

XENOTENDINOUS SUTURES FOR GENERAL AND PLASTIC SURGERY

E.R. Muldashev, R.T. Nigmatullin, R.Z. Sultanov, A.R. Muhametov

Russian Eye and Plastic Surgery Center of the Russian Federation Health Ministry

Abstract: Experimental tests of a new suture material are completed in the department of morphology in the Russian Eye and Plastic Surgery Center and Alloplant biomaterials production laboratory.

The technology of tendinous sutures has been developed with the help of a special preparation and physical-chemical treatment of xenogenic tendon.

After the transplantation, the xenotendinous sutures are replaced with the regenerate formation as per the type of the dense fibrous connective tissue.

The mentioned sutures have been used in general practical surgery (hernioplasty, closure of the laparotomy incisions in emergency surgery), and also in plastic surgery for reconstructive operations in the maxillofacial region.

Key words: biomaterials, xenogenic tendon, suture material, xenotendinous sutures.

Experimental tests of a new suture material are completed in the department of morphology in the Russian Eye and Plastic Surgery Center and Alloplant biomaterials production laboratory.

The technology of tendinous sutures has been developed with the help of a special preparation and physical-chemical treatment of xenogenic tendon.

The laboratory regulations on experimental production of these sutures (according to the Alloplant technology) is approved (patent 2189257 dated 20.09.02.).

These are the advantages of xenotendinous sutures:

- an opportunity of making suture material up to 40cm long and more;
- the worked out technology allows to select sutures of the uniform thickness with diameter calibration varying from № 2 up to № 6;
- this kind of sutural material has optimum biomechanical properties (ultimate strength = $4,28 \pm 1,28 \text{ kgc/mm}^2$, elongation $\varepsilon = 0,23 \pm 0,012$, module of elasticity $E = 18,6 \pm 5,7 \text{ kgc/mm}^2$). As it is seen from the given figures, the developed sutures are as good as the allotendinous sutures as far as the elastic–deformative properties are concerned;
- after the transplantation, the xenotendinous sutures are replaced with the regenerate formation as per the type of the dense fibrous connective tissue.

The results of the experimental tests allowed to pass over to the clinical approbation of the sutures which was carried out in the Russian Eye and Plastic Surgery Center and in the Ufa Railway Station Hospital. The mentioned sutures have been used in general practical surgery (hernioplasty, closure of the laparotomy incisions in emergency surgery), and also in plastic surgery for reconstructive operations in the maxillofacial region.

The results of the experimental and clinical observations allowed to make the following conclusions and practical recommendations:

1. Xenogenic sutures treated according to the Alloplant technology meet the necessary requirements of the suture materials.
2. Suggested xenogenic sutures consist of the biologically inert, non-immunogenic suture material replaced by the dense regenerate of native tissues during 1-3 months period after the implantation into the man's tissues. The regenerate is characterized by the dense fibrous structures and their unidirection.
3. Xenogenic sutures treated according to the Alloplant technology are indicated as a deepened suture material to connect the tissues, which experience significant static and dynamic load. That happens because the formed regenerate has the ability to resist those loads in the specified direction.
4. The suggested xenogenic sutures are easily calibrated, due to their fibrous structure and absence of the solitary bundles. All that allows to split the suture all along its length. The dense packing of the xenosuture fibers allows to tightly fix the latter in a node.
5. The surgical application of the xenotendinous sutures will allow to achieve a reliable tissular connection with the functional regenerate, which is capable to purposely resist tensile loads. They can be used in suturing of soft tissues to prevent ligature fistulas; it can be used for the prevention of the peritoneal commissures of the peritoneum in abdominal surgery and cosmetology, where the formation of the soft and elastic regenerates is required in place of the wounds.
6. The suggested sutures can be successfully applied in traumatology, in case of the replaceable operations on tendons as they allow to achieve good results in restoration of the defects with a high-grade regenerate which has a similar tendinous structure.