

# Composite Bone Cement Arthrodesis In Acrometastasis Of The Proximal Phalanx Of The Hand– A Case Report

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## Citation

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## Abstract

Bone metastases to the hand are extremely rare with a reported incidence rate of approximately 0.1% of all metastatic lesions to the bone (1, 10, 11). The appearance resembles an acute infection and is often mistaken for more common hand sequela (3, 13-15,) even when a primary malignant tumor is known. Acrometastases usually develop late in the course of tumor seeding and are associated with a low life expectancy (5). Treatment is palliative with focus on pain relief and improvement of hand function in order to maintain the patients independency. For distal lesions, amputation is the treatment of choice. Suggested treatment for proximal metastases consists of systemic therapy and/or radiation with or without local excision. A radical resection requires amputation of a significant part of the hand (3, 6). The concept of palliative tumor surgery with local tumor resection and bridging of the defect with a cement osteosynthesis is widely accepted for the long bones. This case presents an attempt to resect a painful acrometastasis to the proximal phalanx and provide stability by a composite cement arthrodesis of the metacarpophalangeal joint in order to avoid amputation.

## INTRODUCTION

Bone metastases to the hand are extremely rare with a reported incidence rate of approximately 0.1% of all metastatic lesions to the bone (1, 10, 11). The appearance resembles an acute infection and is often mistaken for more common hand sequela (3, 13-15,) even when a primary malignant tumor is known. Acrometastases usually develop late in the course of tumor seeding and are associated with a low life expectancy (5). Treatment is palliative with focus on pain relief and improvement of hand function in order to maintain the patients independency. For distal lesions, amputation is the treatment of choice. Suggested treatment for proximal metastases consists of systemic therapy and/or radiation with or without local excision. A radical resection requires amputation of a significant part of the hand (3, 6). The concept of palliative tumor surgery with local tumor resection and bridging of the defect with a cement osteosynthesis is widely accepted for the long bones. This case presents an attempt to resect a painful acrometastasis to the proximal phalanx and provide stability by a composite cement arthrodesis of the metacarpophalangeal joint in order to avoid amputation.

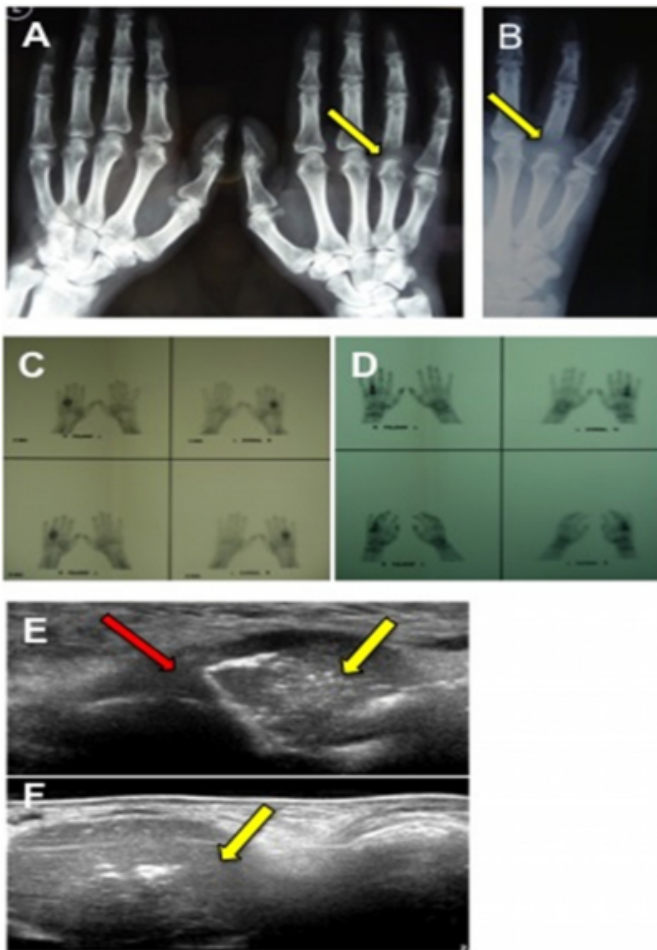
and swelling of his dominant ring finger was referred to our clinic with the suspicion of osteomyelitis after a 99-m technetium three-phase bone scan (Fig 1 A, C, D).

