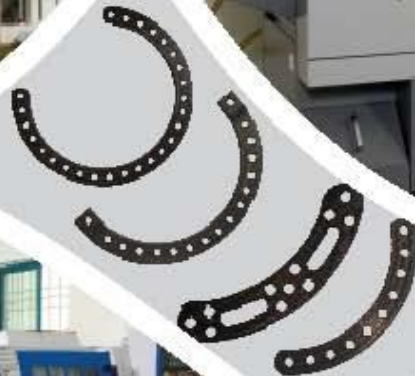


Redefining Excellence



GREENS

**FDA, GMP, ISO 13485
Certified SSI Unit**



CATALOGUE

RING FIXATOR SYSTEM

CERTIFICATION MERITS



Some information on Ring Fixator System Technique

External fixation is a surgical treatment used to set bone fractures in which a cast would not allow proper alignment of the fracture. In this kind of reduction, holes are drilled into uninjured areas of bones around the fracture and special bolts or wires are screwed into the holes. Outside the body, a rod or a curved piece of metal with special ball-and-socket joints joins the bolts to make a rigid support. The fracture can be set in the proper anatomical configuration by adjusting the ball-and-socket joints. Since the bolts pierce the skin, proper cleaning to prevent infection at the site of surgery must be performed. Installation of the external fixator is performed in an operating room, normally under general anesthesia. Removal of the external frame and bolts usually requires special wrenches and can be done with no anesthesia in an office visit. External fixation is usually used when internal fixation is contraindicated- often to treat open fractures, or as a temporary solution.

External fixation is also used in limb lengthening. People with short limbs can have, for example, legs lengthened. In most cases the thigh bone (femur) is cut diagonally in a surgical procedure under anesthesia. External fixator pins or wires (as above) are placed each side of the 'man made fracture' and the external metal apparatus is used to very gradually push the two sides of the bone apart millimetre by millimetre day by day and week by week. Bone is extremely clever tissue and will gradually grow into the small gap created by this 'distraction' technique. Such a process can take many months. In most cases it may be necessary for the external fixator to be in place for many weeks or even months. Most fractures heal in between 6 and 12 weeks. However, in complicated fractures and where there are problems with the healing of the fracture this may take longer still. It is known that bearing weight through fracture by walking on it, for example, with the added support of the external fixator frame actually helps fractures to heal.

Since G. A. Ilizarov described a revolutionary technique in 1950 while working in a remote town of Siberia, a lot of work has been done to understand the intricacies of this technique popularly known as the Russian Technique or just the Ring Fixator System technique.

It is interesting to note that though Ilizarov described the law of tension stress in 1950, the rest of the world was totally unaware till the Italians accidentally discovered the technique in 1980's. Since then it has been widely practiced all over the world and a lot of further research has been done since then. The initial euphoria has now gone and we understand and use the technique in a better way now.

This article is written to clear a few of the misconceptions, which many doctors still have in their mind. I have to state here that this surgery has gone out of favour mainly due to its "Abuse" rather than proper "use".

The Ring Fixator System Technique

Ilizarov described a technique based on what he called the principle of tension stress. He found out that if the cut ends of the bone are distracted in a rhythmic fashion using a ring fixator, then there is new bone formation in the gap created and there is also simultaneous growth of the other tissues like muscles and nerves. The ideal rate of distraction was found to be 0.25mm every six hours. DeBastiani later on described a technique known as Callotasis i.e. stretching of the callus based on the Ring Fixator System principle.

Applications of Ring Fixator System technique in today's practice.

1. Limb lengthening
2. Deformity Correction including soft tissue defects.
3. Infected Non-unions
4. Treatment of Joint Contractures e.g. post burns
5. Treatment of some acute fractures
6. Arthrodesis
7. Treatment of Arthritis
8. Pseudoarthroses of long bones.

CONTRAINDICATIONS:

1. A history of sepsis/osteomyelitis
2. A compromised soft tissue envelope about the ankle
3. Inadequate bone stock at the arthrodesis site to support internal fixation limited to the tibia and talus
4. A leg length discrepancy that is inadequately treated with a shoe modification
5. Failed prior ankle arthrodesis using internal fixation and
6. Anticipated noncompliance with a nonweight-bearing/touchdown weight-bearing

Limb Lengthening Procedure

Limb lengthening is normally advised when the discrepancy between the two limbs is 5 or more centimeters. Limb lengthening is also done for cosmetic reasons in dwarfism e.g. Achondroplasia, where both the limbs are lengthened.

