

ного снабжения.

Introduction: By means of controlled distraction the genesis of soft tissue including small bone vessels is possible as shown by G. A. Ilizarov, who originally described the application of this principle in the treatment of syndactylia.

Material and methods: Two cases of congenital syndactylia in children of 3 and 4 years of age were treated. Previous surgical exploration and ultrasound investigation with colour doppler technique had revealed that the number of arteries necessary for separation of the fingers - at least one artery per finger - were not available. An Ilizarov mini frame mounted with one olive wire per phalanx and crossed wires in the carpal region was used for distraction of the webs over a period of approximately 20 days. In one case two webs were distracted simultaneously.

Results: At separation the fingers were highly vascularized. The need for skin transplantation was not obviated due to reduction in elasticity and thickening of the skin. There were no wound healing problems or pin tract infections.

Conclusion: The method may be recommended for the treatment of cases of syndactylia where separation of the fingers otherwise involves the danger of ischaemia due to insufficient arterial supply.

References:

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Методика Илизарова - выбор лечения в ортопедической хирургии

The Ilizarov technique — a treatment choice in orthopedic surgery

Метод Илизарова использовался для коррекции разницы в длине конечностей и/или угловой деформации у 44-х пациентов; для лечения псевдоартроза и дефектов костной и мягкой ткани - в 38-ми случаях, включая 14 инфицированных. Деформацию стопы лечили у 17-ти пациентов, включая 8 случаев косолапости и 9 деформаций, вызванных полиомиелитом, прогрессирующей невралгической атрофией мышц (Charcot-Marie-Tooth) и др. Артродез голеностопного сустава произвели 7-ми пациентам. В смешанную группу из 8-ми пациентов входили 3 пациента с синдактилией, 2 - с артериальной закупоркой, вызванной атеросклерозом голени, 2 - с контрактурами голеностопного и локтевого суставов, соответственно. Лечение острых переломов (7 закрытых и 11 открытых) осуществляли у 18 пациентов. У 10-ти из них была повреждена и суставная поверхность, причем, в 7-ми случаях - в области коленного сустава, где метод Илизарова использовался в сочетании с артроскопией и минимальной внутренней фиксацией. Если классифицировать по сегментам, у 81 пациента аппарат Илизарова был наложен на большеберцовую кость, у 25 - на стопу, у 19 - на бедро, у 7 - на плечевую кость и у 4 - на запястье и кисть.

Метод Илизарова был единственно возможным методом лечения для многих из этих пациентов. Сочетание метода Илизарова и артроскопии при лечении переломов суставной поверхности имеет некоторые преимущества и перспективы. Осложнения были редким явлением, легко поддавались лечению и у большинства пациентов не влияли на результаты лечения. Следует еще усовершенствовать устранение таких проблем, как инфекция в месте проведения спиц, боль и тугоподвижность сустава. Лечение требует терпения как со стороны врача, так и со стороны пациента, и в некоторых случаях оно причиняет беспокойство. Метод Илизарова - это важная возможность лечения различных ортопедических проблем.

Introduction: Use of the Ilizarov technique, with its new ap-

proach to genesis of bone and soft tissue, has expanded possibilities for reconstructive surgery of the locomotor system. Discovery and application of the "tension stress" effect as a general biological phenomenon has provided the opportunity to treat many diseases, not just in the field of orthopedic surgery. Interest in the Ilizarov technique by orthopedic institutions and specialists increases constantly.

Material and methods: From the beginning in 1991 to 1995, the number of patients have been increased from 4 to 46 a year, in total 125 patients. Currently additional 28 patients with different orthopedic pathologies are under treatment. The Ilizarov technique was applied for correction of limb length discrepancy and/or angulation deformity in 44 patients; and for treatment of pseudarthrosis and bone and soft tissue defects in 38 cases, including 14 infected. Foot deformity was treated in 17 patients, including 8 club feet and 9 deformities due to polio, Charcot Marie Tooth etc. Ankle arthrodesis was performed on 7 patients. A miscellaneous group of 8 patients included 3 with syndactylia, 2 with arterial occlusion due to arteriosclerosis of the leg, 2 with joint contractures of the ankle and elbow respectively.

