

## Nonoperative Fracture Management - Prospect in Low & Middle Income Country

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### Review of Current Evidence

The nonoperative management of fractures with cast, splint or traction application is an often overlooked form of fracture management in the current era of internal fixation and external skeletal fixation. The external limb splintage is a "tried and true" method; however, there are specific indications for the use of this technique. Splints and casts have a place in our armamentarium of fracture management and when appropriately used under the correct circumstances, fracture healing is expected to be similar to that observed using other means of fracture fixation.

Fracture management can be divided into nonoperative and operative techniques. The nonoperative approach consists of a closed reduction (if the fracture is significantly angulated or displaced), followed by a period of immobilization with casting or splinting. If closed reduction is inadequate, surgical intervention may be required. Court Brown *et al.*, defined nonoperative management as treatment that did not involve the use of primary internal or external fixation or arthroplasty [1].

Nonoperative fracture treatment has been used for millennia, but there has been no demographic study of its use for half a century.

In the last 50 to 60 years, there has been an increased interest in operative fracture fixation and in many specialized trauma hospitals nonoperative management is less frequently used. However, these specialized hospitals do not reflect fracture treatment in the whole community. A study to investigate the current prevalence of nonoperative fracture treatment revealed that nonoperative treatment remains the most widely used method of fracture management. However, its prevalence decreases with age, particularly in lower limb fractures. In children, there is a bimodal operative treatment distribution and an increasing prevalence of operative treatment. In some adult fractures, the prevalence of surgery is increasing, but in others, the operations were no more frequently than in the 1950s, despite improved operative techniques [1].

The introduction of antibiotics, modern anesthetic techniques, better implants, and improved surgical techniques has resulted in a wide range of fractures now being treated surgically rather than by casts, braces, splints, or traction [1]. Surgical treatment is not accessible to all patients, specially in the low & middle income countries (LMICs). Injuries occurring in the remote environment present particular challenges to healthcare professionals, and decisions need to be carefully made on an individual basis [2].

Clavicle fracture is one of the most commonly encountered fractures. There is great controversy in its management. Some authors reported that there is no difference in outcome of surgical and nonoperative treatment [3]. Whereas some claimed nonoperative treatment has better outcome than surgical [3,4]. Overall, there is not enough evidence to support routine operative treatment for all patients with a displaced midshaft clavicular fracture [5]. Canadian Orthopedic society found no difference in outcome of nonoperative and operative treatment (with hook plate) for acute acromioclavicular dislocations [6]. However, in modern time, clavicle fractures are treated more surgically with plating techniques for rigid fixation, but there are specific indications for which operative treatment is needed such as comminuted and displaced, middle third clavicle fractures. It was observed that conservative management yielded better functional outcome and resulted in high union rates. All the fractures united, and there was no nonunion in conservative group. For clavicle fractures non operative management gave excellent result in 70% patients and non-fair or poor outcome in 30%. In an operative group, nonunion rate was found to be 7%, and the excellent outcome was found only in 65% patients with 7% fair and only 21% good outcome [7].

The treatment outcomes between initial operative fixation and closed treatment by nonoperative method of displaced tibia fractures in adolescents are similar, but patients must be counseled about the high failure rates with closed reduction. However, the predictors of failure include initial fracture displacement and the presence of a fibula fracture-these variables should be considered when selecting a nonoperative treatment method [8].

In a systematic review by Handoll HH and Brorson S on proximal humerus fractures, operative treatment was not superior to nonoperative treatment concerning functional results, even in displaced fractures. Though the X-ray findings revealed better anatomical reconstruction after surgery, complication rate was higher in the surgery group with a reoperation rate of 32% [9,10]. The functional outcome was even better in nonoperatively treated proximal humerus fractures in children [11]. In elderly patients, it helps to avoid surgical and anaesthetic risks whilst giving satisfactory functional outcomes in this low-demand group [12].

Current evidence also suggests that nonoperative management is indicated for undisplaced patella fractures. The use of an extension brace with partial weight-bearing as tolerated is an acceptable alternative to cylinder casting [13].

In children with minimally angulated fractures of the distal radius, use of a simple splint was as effective as a cast with respect to the recovery of physical function [14]. Even in 127 patients with Type I open paediatric forearm fractures treated nonoperatively, no cases of infection were seen [15]. For the majority of hand injuries, current knowledge suggests that the outcome of nonoperative treatment cannot reliably be improved upon with surgery [16].

There is a growing body of evidence that minor fractures in children often heal satisfactorily with splinting. While the decision of whether or not to intervene surgically must be made by an orthopaedic practitioner, the follow-up of conservatively managed patients may be done by another healthcare provider in rural settings as well, and may not require the services of an X-ray technologist and radiologist. In an era of increasing constraints on healthcare expenditure, clinical follow-up without routine X-rays may allow appropriate treatment while minimizing the costs associated with fracture clinic and radiographic follow-up specially in the LMICs [17].

Nonoperative treatment is the method of choice for the treatment of non-displaced pelvis and acetabular fractures. Excellent or very good results can also be expected in slightly displaced fractures if acetabular roof involvement is minor. In displaced fractures, if the result of surgery is doubtful under various circumstances or if high-risk medical conditions are present in the patient, conservative treatment can be the method of choice with satisfying results [18].

The limited available evidence from randomised trials does not suggest major differences in outcome between conservative and operative management programmes for extracapsular femoral fractures, but operative treatment is associated with a reduced length of hospital stay and improved rehabilitation. Conservative treatment will be acceptable where modern surgical facilities are unavailable, and will result in a reduction in complications associated with surgery, but rehabilitation is likely to be slower and limb deformity more common [19].

## Discussion

The nonoperative management of common fractures has been successfully applied traditionally since millennia and even today it is the choice of treatment in many selected fractures involving long bones, spine, pelvis and acetabulum. However, the advantage of operative treatment in open, unstable and complicated fractures has been well established. However, the surgical management of fractures requires a safe surgical environment, good supply of logistics and trained personnel. These requirements are prohibiting factors in the LMICs. Therefore, there has been a common belief that nonoperative treatment is cost effective method while operative methods are unsafe and costly in the LMICs.

A study in India revealed that the cost per disability adjusted life year (DALY) averted for the surgical interventions is much lower than the cost-effectiveness threshold for India (USD 1508 in 2012). This study therefore provides evidence to re-think the common notion that surgical care is expensive and therefore of lower value than other health interventions [20].

In another article the costs and effectiveness of introducing the SIGN nailing system for femoral shaft fractures in a provincial trauma hospital in Cambodia are compared to those of Perkin's traction treatment. At an average cost per patient of \$1,107 (DALY Averted) in the traction group and \$888 (DALY Averted) in the nail group ( $p < 0.01$ ), and with better clinical outcomes in the nail group, internal fixation is more cost-effective than conservative treatment [21].

Another issue has been the incidence of infection in the LMICs. It has been presumed that operative treatment is not safe due to high chance of infection. Recent evidence does not support this belief. Reported infection rates of less than 8% after IM nailing appear to be reliable and could be used for further research. The low infection rates suggest that IM nailing is a safe procedure also in low- and middle-income countries [22].

## Conclusion

As the operative treatment typically costs more, both in terms of patient risk and healthcare costs, we suggest that for many fractures, nonoperative treatment should be the default position. Surgery should be undertaken on selective patients where the benefit outweighs the cost. However, newer techniques allowing much earlier return to function, with lower risks may supersede non-operative treatment in future. However, the nonoperative treatment still remains the mainstay of fracture care in the LMICs.

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