

UNITED STATES PATENT OFFICE

2,236,542

SURGICAL SUTURE

Clarence D. Lukens, St. Louis, Mo.

No Drawing. Application March 2, 1938,
Serial No. 193,434

4 Claims. (Cl. 128—335.5)

This invention relates to surgical sutures which are adapted for the suturing of surgical wounds in general, but are especially adapted to hernia operations.

Prior to this invention, it had been the practice to make sutures of various materials, such as surgical cat gut, silk, linen and other materials, and it has even been proposed to make such sutures of the treated leg tendons of animals. Difficulty has, however, been experienced in securing the wound-joining tissue of the required strength because of the fact that the suture material, even when absorbable, results in cellular inflammatory reactions which prevents the amalgamation of scar tissues with tissue between the wound parts. That is particularly notable in cases of hernia operations where the maximum strength of the sutured wound is absolutely necessary. In the past, with sutures of the character just referred to, the fibroblasts developed in a straight line to form a scar tissue uniting with parts of the wound; however, the scar tissue formed in that manner was not strong enough to withstand the muscular pressure placed upon it, with the result that in many cases the wound gave away and there was a recurrence of the original condition of hernia.

One of the objects of this invention, therefore, is to provide a novel suture which will overcome the defects of the prior sutures.

Another object is to provide a novel process for making such sutures; further objects will appear from the detailed description in which will be described an embodiment of this invention; it is to be understood, however, that this embodiment is simply illustrative.

Generally stated, in accordance with this invention, the suture embodying this invention is composed of a strand of whole raw skin, that is, the hide of an animal, preferably of the bovine class, freed from its hair and fleshly parts and suitably treated preparatory to formation into strands, followed by sterilization. This strand is, therefore, from the whole raw skin as distinguished from one which has been disintegrated and then formed into a strand. Such a whole raw skin strand, therefore, retains the original fibro-structure of the whole skin; it also retains the texture, strength, pliability, and other characteristics of the original whole hide from which it was cut. A skin which has been found particularly useful to form the basis of the suture embodying this invention is calf skin, and the best results are secured with the skin of a prenatally born calf.

The skin may be prepared in any suitable man-

ner to provide the base for the suture. As an example, the procedure followed in the making of drum heads from the skin of calves produces a desired base material. In accordance with that procedure, the hide is prepared by soaking and washing in soft water to which has been added a small amount of borax; after thorough cleansing the hide is limed for the purpose of preserving and depilating, followed by fleshing and treating by additional washing; the resulting skin is then stretched taut on a frame to dry. It will be understood, of course, that any other suitable procedure known to those skilled in the art may be employed to produce the base material for the sutures embodying this invention.

After processing in the manner generally described heretofore, the skin is preferably cut into long narrow strips about $\frac{1}{8}$ of an inch wide, which strips in the case of a young calf's skin are of the required thickness. The strips may then be sterilized in the usual manner followed in the sterilization of surgical cat gut, namely: by heating for the required period in petrolatum oil or xylol to a temperature of 320 degrees. The sutures are then placed in a suitable surgical suture tube filled with a storing fluid such as alcohol or xylol and alcohol, and the tube sealed.

The procedure of suturing may be in accordance with the general desired practice depending upon the wound to be sutured. In the case of hernia, the wound parts are sutured as usual but preferably crisscrossed to secure a strong union.

The suture strand from such a whole skin retains the original fibro-structure of the whole skin, as distinguished from a strand prepared from a skin by disintegration, followed by other treatment and formation of the disintegrated mass into strands. The suture strand embodying this invention, however, retains the texture, porosity, strength, pliability, and other characteristics of the whole skin from which it was cut.

It has been found that by the employment of the suture embodying this invention, there results a union which is even stronger than the balance of the tissue, and, in the case of hernia, of the muscle. Even in cases where there is a large amount of scar tissue resulting from previous operations, the union of the parts is strengthened to a most marked degree. Investigation shows that the increased scar tissue appears to be due to the fact that the suture is not only strong but also porous, and that it forms an entangling matrix in which fibroblasts grow in an entangled manner, thus forming a strong union of the scar tissue, while the collagen of the matrix was being

absorbed. It was also found that the tissue reaction was practically eliminated compared with that occurring by the use of other suture materials. In fact, the amalgamation of the fibre scar tissue with fibrous tissue between the muscle bundles in the case of hernia, and the absence of muscle degeneration, shows that there results an intimate union of the fibrous tissue and muscle. In fact the fibroblasts seem to grow and even follow the suture in an entangled manner and interlace during the process of healing so as to form a strong union and leave a strong union after absorption of the suture.

While an embodiment of this invention has been described both as to suture and process, it will be understood that this invention is not limited to the embodiments described, but that various other embodiments within the scope of the appended claims are contemplated.

Having thus described the invention, what is claimed is:

1. A surgical suture composed of a sterilized strand of whole raw skin, substantially as described.

2. A surgical suture composed of a sterilized strand of whole raw calf-skin, substantially as described.

3. A surgical suture composed of a sterilized strand of the whole raw skin of a prenatally born calf, substantially as described.

4. The process of making surgical sutures comprising the following steps: severing a whole raw skin into strands and sterilizing the strands, substantially as described.

CLARENCE D. LUKENS.