What are the common causes for limb length discrepancy?

1. Congenital deformity or absence of a bone e.g. Fibular hemimelia
2. Post-traumatic e.g. mal or non union of a fracture
3. Epiphyseal Injuries either due to infection (septic arthritis of the hip) or trauma
4. Neurological e.g. Polio or cerebral palsy
5. Metabolic Bone Diseases
6. Vascular Causes e.g. Arteriovenous fistula or haemangiomas
7. Rare Causes e.g. congenital hemiatrophy

Bones commonly lengthened:

Any bone can be lengthened, however limb length discrepancy in lower limbs is a major problem it is the tibia and femur, which are commonly lengthened.

Age at which lengthening can be done:

Since active physiotherapy plays a very important role in the treatment a child undergoing limb lengthening should be at least five years old. It has also been observed that the bone formation is better during the growing phase and it slows down considerably as the age increases.

Site of lengthening:

The metaphysis of the bone has shown to be the ideal site for lengthening.

How much can one lengthen the bone?

Theoretically any amount but the research has shown that the complications are minimum if one lengthens the bone upto 20 to 25% of its original length. Achondroplastic dwarfs (the tiny jokers seen in circuses) are an exception to this rule. This particular group tolerates lengthening to a much larger extent without complications.

How long does it take to lengthen say 5 centimetres?

The lengthening procedure is divided into three phases

Phase I:

This involves application of the Ring Fixator System and creating a break in the bone. There is a delay between this phase and the next phase i.e. Distraction phase. This delay depends on the age of the patient. In young children this delay is 7 to 10 days whereas in adults it is 14 days.

Phase II:

The actual distraction of the cut bone ends starts. Though Ilizarov described 0.25mm every six hours as ideal rhythm, it was subsequently found out that the rate and rhythm needs to be tailored to each patient. Again the adults do well with 0.25mm twice a day and children can distract at 0.25 four times a day. A too rapid distraction causes less bone formation and a too slow a distraction can prematurely fuse the cut bone ends. The distraction continues till the desired length is achieved.

Phase III:

Once the distraction is completed the phase of consolidation begins. The fixator is kept in place till the new bone is strong enough to take the weight of the body on its own. Once this is achieved the fixator is removed and a cast is given.

Example:

A 7 year old child needs 5cm lengthening:

Delay before distraction = 7 days

1mm per day for 50 days = 5cms

Consolidation phase 2 x phase II = 100 days

Total = 7 + 50 + 100 = 157 days or roughly 5 months i.e. 1 month per centimeter

An adult of 24 needing 5cms:

Delay = 14 days

0.5mm per day = 100 days

Consolidation = 200 days

Total = 14 + 100 + 200 = 314 days

This amounts to almost one year

Why is lengthening over a nail not recommended in child?

Children have a growth plate called as an epiphysis which can get damaged easily while inserting a nail and nailing is therefore contraindicated in a child.

Can a patient walk during the treatment?

All patients are encouraged to walk as these aids in bone consolidation.

What are the complications?

1. Pin tract infections

The wires and half pins act as foreign bodies and if they are not properly cleaned every day can lead to pus formation and subsequent loosening.

2. Joint Stiffness

The stretching of muscles leads to adjacent joint contractures. Knee stiffness is commonly associated with femoral lengthening. A good physiotherapy regimen and patient cooperation usually helps to resolve the stiffness.

3. Injuries to blood vessels and nerves.

Injuries to blood vessels and nerves during the insertion of wires is a known complication but fortunately a rare one.

4. Pain

Pain was a problem initially but with modern medicines and good physiotherapy it has been easily controlled.

Other uses of this technique

1. Deformity Correction

Deformities either acquired (due to trauma) or congenital (since birth) can be successfully treated with Ring Fixator technique. Many of these deformities are associated with limb shortening and simultaneous lengthening can be achieved which is real benefit. Multi-planar deformities can be easily tackled by a Ring Fixator System.

