



## The spacer block technique in osteomyelitis of the phalangeal bones of the hand

Ignacio R. PROUBASTA, Joan P. ITARTE, Claudia G. LAMAS, Joan B. MAJÓ

The authors report a case of an open mallet injury with a traumatic arthrotomy which was complicated with a destructive infection involving both the middle and distal phalanges of a ring digit and which was treated with two-stage reconstructive surgery with good results. In the first stage, after the osteomyelitic portion of adjacent phalangeal bones were excised en bloc, the dead space was filled by means of an antibiotic-impregnated cement spacer. In the second stage, an autogenous corticocancellous bone graft from the iliac crest was secured into the defect with a intramedullary Herbert scaphoid screw.

### INTRODUCTION

An antibiotic-impregnated polymethylmethacrylate (PMMA) spacer block has become a standard treatment in the care of the patient with an infected knee replacement. Traditionally an acrylic block, impregnated with antibiotics, has been used during the period after removal of the infected prosthesis and the eventual implantation of a new prosthesis. However, utilisation of an antibiotic-impregnated cement spacer in the treatment of osteomyelitis of tubular bones of the hand is uncommon (1, 2, 3).

We present a case of osteomyelitis of the middle and distal phalanges of a ring digit secondary to an open mallet injury with a traumatic arthrotomy in which the spacer-block technique was used with good results.

### CASE REPORT

A 50-year-old man was referred to our service with a destructive infection involving both the mid-

dle and distal phalanges of the left ring finger. Three weeks previously, he sustained an open mallet injury with a traumatic arthrotomy, which was treated by tendon suture supplemented with Kirschner wire fixation of the distal interphalangeal (DIP) joint. Physical examination revealed that the DIP joint of his left ring finger was oedematous, markedly erythematous, and tender to palpation. A dorsal sinus tract with abundant suppuration was present. Plain radiographs revealed evidence of septic arthritis and both distal and middle phalangeal osteomyelitis (fig 1). Microbiological examination of the exsudate showed *Staphylococcus aureus* sensitive to oxacillin. Extensive destruction of the base of the distal phalanx and the proximal two-thirds of the middle phalanx resulted in a relatively large bony defect; two-stage reconstructive surgery was therefore decided upon. Through a zig-zag dorsal approach, the infected area was debrided and the infected portions of the middle and distal phalanges were excised en bloc.

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From Hospital de San Pau, Barcelona, Spain.

Ignacio R. Proubasta, MD, Associate Professor.

Joan P. Itarte, MD, Consultant Orthopaedic Surgeon.

Claudia G. Lamas, MD, Consultant Orthopaedic Surgeon.

Joan B. Majó, MD, Professor.

