FEASIBILITY STUDY OF A NEW STERNAL CLOSURE DEVICE USING TUBULAR BRAIDED SUPERELASTIC NITINOL STRUCTURE

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To reduce a risk of sternal dehiscence of the patients subjected to median sternotomy, a new sternal closure device is developed. This device prevents the cut in and through the sternum bones during aggressive post-surgery physiological activities as coughing, deep breathing and brusque movement. Furthermore, the new device is capable of maintaining a merely constant pressure between sternum halves during rehabilitation of such patients, thus improving the bone healing conditions. The principal element of such a device consists in a hollow tubular braided structure made of superelastic Nitinol, which tends towards a flat form when it is in contact with the sternum. Finite element modeling and in-vitro laboratory testing of the tubular superelastic device confirm a 30% reduction in contact pressure exerted by this device on the sternum bones, and a 25% increase in compressive pressure between the sternum halves, as compared to the conventional sternal steel wire closure device.

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