2. Infected Non-unions

During the limb-lengthening phase it has been observed that the blood flow to the limb increases by 400%. In infection the principles of treatment include a thorough debridement (removal of all dead tissues), stability at fracture site and insuring a good blood supply. Ring Fixator System not only fulfills all these criteria but also can increase the length of the limb if it is short after taking away all the dead tissues. Ring Fixator System has revolutionized the treatment of infected nonunions. This increase in blood supply has been used in the treatment of Burger's disease (Thromboangitis obliterans)

3. Treatment of Joint Contractures

In conditions like severe burns or polio patient may have a contracture across a joint, which hampers the function of that joint. One stage correction is usually not possible due to contracture of the neurovascular bundle. In such situations the Ring Fixator System method of gradual distraction is very useful.

4. Treatment of certain acute fractures.

Fractures at peculiar parts of the bone like a pylon fracture of the tibia are difficult to treat with standard implants. Ring Fixator System fixator can be used in such positions.

5. Arthrodesis.

Arthrodesis or fusion of a joint is a common surgery and some of the joints like the ankle joint very difficult to fuse. Ring Fixator System method has made arthrodesis very easy. Knee arthrodesis after a failed total knee replacement surgery where the failure is due to infection is a difficult proposition and one of the ideal indications for a Ring Fixator System surgery.

6. Treatment of arthritis

Recent evidence shows that distraction of an arthritic joint can lead to pain relief for a significant period of time. Italians have distracted hip joints successfully for osteoarthritis of hip.

7. In peripheral Vascular Disease to Increase Vascularity

Though mentioned last this use has been highlighted because very few doctors are aware of it. Peripheral vascular disease like the classical Smoker's arteritis involves all arteries of the limb and commonly results in the tragic amputation. Ilizarov's basic research had shown that the blood supply to a limb being lengthened increases by 400%. This fact is utilized in the treatment of infected non-unions where the blood supply plays a paramount role in the management of infection. This same principle of increased vascularity is used in treating the arteritis cases. The affected limb, usually the lower limb is operated upon at the tibial level and a linear corticotomy is done of the tibia. Once the vascularity is increased the fixator is taken off. A preoperative and a postoperative angiography obviously are a must. However there is no data available about this procedure being used in diabetic angiopathy.

What is the hospital stay?

Usually 5 to 7 days. Epidural anesthesia is used for most of the lower limb surgeries and an epidural catheter is kept in place for three days post-op to control pain. This effectively creates a pain free surgery. It must be a traumatic experience to go through such a long treatment?

Yes. However before the patient is taken up for surgery the entire family is given maximum possible information about the procedure and an effort is made to clear all the doubts. In certain case a psychologist's help is sought. Patients of infected nonunions for example usually have already undergone multiple surgeries which makes them apprehensive and they can be depressed too. Information reduces the anxiety in such patients and usually talking to another patient helps. I maintain an address book of all patients and this really helps.

The most commonly asked question? Can we use this technique to gain limb length solely for cosmetic purposes or can my five foot daughter be made five six

Limb lengthening looks like a bed of roses to many short people on the streets! None of the first timers actually know the procedure details and their enthusiasm fades once the whole process is outlined. Obviously doing such a major surgery without letting the patient know the complications as well as the time taken can only result in a disaster. I would advise to lay all the cards open and let the patient make a choice whether he or she wants a cosmetic limb lengthening.

Conclusion

Ring Fixator System is a specialized surgical technique, which has a very steep learning curve. The results of this technique can be disastrous in an untrained surgeon's hands and hence someone who has inadequate experience should not attempt this surgery. Constant research has solved many problems in this technique and further research is going on to find newer applications of this revolutionary technique.

Understanding of Ring Fixator Technique is necessary by the Consent User/Surgeons expert opinion is highly recommended.

NOTE: Products are available in stainless steel and carbon fibre of international recommended standard.

