

Article name: Use of SCENAR treatment for various bone fractures in children

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One of the principal causes negatively affecting the health of children is locomotor trauma.

A constant growth is being observed in the number of permanently handicapped children due to injuries and diseases of the skeletal and locomotor system.

Statistically, over 600,000 bone fractures are diagnosed in children and teenagers annually in Russia.

According to the Child Orthopedic Chair and the city emergency traumatology center in Rostov-on-Don, the number of injuries in children under 14 years grew from 10 241 in 2001 to 12 816 in 2006. The number of especially grave injuries is also on the rise - in 2006 42 children under 14 years old were left with permanent disabilities.

The Child Traumatology department in Rostov-on-Don is based at the city hospital No.20, where an orthopedic & traumatology department (75 beds) and a child traumatology ward have been functioning since 1976.

The child traumatology department is one of the country's largest, its location at a multi-profile hospital allows for specialized care for both injuries and diseases of the locomotor systems. The department serves as the study base for the Child Surgery and Orthopedic Chair of the Rostov State Medical University. The department's staff combine their medical duties with teaching, and new scientific developments are widely integrated in the department's practice. Numerous intern student and clinical coordinators, including foreign students, practice at the department under the guidance of staff medics.

Outpatient care is extremely important for child traumatology, as (provided outpatient care is well-funded and correctly administered) up to 95% of all injuries in children can be treated without hospitalization. Incoming patients with injuries are treated in the traumatology center of the city hospital No.20, which provides first aid, outpatient care, follow-up of patients discharged from hospital, monitoring patients with traumatic after-effects and preventive work in the child traumatology field.

The modern standards of aid in limb fractures incorporate a combined approach to treatment. The main procedure is closed manual repositioning of fragments, followed by gypsum cast immobilization. If repositioning fails (fragments remain displaced) operative treatment is used. Starting from early post-operative period the patients receive courses of medications, physiotherapy and physical therapy exercise.

Bone fracture, causes in the trauma zone, and a source of irritation that launches the mechanisms of reparative regeneration - bone healing (formation of bone callus). The

healing process proceeds in stages. Early, within 3-4 days the primary blastome is formed - a preparation stage when materials for the regeneration are stockpiled. Between the 3-4 and 12-15 days the second reparation stage begins - the stage of forming and differentiating tissue structures, with scar or cartilage tissue regeneration. The third stage is called the "angiogene structure formation and regeneration matrix mineralization" – at this stage the bone callus formation takes place between 12-15 days and lasts till the first to second month. The fourth and final stage, when the secondary reconstruction and restoration of the original bone structure takes place, can continue for months.

The changes are not only local; the blood pressure, heartbeat, breathing measurements, blood and urine analysis demonstrate profound post-traumatic changes.

Materials and methods: Our goal was assessing the effect of SCENAR therapy in treating children with various bone fractures.

The patients (32 children aged 4 to 17, 21 boys and 11 girls) were admitted to the hospital in the acute period (1 to 3 hours following injury) with local pains, swellings, deformations. All underwent X-ray, general blood and urine analysis.

The children were randomly distributed into two groups. The first group (13 patients - 9 boys, 4 girls) received SCENAR treatment. The second, control group (19 patients - 12 boys, 7 girls) underwent traditional treatment.

SCENAR treatment was administered daily using the SCENAR 97.5 device, in constant and individual measured modes. The course consisted of 5-8 sessions of 20-40 minutes duration. Both general zones ("three pathways and six points") and reciprocal areas on the symmetric limb were treated. Of all medications, only analgesics (during the two first days) were administered.

Results and discussion:

In 5 of the patients already the first SCENAR treatment session had greatly relieved the pain. In 7 more the first session showed improvement in microcirculation (decreasing the swelling), by the 3-4 treatment session none of the patients complained of pain. By the end of the treatment course none of the patients exhibited neuro-circulatory disorders, all were in satisfactory condition. At the same time in the control group the pain subsided only by the 2-3 day of treatment, a visible decrease in swelling took as much as 4-5 days.

Depending on the fracture complexity, control X-rays were made 1, 2, 3 or 4 weeks later. After discharge from hospital all patients were monitored at the city traumatology center, where X-rays were also undertaken at the time.