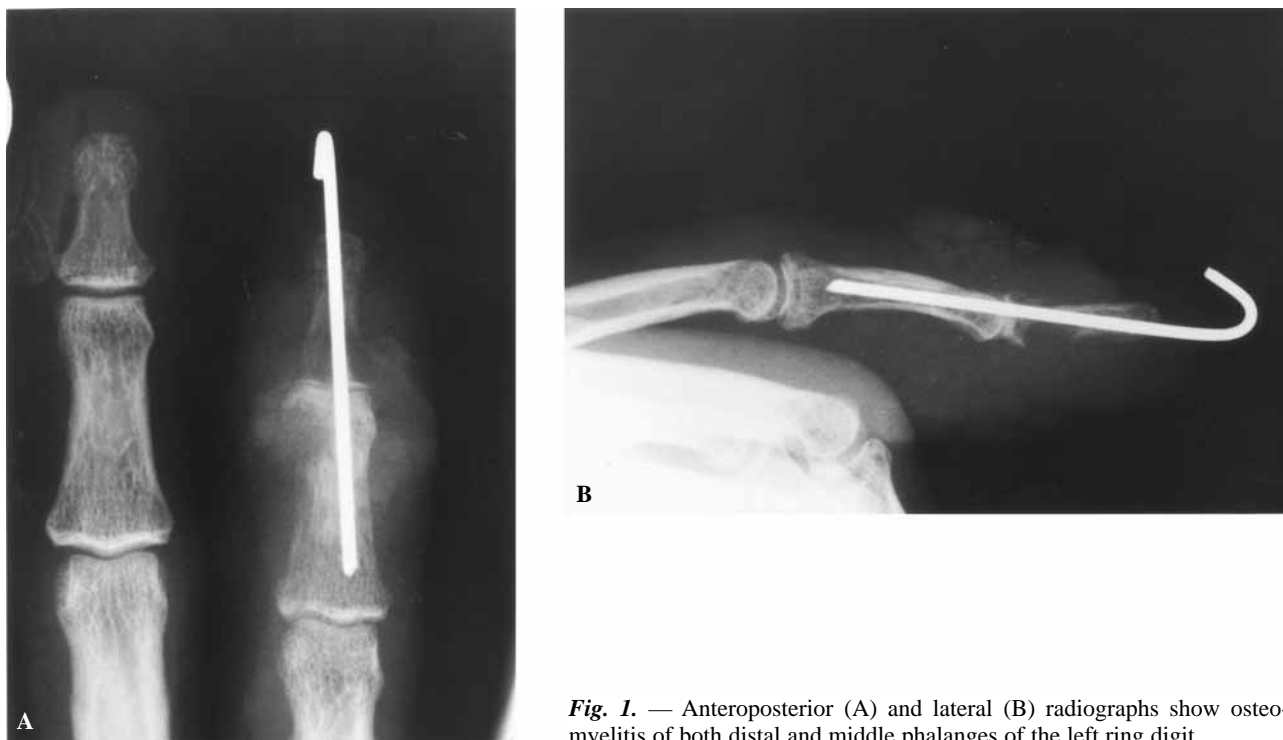
Servicio de Cirugía Ortopédica y Traumatología., Hospital de Sant Pau, Barcelona Spain.

Correspondence : Ignacio R. Proubasta, Servicio de Cirugía Ortopédica y Traumatología, Hospital de Sant Pau, Avenida. San Antonio M<sup>a</sup> Claret, 167, 08025 Barcelona, Spain.

E-mail : iproubasta@hsp.santpau.es.

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**Fig. 1.** — Anteroposterior (A) and lateral (B) radiographs show osteomyelitis of both distal and middle phalanges of the left ring digit.

The flexor tendon was undamaged but the bony insertions of the A4 and A5 annular pulleys and C3 pliable cruciate pulley of the digital flexor tendon sheath were sectioned in the bone debridement. An antibiotic-impregnated PMMA spacer (Cemex Genta® Verona, Italy) was used to fill the dead space (fig 2). The surgical wound was partially sutured, avoiding tension. Four weeks after initial surgery, the wound had healed and the patient was symptom free. A second stage was then performed: through a volar approach with an oblique incision of the middle phalangeal zone, the antibiotic-impregnated spacer was removed and an autogenous corticocancellous bone graft from the iliac crest was secured into the defect with an intramedullary Herbert scaphoid screw. The skin was closed with simple sutures. The finger was immobilised for three weeks, following which active motion was begun. Six months later, radiographs demonstrated that the bone graft had united with the adjacent phalanges at both ends (fig 3). At the most recent follow-up examination 12 months later, the patient had returned to his