## CASE REPORT

An 85-year-old male patient with acute dull, persisting pain

**Figure 1**

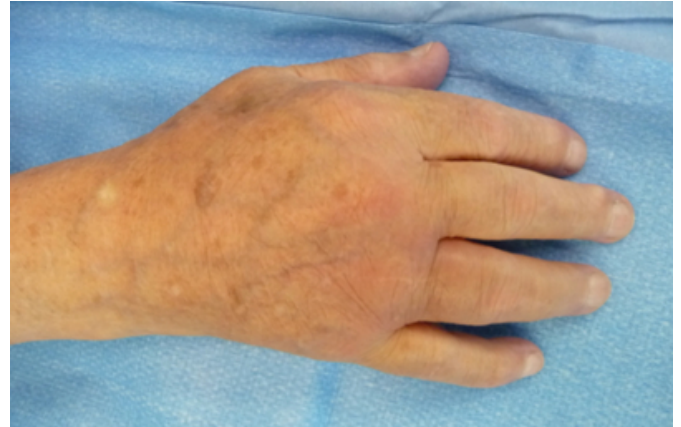
Figure 1: Radiographic view one month after onset of pain in the right ring finger with destruction of the base of the proximal phalanx (A, yellow arrow), radiographs 3 weeks later with progressing resorption of the base of the proximal phalanx, the cortices are dissolved (B, yellow arrow), 3 phase bone scan showing increased uptake at the metacarpophalangeal joint of the right ring finger in the early (C) and late (D) phase, high resolution ultrasound showing the soft tissue mass around the metacarpophalangeal joint (red arrow) and the destruction of the cortex of the proximal phalanx (yellow arrow) on the longitudinal (E) and trans sectional view (F).



The patient was under palliative chemotherapy for a metastatic gastro-esophageal adenocarcinoma but was subjectively symptom free. On clinical examination the patient was in good general condition. Due to significant pain and reduced range of motion of the hand the patient was substantially impaired (Fig 2).

**Figure 2**

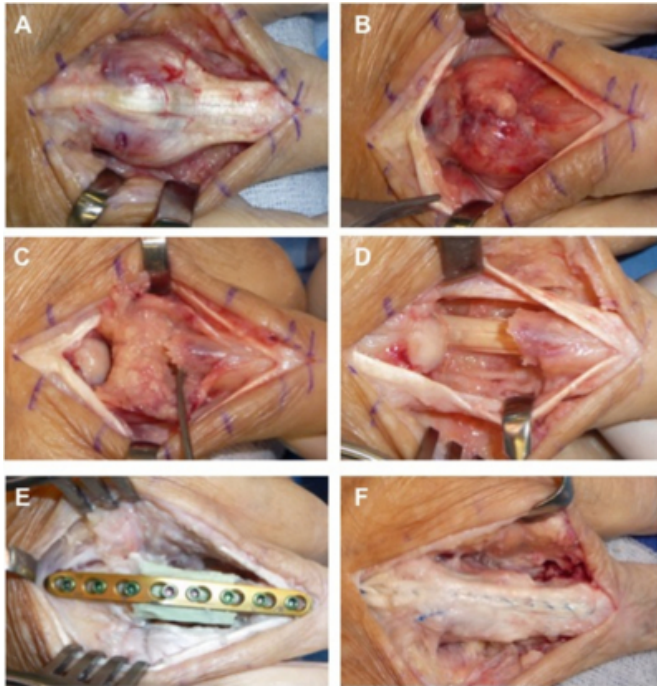
Figure 2: Right hand: Clinical presentation 1 month after onset of pain with red, swollen and warm metacarpophalangeal joint and proximal phalanx of the right ring finger, tender and indurated mass on palpation.



