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SURGICAL TAPE OF SUBMUCOSA TISSUE

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4 Claims. (Cl. 128—335.5)

The present invention relates to ribbon or flat surgical gut and this application is a continuation of my previously filed application Serial No. 726,328, filed May 18, 1934.

5 The principal object of the invention is the provision of a ribbon gut of absorbable animal submucosa tissue of requisite tensile strength and absorptive properties, which will not have these properties adversely affected by heat sterilization, and to devise a novel method of preparing the same.

10 In the application of so-called catgut to the healing of wounds, the material principally used is composed of a layer of intestinal tissue. In the preparation of such raw catgut strings, the small intestine, which is tubular, is cut longitudinally at two or three different points so that the intestine is actually divided longitudinally into halves or thirds, making two or three strips. 15 These strips are subsequently cleaned, plumped, and twisted together in the form of a string, which is then thoroughly washed and dried under tension. This string may be of any size desired and has the property, when embedded in living tissue, 20 of becoming eventually absorbed. Such material is used in surgical operations and is technically known as a surgical suture or ligature, depending upon the manner of use. Its application is very diversified, finding its most common use in operations performed in tissues in which the stitches cannot be removed after the wound has healed. Being of animal origin, this material becomes eventually a part of the scar tissue which is formed, and results in added strength being given 25 to the surfaces thus held in apposition.

30 In operating on certain internal organs, the tissues of which are extremely soft, the kidney being an excellent example, the surgeon experiences difficulty in bringing about satisfactory apposition of the incised edges of the wound in the organ, as the ordinary suture has a tendency to cut through or pull out of the tissue. It was this difficulty that suggested an investigation of some means of producing a surgical suture or ligature 35 which could be applied to an internal organ as one might tie up a bundle with tape. In other words, the problem was to produce a flat surgical ligature or suture in the form of a ribbon, which would have all the characteristics of so-called catgut as regards strength and absorbability, and the physical properties of which would not be adversely affected by heat-sterilization, and at the same time would be flat like a ribbon rather than round like a string. Such a ribbon has many 40 advantages and a wide field of usefulness in those

surgical situations where it is desirable to distribute the pressure, incidental to tissue approximation, over a broad surface, and where support is needed.

Cattle intestine, such as that of the sheep or 5 the ox, consists of four distinct layers of tissue. On the outside is the serous membrane, next a muscular layer of circular and longitudinal fibres; next a submucous layer, and finally the mucous membrane. In preparing a ribbon gut according to this invention, the animal intestine is subjected to the same character of stripping, 10 scraping, sliming and cleaning as is used in making the ordinary surgical catgut string, three of the above layers of intestinal tissue being removed, leaving only the submucous layer. 15

The resulting submucous layer in the form of a comparatively wide sheet is then cut into short strips and spread on smooth surfaces of a material to which the submucous layer or membrane 20 will properly adhere while drying, but from which it can be readily removed or stripped when thoroughly dry. These surfaces may be metal plates, preferably tinned, or they may be wax-coated glass or porcelain surfaces, either flat, curved, or cylindrical in shape. For very long ribbons, a tubular drying surface may be used and the membrane wound helically around the same. 25 After being applied to the drying surface, moderate pressure is applied to the sheet of submucous layer or membrane and the same permitted to dry at approximately 20° C. When dry, the sheet is removed from the drying surface and cut into the desired width. 30

In the manufacture of ordinary twisted catgut 35 strings, the strips of intestinal tissue are cut into the desired widths prior to being twisted. This is undesirable for the present purpose in that the drying operation has a tendency to produce rough or uneven edges. This fact is of no moment in twisted strings because in the twisting operation the rough edges merge with each other and any remaining roughness is removed by polishing in subsequent operations. In the present instance, however, it is desirable to dry the sheets 40 first and then cut the same into ribbons of a desired width. This has the effect of securing perfectly straight smooth edges which are not subsequently disturbed. 45

If as in some cases, a heavy ribbon is desired, a number of the cleaned, wet intestinal tissue strips are superimposed one on the other in such a manner that the resulting material is laminated to form a plurality of layers or plys. In this case, only the first strip is in contact with the 50 55

drying surface, the other intestinal strips being made to adhere to each other and to the first strip after being placed together, by means of a rubber roller repeatedly applied with moderate pressure, in such manner that the roller always moves in one direction. The rolling under pressure is continued until all air bubbles are forced out from between the various layers which are thus made to adhere together to form a homogeneous laminated membrane. This laminating and drying process may be carried out at room temperature of approximately 20° C.

For those surgical conditions which require that the ribbon should resist absorption in the tissues for various periods of time, I have employed successfully ribbon gut made in accordance with the above methods, but which has also been subjected to various degrees of tanning by the usual or well-known chrome-tanning process as applied to animal fibers for the purpose of delaying absorption. By varying the strength of the chemicals used, as well as the duration of the chrome-tanning process, the degree of tanning may be regulated.

One outstanding advantage of ribbon gut from

a surgical standpoint is that its physical properties are unimpaired by intense heat. This material, therefore, readily lends itself to the heat method of sterilization, which does not affect its tensile strength nor its absorptive properties.

While the invention has been described with particular reference to special materials and methods of treatment, yet obviously I do not wish to be limited thereto but the invention is to be construed broadly and restricted only by the scope of the claims.

I claim:

1. As a complete article of manufacture, a surgical tape comprising a ribbon of submucous animal intestinal tissue.

2. As a complete article of manufacture, a surgical tape consisting of a ribbon of submucous animal intestinal tissue.

3. As a complete article of manufacture, a surgical tape comprising a laminated ribbon of submucous animal intestinal tissue.

4. As a complete article of manufacture, a surgical tape comprising a tanned ribbon of submucous animal intestinal tissue.

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