

PRELIMINARY REPORT ON THE USE OF TANTALUM MESH IN THE REPAIR OF VENTRAL HERNIAS*

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THE REPAIR of very large ventral hernias has always taxed the ingenuity of the surgeon. This is true not only when the defect is large, but also when the fascial structures surrounding a smaller defect are weak. A large proportion of these cases occur in very obese people. In such people the fascia surrounding the defect is often weakened by the infiltration of fat, and this militates against a successful repair by any of the ordinary methods. Fascial flaps of various sorts from the local site have been used to repair the defect. Free autogenous transplants of fascia lata have also been used. Years ago the present writer¹ introduced the use of large sheets of ox fascia lata for the repair of such defects. All of these methods have been more or less successful, but none has been uniformly so, especially in the type of case dealt with in this paper.

On March 20, 1946 when my attention was called to tantalum mesh by one of our leading surgical supply houses,† I welcomed the opportunity to try it out, both experimentally and clinically. The material had already been used on a limited number of cases by C. R. Lam,² of the Henry Ford Hospital, and by T. D. Throckmorton,³ of Des Moines. I, also, have now used the material in a limited number of cases both experimentally and clinically. It has not been used more widely because the supply has been very limited; for a period of time the material was not procurable at all. Recent information indicates that it is now available on the open market.

Metal filigrees, such as silver, were introduced for hernia repair many years ago, and this method has recently been reviewed by Cole.⁴ So far as I know, however, nothing similar to a screen mesh has been used before the introduction of tantalum mesh.

I have used tantalum mesh experimentally in four dogs. In each instance three to six inches of the rectus muscle on each side was resected, and the defect immediately repaired by suturing a piece of tantalum gauze to the edges of the fascia surrounding the defect, there being nothing left between the peritoneum and the subcutaneous tissue but the tantalum gauze. These animals were sacrificed from 4½ to 9½ months after operation. In each instance the defect was completely closed by the mesh, which had become

* Read before the Southern Surgical Association at Hollywood Beach, Florida, December 11, 1947.

† My attention was first directed to tantalum gauze by Dr. Herbert L. Davis, Director of the Department of Experimental Research for the Ethicon Suture Laboratories, of Johnson & Johnson, New Brunswick, New Jersey. During the course of some correspondence with Dr. Davis, with regard to changing the solution in which ox fascia is preserved, he stated that he had been interested in the possibilities of tantalum gauze for the repair of hernias and asked if I would like to try it out. Johnson & Johnson furnished all the materials (tantalum mesh and tantalum wire) used for the experiments in this paper.

covered by a thick and tough envelope of fibrous tissue. The fibrous tissue had grown through the meshes of the gauze throughout, and could not be separated from it except by very sharp dissection (Fig. 1). A firmer and more thorough-going closure of the defect can scarcely be imagined.

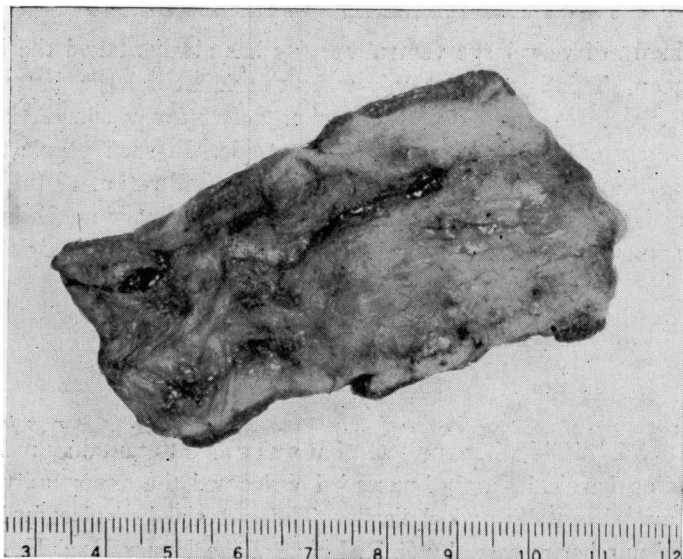


FIG. 1. Piece of tantalum gauze removed from a dog 9½ months after operation. The meshes of the gauze have been thoroughly infiltrated with fibrous tissue and the entire piece of gauze is covered with a tough envelope of fibrous tissue.

