Peripheral nerve injuries and subsequent chronic pain are a common and challenging problem faced by the lower extremity reconstructive surgeon. They can occur as a result of direct trauma, compressive forces, or ischemic injuries. These injuries can lead to varying degrees of nerve fiber dysfunction, which may result in sensory, motor, or autonomic deficits. The surgical algorithm described in this protocol provides the lower extremity reconstructive surgeon with a systematic approach to peripheral nerve injuries based on zone of injury and specific nerve affected.

**Procedures/Results**

**Nerve Injury**

### Type I: Neuropraxia

**Compressive Trauma**

- Amplitude: Normal past ZOI
- Velocity: Normal
- Myelin: Intact
- Axons: Intact

**Treatment Options**

- Neurolysis
- External Neurolysis
- Decompression

**Type II: Axonotmesis**

**Neuroma-in-continuity**

- Amplitude: Decreased past ZOI
- Velocity: Decreased past ZOI
- Myelin: Disrupted
- Axons: Internal degloving

**Treatment Options**

- Neurolysis
- External Neurolysis
- Internal Neurolysis
- Conduit or conduit-assisted nerve coaptation
- Conduct assisted alloplast or autograft repair

**Type III: Neurotmesis**

**"End Neuroma"**

- Amplitude: Absent past ZOI
- Velocity: Absent past ZOI
- Myelin: Disrupted
- Axons: Disrupted

**Treatment Options**

- Neurolysis
- External Neurolysis
- Internal Neurolysis
- Conduit or conduit-assisted nerve coaptation
- Conduct assisted alloplast or autograft repair

**References:**


**Analysis & Discussion**

Peripheral nerve injuries and subsequent chronic pain pose a common and challenging problem faced by the lower extremity reconstructive surgeon. Various surgical techniques and classifications of nerve injuries can be explained in three main groups in combination with Sunderland’s classification. Patients with severe nerve injuries are at an increased risk of emotional deficits, depression, and socio-economic debilitation. Hence, it is essential to outline a treatment paradigm. Sherry and Divu reported on the surgical principles of nerve regeneration and chemotherapy. Alternative procedures are commonly performed, often result in a resurgence of symptoms or do not adequately address the pathologic process. As a result, there has been a recent trend in reconstructive procedures that has been described in the plastic and reconstructive literature.

The surgical algorithm described herein, provides the lower extremity surgeon a systematic approach to peripheral nerve injuries based on zone of injury and specific nerve affected. The surgical algorithm provides the lower extremity reconstructive surgeon a systematic approach to peripheral nerve injuries based on zone of injury and specific nerve affected. This protocol provides surgeons with a guide to understand and treat peripheral nerve injuries of the lower extremity. We discuss basic principles and patient work-up. Additionally, we highlight reconstructive procedures such as nerve transposition with relocation, autologous/allograft implantation, as well as nerve relocation with grafting. The surgical algorithm serves as a comprehensive resource to assist in the decision-making process. Utilizing this framework, the lower extremity surgeon can more readily incorporate this knowledge into their armamentarium.