Treatment of acute (7 closed and 11 open) fracture was done in 18 patients. Ten of these involved joint surface, in 7 cases in the knee, where Ilizarov technique was performed in conjunction with arthroscopy and minimal internal fixation. Divided by segments, in 81 patients Ilizarov frame was applied on the tibia, in 25 on the foot, in 19 on the femur, in 7 on the humerus and in 4 on the wrist and hand.

Results: Lengthening (up to 9 cm) and correction of axis was completely achieved in 38 patients and partially in 6. Healing of non unions and elimination of defects (up to 12cm) was done in all but two patients of which one had a femoral amputation. The correction of foot deformities with a good functional outcome was reached in 14 patients. Ankle arthrodesis healed in all but one patient. Treatment of syndactylia was successful in all cases. Treatment of arteriosclerosis was successful in the first patient and failed in the second who had a lower leg amputation. In treatment of joint contracture the range of motion was improved in both patients. Healing of acute fractures was successful with a good anatomical and functional result in all cases. Summarizing our results of treatment 80% were good, 16% were fair, 4% were bad.

Discussion and conclusion: The Ilizarov technique was the only possible treatment method available for many of these patients. Combination of Ilizarov technique and arthroscopy in treatment of joint surface fractures seems to have some advantages and perspectives. Complications were rare, manageable, and in a majority of our patients did not affect the results of treatment. Management of problems like pin tract infection, pain and joint rigidity still has to be improved. Treatment requires patience on the part of both doctor and patient, and in some cases cause discomfort. The Ilizarov technique is an important treatment modality for different orthopedic problems.

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Устранение дефектов большеберцовой кости с помощью внутреннего костного перемещения по методу Илизарова

Tibial Bone Defects treated with Internal Bone Transport by Ilizarov Technique

15 пациентов, 10 мужчин и 5 женщин, средний возраст которых составлял 32 (10-54) года, с дефектами большеберцовой кости лечили с помощью внутреннего перемещения кости в период с 1991 по 1995 гг. 6 дефектов были инфицированными. Лечение заключалось в радикальном иссечении патологического участка кости и мягкой ткани, одновременно брали пробы ткани на микробиологический анализ. В

случаях клинических признаков инфекции или ее предоперативного устранения проводили консервативное лечение. Для образования кости осуществляли метафизарную кортикотомию с последующей дистракцией по Илизарову, а у одного пациента вместо кортикотомии использовали сопутствующий надмышелковый перелом. 13 пациентов лечили аппаратом Илизарова для наружной фиксации, 1 пациента лечили аппаратом Orthofix.

Восстановление кости и устранение инфекции было успешным с последующими хорошими функциональными результатами, за исключением одного пациента, у которого был дистальный дефект. Длина конечности была восстановлена, достигнут хороший функциональный результат, но заживление было неудачным в месте артродеза голеностопного сустава. Одному пациенту потребовалась повторная остеотомия из-за преждевременной консолидации костного регенерата. У трех пациентов с проблемами заживления в зоне иссечения отмечались реакции на аутогенный костный трансплантат. Ни у одного из пациентов не было проблем в отношении консолидации костного регенерата, а поставленные перед операцией задачи по удлинению были достигнуты.

Introduction: Tibial fractures may lead to non union, osteomyelitis and/or bone loss. Infected tibial fractures and non unions require radical debridement of infected bone, and insufficient resection can result in failure. By use of distraction osteogenesis as introduced by Ilizarov it is possible to restore even large bone and soft tissue defects. The aim of this study was to evaluate the treatment in our department of tibial defects using internal bone transport by the Ilizarov technique.

Material and methods: In the period 1991-95 15 patients, 10 males and 5 females, median age 32 (10-54) years with tibial defects were treated by means of internal bone transport. Six defects were infected. Treatment comprised a radical excision of pathological bone and soft tissue, at the same time collecting tissue samples for microbiological analysis. In cases with clinically signs of, or preoperatively proven infection, a local application of gentamycin took place. In infections antibiotic treatment on a long term basis adjusted according to microbiological analysis and weekly blood tests of ESR and C-reactive protein was used. For bone formation a metaphyseal corticotomy followed by distraction according to Ilizarov was performed, yet in one patient using a co-existing supramalleolar fracture in stead of a corticotomy. Thirteen patients were treated with the Ilizarov external fixator and one with the Orthofix.