Ilizarov Rings



Full Rings (adult)

S.S. Cat No.	Carbon Cat No.	Carbon Rings
460.012	350.012	80mm ID
460.014	350.014	100mm ID
460.015	350.015	110mm ID
460.016	350.016	120mm ID
460.017	350.017	130mm ID
460.018	350.018	140mm ID
460.019	350.019	150mm ID
460.020	350.020	160mm ID
460.022	350.022	180mm ID
460.024	350.024	200mm ID
460.026	350.026	220mm ID



3/4 Rings (adult)

S.S. Cat No.	Carbon Cat No.	Carbon Rings
460.112	350.112	80mm ID
460.114	350.114	100mm ID
460.115	350.115	110mm ID
460.116	350.116	120mm ID
460.117	350.117	130mm ID
460.118	350.118	140mm ID
460.119	350.119	150mm ID
460.120	350.120	160mm ID
460.122	350.122	180mm ID
460.124	350.124	200mm ID
460.126	350.126	220mm ID



5/8 Rings (adult)

S.S. Cat No.	Carbon Cat No.	Carbon Rings
460.212	350.212	80mm ID
460.214	350.214	100mm ID
460.215	350.215	110mm ID
460.216	350.216	120mm ID
460.217	350.217	130mm ID
460.218	350.218	140mm ID
460.219	350.219	150mm ID
460.220	350.220	160mm ID
460.222	350.222	180mm ID
460.224	350.224	200mm ID
460.226	350.226	220mm ID
460.228	350.228	240mm ID



Half Rings (adult)

S.S. Cat No.	Carbon Cat No.	Carbon Rings
460.312	350.312	80mm ID
460.314	350.314	100mm ID
460.315	350.315	110mm ID
460.316	350.316	120mm ID
460.317	350.317	130mm ID
460.318	350.318	140mm ID
460.319	350.319	150mm ID
460.320	350.320	160mm ID
460.322	350.322	180mm ID
460.324	350.324	200mm ID
460.326	350.326	220mm ID
460.328	350.328	240mm ID
460.330	350.330	260mm ID

Ilizarov Rings



Half Rings (pediatric)

S.S. Cat No.	Carbon Cat No.	Size
460.412	350.412	80mm ID
460.422	350.422	90mm ID
460.432	350.432	100mm ID
460.452	350.452	120mm ID



3/8 Rings (adult)

S.S. Cat No.	Carbon Cat No.	Size
461.012	351.012	80mm ID
461.014	351.014	100mm ID
461.015	351.015	110mm ID
461.016	351.016	120mm ID
461.017	351.017	130mm ID
461.018	351.018	140mm ID
461.018	351.018	150mm ID
461.020	351.020	160mm ID
461.022	351.022	180mm ID
461.024	351.024	200mm ID
461.026	351.026	220mm ID



1/4 Rings (adult)

S.S. Cat No.	Carbon Cat No.	Carbon Rings
461.112	351.112	80mm ID
461.114	351.114	100mm ID
461.115	351.115	110mm ID
461.116	351.116	120mm ID
461.117	351.117	130mm ID
461.118	351.118	140mm ID
461.119	351.119	150mm ID
461.120	351.120	160mm ID
461.122	351.122	180mm ID
461.124	351.124	200mm ID
461.126	351.126	220mm ID



Italian Arch 90 Degree

S.S. Cat No.	Carbon Cat No.	Size
461.170	351.170	012mm ID
461.190	351.190	140mm ID
461.210	351.210	180mm ID
461.230	351.230	180mm ID
461.260	351.260	200mm ID

Ilizarov Rings



Italian Arch 120 Degree

S.S. Cat No.	Carbon Cat No.	Size
461.370	351.370	120mm ID
461.390	351.390	140mm ID
461.410	351.410	160mm ID
461.430	351.430	180mm ID
461.450	351.450	200mm ID



Connecting Plates (short Adult)

S.S. Cat No.	Carbon Cat No.	Size
462.002	352.002	Two Holes
462.003	352.003	Three Holes
462.004	352.004	Four Holes
462.005	352.005	Five Holes
462.006	352.006	Six Holes



Connecting Plates (long Adult)

S.S. Cat No.	Carbon Cat No.	Size
462.011	352.011	Eleven Holes
462.016	352.016	Sixteen Holes
462.020	352.020	Twenty Holes



Connecting Plates (short Pediatric)

S.S. Cat No.	Carbon Cat No.	Size
462.102	352.102	Two Holes
462.103	352.103	Three Holes
462.104	352.104	Four Holes
462.105	352.105	Five Holes
462.106	352.106	Six Holes

Ilizarov Rings



Connecting Plates (long Pediatric)

