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# The Use of Porcine Dermal Collagen Implant in an Extremely Difficult Case of Incisional Hernia Repair

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## Abstract

It is not rare, that in patients undergoing multiple laparotomies there is a tissue loss with accompanying surgical site infection that enables abdominal wall closure with the use of the standard techniques. There are no level 1 statements imposing specific procedure in such difficult situations. However, it is generally recognized that synthetic meshes should not be implanted in the contaminated field.

**Keywords:** Incisional hernia repair; Negative pressure wound therapy; Porcine dermal collagen implant; Permacol; Surgical site infection; Polypropylene mesh

## **Case Report**

An obese male patient (BMI=34.6), aged 67, was admitted to the Department of General Surgery with the suspicion of the ileum obstruction, caused by incarceration of the small intestine in the incisional hernia post vertical banded gastroplasty surgery that he had undergone years before that was followed by surgical site infection (S. *aureus*). Three months before admission he had undergone open cholecystectomy that was also complicated by surgical site infection.

The patient was operated on due to obstruction; the operation was connected with hernioplasty with the use of  $30 \times 30$  cm polypropylene mesh, using sublay technique.

After three days patient required another procedure, because of the recurrent obstruction. During the procedure the polypropylene mesh had been cut in order to explore the abdominal cavity and during the abdominal closure it was sutured. Six days after the second operation, eventration was stated. Exploration of the wound revealed that the fascia was infiltrated, brittle and tearing. Negative pressure wound therapy (NPWT) was applied because of the accompanying surgical site infection. The wound was not closed after that procedure. During the next dressing exchange, the contamination of the mesh had been stated and the decision of mesh removal was made.

NPWT was maintained with good results, and after four weeks, as soon as the wound was sterile and clean, confirmed by the microbiological result. The decision to implant the biological material was made. 20  $\times$  40 cm Permacol^{\rm TM} was implanted on the musclefascia layer, using sublay technique (Figure 1). Two drains above the fascia were left. Moreover, sutures preventing from eventration were placed as well. Three days post Permacol<sup>TM</sup> implantation a massive leakage from the wound was noticed connected with the necrosis of the wound brims. The removal of the sutures was necessary. After wound exploration, it turned out that dissolved Permacol<sup>TM</sup> had caused the leakage. The biological mesh remained intact only on the brims (Figure 2). According to the histopathological examination of the removed Permacol<sup>TM</sup>, there were features of granulation, acute inflammation and foci of necrosis. Patient required open wound healing, connected with NPWT, nevertheless there were no microbiological cultures. NPWT was maintained for another month, during which another infection appeared. The culture of the wound revealed S. epidermidis that was treated by intravenous vancomycin therapy. The next step was the cleaning with the use of the water knife. The part of the wound was sutured, on the bottom part of the wound NPWT was implied. After another week the remaining part of the wound was sutured.



Figure 1: Permacol<sup>™</sup> was implanted on the muscle-fascia layer, using sublaytechnique.



Figure 2: The biological mesh remained intact only on the brims.

The patient was discharged to the outpatient clinic after 100 days. Dressing change three times a week was necessary, due to the sterile serum leakage from the wound (Figure 3). Because of the lack of progression of the wound closure, new sutures were added 2 times. After one month

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of unsuccessful wound closure-brims of the wound were an ergic, the decision about surgical cleaning of the wound and resuturing connected with  $Permacol^{TM}$  implantation was made (Figure 4).

Wound swab was sterile; patient had lost 20 kg (BMI=28.75) since the first surgery. During the procedure of the second Permacol<sup>TM</sup> implantation, the brims of the wound were refreshed; the tissues that have been included in the inflammatory infiltration were removed. The fascia was identified (Figure 5) and slightly separated from the thickened peritoneum (Figure 6). Permacol<sup>TM</sup> after previous preparation was implanted with sublay technique (Figure 7) and the fascia was closed above it. Fascia closure was possible probably due to the patient's weight reduction. Moreover, it might have had an influence on the final results of treatment (Figures 8 and 9).



Figure 3: Dressing change three times a week was necessary, due to the sterile serum leakage from the wound.



Figure 4: Surgical cleaning of the wound and resuturing connected with PermacoITM implantation.



Figure 5: The fascia was identified.



Figure 6: fascia slightly separated from the thickened peritoneum.



Figure 7:  $\mathsf{Permacol}^{\mathsf{TM}}$  after previous preparation was implanted with sublay technique.



Figure 8: Fascia was closed above it. Fascia closure was possible probably due to the patient's weight reduction.



Figure 9: It might have had an influence on the final results of treatment.

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**Figure 10:** One week after the second repair surgery magnetic resonance imaging was done in order to visualise the presence of the biological material.



Figure 11: There was a small amount of fluid along the whole implanted material.

One week after the second repair surgery magnetic resonance imaging was done in order to visualise the presence of the biological material (Figures 10 and 11). There was a small amount of fluid along the whole implanted material. After the 4 months of treatment patient was successfully discharged with completely healed wound and without abdominal hernia.

