

# The Use of Ilizarov Technique in Paediatric Traumatology and Orthopaedics

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## Abstract

“Paediatric Orthopaedics” is deformities, defects, and dysplasia, deficiencies of limb, infections and trauma. All these conditions can be very effectively managed by Ilizarov technique (Original Kurgan Pattern technique). It was rather difficult and sometimes impossible to treat certain conditions, which has become possible by Ilizarov. Conventional methods needed many procedures to achieve such results which are mostly done in single stage and at shorter time by Ilizarov. Since 1992, 276 applications of the Ilizarov technique have been successful in treating a variety of pediatric orthopedic problems in our Center. The principles of the method are almost the same in adults and children. Proper preoperative planning and close follow-up gave remarkable and lasting results with least and treatable Complications. Advent in Ilizarov technique has opened up wide applications in the treatment of difficult Paediatric conditions such as deformities, limb discrepancies and dwarfism, defects, control of infections, joint reconstruction and Non unions like congenital pseudoarthrosis of Tibia etc. Closed transosseous Osteosynthesis and corticotomy are key factors in the success by Ilizarov. Ilizarov frames are well tolerated in all age groups, however earlier is the treatment less, treatment time is required and it won't hamper child's development and schooling. We got very encouraging results and relatively cost-effective. Ilizarov being virtually bloodless and carless surgery it gave cosmetic results.

**Keywords:** Paediatric; Ilizarov; Applications

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## Introduction

“Ilizarov” a 66 year old, time-tested magical technique of ‘Transosseous Osteosynthesis’ has developed very extensively over recent years addressing broad range of applications in Paediatric Orthopaedics and Traumatology especially Congenital and acquired conditions in a far better way than conventional methods [1]. Physical handicappers' causes cosmetic disfigurement, limitation in physical activities, demands more energy to perform same activities and Psychological depression and inferiority complex in kids. If treated earlier, it causes better physical and mental growth without hampering child's normal development. Objectives of this study were to access wide applications of Ilizarov and its better results in Paediatric trauma & Orthopaedics. We have included all Paediatric traumas and Orthopedic cases fresh or failed by earlier conventional technique.

## Method

Our Center has treated 276 cases in different Paediatric age groups for different conditions by Ilizarov. It is applied from 3

years onwards as the Ilizarov ‘K’ wires needs tensioning. There are two age related features, the growth plate should not be damaged and in lengthening during accelerated growth, the limb length discrepancy may remain or increase [2].

We follow protocol of preoperative planning of Ilizarov frame application along with psychological counseling of the kids [3]. We use light weight carbon fiber, Aluminum alloy or Titanium frames to minimize the weight of the fixator to become it more tolerable. Ilizarov ‘K’ wires are less tensioned than adults, between 100 to 110 kg considering soft bone [4]. After corticotomy, distraction is started after 5<sup>th</sup> day and by 0.5-0.75 mm/day in 4 intervals. In polio as regeneration is poor and slow rate is slow. Special care is taken that the child won't get any fall, damaging soft tissues and bone regenerate. Also good physiotherapy protocol is followed to prevent joint contractures. All cases are strictly followed on every month for clinical and radiological assessment. After clinical and radiological sound union, the frame is dynamised and completely removed 3 weeks later under anesthesia. Only mentally unstable kids are contraindicated for Ilizarov.

The applications can be categorized in:

- 1. Deformities:** Congenital and acquired malformation of limb bones, Post arthritis deformities, Rickets, Blount's (O/X Type), sequel of Polio, infections and Tuberculosis, Obstetrical palsy, Posttraumatic deformities etc.
- 2. Lengthening:** For cong. Anomalies, Post traumatic or post infection, Skeletal Dysplasia's, short limb stumps, major joint ankylosis and cosmetic in dwarfs like Achondroplasia etc.
- 3. Defects pseudoarthrosis and bone tumors:** Bone defects following trauma, infection, tumor excision etc. Non unions such as Congenital Pseudo orthosis of Tibia (CPT), post traumatic and infections. In CPT, the Pseudoarthrotic area is excised and docked and corticotomy is done for lengthening. These cases are well protected by Plaster cast or brace for nearly 6 months to 1 year [5].
- 4. Major joint pathologies**  
**Hip:** CDH, dysplasia, Pertheis, neglected dislocation, ankylosis.  
**Knee:** Contractures, deforming arthrosis, cong. dislocation of patella, ankylosis etc.  
**Elbow:** Contractures and ankylosis etc.
- 5. Infections:** Chronic Osteomyelitis complicated by pathological fractures, non-union, infected fractures,

malunion with shortening and osteomyelitis cavities etc. Sequestrum is excised, Corticotomy done which 200 times increases local blood supply which clears up Infection and helps in union too.

- 6. Fractures and dislocations:** All varieties of open closed, intra/per articular, polytrauma, degloving injuries, post traumatic sequel like mal/nonunion, shortening etc. Fractures of Pelvis [6], hand and foot, Clavicle etc.
- 7. Hand and foot:** Mini Ilizarov fixators are useful for treating all varieties of Trauma, deformities, lengthening, cosmetic remodeling, contractures, pseudoarthrosis, clubfoot, lengthening of stumps etc. All club foot deformities are treated by only percutaneous tenotomy without any bony resection [7]. Along with deformity correction it gives normal foot length, pliable, plantigrade, cosmetic and lasting correction [8] Conventional methods lack in giving normal foot length and Cosmetic results (Figures 1-6).

## Results

Out of 276 cases, 106 were fractures and its sequel, 170 were Orthopaedic cases. Results of 'Ilizarov' are far better, faster, cosmetic [9], cost-effective and lasting with least complications and limitations (unlike conventional treatment). We got the results in shorter treatment time, almost in single stage procedure, without any disfiguring, bad, permanent surgical



**Figure 1** 8 years old boy with chronic osteomyelitis of Rt. humerus and 3 cm shortening, with 3 previous failed surgeries.



**Figure 2** Sequestrectomy, 2 ring Ilizarov frame and corticotomy.



**Figure 3** Infection totally healed up and both arm equalization.



**Figure 4** 11 year's girl with degloving injury and Rt. sub trochanteric fracture femur.



**Figure 5** Fixed by Ilizarov, 3 ring construct.



**Figure 6** Fracture healed with full range of hip movements.

scars, in comparative low cost, with nearly 3% recurrence, nearly 6% treatable complications and practically there were no any limitations for treating with Ilizarov. The commonest complication was pin site infection. "Versatility" of 'Ilizarov' has opened limitless possibilities in Paediatric Orthopedics of modern era! Advantage of Ilizarov is that being functional; patients are ambulated from next day and can join their routine activities and schooling in spite of longer treatment period.

## Conclusion

Ilizarov has opened a new world to treat variety of Paediatric problems simultaneously and wonderfully. Previously when amputation was the last resort it has helped in salvaging limbs. Also it has given functional and cosmetic results in previously compromised treatment methods. Ilizarov is considered as most effective armamentarium of Paediatric Orthopaedic surgeons of 21<sup>st</sup> century.

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