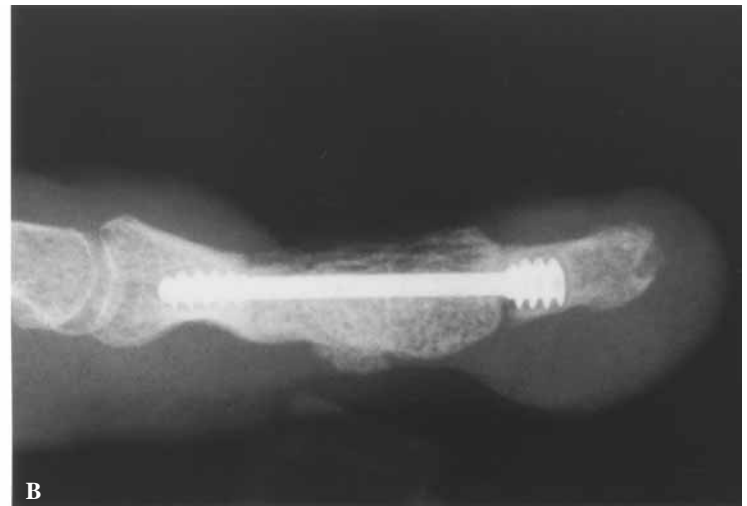
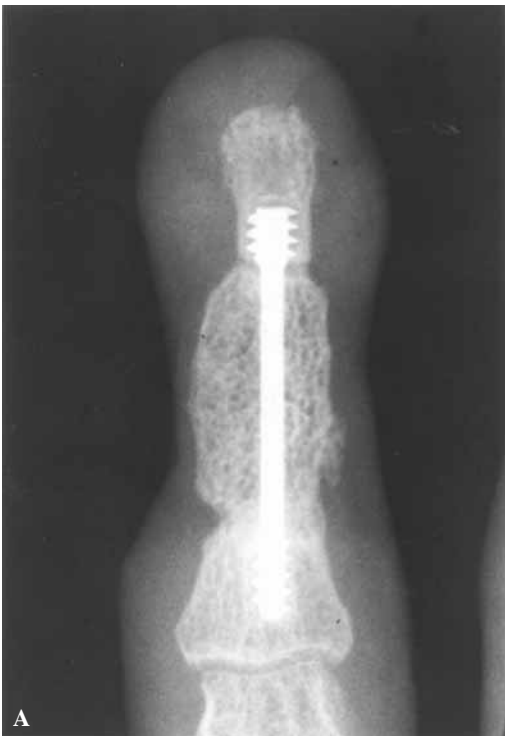
maintenance work full time. He was pain free and there was no evidence of residual infection. The proximal interphalangeal joint was pain free and mobile.

## DISCUSSION

Joint infections and osteomyelitis usually result from penetrating trauma such as a bites or wounds produced by other causes. The incidence of osteomyelitis of the metacarpal and phalangeal bones of the hand is reported to be between 1.1% and 10% (1, 2, 3), and when this occurs various surgical procedures have been proposed for the treatment of this potentially disabling condition, including irrigation and debridement, bone resection and subsequent arthrodesis, staged reconstruction or amputation (1, 2). For severe, extensive involvement in a digit, amputation may indeed be the most expeditious treatment and may prevent stiffness and major disability of the uninfected parts (2). However, in our case, due to the profession of the patient (carpenter) an attempt was made to save the



**Fig. 2.** — Spacer block *in situ* after resection of all infected bone. A) Anteroposterior view. B) Lateral view.



**Fig. 3.** — Six months after the initial surgery, anteroposterior (A) and lateral (B) radiographs show perfect consolidation of the osseous graft at both ends of the intercalated graft.

digit with two-stage reconstruction surgery rather than performing an amputation.

Generally, the successful management of osteomyelitis depends on early and accurate diagnosis and effective medical and surgical treatment. However, in severe or chronic infections, all infected bone as well as any sequestrum must be removed if we want the infection healed (1). In these cases, defects that result in loss of major digital length may be managed by a staged reconstruction with temporary placement of an antibiotic-impregnated spacer and eventual segmental bone grafting once all signs of infection have disappeared (1). Small bone defects (less than 1.0 or 1.5 cm) can be filled with autogenous cancellous bone. This provides a combination of good potential revascularisation, healing, and resistance to infection, whereas for large defects that require more structural stability, autogenous corticocancellous grafts are more suitable (1). However in certain cases, as a in our patient, fixation of the bone graft is difficult. Transfixing wires, external fixation, or a combination of the two may be used as definitive fixation or may be converted to plate fixation at the surgeon's discretion (1). Plate fixation is a good alternative for definitive fixation because it provides greater stability. However, it is not always possible to obtain a good internal fixation with this fixation system due to the small size of the remain-

ing parts of the phalanges. Therefore, the placement of a plate in a zone of poor quality skin carries a risk for septic complications. It is for these reasons that in our case we used the Herbert screw, and also because with this type of screw, the intercalary bone graft may be submitted to compression at both ends of the remaining phalanges, facilitating the healing process and more intensive rehabilitation activity.

## CONCLUSIONS

In situations where bone is lost secondary to osteomyelitis, the use of an antibiotic-impregnated PMMA spacer block constitutes an alternative method to immediate amputation. The use of the Herbert intramedullary screw to secure the bone graft may be a good system of internal fixation when other devices are too difficult to insert.

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