

## Supplementary material

Disease etiology grouped into 4 items constructed by modification in accordance with Stricker and Hunt and added category unknown (Stricker and Hunt. Int Pediatr 2004; 19(3): 134-46).

### Congenital

#### Congenital disease

- Tibial hemimelia
- Fibular hemimelia
- Developmental coxa vara
- Developmental dysplasia of the hip
- Proximal femoral focal deficiency
- Hemihypertrophy idiopathic
- Nonsyndromic hemihypertrophy
- Congenital tibial pseudarthrosis
- Congenital posteromedial bowing tibia

#### Syndrome

- Klippel-Trenaunay syndrome
- Neurofibromatosis
- Beckwith-Wiedemann syndrome
- Ollier disease (multiple enchondromas)
- Russell-Silver
- Proteus
- Conradi-Hunerman
- Vivid cutis marmorata
- Hemiatrophy

### Short stature

- Short stature cosmetic
- Achondroplasia
- Growth-hormone deficiency

### Acquired/developmental limb-length discrepancy

#### Physeal growth disturbance

- Ischemic physeal arrest (Perthes, post-infectious, limb ischemia, septic shock)
- Blount's disease (tibia vara)
- Radiation therapy
- Juxta-physeal tumor or bone cyst
- Multiple exostosis / osteochondromatosis

#### Trauma

- Traumatic physeal growth arrest
- Fracture malunion (overriding)
- Slipped capital femoral epiphysis (SCFE)

#### Hyperemia

- Post-traumatic overgrowth (common after femur shaft fracture)
- Chronic knee synovitis with overgrowth
- Chronic osteomyelitis
- Hemophilia
- Rheumatoid arthritis
- Osteoid osteoma
- Arterio-venous malformation (AVM) or hemangiomatosis
- Post-surgical hyperemia

#### Neuromuscular

- Poliomyelitis
- Spastic hemiplegia (cerebral palsy, stroke)
- Spinal cord anomaly (tethered cord, syrinx)

#### Adult

- Malunion
- Post-traumatic and bone infection
- Secondary to acute shortening
- Non-union
- Bone infection

### Unknown

Cases in which the LLD etiology could not be established.

The complication origin categorized into 8 main groups and 33 subgroups according to Frost et al. (Frost M W, Rahbek O, Traerup J, Cec-cotti A A, Kold S. Acta Orthop. 2021; 92(1): 120-7).

Main origin	Sub-origin	Definition
Soft tissue		
Skin		Skin irritation related to incision, internal/ external devices, braces or other treatment related issues
Muscles		Muscles irritation/ pain/ capturing/ rupture related to incision, other treatment related issues
Tendon		Tendon irritation/ pain/ captured/ rupture related to incision, other treatment related issues
Pain		Pain related to the treated extremity that is assessed to originate from the treatment
Others		Others soft tissue complications that are not classified in above categories, including compartment syndrome
Joint		
Pain		Pain related to the joint above or below the treated bone
Contracture		Reduced joint range of motion compared to start of treatment
Subluxation		A subluxation of a joint is where a connecting bone is partially out of the joint
Dislocation		A dislocation of a joint, is a complete separation of the joints
Others		Other joint complications that are not classified in above categories
Vascular		
Vascular damage		Blunt injury or penetrating injury to a blood vessel causing thrombosis, bleeding or permanent vessel damage
Deep vein thrombosis		Deep vein thrombosis refers to blood clots in large veins of lower limb.
Pulmonary embolism		Pulmonary embolism is a blockage of an artery in the lungs by a substance.
Hemorrhage/ hematoma		A hemorrhage is blood escaping from the circulatory system from damaged blood vessels. A hematoma is a localized bleeding outside of blood vessels.
Others		Other vascular complications not classified in above categories
Bone		
Premature consolidation		The bone regenerated forms bone bridge between the two bone segments. The bridge stops lengthening and an intervention more than standard lengthening is needed
Delayed healing		Non-union or slow consolidation of the bone regeneration
Secondary malalignment		Occurrence of new bone malalignment
Fracture		A partial or complete break in the continuity of the bone
Others		Other bone complications not classified in above categories
Neurology		
Paresthesia		An abnormal dermal sensation with no apparent physical cause and of transient time
Paralysis		Loss of muscle function in one or more muscles and/or sensory disturbances in the affected area. Can be permanent or transient
Others		Other neurological complications that are not classified in above categories
Infection		
Superficial soft tissue		Clinical soft tissue infected above the facies
Deep soft tissue		Clinical soft tissue infected below the facies
Osteomyelitis		Infected bone marrow
Others		Other infectious complications not classified in above categories
Device-related (modified) (Lee et al. 2017)		
Distraction mechanism-related		Runaway, difficult to distract, non-distracting, non-functioning, and running back
Mechanical strength		Nail/ring/bar bending or breakage. Rotational instability
Attachment failure		Failure screw/wire/pins
Other		Others device-related complications not classified in above categories. Could be corrosion, tissue reaction
Others		
Patient		Patient related complication that cannot be classified elsewhere
Surgical		Surgical related complication that cannot be classified elsewhere
Others		All other complication that cannot be classified elsewhere

Following predefined interpretation was applied: Patient request to stop the lengthening procedure was categorized into the origin as others/ patient. Backing out of a locking screw was categorized: device-related/attachment failure. Pain or discomfort from device parts like screws was categorized as device-related/other. Knee pain after the end of treatment was categorized as joint/pain. Complications expected to be controllable by the surgeon at nail insertion were categorized into the subgroup: other/surgical. Thus, intra-articular nail protrusion causing joint irritation or residual deformity if there was absence of device failure or bone complication were categorized into subgroup: others/surgical. Compartment syndrome was categorized as soft tissue/others