

Comparative Evaluation of the Effectiveness of Different Wavelengths in Endovascular Laser Coagulation of Varicose Veins

Shahi Gopal Krishna

Student (bachelor)

Мордовский государственный университет им. Н.П. Огарёва, Saransk, Россия

E-mail: gkrishnashahi111@gmail.com

Gopal Krishna Shahi

Студент (специалист)

Aarunya Ahuja

Student

Мордовский государственный университет им. Н.П. Огарёва, Медицинский институт, Саранск, Россия

E-mail: ntsaransk@mail.ru

Objective. To conduct a comparative histological analysis of venous wall and paravenous tissue damage following endovenous laser ablation (EVLA) using 1470 nm and 1940 nm wavelengths at different power parameters.

Materials and Methods. An experimental study was conducted on sheep undergoing EVLA of limb subcutaneous veins. Laser systems with wavelengths of 1470 nm and 1940 nm were used at power settings of 5.0 W and 8.5 W. Radial fibers with 600 μm diameter were employed. Histological examination was performed 7 days post-intervention by harvesting segments of coagulated veins with surrounding paravenous tissues. Specimens were stained with hematoxylin and eosin, with morphometric analysis of thermal damage depth.

Results. Histological Evaluation of EVLA with 1470 nm Wavelength. At 5 W power (LEED 25 J/cm): Incomplete lumen occlusion with slit-like cavity preservation, areas of venous wall coagulative necrosis, thermal damage to paravenous tissues extending up to 2.3 mm.

At 8.5 W power (LEED 42.5 J/cm): Complete destruction of venous wall structure, extensive coagulative necrosis foci, tissue vacuolization, microvascular thrombosis in paravenous adipose tissue.

Histological Evaluation of EVLA with 1940 nm Wavelength. At 5 W power (LEED 25 J/cm): Complete lumen occlusion with dense thrombus formation, preserved venous wall integrity, minimal alterations in paravenous tissues.

At 8.5 W power (LEED 42.5 J/cm). Fragmental destruction of venous wall, carbonization areas, significant destructive changes in paravenous adipose tissue.

Conclusion. This study demonstrates the superiority of 1940 nm wavelength over 1470 nm for endovenous laser ablation. The application of 1940 nm wavelength radiation with LEED of 25 J/cm provides reliable venous occlusion with minimal thermal damage to paravenous tissues, potentially contributing to reduced postoperative complication rates.