

Biomechanical Analysis on Skin and Jejunum of Chemically Prepared Cat Cadavers Used in Surgery Training

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Abstract : Biomechanical analysis is an important factor in tissue studies. The objective of this study was to determine the feasibility of a new anatomical technique and quantify the changes in skin and the jejunum resistance of cats' corpses throughout the process. Eight adult cat cadavers were used. For every kilogram of weight, 120ml of fixative solution (95% 96GL ethyl alcohol and 5% pure glycerin) was applied via the external common carotid artery. Next, the carcasses were placed in a container with 96 GL ethyl alcohol for 60 days. After fixing, all carcasses were preserved in a 30% sodium chloride solution for 60 days. Before fixation, control samples were collected from fresh cadavers and after fixation, three skin and jejunum fragments from each cadaver were tested monthly for strength and displacement until complete rupture in a universal testing machine. All results were analyzed by F-test ($P < 0.05$). In the jejunum, the force required to rupture the fresh samples and the samples fixed in alcohol for 60 days was $31.27 \pm 19.14\text{N}$ and $29.25 \pm 11.69\text{N}$, respectively. For the samples preserved in the sodium chloride solution for 30 and 60 days, the strength was $26.17 \pm 16.18\text{N}$ and $30.57 \pm 13.77\text{N}$, respectively. In relation to the displacement required for the rupture of the samples, the values of fresh specimens and those fixed in alcohol for 60 days was $2.79 \pm 0.73\text{mm}$ and $2.80 \pm 1.13\text{mm}$, respectively. For the samples preserved for 30 and 60 days with sodium chloride solution, the displacement was $2.53 \pm 1.03\text{mm}$ and $2.83 \pm 1.27\text{mm}$, respectively. There was no statistical difference between the samples ($P=0.68$ with respect to strength, and $P=0.75$ with respect to displacement). In the skin, the force needed to rupture the fresh samples and the samples fixed for 60 days in alcohol was $223.86 \pm 131.5\text{N}$ and $211.86 \pm 137.53\text{N}$ respectively. For the samples preserved in sodium chloride solution for 30 and 60 days, the force was 227.73 ± 129.06 and $224.78 \pm 143.83\text{N}$, respectively. In relation to the displacement required for the rupture of the samples, the values of fresh specimens and those fixed in alcohol for 60 days were $3.67 \pm 1.03\text{mm}$ and $4.11 \pm 0.87\text{mm}$, respectively. For the samples preserved for 30 and 60 days with sodium chloride solution, the displacement was $4.21 \pm 0.93\text{mm}$ and $3.93 \pm 0.71\text{mm}$, respectively. There was no statistical difference between the samples ($P=0.65$ with respect to strength, and $P=0.98$ with respect to displacement). The resistance of the skin and intestines of the cat carcasses suffered little change when subjected to alcohol fixation and preservation in sodium chloride solution, each for 60 days, which is promising for use in surgery training. All experimental procedures were approved by the Municipal Legal Department (protocol 02.2014.000027-1). The project was funded by FAPESP (protocol 2015-08259-9).

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