The material has now been used clinically in five cases. All of these cases were very fat people who had very large hernias and poor tissues to deal with. The first case was a private patient operated upon at the Union Memorial Hospital. Three cases were ward patients from my service at the Sinai Hospital. One patient was operated upon on the service of Dr. Howard Kern at the Sinai Hospital, and he has kindly consented to allow me to include it in the series. In Case 4 of the series (Figs. 2, 3, 4 and 5), it was impossible to close the large defect, and a piece of tantalum gauze was sutured to the edges of the defect, overlapping the edges somewhat, and leaving only the gauze between the peritoneum and the subcutaneous tissue, just as in the experimental animals. In the other cases it was possible barely to approximate the edges of the defect, and it was certain that the repair would not have held with this simple approximation. In these cases the suture line was reinforced by suturing a piece of tantalum mesh over it, well overlapping the surrounding weak fascia. In one case (Case 5), after a simple approximation of the edges of the defect, the tissues were under so much tension that the rectus sheath was split longitudinally on each side of the suture line to relieve tension, and then the suture line, and also the incisions in the rectus sheath, were covered by tantalum mesh.

The technic of using this material is shown in Figure 6. The mesh is held



FIG. 2.—Front view of Case 4 before operation.



FIG. 3.—Side view of Case 4 before operation.



FIG. 4.—Front view of Case 4 two weeks after operation.



FIG. 5.—Side view of Case 4 two weeks after operation.

in place with interrupted sutures of tantalum wire. Before placing the sutures, about $\frac{1}{4}$ inch of the edge of the mesh is turned over on itself, so that the sutures go through two thicknesses of the mesh. This makes the sutured edge stronger, and prevents the wire suture from pulling out of the mesh. The material is pliable and easy to handle. It can easily be cut with ordinary surgical scissors. Braided tantalum wire is now available on atraumatic needles, which makes the suturing of the mesh in place a much easier procedure. The braided wire is as easy to handle as silk or catgut.

