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Cryopreserved and lyophilized organs in surgical skills training

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Developing surgical skills is essential in the training of all the surgical specialties. However, ethical, legal and economic issues have limited surgical training associated with learning on human patients, human cadavers and live laboratory animals. Cryopreservation and lyophilization are two techniques that preserve the structure and function of tissues and cells. We have developed training programs to teach surgical skills to junior surgeons based on experimental animal organs preserved either by cryopreservation or lyophilization and we have obtained excellent results. (1) Cryopreservation: 30 stomachs were harvested from Wistar rats at the end of non-abdominal research studies. The stomachs were washed with cold saline solution and filled with hyaluronic acid solution. The organs were cryopreserved at -30 °C for 60 days. The stomachs were thawed to room temperature on the day of the surgical skills practice and two full-thickness incisions were made. 10 tracheas were harvested from 10 non-trachea related research dogs at the moment of euthanasia. Tracheas were trimmed in six or seven ring segments and cryopreserved at -70 °C for 60 days during 60 days. The day programmed for surgical skills practice, they were thawed to room temperature. Two incisions were made on every tracheal segment and sutured with running or separate stitches. (2) Lyophilization: Esophagus were harvested from 4 non-esophagus related research dogs at the moment of euthanasia and trimmed in 3 cm long segments. They were lyophilized at -55 °C and 10 mBar vacuum pressure during 24 hours. The day programmed for surgical skills practice, they were rehydrated. One incision was made on every esophageal segment and sutured with running stitches. Preservation of different tissues is practical, reproducible, low-cost, and high-fidelity bench model that allows surgical fellows to learn how to handle an organ and improve their surgical abilities before performing surgery on patients or laboratory animals.

Biography

Avelina Sotres Vega is a Chemist Biologist with Master's degree in Physiological Sciences and PhD in Biological Sciences from National Researcher of the Science and Technology Council of Mexico (CONACYT). She is a Full Professor and Researcher at National Institute of Respiratory Diseases "Ismael Cosio Villegas", Mexico, since 1988. She has expertise in cryopreserved tracheal grafts in experimental models of long segment replacement as well as teaching and learning programs on surgery using preserved biomaterials either by cryopreservation or lyophilization.

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