

Editorial

Fracture Care: The Past, Present, and Future

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The origins of contemporary fracture care date back to antiquity. Among the earliest documented healed fractures were found in a mummified corpse found in an Austrian glacier dating back to over 5000 years.¹ An examination of 6000 Nubian skeletons in Egypt showed that 31% had prior fractures of the ulna and/or radius, many likely occurring during conflicts.² Fractures were found treated with splints made of bamboo, reeds, or wood and padded with linen.

It is remarkable that several thousand years later, similar splints were commonplace in Europe and known as Joncs.

An extraordinary Indian physician named Sushruta, in his series of surgical volumes known as *The Sushruta Samhita* provided an in-depth account of the treatment of 12 varieties of fractures and developed the 'Ayurvedic treatment' based upon the principles of traction, manipulation, apposition, stabilization, and physical therapy.³ His concepts were carried by Buddhist monks to China where these techniques were enhanced by anesthesia provided by various herbs and wine.

Fracture stabilization was advanced by Arab physicians who showed stable immobilization of limbs could be achieved by pouring a mixture of lime and egg white left in place until healing was judged to have completed.⁴ When armor emerged in European wars, blacksmiths adapted metals to make splints specific to the injury.

Despite advancement in immobilization techniques, stiffness remained a common complication leading early Greek and Roman fracture healers to appreciate also the need for mobilization to avoid permanent joint contracture.^{5,6}

The introduction of antisepsis by Lister and that of the X-ray by Roentgen radically changed the surgical treatment of fractures.^{7,8} Emil Kocher and Robert Danis were at the forefront of creating the surgical approaches and internal skeletal fixation that have led to contemporary fracture care.^{9,10} The latter influenced a small group of Swiss surgeons (including Maurice Muller, Robert Schneider, Hans Willenegger, and Martin Allgower) to establish AO/ASIF (*Arbeitsgemeinschaft für Osteosynthesefragen* / Association of the Study of Internal Fixation) which established the contemporary standards of skeletal stabilization using plate and screw constructs for even the most complex extremity fractures. Further evolution included refinement of intramedullary fixation, advances in screw technology, and

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advances in arthroscopy and arthroplasty with its incorporation into the surgical management of fractures.

The future of fracture care will see technology advancing new approaches. These will include new imaging techniques allowing more percutaneous or minimally invasive fracture fixation. New composite metals will offer greater biocompatibility along with implant designs based upon cad-cam technology specific to the individual fracture. Ad-

vances in bone substitutes as well as expansion of bone growth factors, may help overcome the inherent difficulties of stabilizing fragility fractures. As technology continues to grow by leaps and bounds, so will its incorporation in fracture management for the betterment of the patient and society.

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