S.S. Cat No.	Carbon Cat No.	Size
462.110	352.110	Ten Holes
462.115	352.115	Fifteen Holes
462.120	352.120	Twenty Holes

Arches (veterinary)

S.S. Cat No.	Carbon Cat No.	Size
462.180	352.180	140mm ID
462.260	352.260	220mm ID



Full Rings (veterinary)

S.S. Cat No.	Carbon Cat No.	Size
462.374	352.374	50mm ID
462.390	352.390	66mm ID
462.394	352.394	70mm ID
462.414	352.414	84mm ID
462.426	352.426	100mm ID
462.446	352.446	118mm ID



5/8 Rings (veterinary)

S.S. Cat No.	Carbon Cat No.	Size
462.574	352.574	50mm ID
462.590	352.590	66mm ID
462.594	352.594	70mm ID
462.614	352.614	84mm ID
462.626	352.626	100mm ID
462.646	352.646	118mm ID

Ilizarov Rings



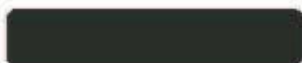
1/3 Rings (veterinary)

S.S. Cat No.	Carbon Cat No.	Size
462.774	352.774	50mm ID
462.790	352.790	65mm ID
462.794	352.794	70mm ID
462.814	352.814	84mm ID
462.826	352.826	100mm ID
462.848	352.848	118mm ID



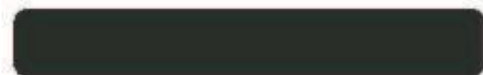
Rods 4mm Diameter

S.S. Cat No.	Carbon Cat No.	Size
463.008	353.008	4mm Dia 80mm Long
463.010	353.010	4mm Dia 80mm Long
463.012	353.012	4mm Dia 80mm Long
463.015	353.015	4mm Dia 80mm Long
463.016	353.016	4mm Dia 80mm Long
463.017	353.017	4mm Dia 80mm Long
463.020	353.020	4mm Dia 80mm Long
463.025	353.025	4mm Dia 80mm Long
463.030	353.030	4mm Dia 80mm Long
463.035	353.035	4mm Dia 80mm Long



Rods 6.3mm Diameter

S.S. Cat No.	Carbon Cat No.	Size
463.105	353.105	6.3mm Dia 60mm Long
463.110	353.110	6.3mm Dia 100mm Long
463.115	353.115	6.3mm Dia 150mm Long
463.120	353.120	6.3mm Dia 200mm Long
463.125	353.125	6.3mm Dia 250mm Long



Rods 8mm Diameter

S.S. Cat No.	Carbon Cat No.	Size
463.210	353.210	8mm Dia 100mm Long
463.215	353.215	8mm Dia 150mm Long
463.220	353.220	8mm Dia 200mm Long
463.225	353.225	8mm Dia 250mm Long
463.230	353.230	8mm Dia 300mm Long
463.235	353.235	8mm Dia 350mm Long
463.240	353.240	8mm Dia 400mm Long

Ilizarov Rings



Rods 9.5mm Diameter

S.S. Cat No.	Carbon Cat No.	Size
463.305	353.305	9.5mm Dia 50mm Long
463.310	353.310	9.5mm Dia 100mm Long
463.315	353.315	9.5mm Dia 150mm Long
463.320	353.320	9.5mm Dia 200mm Long
463.325	353.325	9.5mm Dia 250mm Long
463.330	353.330	9.5mm Dia 300mm Long
463.335	353.335	9.5mm Dia 350mm Long
463.340	353.340	9.5mm Dia 400mm Long



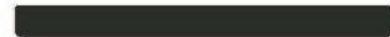
Rods 11mm Diameter

S.S. Cat No.	Carbon Cat No.	Size
463.410	353.410	11mm Dia 100mm Long
463.415	353.415	11mm Dia 150mm Long
463.420	353.420	11mm Dia 200mm Long
463.425	353.425	11mm Dia 250mm Long
463.430	353.430	11mm Dia 300mm Long
463.433	353.433	11mm Dia 330mm Long
463.435	353.435	11mm Dia 350mm Long
463.440	353.440	11mm Dia 400mm Long
463.445	353.445	11mm Dia 450mm Long
463.450	353.450	11mm Dia 500mm Long