The average time for the appearance of primary bone callus in SCENAR-treated children was $25,6 \pm 2,4$ days, while in the control group the same took $33,5 \pm 2,5$ days.

It must be noted that independent of the fracture complexity, all patients accepted SCENAR therapy well, not a single case of worsening the condition was observed.

A few X-rays to demonstrate the effect of SCENAR:

Kurnosenko M.V., aged 15
13.02.07 - 25.02.07

Diagnosis: Closed fracture of the right humerus medial epicondyle with dislocation of fragments. Closed dislocation of right forearm bones to the rear. Injury caused by fall on ice. On arrival, the dislocation had been set. Operation – open repositioning of the epicondyle fracture, pin osteosynthesis after Papp. The gypsum cast was removable, allowing direct SCENAR treatment of the injured limb.

On the 1st day following surgery, right elbow joint circumference on the shoulder side was 28,0 cm, on the forearm side 28,5cm; the difference from the intact elbow was, therefore, +6 cm. After the first session, on the 2nd day the difference decreased by 2,5 cm.

Nesterenko D.C. aged 4
02.03.07 - 23.03.07.

Diagnosis: Closed transverse fracture of the right radius in the lower third part, with dislocation of fragments. Injury caused by falling from a swing. Manual repositioning, gypsum cast immobilization.

On the 21st day X-ray bone callus formation was visible; cast removed, regenerative treatment commenced.

Bagiryan A.G. aged 14
12.02.07 - 12.03.07r

Diagnosis: Closed transverse fracture of the left radius, with moderate fragment dislocation. Gym fall injury. Gypsum cast immobilization. The X-ray taken on the 28th day showed formation of bone callus. The misalignment of fragments was within the cortical layer width. Cast removed, regenerative treatment commenced.

Blood analysis dynamics:

On 12.02.07. Er- $4,5 \times 10^{12}/l$; Leuk- $9,6 \times 10^9/l$; Hb-149g/l; eosionophile-0, p-6, s-76, lymphocytes-16, monocytes-2.

On 13.02.07. Er- $4,4 \times 10^{12}/l$; Leuk- $9,0 \times 10^9/l$; Hb-146r/l; e-0, p-5, s-76, l-16, m-3.

On 14.02.07. Er- $4,1 \times 10^{12}/l$; Leuk- $6,2 \times 10^9/l$; Hb-135r/l; e-1, p-1, s-66, l-30, m-2.

Before discharge 19.02.07. Er- $4,2 \times 10^{12}/l$; Leuk- $5,7 \times 10^9/l$; Hb-140g/l; e-1, p-1, s-60, l-36, m-2.

Shochev D.H. aged 6.
08.01.07 - 05.02.07

Diagnosis: Closed transverse fracture of the right radius, mid-lower third part with dislocation of fragments. Injury caused by a fall at home. Manual repositioning, gypsum cast immobilization.

Already on the 8th day the X-ray demonstrated signs of bone callus formation. The callus formation completed by 28th day, cast is removed, regenerative treatment commenced.

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On 08.01.07. Er- $4,1 \times 10^{12}/l$; Leuk- $8,0 \times 10^9/l$; Hb-134g/l; e-1, p-1, s-67, l-29, m-2.

On 09.01.07. Er- $4,0 \times 10^{12}/l$; Leuk- $6,6 \times 10^9/l$; Hb-131g/l; e- , p-2, s-71, l-17, m-10
Before discharge 13.01.07. Er- $4,5 \times 10^{12}/l$; Leuk- $5,3 \times 10^9/l$; Hb-140g/l; e-4, p-2, s-58,
l-24, m-12

Ansimov A.V, aged 7.
05.01.07 - 17.02.07

Diagnosis: Closed spiral fracture of the right tibia, middle-lower part with moderate dislocation of fragments. Skating accident injury. Fragment repositioning, gypsum cast immobilization.

The control X-ray demonstrated bone callus formation. Cast removed, regenerative treatment commenced.

Conclusions: Thus, the new non-invasive electric impulse treatment technology allows the decrease of fracture consolidation time in children by $7,3 \pm 3,1$ days, stimulating the bone tissue reparation, without side effects and complications. This allows the application of gypsum casts for a shorter period time and the commencement of combined regenerative treatment earlier.