Results: Restoration of bone and eradication of infection was successfully followed by good functional results in all but one patient, who had a distal defect. Limb length was restored and good function was achieved, but with failure of healing in an intended ankle arthrodesis. Median lengthening index was 1,02 month pr. cm (0,57-2,13). Pin tract infections were noted in nine cases, treated with local wound care and systemic antibiotics. One patient needed a re-osteotomy due to a premature consolidation of the bone regenerate. Three patients with healing problems at docking site responded to autogenous bone. grafting. No patients had problems in consolidation of the regenerated bone, and the preoperative aims for lengthening were achieved.

Discussion and conclusion: Treatment of large tibial bone defects must be considered a limb saving procedure and a restorative procedure as well. The Ilizarov technique offers unique possibilities for that. The technique for bone transport is a demanding and a long lasting procedure, which is often troublesome for the patient. We have noted a number of difficulties during the treatments but few serious complications.

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Применение метода Илизарова под контролем функции нерва с помощью ССВП

Ilizarov apparatus application under control of neural function by SSEP

Для раннего обнаружения нервного компромисса, связанного с наложением аппарата внешней фиксации на нижние и верхние конечности, предлагается использовать управление неврологической функции Соматосенсорным Возбудителем Потенциалов (ССВП).

Шестидесяти пяти пациентам в возрасте от 5 до 17 лет накладывали аппарат Илизарова на нижние (60) и верхние (5) конечности для удлинения и/или исправления деформаций. Под общей анестезией проводился мониторинг функции периферического нерва использованием ССВП диагностическим оборудованием Cadwell Excel (Cadwell Corp., Kennewick, WA). Запись основной линии возбудителей потенциалов собирались непосредственно перед наложением аппарата. В последующем запись повторялась в течение всей операции. Более 10% продолжительности латентности и более 50% снижения амплитуды или наличие обеих считалось значительным и указывало на повреждение нерва. Один из нервов противоположной конечности также находился под контролем вариабельности внутриоперационного ответа из-за анестезии или прочих факторов.

Мониторинг с помощью ССВП оказался технически осуществимым и клинически надежным методом для оценки нервного компромисса во время внешней фиксации нижних и верхних конечностей. Данная методика может усилить безопасность операций по наложению аппаратов внешней фиксации, и таким образом, может быть ценным дополнением к хирургическому инструментарию.

Intoduction: Acute nerve injury is an uncommon but troublesome complication of external fixation. For the earlier detection of nerve compromise associated with external fixator application on the lower and upper extremities, we proposed to use intraoperative monitoring of neural function by Somatosensory Evoked Potentials (SSEP).

Method and materials: Sixty five patients, ranging from 5 to 17 years of age underwent Ilizarov apparatus application to the lower (60) and upper (5) extremities for limb lengthening and/or deformity correction. Apparatus was applied to the tibia in 33 cases, to the femur in 23 cases, to both tibia and femur in 4 cases, to the humerus in 2 cases, and to the forearm in 3 cases. After the induction of general anesthesia, peripheral nerve function monitoring was commenced by using SSEPs with Cadwell Excel diagnostic unit (Cadwell Corp., Kennewick, WA). Deep peroneal and posterior tibial nerves were evaluated in the lower extremities. In the upper extremities, median, ulnar, and radial nerves were assessed. For the stimulation, a pair of Nicolet needle electrodes was applied subcutaneously over the each examining nerve in the lower tibia or the lower forearm. Stimulus Intensity was set to 30 mA and maintained stable throughout surgery. Square wave pulses with a duration of 100 μ sec and a frequency of 4 - 5 per second were delivered to the nerves for a total of 200 repetitions for each resulting signal. The waves were passed through band-pass filters of 100-2000 Hz. Evoked potentials were subsequently recorded by the same type of electrodes at the popliteal fossa, lumbar and anterior cervical areas for the lower extremities and at the Erb's point and anterior cervical area for the upper extremities. Baseline evoked potential recordings were generated right before the apparatus application. Further recordings were continuously repeated throughout surgery. More than 10% latency prolongation and more than 50% amplitude reduction or both were considered significant and indicative of nerve injury. One of the nerves of opposite extremity was monitored as well for control of intraoperative response variability due to anesthesia or other factors.

Results: Significant deterioration or total loss of peroneal nerve SSEPs during apparatus application to the lower extremities occurred in 4 cases. Two of these patients were preoperatively normal and had symptoms of neurologic deficit postoperatively; the other two suffered exacerbation of pre-existing neuropathy.