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Analiza porównawcza wyników leczenia operacyjnego aseptycznych stawów rzekomych kości piszczelowej przy użyciu metody Ilizarowa oraz osteosyntezy wewnętrznej

(streszczenie)

Rozprawa na stopień doktora nauk medycznych i nauk o zdrowiu w dyscyplinie nauki medyczne

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The Ilizarov method is an effective surgical technique used in the treatment of long-bone fracture nonunion and is the method of choice in infected nonunion and delayed bone healing with concomitant limb deformity or bone tissue loss. The Ilizarov method combines the benefits of excellent mechanical stabilization and minimal invasiveness.

While reviewing the available literature for tibial nonunion treatment one encounters reports on various surgical techniques and implants and the resulting rates of union. However, those reports are based on short-term outcomes of nonunion treatment. After some time, some patients develop re-fracture at the healed site. There are few studies assessing long-term outcomes of tibial nonunion treatment (including treatment with the use of the Ilizarov method) in terms of bone union maintained over many years.

The first report of the series was a retrospective analysis of 102 patients treated with the Ilizarov method, with a minimum two-year follow-up after treatment completion. Bone union was achieved in all patients, with 95.1% of them maintaining bone union throughout a mean follow-up period of 7 years (2–12 years). Five of the patients experienced re-fracture and required another Ilizarov fixator treatment. The conclusions from that study showed the need for introducing a new criterion for assessing treatment outcomes of delayed bone healing, namely the rates of bone union maintained over many years. Achieving bone union alone, evaluated short-term, may be insufficient to assess the treatment method.

The Ilizarov method, which is based on the phenomenon of distraction osteogenesis, is commonly used in the treatment of congenital and acquired long-bone deformities. In nonunion of the tibia there is often a need to correct a shortened limb or angular deformity. Inadequate stabilization of bone fragments, insufficient bone fragment perfusion, and comorbidities contribute to delayed fracture healing. The second report of the series was a comparative analysis of nonunion treatment outcomes achieved via the Ilizarov method and internal bone fixation techniques. The study group of 75 patients treated with an Ilizarov external fixator was compared with the control group of 51 patients treated with internal bone fixation. The evaluated parameters were time to bone union and the correction of the initial deformity and limb length discrepancy. The incidence and type of treatment complications and their effect on the final outcome were analyzed. The Ilizarov method showed significant superiority in terms of bone union rates (100% vs. 51.92%). Moreover, the effect size in the Ilizarov group was greater both in terms of reduced final limb deformity and reduced limb length discrepancy, even though the Ilizarov method had

been used in patients with higher baseline values of those parameters. There was no significant difference in healing duration between the patients with at least one risk factor for delayed bone healing (diabetes mellitus, steroid therapy, smoking, alcoholism, or severe atherosclerosis in lower limbs) and those without risk factors. The lack of significant differences suggests that the Ilizarov method should be recommended particularly for patients with additional health-related risk factors of delayed bone union.

The third report from the series evaluated different surgical techniques and treatment strategies of treating bone nonunion with the Ilizarov method. Depending on the type of nonunion, condition of soft tissues, limb length discrepancy, bone deformity, and surgeon's preferences the treatment may be planned in various ways. This retrospective analysis assessed a group of 75 patients treated for aseptic nonunion of the tibia following traumatic fracture in terms of various treatment techniques and strategies with the use of an Ilizarov fixator. Some patients underwent closed treatment, without opening the site of nonunion (technique 1). In others, the nonunion site was accessed surgically, bone surfaces were resected and bone fragments adapted, with a subsequent mounting of an Ilizarov fixator (technique 2). During the postoperative period, either neutral fixation without compression (strategy 1) or continued compression, adjusted by 0.25 mm every 3 days, (strategy 2) was used. All patients underwent fibular osteotomy. The assessed parameters were the rates of union, number of complications, hospital stay duration, ASAMI bone scores, and ASAMI functional scores. The results showed no significant differences between the techniques (closed vs. open) or the use of lack of compression in achieving bone union, the number of complications, or duration of hospital stay, with only the ASAMI functional scores higher in the closed-surgery patients.

In summary, the Ilizarov method helps achieve high rates of union and maintained union in patients with nonunion of the tibia following traumatic fracture. This method is superior to internal bone fixation in terms of treating co-existing tibial deformities and length discrepancy. Due to its minimally invasive character, the Ilizarov method is particularly recommended in patients with additional risk factors for delayed bone union.