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Mechanical properties of peripheral nerves.

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Abstract

Peripheral nerve trunks are viscoelastic tissues with unique mechanical characteristics. Tensile strength, which includes elastic limit and mechanical failure, concerns surgeons. This study shows that measurements of the load necessary to achieve certain elongations on specimens outside the body do not correspond with in situ measurements. The necessary load is influenced by the presence or absence of branches and by the amount of fibrosis. Because of transverse contraction, elongation beyond a certain limit substantially decreases intrafascicular volume, leading to increased intrafascicular pressure. Stress relaxation is effective only if the nerve repair site is maintained under constant tension. Its beneficial effect disappears after 10 minutes if the repaired nerve is returned to a relaxed state. Therefore, tension at the repair site should be minimized.

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