

## The Neonatal Correction of Tibia Bowing

**António Gentil Martins\***

*Department of Children's and Adolescents Oncology, Portuguese Cancer Institute Francisco Gentil, Lisboa, Portugal*

**\*Corresponding Author:** António Gentil Martins, Department of Children's and Adolescents Oncology, Portuguese Cancer Institute Francisco Gentil, Lisboa, Portugal.

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### Abstract

The main purpose of this paper is to call attention to Pediatricians, having at their disposal an obvious clinical diagnoses of bowed leg immediately after birth, so that they can rapidly send their Patient for an appropriate Professional that can, either manually (or even with the help of instruments) correct the bowing, the compensation of the limb shortening being left for a second date.

We consider congenital bowing of the tibia almost a NeoNatal Orthopedic Emergency, if one wants to simplify treatment and reduce the danger of pseudoarthrosis.

**Keywords:** *Tibia Bowing; Pseudoarthrosis; Legs Dysmetry*

### Introduction and Objectives

Tibia bowing is a relatively rare congenital malformation that can eventually be markedly troublesome. The difficulties that we have had in our own experience, that did no more than to reproduce the difficulties we had found in the literature, led us to think if we would be able to profit from the extraordinary capacity for healing and bone remodeling of the NeoNate to allow for the straightening of the tibia and simultaneously, prevent the possibility of pseudoarthrosis, namely after surgical correction of any residual bowing.



**Figure 1:** *Typical tibia bowing.*

### Technique

Straightening of the Bowed Tibia should be performed soon after birth, under general anesthesia, eventually only manual but, if needed, with closed “instrumental” help. Immobilization with a plaster cast should be maintained for around 4 weeks, thus avoiding a possible future incapacitating pseudoarthrosis.

It is obvious that straightening the bone cannot compensate for the usual dysmetry resulting from the congenital bone hypoplasia always existing in a minor or major degree. That will have to be corrected later.



**Figure 2:** Usual dysmetry.

In the cases in which that dysmetry is significant, one has obviously to compensate for that shortening of the limb till the desired length, namely through a tibia osteotomy at its upper part, where the blood supply is more favorable. and placement of a “compression device”, like Orthophix (our preference), Elizarov or Wagner, thus allowing for progressive lengthening according to need.

The dysmetry, generally corrected at a rate of 1 mm a day, followed by immobilization for 4 to 6 months (depending on the age of the patient), for consolidation of the obtained gain. In any case the compression device must not be removed before R-Rays have confirmed the good appearance of the intermediate segment resulting from elongation.

### Discussion

NeoNatal tibia angulation is usually localized at the level of lesser resistance of the bone, area corresponding to the point where converge the vessels from the main feeding tibia artery, that starts from the upper part of the bone, and the vessels proceeding from the lower epiphyses. That meeting area, placed between the middle and lower third of the tibia, is the site of about 80% of the tibia fractures, namely the ones resulting from indirect trauma.

It is well known the bone healing difficulty at that level, eventually because of being a zone of less vascularity but also because of a finer periosteal lawyer and an area of less muscular insertions, that could eventually be a source of complementary vascularity.

Bowing assumes fundamentally two types that appear to have different prognoses. The bowing with posterior vertex seems to have a certain tendency for partial correction with growth and more rarely be associated with pseudoarthrosis, contrary to what happens when the vertex of the bowing is anterolateral (unfortunately the more frequent situation).

Frequently, associated with the tibia bowing exist also peroneal problems and almost always global hypoplasia of the limb below the knee, with a short foot and also a short tibio/fibula complex, even after straightening. So, it is not the angulation that causes shortening of the limb but certainly the association of a global malformation process.

At birth, in the cases of antero-external angulation, occasionally there exists already a true congenital pseudoarthrosis, with tapering of the bone and blockage of the medullary channel. Nevertheless, in most cases, that pseudoarthrosis only happens after trauma (even mild), healing being slow and occasionally even non-existent. Some pseudoarthrosis seem to develop with progressively thinning of the bone, increase in local scleroses and obstruction of the medullary canal (and then even leading to fracture).

Those are the cases with the worst prognosis, although when it exists at that level a cystic type of lesion, a simple fibrous dysplasia or signs compatible with bone neurofibromatosis, the prognosis appears to be more favorable.

The pseudoarthrosis seems to heal more easily in the older child, healing being particularly more difficult in the younger children. It is a malformation predominantly unilateral and in which the peroneus might not be affected, that may lead later to an eventual dislocation of the head of the fibula from its articulation with the upper part of the tibia diaphysis.

After the fracture, even in minimal trauma, the bone has difficulty in healing and even with the use of the more sophisticated orthopedic techniques (with various types of grafts and osteosynthesis) a satisfactory end result is not obtained.

They are not infrequent in the medical literature cases in which the final result was amputation and placement of a walking prostheses. Some authors even suggest the protection of the child with tibia angulation with orthothesis that intend to preclude the possibility of fracture and others even consider it to be a serious error to try straightening through osteoclasia or osteotomy.

In the cases that the Patient is examined beyond the NeoNatal period and with an already existing pseudoarthrosis we believe that the best solution is to proceed with resection of the diseased area. It is very important that the bone be sectioned in a zone with a good medullary canal, that will allow for a better progressive global bone healing, thus not only correcting the pseudoarthrosis but also the dysmetry.

The age at which one should compensate for leg shortening is debatable, but the truth is that usually one does not find significant increase in the differential leg length during the child's growth, particularly after the 4 years of life. Serial X-Rays studies of the two tibias and also the study of classical "growth charts" or the more modern Multiplier App develop by give us a presumed eventual difference in leg's length at the end of growth, what allows us to eventually make the compensation earlier in life, whenever that dysmetry is significant (and having previously compensated that difference in length). It is obvious that compensation of the dysmetry all along growth generally with an appropriate insole, is essential to avoid further problems. During lengthening surgery, any eventual residual angulation can and should also be corrected [1-9].

### Conclusion

The results have been excellent, with clinical and radiological recovery, and without complications. The main purpose of this paper is to call attention to Pediatricians, having at their disposal an obvious clinical diagnosis immediately after birth, so that they should send their Patient for an appropriate Professional.

For us, congenital bowing of the tibia is almost a NeoNatal Orthopedic Emergency.

### Disclaimer

The paper is a single author piece and presents no conflict of interests.

### Ethical Approval

Yes, according to the Helsinki declaration.

### Consent to Participate

Patient not identified.

### Consent to Publish

Patient not identified.

### Authors Contributions

I am the only author.

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There are no conflicts of interest.

### Availability of Data and Materials

N/A.

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