The first of the patients here reported was operated upon 18 months ago,

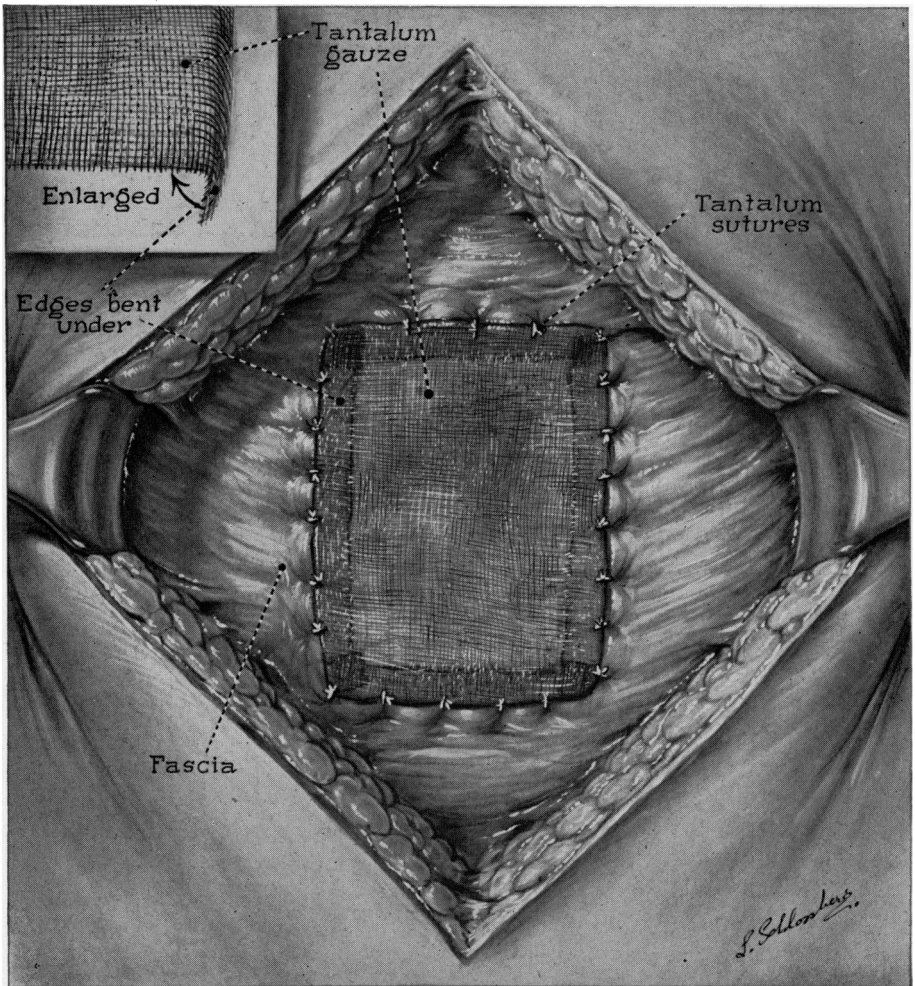


FIG. 6.—Technic of suturing tantalum mesh in place.

and the most recent one only 2 months ago. All of these patients have recently been examined personally by me, and all so far show excellent results. Also, all of them are delighted with the excellent results obtained, so far as their personal comfort is concerned. We often overlook the fact that these patients suffer a great deal of discomfort, not only from the feeling of insecurity occasioned by the defect in the abdominal wall and the dragging down sensation associated with it, but also from nausea and other disagreeable symptoms. The second patient in the present series was so miserable that he had contemplated suicide, because a previous attempt to cure his hernia had been unsuccessful, and he felt that there was no relief from his discomfort. Life is now again a pleasure for him. The first patient in the series had had two unsuccessful attempts to repair her hernia, and she is equally delighted with the outcome.

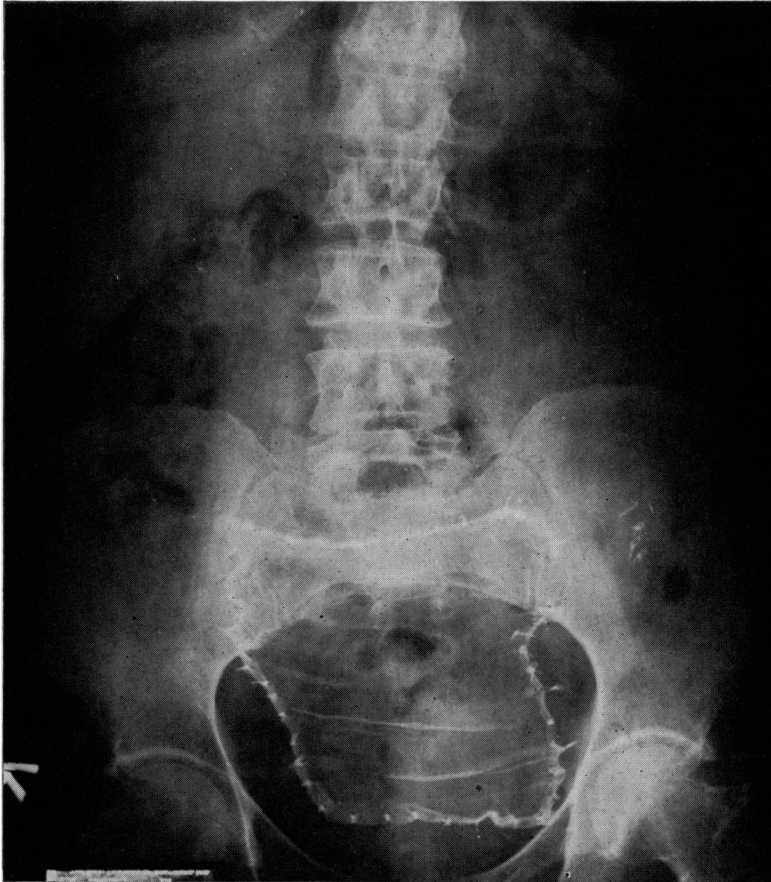


FIG. 7—X-ray of Case 5 five weeks after operation, showing the implanted piece of tantalum gauze to be intact.

