

Prophylactic and Therapeutic Peroneal Nerve Decompression for Deformity Correction and Lengthening

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Nerve injury is one of the most serious and frequent complications of deformity correction and limb lengthening. Acute or gradual deformity correction or limb lengthening is frequently complicated by nerve injury. The peroneal nerve is the most frequently injured around the knee and the upper tibia. Decompression of this nerve should be considered as prophylactic and therapeutic treatment to avoid injury and ensure recovery, respectively. There are 2 tunnels of entrapment near the neck of the fibula. Knowledge of this anatomy is important to all surgeons treating patients at risk of this injury.

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Peroneal nerve entrapment and injury are well-known complications of trauma, acute deformity correction, and of limb lengthening.¹⁻¹² The primary entrapment described is at the neck of the fibula. Peroneal nerve decompression is a well-recognized technique for the treatment of peroneal nerve palsy and entrapment.^{7,13} For prophylactic use, the indication for peroneal nerve decompression is a nerve at risk (eg, acute valgus correction of tibia of more than 5°, acute valgus correction of the femur of more than 5°). Mont et al¹⁷ reported that correction of deformities of more than 15° of valgus put the nerve at risk when performing total knee arthroplasty and achieving correction in varus.

For therapeutic decompression, the indication is when there are signs or symptoms of nerve problems (eg, referred pain to the dorsum of foot, hypersensitivity or hyposensitivity, weakness or paralysis of muscles). The potential complications of nerve decompression are nerve injury, infection, and hematoma.

Nogueira et al¹⁴ found that peroneal nerve decompression is efficacious for the treatment of peroneal nerve injury secondary to acute and gradual deformity correction and lengthening.

Nerve stretch injuries are caused when distraction overcomes the nerve-fibers' elastic and plastic properties. These injuries have been the subject of many studies.¹⁵⁻¹⁷ It has been assumed that nerve injury resulting from limb lengthening and from acute valgus to varus deformity correction is a stretch injury.

When nerve decompression was performed on patients undergoing limb lengthening, intraoperative findings included hemorrhage, nerve flattening, narrowing of the nerve at the entrance of the fascial tunnel, and reduction of the perineural vascularization at the site of compression,¹⁴ findings typical of nerve entrapment and not stretch injury.¹⁴

Nogueira, et al¹⁴ documented that when peroneal nerve injuries are caused by limb lengthening, acute deformity correction, or gradual deformity correction, the timing of decompression affected the rate of nerve recovery. Performing an early decompression resulted in patients experiencing an early recovery, and performing a late decompression resulted in patients experiencing a late recovery.¹⁴ However, the authors failed to find a relationship between nerve injury and the amount or percent of lengthening, suggesting again that entrapment and not stretch injury is the cause.

Nerve entrapment might also be a factor when stretch, acute trauma, or compression injury occurs. Injury leads to inflammation. The peroneal tunnels are normally very tight,

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