

ANNEX 6: RECONSTRUCTIVE SURGERY AND DEFINITIONAL ISSUES

Having a clear definition of **reconstructive surgery** is critically important. Surgically speaking, there is a linearity with respect to time in wound management, which is as follows: initial wound management → definitive wound management → if failure, early reconstruction to prevent/minimize complications → if failure and established complication, and later reconstructive surgery. In other words, reconstructive surgery is what is needed when the initial definitive treatment of an injury has failed. Common negative outcomes that require reconstruction include chronic osteomyelitis, mal-unions and non-unions, chronic limb wounds and post-traumatic degenerative joint disease. These might be the result of the injury per se, but in LMIC contexts, it is often also seen as the result of inadequate/inappropriate initial and/or subsequent surgical management (i.e., iatrogenic etiology).

Skills, techniques, and technical platforms needed to provide appropriate reconstructive surgery are also fairly specific: bone and soft tissue grafts, management of chronic bone infection with bone transport or induced membranes, and expert use of external and internal fixation techniques, either by intra-medullary nails or plates and screws.

There are very few orthopedic surgeons who are skilled at both – the vast majority do one or the other. The difficulty in managing chronic limb injuries is not at a technical level but in a clear understanding of the main pathology and how to establish the best management strategy, which is usually multi-staged. Few orthopedic surgeons from rich environments have comprehensive experience in treating chronic musculoskeletal infections, even when there is no lack of resources - the problem is the lack of cases. In conflict zones such as Mosul or Gaza, the problem is reversed: many cases but limited resources (human, diagnostic, therapeutic and/or rehabilitative).

Acute osteomyelitis is usually a pediatric disease that involves hematogenous spread of bacteria that accumulate at the metaphyseal side of the growth plate, creating osteonecrosis and an abscess within the metaphysis. The abscess finds its way under the periosteum creating complete devascularization of a segment of cortex, which will then become a sequestrum. Eventually, the dead bone is covered/replaced by new living bone, the involucrum, and one of 3 scenarios are possible: the sequestrum is resorbed and the infection disappears (most common), the sequestrum is spontaneously expelled from the body through a sinus tract, or the sequestrum remains an infected foreign body within the bone that requires surgical excision. In rich countries, early diagnosis leads to early surgical decompression to prevent the complete devascularization of bone and thus the development of a sequestrum.

This condition should not be confused with “acute osteomyelitis “ following penetrating injuries seen in conflict contexts. This is actually a misnomer that is used to describe what is actually a fairly fresh (acute) wound with fracture/s that is infected and draining pus. This is the result of inappropriate initial surgical care of the wound, either by insufficient/ inadequate debridement, not removing all devitalized bone fragments, or premature/primary closure of the wound. A well debrided wound contains only living bone and there is thus no “acute osteomyelitis.”

Chronic osteomyelitis is a condition that can present in many ways: exposed dead bone in continuity, chronic fistula, recurring fistula, but always involves a piece of dead bone from the initial injury, the treatment or that develops months or even years after apparent healing of the wound and even of the bone. The hallmark feature of dead bone (as well as hardware) is that it is covered by a biofilm that can only be eliminated (cured) by surgery. The management of COM falls within the realm of reconstructive surgery.