Rods 1/8 Inches Diameter

S.S. Cat No.	Carbon Cat No.	Size
464.007	354.007	1/8" Dia 75mm Long
464.010	354.010	1/8" Dia 100mm Long
464.015	354.015	1/8" Dia 150mm Long



Rods 3/16 Inches Diameter

S.S. Cat No.	Carbon Cat No.	Size
464.100	354.100	3/16" Dia 100mm Long
464.115	354.115	3/16" Dia 150mm Long
464.120	354.120	3/16" Dia 200mm Long
464.125	354.125	3/16" Dia 150mm Long

Ilizarov Rings



Rods 5/16 Inches Diameter

S.S. Cat No.	Carbon Cat No.	Size
464.210	354.210	5/16" Dia 100mm Long
464.215	354.215	5/16" Dia 150mm Long
464.220	354.220	5/16" Dia 200mm Long
464.225	354.225	5/16" Dia 250mm Long



5/8 Rings (pediatric)

S.S. Cat No.	Carbon Cat No.	Size
465.012	355.012	80mm ID
465.022	355.022	90mm ID
465.032	355.032	100mm ID
465.052	355.052	120mm ID



3/4 Ring (pediatric)

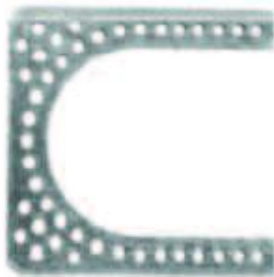
S.S. Cat No.	Carbon Cat No.	Size
465.112	355.112	80mm ID
465.122	355.122	90mm ID
465.132	355.132	100mm ID
465.152	355.152	120mm ID

Ilizarov Rings



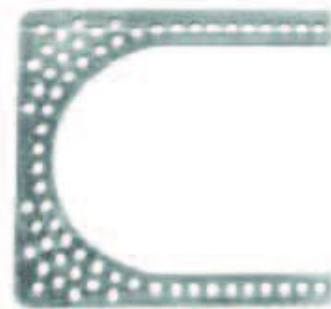
Rings with Curved Extremities

CAT. No.	Dimension
372.350	80 mm
372.352	100 mm
372.354	120 mm
372.356	140 mm
372.358	160 mm
372.360	180 mm



**Composite Foot Ring
Short Arm**

CAT. No.	Dimension
372.300	80 mm
372.302	100 mm
372.304	120 mm
372.306	140 mm
372.308	160 mm
372.310	180 mm



**Composite Foot Ring
Long Arm**

CAT. No.	Dimension
372.320	80 mm
372.322	100 mm
372.324	120 mm
372.326	140 mm
372.328	160 mm
372.330	180 mm

Femoral Components



Arches with Holes

CAT. No.	Dimension
374.300	110 mm
374.302	120 mm
374.304	140 mm



Composite Half Pin Arc

CAT. No.	Dimension
374.350	150 mm, 90°
374.352	180 mm, 90°
374.354	200 mm, 90°
374.356	160 mm, 180°



Single Pin Fixation Bolt

CAT. No.	376.110



Multiple Pin Fixation Bolt

CAT. No.	376.120



Nut

CAT. No.	Dimension
397.001	11 mm
397.010	13 mm



Oblique Support with Thread

CAT. No.	377.100

Threaded Rod Ø 6.0mm	
CAT. No.	Dimension
378.050	Ø 6.0 mm x 50 mm
378.075	Ø 6.0 mm x 75 mm
378.100	Ø 6.0 mm x 100mm
378.125	Ø 6.0 mm x 125mm
378.150	Ø 6.0 mm x 150mm
378.200	Ø 6.0 mm x 200mm
378.225	Ø 6.0 mm x 225mm
378.250	Ø 6.0 mm x 250mm
378.275	Ø 6.0 mm x 275mm
378.300	Ø 6.0 mm x 300mm
378.350	Ø 6.0 mm x 350mm
378.400	Ø 6.0 mm x 400mm

Threaded Rod Partial	
CAT. No.	379.200

Slotted Threaded Rod Ø 6.0mm	
CAT. No.	Dimension
379.075	Ø 6.0mm x 75 mm
379.100	Ø 6.0mm x 100 mm
379.125	Ø 6.0mm x 125 mm
379.150	Ø 6.0mm x 150 mm