X-ray and high-resolution ultrasound displayed complete resorption of the cortical bone at the base of the proximal phalanx and a homogenous hypoechogenic mass surrounding the metacarpophalangeal (MCP) - joint of the ring finger (Fig 1. B, E, F) consistent with a metastasis. The patient wished to preserve his ring finger and due to the low life expectancy we performed a local surgical excision with a composite bone cement arthrodesis of the MCP joint using an 8-hole 2.4mm (Synthes) locking plate (Fig 3).

**Figure 3**

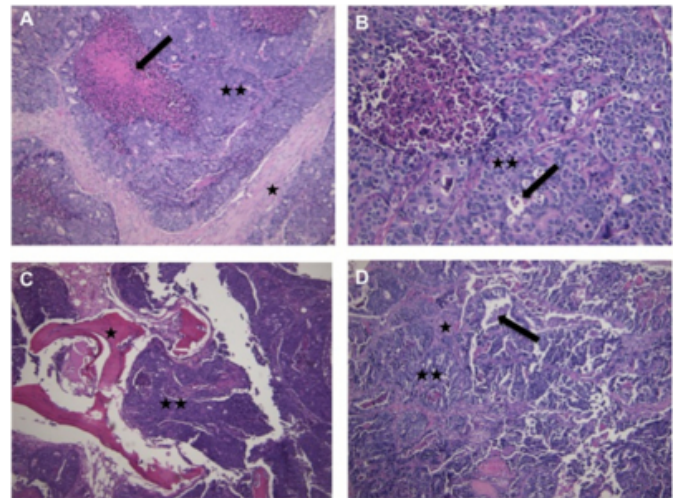
Figure 3: Intraoperative situs after dorsal approach to the ring finger metacarpophalangeal joint. Tumor expanding the extensor mechanism (A), central split of the extensor tendon with view onto the tumor (B), completely dissolved base of the proximal phalanx by tumor mass (C), presentation after resection of the tumor, the flexor tendons and neurovascular bundles are intact (D), resection of the metacarpal head, the defect was bridged with an Palakos cement arthrodesis (E), closure of the extensor tendon over the arthrodesis (F).



Histology revealed an R1 resection of an adenocarcinoma with a high cell core pleomorphism and necrotic bone (Fig 4).

**Figure 4**

Figure 4: Histologic presentation in Hematoxylin and Eosin (HE) stain. Pictures A-C present the tissue after the first tumor resection. In picture A (4x magnification) there is a central necrosis (arrow) and soft tissue infiltration with malign epithelial carcinoma cells (double asterisk) within normal tissue (asterisk). Picture B (10x magnification) shows the malignant tumor cells (double asterisk) and tubular and acinous cells consistent with an adenocarcinoma (arrow). In picture C there is marked tumor cell invasion (double asterisk) of the bone (asterisk). Picture D shows infiltration of the normal connective tissue (asterisk) with tumor cells (double asterisk) and glandular structures (arrow).

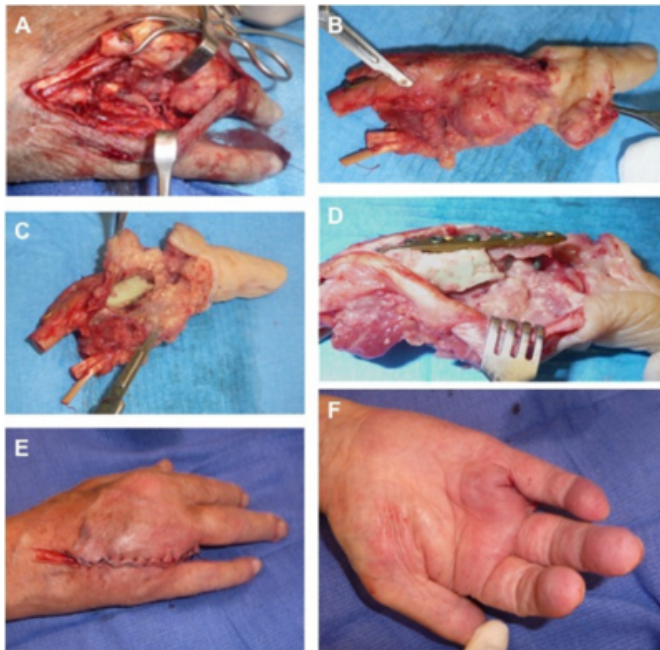


Four weeks after the surgery the patient was pain free with an evident improvement in hand function and quality of life. Eight weeks postoperative the patient redeveloped increased swelling with intolerable pain of the fourth finger that could not be relieved with conservative treatment. Follow up X-rays showed a progressive destruction of the remaining proximal phalanx and loosening of the plate (Fig 5).