The appearance of the tantalum gauze by x-ray has been studied in two cases. Figures 7 and 8 show the x-rays of these two cases (Cases 2 and 5), one taken five weeks after the operation and the other 11 months after operation. It will be noted that in the case recently operated upon (Case 5—Fig. 7), the mesh is intact, while in that operated upon 11 months prior to x-ray (Case 2—Fig. 8) there is a good deal of fragmentation of the mesh. This fragmentation, which occurred in the second case (discussed in the preceding paragraph), has not in any way interfered with the strength of the repair. The patients, in general, are unaware of the presence of the mesh. The strength of the repair is not due to the mesh itself, but to the fibrous tissues built up through and around it, which form a very strong abdominal wall.

I have often wondered what another surgeon, subsequently doing a laparotomy on one of these patients, would think when he had encountered wire screening in the belly wall of his patient. It might be wise for the patient to tell any subsequent surgeon about the type of hernia repair he had had. The

material, however, would offer no real obstacle to a subsequent laparotomy, as it is readily cut through with scissors.

COMMENT

The early results with the use of this material, both experimentally and clinically, are such as to fill this writer with enthusiasm. There have been no untoward side effects in any of the cases, except that in the first case



FIG. 8.—X-ray of Case 2 eleven months after operation. Note the partial fragmentation of the tantalum mesh.

operated upon there was a collection of sterile fluid in the lower end of the wound. This was aspirated and did not recur. None of the other cases had it. I believe that the collection of fluid was probably due to a dead space left at the time of operation. This should be avoided. There have been no infections in this small series, and there has been no untoward tissue reaction, either experimentally or clinically.

In operating on these cases, the tantalum mesh should be covered by skin that has enough subcutaneous tissue under it to prevent the palpation of the

mesh through the skin. Very often the subcutaneous tissue is very much thinned out over the hernia, and in places is entirely absent, the peritoneum being adherent to the skin itself. In these cases, however, there is generally enough redundant skin to permit resection back to skin that has underlying cutaneous tissue. If necessary, flaps can be mobilized by undercutting, and brought together over the implanted tantalum mesh.

CONCLUSION

A limited experience with the use of tantalum mesh in the repair of large and difficult ventral hernias leads to the belief that it will prove a most valuable material in the cure of this difficult condition.

REFERENCES

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- ² Lam, C. R.: Personal Communication, June 10, 1946.
- ³ Throckmorton, T. D.: Personal Communication, June 12, 1946.
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DISCUSSION.—DR. J. M. T. FINNEY, JR., Baltimore: I cannot let this go by without giving a personal word of thanks to Amos Koontz for his interest in this problem of bad herniae. His experimental work in the healing of tissues after operative repair is classic. As you all know, he has been interested for many years in repair of difficult herniae, and anyone who does surgery knows such repair can be most difficult, particularly if there have been three or four previous operations to mess things up. He gave us preserved fascia and now this mesh. The coordinating clinical work is something for which we all, as operating surgeons, should be eternally grateful. I have not used the mesh yet, but if I run into any problems like those he showed on the screen, I shall certainly be glad to have him tell me how to handle them.

DR. WILLIAM H. PRIOLEAU, Charleston, S. C.: With Dr. Finney, I would like to commend Dr. Koontz for his continued pioneer work in this field. It appears that the use of tantalum mesh will prove to be a solution in the repair of a large number of ventral herniae. We are familiar with the value of alloy steel wire in the closure of grossly contaminated and even infected abdominal incisions. In such cases the wire is well tolerated by the tissues. It is seldom extruded or causes a persistency of the infection with sinus formation, as is so commonly the case with silk and cotton. It would be of interest and utmost importance to know how tantalum mesh would behave under such conditions. Would it be tolerated and serve as an effective support to the wound, or would it have to be removed? If well tolerated in the presence of infection and contamination, its field of usefulness will be greatly increased.

DR. AMOS R. KOONTZ, Baltimore (closing): I want to thank both Dr. Finney and Dr. Prioleau for their discussions, and also Dr. Prioleau for his suggestion with regard to trying out tantalum gauze in infected areas. I shall certainly follow through on this when I get back.