 immunostain highlights tumor cells.

[1, 2]. In a study by Thompson et al. [3], the most common type of malignancy in synovial metastasis was adenocarcinoma followed by squamous cell carcinoma, lymphoma, and renal clear cell carcinoma, with lung being the most frequent primary origin followed by gastrointestinal primaries. Synovial metastasis is associated with a poor prognosis with an average survival time of a few months after diagnosis [3]. Given its aggressive nature, treatment for synovial metastasis is usually palliative [5]. The knee is the most typical site of synovial metastasis [3]. On the other hand, metastatic spread of tumors to the finger or toe joints has, to our knowledge, been reported in one case only to date [3]. Our case represents the second case of synovial metastasis to the PIP joint of the finger in a patient with metastatic malignancy.

Finger joint or synovial metastasis is different from acrometastasis which is defined as bone

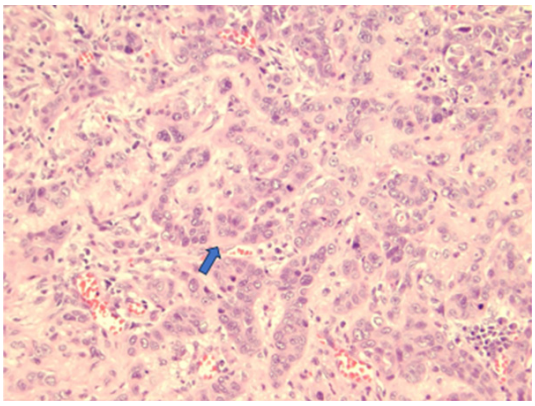

Figure 8. H&E of the patient's previously diagnosed lung squamous cell carcinoma shows nests of tumor cells and foci of keratinization (arrow) similar to the PIP joint tumor biopsy (20 ×).

metastasis located distal to the elbow and knee [4] whereby the finger/toe joint may be secondarily involved by the metastatic tumor deposit while the adjacent bone is in fact the original site of metastasis where the bulk of the tumor mass or epicenter is located. In our case the bulk or epicenter of the tumor was at the level of the PIP joint of the right third finger and was associated with secondary destruction of the adjacent proximal third of the middle phalanx bone and distal third of the proximal phalanx bone.

Similar to synovial metastasis, the most common primary cancer site in acrometastasis is the lung, followed by colorectal origin. It accounts for approximately 0.1% of metastases [4, 6-8] and usually has a non-specific clinical or radiologic presentation thus posing diagnostic challenges particularly when it mimics benign entities or primary bone tumors [9]. Compared to synovial metastasis, its occurrence is considered more common; however, it is similarly associated with a short life expectancy and poor prognosis given its late stage presentation [10, 11]. Early recognition of both synovial metastasis and acrometastasis is essential for providing appropriate management.

The mechanism of synovial or joint metastasis is primarily similar to bone metastasis with systemic spread being the most plausible explanation to such phenomenon [3], especially with the synovium being a richly vascularized structure. Once the neoplastic cells involve the

synovium the tumor frequently extends into the joint space and can secondarily spread to the juxta-articular bone. The secondary juxta-articular bone involvement in our case is a good example of such a mechanism [12-16].

The initial clinical presentation of synovial metastasis can mimic rheumatoid, inflammatory, or septic arthritis [2]. Radiologic modalities are important and can help in ruling out benign entities in the differential diagnosis. However, synovial biopsy remains the gold standard diagnostic modality with a sensitivity of 85%, specificity of 100%, positive predictive value of 100%, and negative predictive value of 62% [6].

Possible entities that enter the differential diagnosis of synovial metastasis include septic or infectious arthritis, rheumatoid or inflammatory arthritis, crystal deposition disease, tenosynovial giant cell tumor, and primary malignant tumors including synovial sarcoma and synovial chondrosarcoma among others [1, 17].

Clinical, radiologic, and histopathologic findings play an integral part in the diagnosis of synovial metastasis and in ruling out the different mimickers. Infectious and septic arthritis are associated with prominent joint effusions and juxta-articular osseous erosions [1]. Rheumatoid arthritis presents as proliferative synovitis and may result in joint ankylosis. Arthrocentesis and detection of crystals within the synovial fluid is diagnostic of crystal deposition disease. Tenosynovial giant cell tumor has characteristic radiologic findings including its close association with tendons and low signal intensity on T1 and T2 weighted images [18]. Thus, histopathologic evaluation remains the most essential tool in elucidating the different diagnostic considerations, including primary synovial malignancies, from synovial metastasis.

The relationship between rheumatoid arthritis and synovial metastasis is uncertain at this point in time. Patients with synovial metastasis and coexisting rheumatoid arthritis, just like our case, have been reported in the literature; however, whether there is an association between both entities remains to be determined [1].

In conclusion, synovial metastasis to the finger joint is a very rare phenomenon that is associated with a non-specific presentation and poor prognosis, thus requiring multidisciplinary management. The author herein reports the second case of synovial metastasis to the finger joint in a patient with metastatic pulmonary squamous cell carcinoma and reviews the literature on this rare entity.

Disclosure of conflict of interest

None.

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