**Figure 5**

Figure 5: Intraoperative findings at revision surgery. Expansive tumor recurrence with infiltration of the soft tissues around the bone cement arthrodesis along the 4 ray (A). Resected 4 ray at the base of the 4 metacarpal bone (B). The remaining distal part of the proximal phalanx is almost dissolved (C), showing the loosened screws distal (D). Clinical presentation after ray resection and closure with excision of the interosseous and lumbrical muscles between ring- and middle finger (E, F).



Because of the aggressive nature of the tumor and the renewed symptomatic patient we then decided to perform a ray resection (Fig 5). Postoperatively the general health condition deteriorated rapidly and the patient expired 2 months after the second procedure.

**DISCUSSION**

Appearance of a metastasis in the hand is a poor prognostic sign and is usually followed by rapid decline in the patient's general health condition (9). Median survival for the patient with a metastatic tumor in the hand is reported to be approximately 6 months (1, 8). The distal phalanges are involved most frequently, followed by the proximal and middle phalanges, metacarpals and the carpus (1, 4, 11, 12). It is crucial to assess the patient's pain level, functional status and his expectations in correlation to the poor overall prognosis. Treatment is mostly palliative and directed predominantly to pain relief, and preservation of function. The goal should be an improvement in quality of life. In chronically debilitated patients with a distal metastasis in the hand, amputations through the joint proximal to the level of

involvement have been recommended (1). We think this is appropriate in distal lesions, however in more proximal tumor locations radical amputations are debilitating in an independent patient and may not be necessary in the setting of palliative surgery. Castello et al. (3) suggested amputation for distal lesions and local excision and/or radiation for proximal lesions. However, the role of radiation therapy in the treatment of hand metastasis remains unclear (6) and may require frequent arduous outpatient treatments.

In spite of our patient's diagnosis and dismal prognosis his only debilitating factor was the painful finger. The proximal phalanx was unstable and thus local radiation therapy would have been an insufficient option for pain relief. The patient rejected our recommendation for simple ray resection. Healey et al. proposed a local resection, curettage and tumor cementation (7). Due to the proximity of the tumor in the proximal phalanx to the MCP joint and large defect after tumor resection a simple cementation was not feasible. We therefore decided to apply the concept of long bone palliative tumor surgery with defect bridging by cement osteosynthesis to the finger. We performed a cement bridging arthrodesis of the metacarpophalangeal joint as described. To our knowledge this procedure has not been published in the hand. The histologic resection was R1. Early postoperative results were promising with complete pain resolution and retaining hand function. However, the aggressive nature of the tumor was underestimated and recurrence with complete destruction of the remaining proximal phalanx as well as soft tissue with loosening of the plate was observed. In consequence a ray resection was required eight weeks postoperatively. Local tumor recurrence in the hand has been described only twice by Amadio et al. (1). The recurrence occurred in one case following radiation therapy and in the other case after local resection although no mention was made to the initial resection margins. The aggressive nature of tumor cells towards bones in the hand has previously been postulated due to the tumors capability of direct destruction of osseous tissue or by production of mediators of bone resorption (2).

In conclusion the scarcity of these lesions makes it difficult to gain experience pertaining to the different treatment regimens. The empathy to guide a dying patient's request pertaining to a minimal or more radical procedure and to judge their possible advantages is extremely delicate. In this case we complied with the patient's wish and performed a local resection, without arduous radiotherapy, expecting a

sufficient improvement of the situation for the remainder of life expectancy. The aggressive recurrence of this tumor and the subsequent severe symptoms were certainly not anticipated and led to a subsequent operation that may have been averted.

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