

Mechanical properties of fibrin adhesives for blood vessel anastomosis.

Authors: Flahiff C, Feldman D, Saltz R, Huang S

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Abstract:

Various methods have been used for anastomosing, or attaching, two ends of a severed blood vessel together. The most common method, suturing, is tedious, can be time-consuming, and requires special training in microvascular surgery. Other methods, such as mechanical devices and lasers, have some problems as well. The use of fibrin adhesives for blood vessel anastomosis might eliminate some of the current problems by allowing a quicker, simpler, and more reliable method of attachment. Although mechanical studies have been conducted to determine fibrin glue properties in shear, tensile, and burst tests; most of these studies have used skin or intestinal tissue. Therefore, to evaluate the feasibility of using fibrin glue as an adhesive for blood vessel anastomosis, the mechanical properties of blood vessels joined with fibrin glue were examined using tensile and burst tests. High and low fibrinogen concentrations were tested after 5- or 45-min time periods. In addition, three clinical methods of attachment were compared: end-to-end anastomosis, vessel overlapping, and suturing. In this study, because the adhesive strength was not found to increase significantly after 5 min, setting times for fibrin glue may be short enough to make it a clinical option when compared to suturing. In addition, the higher fibrinogen concentration did not result in a significantly higher adhesive strength, indicating that the lower concentration fibrin adhesives may be of comparable strength to the higher concentrations for clinical applications.