### Discussion

There are different approaches toward dealing with cases connected with difficult wound healing and complex abdominal wall defect. Reconstruction of a large defect of fascia in patients suffering from other diseases, e.g. obesity, cardiovascular problems or in patients who are taking immunosuppressive drugs is a challenging problem for the majority of surgeons. The primary suture repair is associated with the lowest risk of infection, but firstly, recurrence rate of hernia in this way of repair exceeds up to 60% [1-5] and secondly, huge fascia defect often makes is technically impossible to close the wound without excessive tension.

Permacol<sup>TM</sup> is a laminar mesh derived from porcine dermal collagen, crosslinked with hexamethylene diisocyanate and consists mostly of type I collagen, 5% type III collagen and elastin. There is a conviction that Permacol<sup>TM</sup> may be used in the contaminated field, though there is no level 1 evidence [3] confirmation of that thesis. For that reason, many authors support that statement with the stipulation that it should be reserved for the multicomplicated cases only.

It is commonly believed that biological materials have lower affinity for bacterial colonization [4], which is contradictory to the examination performed by Perez-Kohler et al. who claims that the conventional nonabsorbable polymer materials are better option for use in contaminated surgical fields [1]. In our case, Permacol<sup>™</sup> was implanted in the sterile field. The reason of the first failure of Permacol<sup>™</sup> implantation in our patient was the lysis of the biomaterial for the unknown reason and it seems it is not connected with microbiological infection. As Novitzky [2] noticed in his research, implantation of the biological material induces cell infiltration, which was confirmed in our histopathology examination.

Because of the former polypropylene mesh infection, we decided not to implant the polypropylene mesh again. Moreover, biologic implants are believed to have less potential for bowel adherence [6] that is extremely important while placing the graft with the use of intraperitoneal sublay technique with bridging.

Another putative advantage of Permacol<sup>TM</sup> is its flexibility that does not prevent from the neovascularization. One of the probable reasons of the mesh lysis in our case might have been the material disintegration or poor mash incorporation. Those complications were described by Harth [7,8].

There are cases describing the successful usage of Permacol<sup>™</sup> in the contaminated field [7]. According to our centre experience, we are in agreement with that statement.

Relying on our centre experience,  $Permacol^{TM}$  can also be safely used in the post transplantational patients who are put on immunosuppressive therapy.

There are no standard procedures for coping with such difficult cases, but without any doubts the commonly recognized risk factors as accompanying infection, diabetes mellitus or obesity have a negative impact on the wound healing and abdominal wall closure. Furthermore, it is extremely important to treat each patient individually.

## Conclusion

Our goal was to present the case of coping with extremely difficult wound healing case and the very rare entity of Permacol<sup>™</sup> dissolving.

One may notice, that from time to time the simplest option is the best option (in that case closure of the subcutaneous layer and the skin, with the adjournment of the abdominal plasty). Planning two-round treatment turned out to be the best option in that specific case, nevertheless it did not preclude the reuse of Permacol<sup>TM</sup> with good effect.

The results of use of biological material are not ideal, however biological materials may be useful in the selected group of patients. Further examination regarding the use of biological materials should be performed.

#### References

- Pérez-Köhler B, Sotomayor S, Rodríguez M, Gegúndez MI, Pascual G, et al. (2015) Bacterial adhesion to biological versus polymer prosthetic materials used in abdominal wall defect repair: do these meshes show any differences in vitro? Hernia 19: 965-73
- Novitsky YW, Orenstein SB, Kreutzer DL (2014) Comparative analysis of histopathologic responses to implanted porcine biologic meshes. Hernia 18: 713-721.
- Harth KC, Krpata DM, Chawla A (2013) Biologic mesh use practice patterns in abdominal wall reconstruction: a lack of consensus among surgeons. Hernia 17: 13-20.

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- Leber GE, Garb JL, Alexander AI, Reed WP (1998) Long-term complications associated with prosthetic repair of incisional hernias. Arch Surg 133: 378-382.
- Burger JW, Luijendijk RW, Hop WC, Halm JA, Verdaasdonk EG, et al. (2004) Long-term follow-up of a randomized controlled trial of suture versus mesh repair of incisional hernia. Ann Surg 240: 578-583.
- Butler CE, Prieto VG (2004) Reduction of adhesions with composite AlloDerm/ polypropylene mesh implants for abdominal wall reconstruction. Plast Reconstr

Surg 114: 464-473.

- Beale EW, Hoxworth RE, Livingston EH, Trussler AP (2012) The role of biologic mesh in abdominal wall reconstruction: a systematic review of the current literature. Am J Surg 204: 510-517.
- Hart KC, Rosen MJ (2009) Major complications associated with xenograft biologic mesh implantation in abdominal wall reconstruction. Surg Innov 16: 324-329